passam ag

Männedorf
Switzerland

LIETUVOS ORO KOKYBĖS MONITORINGO SISTEMOS MODERNIZAVIMAS NAUDOJANT DIFUZINIUS ĖMIKLIUS

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Lithuanian Air Monitoring System Modernization Using Diffusive Samplers

Final Report

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Contents

Summary

In order to get an overview of the air quality in Lithuania, 375 monitoring sites at different location were equipped with diffusion tubes for assessing NO_2, SO_2, benzene at nearly all sites, and ozone at EMEP sites and NH_3 at some agricultural sites. All 4 seasons: Autumn 2010, winter, spring and summer of 2011 were covered in 8 measurement periods. 10% of the sampler was in duplicates; this information was used for uncertainty calculation in the framework of GUM, applied in the laboratory of passam ltd. Switzerland. The data capture was over 98%, missing values were replaced by the mean of the whole campaign and values below detection limit were replaced by half of the detection limit.

The study results showed that the mean concentrations of sulfur dioxide in all investigations sites during the study period did not exceed the annual limit value of 20.0 $\mu g/m^3$ and were below the lower assessment threshold value of 8.0 $\mu g/m^3$. The mean concentrations of nitrogen dioxide in Vilnius agglomeration exceeded the annual limit value of 40 $\mu g/m^3$ at seven sites, in Kaunas – at two sites and in zone – at three sites with the intensive traffic flow in Klaipeda and at the site Grigiskes, located near to highway A1. The mean concentrations of nitrogen dioxide in 40 zones' territory sites, using EMEP grid 50 km x 50 km and around the "Lithuanian Power Plant" during the study period did not exceed the annual limit value of 40.0 $\mu g/m^3$. The mean concentrations of benzene in Vilnius, Kaunas agglomerations, zone, in 40 zones' territory sites, using EMEP grid 50 km x 50 km, and around the "Lithuanian Power Plant" during the study period did not exceed the annual limit value of 5.0 $\mu g/m^3$ for the human health.

The mean annual concentrations of ammonia around the swine Stock Company „Birzu bekonas“ and the swine SC „Saerimner“ division 06 during the study period did not exceed the limit value of 40.0 $\mu g/m^3$. The mean concentrations of ammonia around the swine Stock Company „Saerimner“ Rupinsku exceeded the limit value of 40.0 $\mu g/m^3$ at site 50 m in downwind direction from farm during the autumn, winter, spring and summer. The atmospheric concentrations of ammonia around the SC "Sistem" swine complex in be-weekly samples exceeded the limit value 2 – 3 times during study period (25 March – 4 July 2011). The concentrations of NH_3 in ambient air at sites in downwind direction from the swine complex were 1.3–2.4 times higher than those at site in upwind direction to the swine complex.

1. Introduction

Currently Lithuanian national air monitoring network consists of 1 mobile, 14 automatic urban and 3 integrated monitoring stations. European Union (EU) law acts and National Environmental Monitoring Program (NEMP) for the year 2005-2010, confirmed by the Lithuanian Republic government's resolution No. 130 on February 7, 2005 (2005 No. 19-608, 2008 No. 104-3972) obligates to optimize current air monitoring station network and fully assess the air pollution level in 2 agglomerations (city of Vilnius and Kaunas) and the zone (the rest part of Lithuania). Agglomerations and zone are confirmed by the minister of environmental protection and public health on 13 November, 2008 order No.D1-574/V-1056 (2000 No.100-3184, 2008 No. 130-4998).

In order to get an overview of the air quality in Lithuania the diffusive samplers for atmospheric sulfur dioxide, nitrogen dioxide and benzene were set up in the urban background (residential), semi-urban (mixed residential and commercial) and roadside (busy street/road and crossing) sites. The obtained data were compared with the acceptable levels of air pollutants that are adopted in the EU as the limit values (Table 1). The guidelines are written for worldwide use,

and are intended to support actions aiming for the optimal achievable level of air quality in order to protect public health and the environment in different contexts. There are still no adopted limit values for the volatile organic compounds as toluene $C_6H_5CH_3$, etilbenzen and (orto-, meta-, para)-xylene C_6H_4 $(CH_3)_2$. Benzene is considered as an indicator of others volatile organic compounds and if its limit value is not exceeded, it means that the others volatile organic compounds are not hazardous to human health.

There are no set air quality guidelines for ammonia atmospheric concentrations. Therefore the measured NH_3 concentrations during this study were compared with daily limit value of 40.0 μg/m^3, which is adopted by the minister of environmental protection and public health on 30 October 2000, order No. 471/582 (2000 No.100-3185, 2007 No. 67-2627).

Table 1. Atmospheric air quality (μg/m^3) guidelines for selected air pollutants aiming to protect human health adopted by the European Union Council Directive 2008/50/EB.

	SO_2	NO_2	C_6H_6
Anual limit value (LV)	20 (Vegetation)	40 (Human health)	5 (Human health)
Upper assessment threshold (UAT)	12	32	3.5
Lower assessment threshold (LAT)	8	26	2

2. Objectives

Purpose – to renovate and modernize national environmental air monitoring system according to EU directives, UN Long-range transport convention and other law act's requirements.

1. The assessment of airborne pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and volatile organic compounds BTX (benzene, toluene, ethyl benzene, orto-, meta-, paraxylene) distribution of average concentrations in the agglomerations of Vilnius and Kaunas, as well as in 58 towns, where population do not exceed 5 thousand people.

2. The assessment of airborne pollutants: nitrogen dioxide (NO2), sulfur dioxide (SO2) and volatile organic compounds BTX and ozone (O3) average concentrations dimensional distribution in 40 zones' territory sites, using EMEP grid 50 km x 50 km.

3. The assessment of airborne pollutants: nitrogen dioxide (NO2), sulfur dioxide (SO2) and volatile organic compounds BTX average concentration's distribution around the company "Nuclear power station".

4. The assessment of ammonia (NH_3) average concentration's distribution around 4 swine farms.

5. According to the received results from geographical information systems (GIS) prepare the map of pollutants' dispersion; estimate the air quality monitoring stations network's and Lithuanian territory partition's into zone and agglomerations compliance to the EU directives' requirements.

3. Performance of Project

3.1 Organisation

The following organisation flow diagram shows the performance of the project.

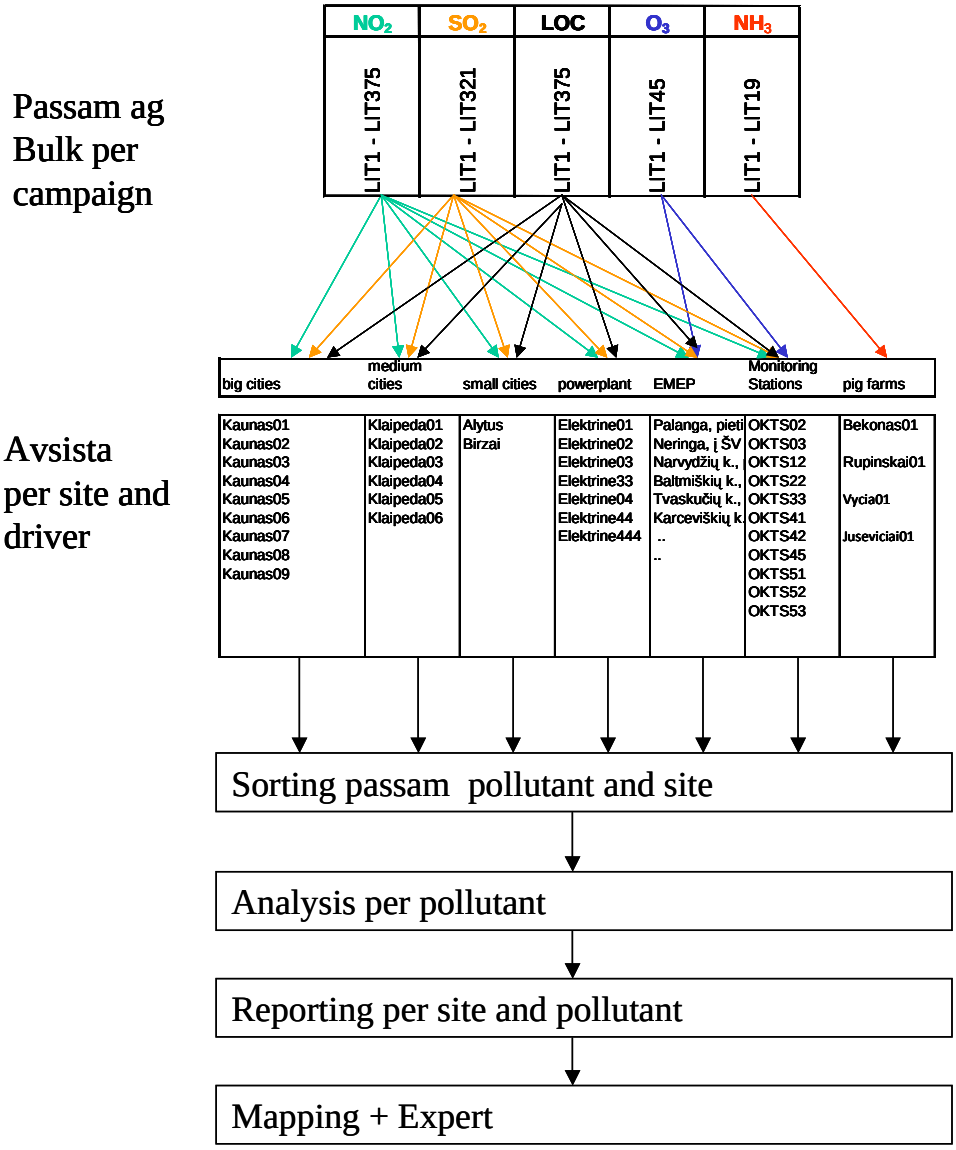


Fig.1. Work flow diagram

3.1.2. Work plan of projekt "Lithuanian Air Monitoring System Modernization Using Diffusive Samplers"

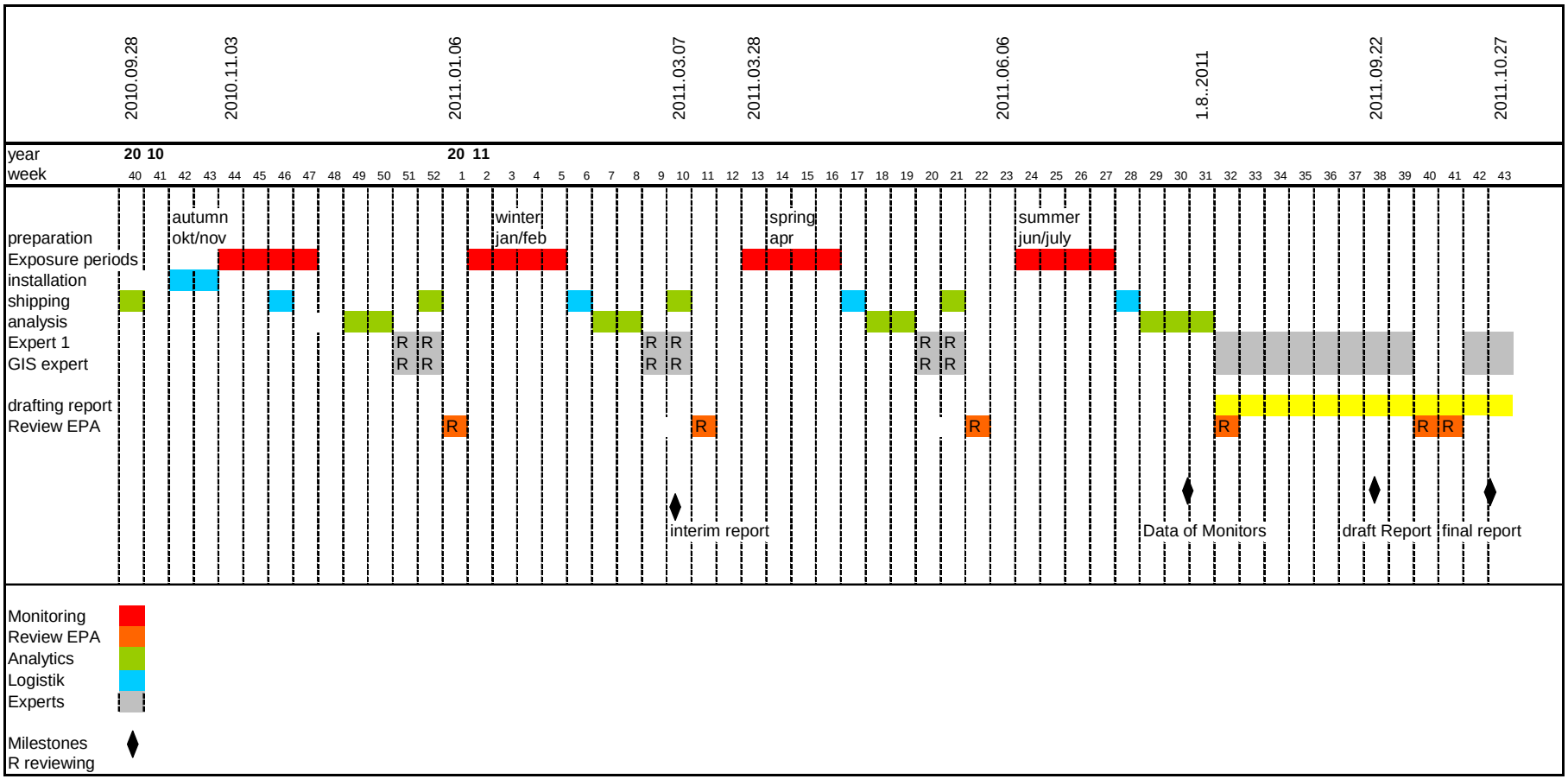


Fig. 2. Work plan

3.2 Description of samplers

3.2.1 NO_2 Diffusive Sampler

The sampler is based on that of Palmes and is a passive device requiring no power for its operation. It collects NO_2 by molecular diffusion along an inert tube to an absorbent, in this case triethanolamine. The sampler, which is shown in the following dia-gram, consists of a polypropylene tube of 9.8 mm internal diameter and 7.4 cm length. The samplers are placed in a special shelter to protect them from rain and minimize the wind influence.

In use the samplers are mounted vertically and the lower stopper is removed at the onset of sampling allowing NO2 to be transported by molecular diffusion up the tube to the TEA, where it is re-tained. Collected NO2 determined spectrophotometrically by the well-established Saltzmann method. Sampling periods range usually from one to two weeks.

3.2.2 SO_2 Diffusive Sampler

The passive sampler for sulphur dioxide is based on the diffusion of sulphur dioxide molecules onto a mixture of potassium carbonate and glycerol. The passive samplers are composed of a polypropylene housing with an opening of 20 mm diameter. To reduce wind disturbance a glass fiber membrane is attached, supported by a wire net. The amount of absorbed sulphur dioxide is proportional to the environmental concentration. Following an exposure period of 2 weeks total amount of sulphur dioxide is extracted and ion-chromatographically determined.

3.2.3 BTX Diffusive Sampler

The diffusion tube comprises a glass sampling tube open at both ends and filled with activated charcoal. Each opening in the sampling tube is filled with a cellulose acetate diffusion barrier as the following figure shows:

Ambient air diffuses into the sampling tube in a controlled manner. BTX are absorbed on the activated charcoal and desorbed by carbon disulphide in the laboratory and analyzed by gas chromatography.

3.2.4 NH_3 Diffusive Sampler

The ammonia diffusive sampler is based on ammonia molecules diffusion of onto phosphoric acid. The diffusive sampler consists in a polypropylene housing which has a 20mm diameter opening. A Teflon membrane supported by a wire net is used in order to reduce wind effects. A special suspension device is also recommended to protect the sampler from wind and stress of weather.

The amount of ammonia absorbed by the sampler is in proportion with the concentration found in the environment. After a predetermined period of time (ranging from 2 weeks and up to 1 month), ammonia is extracted in its entirety from the sampler and its quantity is determined spectrophotometrically by Indophenol-method at 630 nm

3.2.5 O_3 Diffusive Sampler

The diffusive sampler for ozone is based on the diffusion of ozone along a tube to an absorbing medium. The chemisorption of ozone takes place by reaction with 1,2-di(4-pyridyl)-ethylene (DPE); the ozonide formed undergoes cleavage and yields an aldehyde. The amount of aldehyde is finally determined spectrophotometrically by the MBTH method at 442 nm.
The diffusive sampler for ozone consists of a polypropylene tube of 4.9 cm length and 0.9 cm diameter. At the closed end there is a glass fiber filter dipped in a solution of DPE in acetic acid. To protect the samplers against weather conditions and to eliminate the light effect on DPE, a special shelter was developed.

Fig. 3. Used samplers of passam ltd.

3.2.6 Calculation

The concentration of pollutant in ambient air is calculated according to the following formula:

$$c = \frac{Q \cdot l}{D \cdot A \cdot t} = \frac{Q \cdot 10^6}{SR \cdot t}$$

c	concentration of pollutant	[µg/m^3]
Q	amount of absorbed pollutant	[µg]
D	diffusions coefficient pollutant /air	[cm^2/min]
A	diffusion area	[cm^2]
l	diffusion path (=length of tube)	[cm]
t	exposure time	[min]
SR	sampling rate	[ml/min]

Sampling rate	NO_2 :	0.9047 ml/min	at 20°C
Sampling rate	SO_2:	11.9ml/min	at 20°C
Sampling rate	Benzene	6.44ml/min	at 20°C
Sampling rate	NH_3	31.5ml/min	at 20°C

Sampling rate	Ozone	0.0327	empirical factor [field calibration in Lithuania]

A temperature correction was not made, because during a yearly measurement campaign, influence of temperature is balanced.

3.3 Measurement uncertainty

3.3.1 Overall uncertainty according GUM

Passam uses the indirect approachof GUM (Guide for assessing measurement uncertainty) [1,2,3] The permanent verification of sampling rate, based on weight losses of permeation tubes, is a independent way of checking the overall performance of diffusive sampling systems. The output information is important for assessing measurement uncertainty. With this procedure the requirements of ISO 9001 (process control) are fulfilled as well.

The analytical control charts give information of the internal variation of analytics. Furthermore, with this procedure long-term stability of results can be guaranteed and measurement results are comparable over time.

The calculation of uncertainty started on the basis of the following measurement equation

$$C_u = \frac{\left(m_d - m_b\right) \cdot 10^6}{SR \cdot t}$$

where

C_u:	ambient concentration	[µg/m^3]
m_d:	mass of desorbed analyte	[µg]
m_b:	blank of analyte	[µg]
SR:	diffusive uptake rate	[ml/min]
t:	exposure time	[min]

The input quantities and their uncertainties are defined as follows:

u_{md}: Uncertainty of the mass of absorbed analyte. The standard uncertainty can be characterized by the standard deviation of the calibration function

u_{mb}: Blank values: The variation of blank value has to be added to u_{md} in absolute terms

u_{SR}: Uncertainty of sampling rate. The variation of this term is given by the standard deviation of repeated verification experiments in standard atmospheres.

u_t: Exposure time. This term is in general negligible at exposure times of more than one week. At shorter times, this term has been taken into account.

An additional term has been introduced, which covers the uncertainties budgets of repeated measurements, microenvironmental factors, variations in the geometry of samplers etc.

u_P Variation of multiple samples at the same site. The size of this term is estimated by the median of triplicate samplers in the field.

u_{ext}: External influences such as temperature, wind speed, humidity.
This term has to be taken into account, if the samplers are used in extreme conditions.
This term has to be estimated.

The combined uncertainty u_k is calculated as follows:

$$u_k = \sqrt{u^2_{SR} + (u^2_{md} + u^2_{mb}) + u^2_P + u^2_t + u^2_{ext}}$$

The expanded uncertainty is calculated by using a coverage factor of 2.

$$U_e = 2 \bullet \sqrt{u^2_{SR} + (u^2_{md} + u^2_{mb}) + u^2_P + u^2_t + u^2_{ext}}$$

The uncertainty of the mean of the 8 periods is calculated as follows:

$$U_{mean} = U_{single}/\sqrt{8}$$

Tabele 1. Uncertainty estimation according GUM.

Component		Limit value ug/m^3	uncertainty combined	uncertainty expanded	U_{mean} 8 periods
NO_2	annual mean	40	10.8	21.6	7.7
	UAT	32	10.2	9.9	7.3
	LAT	26	20.5	19.7	7
SO_2	annual mean	20	11	22.1	7.8
	UAT	12	13.1	26.2	9.3
	LAT	8	16.7	33.5	11.9
Benzene	annual mean	5	14.1	28.2	10
	UAT	3.5	17.3	34.6	14.1
	LAT	2	26.6	53.3	18.9
Ozone	annual mean	60	13.9	27.8	9.9
NH_3	annual mean	20	16.9	33.7	12
		5	45.8	91.6	32.5
		1	219.2	438.4	155.5

3.3.2 Duplicates

The standard deviations of duplicate determinations can taken as a measure of the reproducibility of the method used. They are calculated by the following equation:

$$s_D = \sqrt{\frac{\sum_{i=1}^{n} (y_{1i} - y_{2i})^2}{2n}}$$

where

s_D Standard deviation of duplicate
y_{1i}, y_{2i} Measured values of the duplicates
n Number of duplicates
i Cycle number of duplicates

The SD's stands for the standard deviation of the overall process, therefore, including preparation, sampling and analysis.

Table 2. Relative standard deviations, calculated from duplicates

Component		limit value ug/m^3	rel. standard deviation
NO_2	annual mean	40	3.9
	UAT	32	4.8
	LAT	26	5.9
SO_2	annual mean	20	5.4
	UAT	12	8.9
	LAT	8	13.4
Benzene	annual mean	5	9.8
	UAT	3.5	14
	LAT	2	24.6
Ozone	14-mean	60	47.4
NH_3	annual mean	20	11
		5	73
		1	219

This figures were used for uncertainty calculation in chapter 4

3.3.3 Uncertainty as consequence of incomplete measurements

A scientific judgement of this figure has been made out of yearly series of NO_2 continuous measurement data. The same periods as the tube campaign were selected and the mean calculated. This means were compared with the corresponding yearly means.

Table 3.

Monitoring site	yearly mean	mean 4 seasons	difference absolute	difference relative %
Vilnius_Lazdynai	9.0	11.7	2.7	30.4
Vilnius_Žirmūnai	23.4	15.0	-8.4	-35.8
Vilnius_Savanorių	20.8	20.0	-0.8	-3.8
Kaunas_Petrašiūnai	11.7	12.6	0.9	7.3
Kaunas_Noreikiškės	8.7	10.2	1.5	17.6
Klaipėda_Šilutės	23.7	23.7	0.0	0.1
Šiauliai	21.4	23.5	2.1	9.7
Mažeikiai	6.8	6.8	0.0	-0.5
Panevėžys_Centras	13.9	15.2	1.3	9.1
Jonava	9.0	9.7	0.7	8.1
Kėdainiai	8.3	9.6	1.3	15.8

A standard deviation of the differencies of 2.013 was calculated, which means a relative standard deviation of 5 % at 40 um/m^3. This uncertainty term has to be added to the combined uncertainties of table 2.

4. Results

The link between the atmospheric pollutants concentrations and the emissions of pollutants in the atmosphere is rather complex. The observed concentration levels are the result of the complex dynamical behaviour of meteorological conditions and physical-chemical (transformation) processes of the pollutants emitted by a great diversity of sources that are unequally distributed in time and space. Atmospheric concentrations of sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and volatile organic compounds (VOC): benzene (C_6H_6), toluene, ethylbenzene and orto-, meta-, para-xylene were measured on the urban localities of Lithuania in order to evaluate the effects of anthropogenic activity on air quality. The purpose of this project was to get spatial variation in pollutants (sulfur dioxide, nitrogen dioxide and volatile organic compounds: benzene (C_6H_6), toluene, ethylbenzene and orto-, meta-, para-xylene) concentrations in Lithuania based on one year measurements with diffusive air samplers. Eight sampling campaigns of 14 days were carried out from 3 November 2010 to 4 July 2011 in Vilnius and Kaunas agglomerations and zone (the rest part of Lithuania). The diffusive samplers for atmospheric sulfur dioxide, nitrogen dioxide and benzene were set up in the urban background (residential), semi-urban (mixed residential and commercial) and roadside (busy street/road and crossing) sites in order to get spatial variation in pollutants concentrations.

4.1 Summary data

The data were published per measuring site and each period:
Table 4.

season	period		
I_ automn	1	5.11.2010	17.11.2010
	2	17.11.2010	1.12.2010
II_winter	3	6.1.2011	20.1.2011
	4	20.1.2011	3.2.2011
III_spring	5	25.2.2011	8.4.2011
	6	8.4.2011	22.4.2011
IV_sommer	7	6.6.2011	20.6.2011
	8	20.6.2011	4.7.2011

The data were cleared up in the following way:

Not detected: replacing by half of detection limit, green underlined
Outlier rejection by Grubbs test. red underlined

Grubbs' test is defined for the hypothesis:

H_0: There are no outliers in the data set
H_a: There is at least one outlier in the data set

$$G = \frac{\max_{i=1,\ldots,N} \left| Y_i - \bar{Y} \right|}{s}$$

with and s denoting the sample mean and standard deviation, respectively. The Grubbs test statistic is the largest absolute deviation from the sample mean in units of the sample standard deviation.

The file names are the following_

Lithuania_Benzene_Summarytable_240811.xls
Lithuania_NH3_Summarytable_240811.xls
Lithuania_NO2_Summarytable_300811.xls
Lithuania_O3_Summarytable_010911.xls
Lithuania_SO2_Summarytable_300811.xls

4.2 Meteorology

The first campaign (2010.11.03–2010.12.01)

The climate of the Lithuania can be described as typical European continental influenced climate with warm, dry summers and fairly severe winters.

The unusually warm weather prevailed during the greater part of the November. The highest air temperature was recorded in the middle of the month (11-15 °C) and exceeded the highest mean temperature in many places. From 26 November weather cooled down, the mean daily air temperature fall below zero. The lowest air temperature at the end of the month in many areas dropped to -11 ...- 15 ° C, in Kybartai to -16 ° C, and in Zarasai Rokiškis to -17 ° C. Monthly mean air temperature varied from 2.3 to 4.4 ° C (in most places higher than the average multi-annual by 2.5°C).

The amount of rainfall reached 50-70 mm in Lowlands, and 71-125 mm in northern areas. Such rainfall in many places was close to the norm, in some places it exceeded by 1.5 times. The earliest snow was November 25-26.

The second campaign (2011.01.06–2011-02-03)

In January, the prevailing weather gets cold. The highest air temperature of 3-6 °C was observed. The lowest air temperature in most areas was -15 ...- 20 ° C, in the northern regions of -21 ...- 23 ° C. Monthly mean air temperature varied from -0.9 ° to -3.9 at the seaside.

During the month precipitation varied from 40 to 55 mm (near normal), and from 56 to 75 mm in north-eastern coastal areas. The lowest rainfall was observed in some southern areas, i.e. 27-30 mm.

The highest wind speed in many areas reached 15-18 m/s, in Klaipeda and Kybartai - 21 m/s.

Sunshine totals for the period was observed of 20-30 hours (10-15 h less than the norm mean duration), in the eastern and southeastern regions - 10-15 hours (25-30 h less than the norm).

The third campaign (2011.03.25–2011.04.22)

Dry weather dominated during April. During the third decade weather was the warmest; the highest temperatures in many areas have risen to 23-26 °C, to 20-21 °C at the coastal zone. The lowest air temperature in April in most districts was still falls to -1 ...- 5 ° C. Mean air temperatures were above normal for the season (1.5 to 3 ° higher than the mean multi-annual) and was observed from 6.6 to 9.3 ° C.

Rainfall totals for this period were normal almost everywhere (20-30 mm), in central and eastern regions only 14-19 mm (35-40% rate). The heaviest falls during the season were measure during the first decade, then dominated dry weather southeast.

Mean windspeeds for spring were about average for the season. The highest wind speeds in many areas reached 15-19 m / s, sometimes 21-23 m / s. Sunshine totals for the period were above 195-250 h (35-65 h more than the average luminosity of multi-period).

The fourth campaign (2011.06.06–2011.07.04)

In most areas monthly mean air temperature varied from 16.6 to 18.4 ° C in June, in seaside locations and in the central regions from 2.6 to 3.0 °C higher than the mean multi-annual. The lowest air temperature was observed 4-10 °C. Especially in the first decade the warm weather was occured, when the highest air temperature in most areas has risen to 30-32 ° C.

Rainfall totals for this period were 45-83 mm, in the southern and eastern regions of 40-44 mm, in some places in southern and north-east of 84-115 mm.

The highest wind speed in most areas were 10-14 m/s, sometimes 15-17 m/s, in Silute - 22 m/s.

Sunshine totals through the month was found to be 304-327 hours (14-69 h more than the mean luminosity of multi-time).

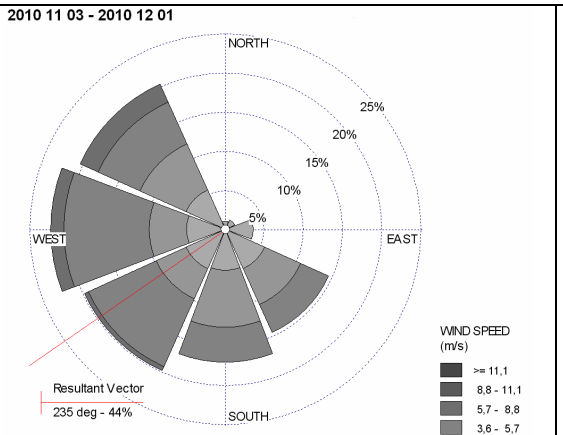
Tabele 6. The average characteristics of the meteorological parameters for the study period from 3 November 2010 to 4 July 2011

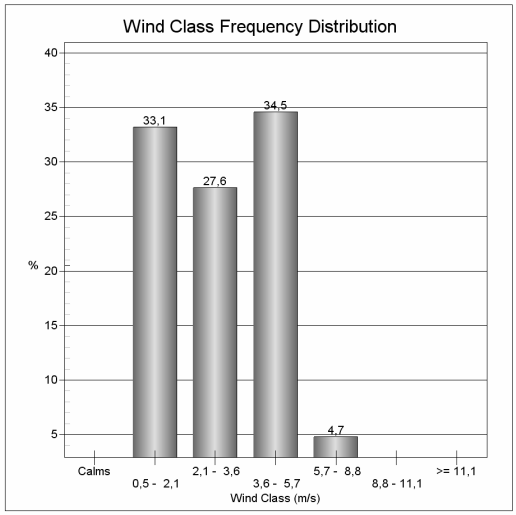
SIAULIAI	Periods					
		t, ^{0}C	**Wind speed, m/s**	**Wind direction, degrees**	**relative humidity, %**	**Precipitation, mm**
	1	6.3	1.7	241	89.8	
	2	4.2	2.4	325	83.7	
	3	-1.3	2.7	187	93.6	
	4	-3.0	2.9	239	92.1	
	5	3.3	3.3	222	77.6	
	6	6.6	2.8	218	68.8	
	7	17.9	2.1	198	*55.0*	
	8	17.2	2.2	182	*55.0*	
KAUNAS						
	1	6.8	2.1	300	91.2	15
	2	5.8	2.6	99	86.4	27
	3	-0.8	3.8	190	89.8	70
	4	-4.3	3.7	221	88.4	90
	5	3.8	4.0	234	76.7	12
	6	7.0	3.3	231	67.5	6
	7	18.2	3.0	229	*56.0*	90
	8	17.4	2.8	177	*56.0*	30
KYBARTAI						
	1	6.7	1.7	278	91.8	25
	2	6.0	1.8	191	86.5	42

	3	0.0	3.4	190	89.6	26
	4	-3.6	4.0	228	88.2	39
	5	4.9	4.4	230	75.7	9
	6	7.3	3.2	234	70.9	8
	7	17.6	3.2	222	*61.0*	11
	8	18.3	3.2	194	*61.0*	16
KLAIPEDA						
	1	7.7	4.1	303	94.3	24
	2	5.4	2.3	106	85.8	19
	3	-0.1	4.3	206	93.9	54
	4	-1.3	4.4	232	92.5	32
	5	-0.1	4.3	206	93.9	40
	6	-1.3	4.4	232	92.5	9
	7	3.1	4.4	221	*84.3*	9
	8	4.7	3.4	243	*83.9*	8
VILNIUS						
	1	5.9	1.4	317	94.9	
	2	5.6	2.2	126	90.5	
	3	-1.1	3.4	202	91.5	
	4	-4.5	3.1	244	89.6	
	5	3.4	3.7	226	74.3	
	6	6.6	3.2	237	63.1	
	7	18.6	2.8	219	*56.0*	
	8	16.9	2.7	173	*56.0*	
UTENA						
	1	5.5	1.1	258	87.5	
	2	5.2	1.4	276	85.9	
	3	-1.3	2.3	205	87.3	
	4	-4.2	2.4	235	87.0	
	5	3.2	2.7	229	73.6	
	6	6.2	2.4	233	68.6	
	7	18.4	1.8	200	*60.0*	
	8	17.1	2.2	156	*60.0*	
VARENA						
	1	5.1	1.2	194	96.7	
	2	6.3	2.0	54	88.7	
	3	-0.4	2.3	197	92.3	
	4	-4.1	2.3	236	90.0	
	5	4.1	3.0	228	73.7	
	6	6.6	2.6	232	65.9	
	7	18.2	2.4	231	*53.0*	
	8	17.7	2.1	191	*53.0*	
TELSIAI						
	1	6.0	2.3	284	88.4	80
	2	4.0	2.2	198	79.4	16
	3	-1.1	3.4	212	86.3	90
	4	-2.8	3.7	252	84.9	25
	5	2.7	3.7	238	76.1	90
	6	6.3	3.2	238	68.3	16
	7	17.0	2.9	213	*52.0*	6
	8	17.7	3.0	173	*52.0*	21
BIRZAI						
	1	6.6	2.1	252	88.1	
	2	4.9	2.0	302	82.1	
	3	-1.3	3.0	192	91.1	
	4	-3.7	2.8	231	91.4	

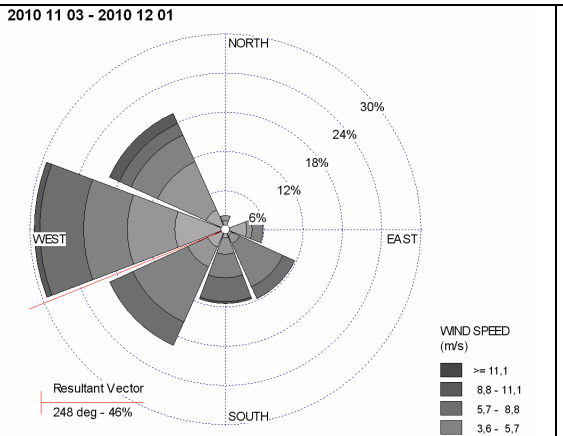
	5	3.0	3.1	226	78.1
	6	6.5	2.4	259	68.9
	7	18.6	2.3	208	*64.0*
	8	17.6	2.4	155	*64.0*
LAUKUVA					
	1	5.5	2.1	277	91.2
	2	3.9	3.0	75	88.9
	3	-1.6	4.2	209	93.5
	4	-3.9	3.9	222	92.3
	5	2.3	4.6	242	80.5
	6	5.9	3.8	217	72.2
	7	16.3	3.7	210	*57.0*
	8	16.7	3.9	151	*57.0*

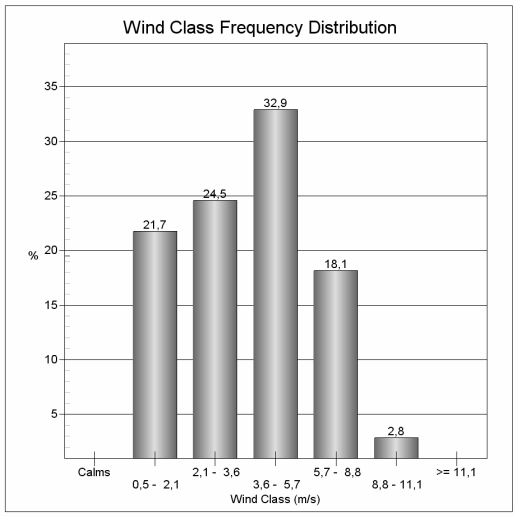
Biržai



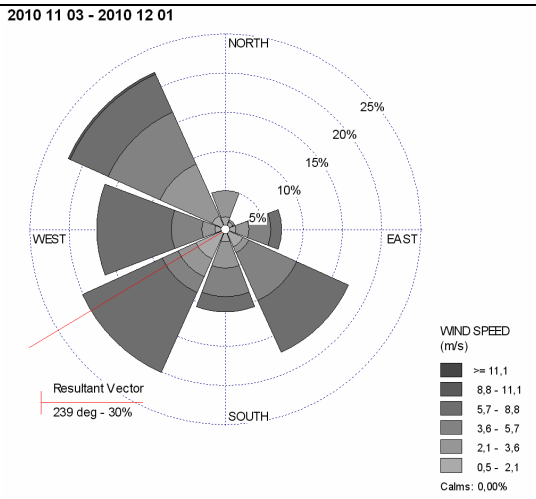


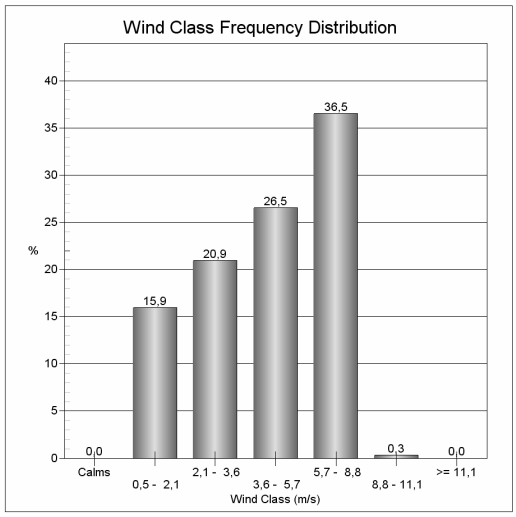
Kaunas



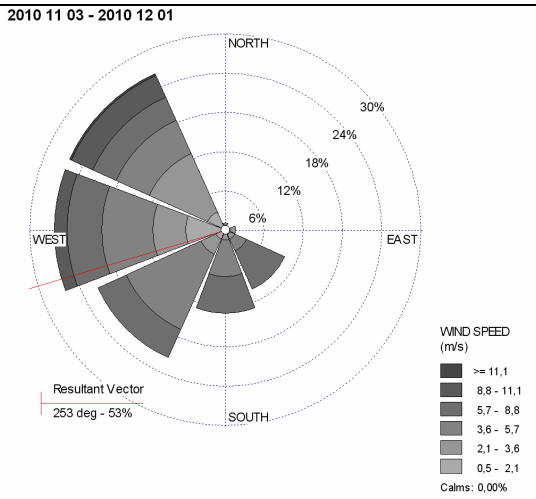


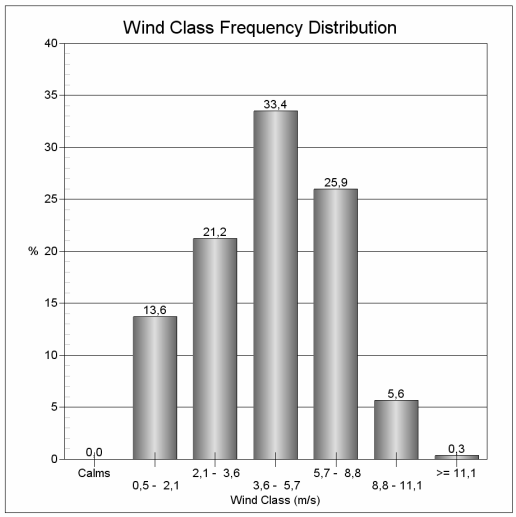
Klaipėda



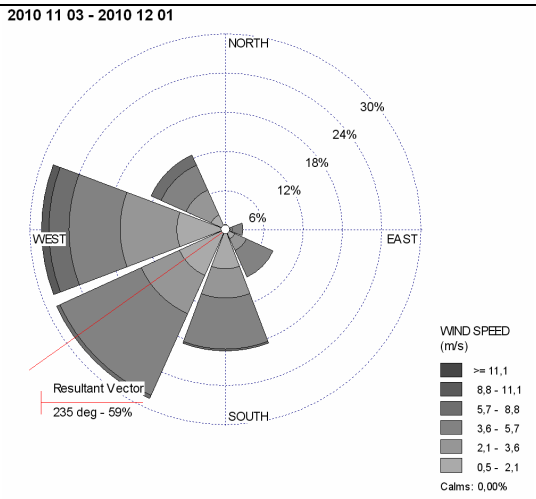


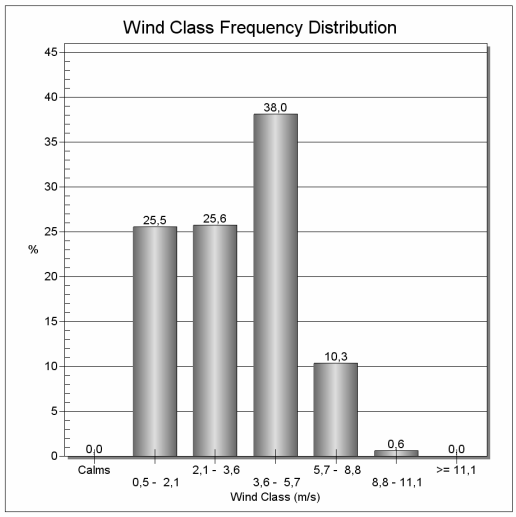
Laukuva



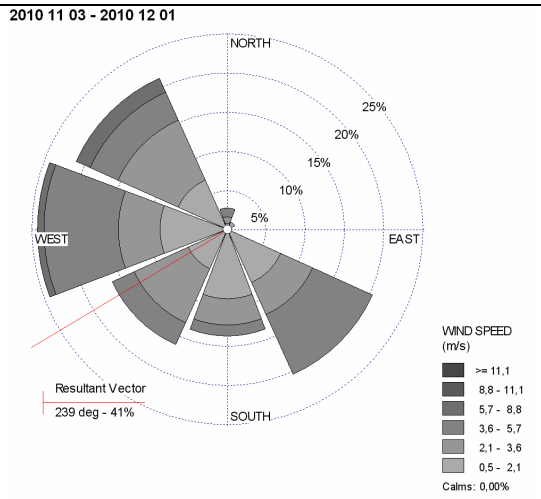


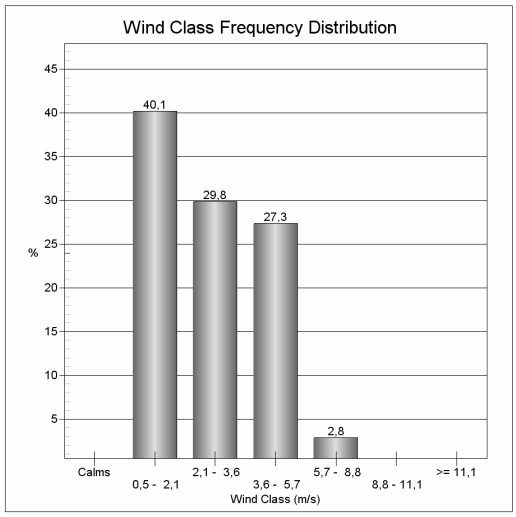
Šiauliai



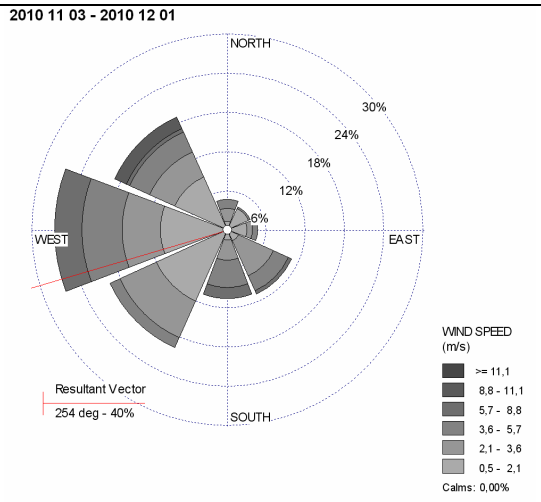


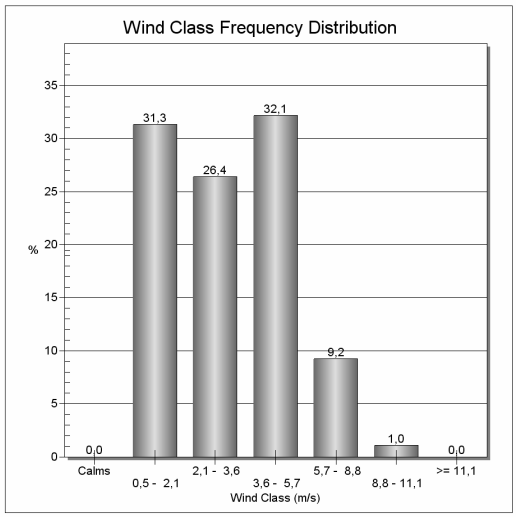
Utena



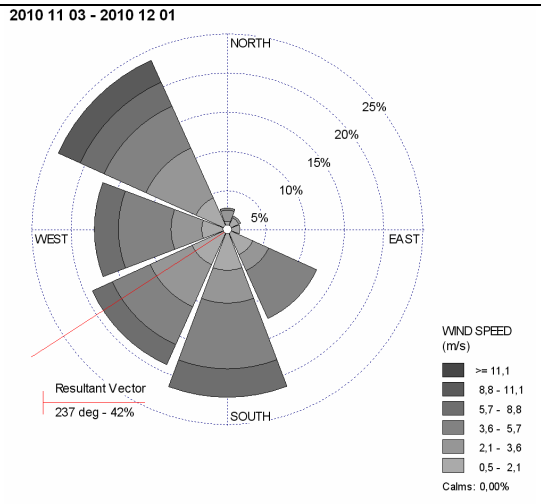


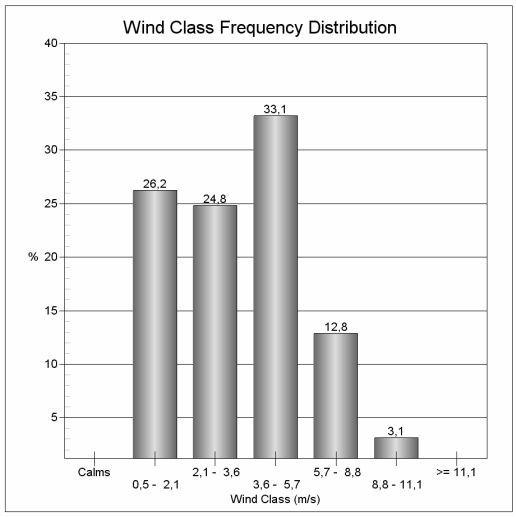
Varėna





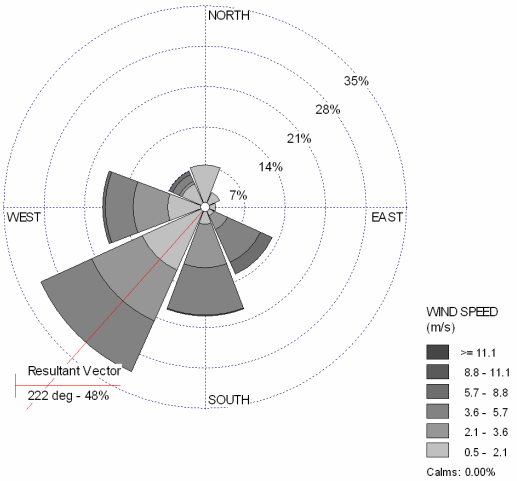
Vilnius

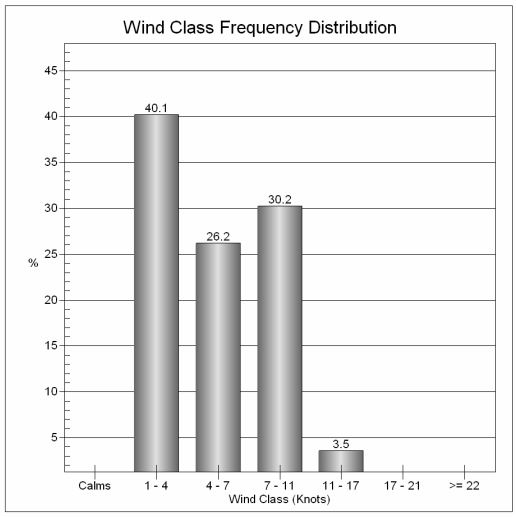




Biržai

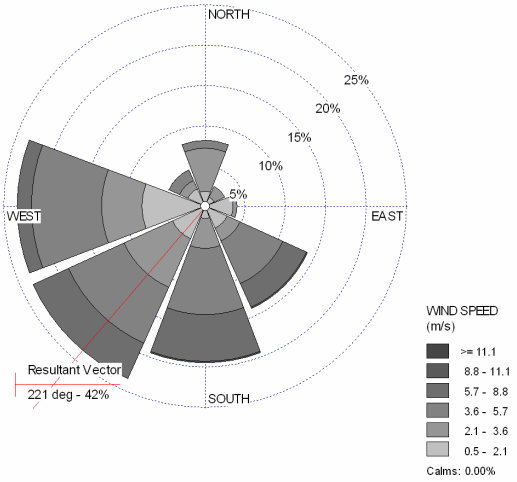
2011 01 06 - 2011 02 03

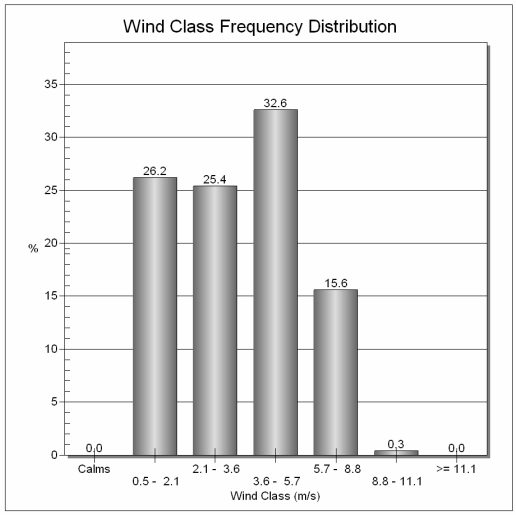




Kaunas

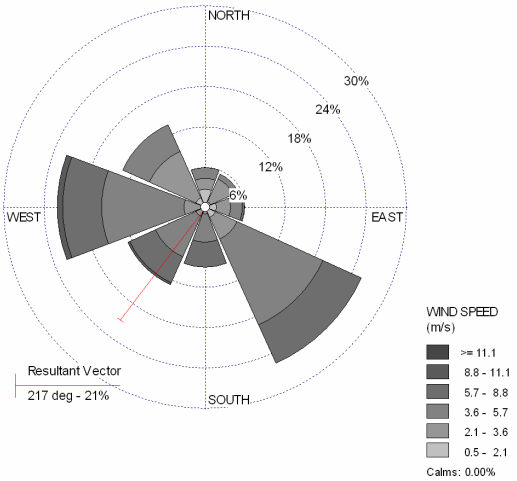
2011 01 06 - 2011 02 03

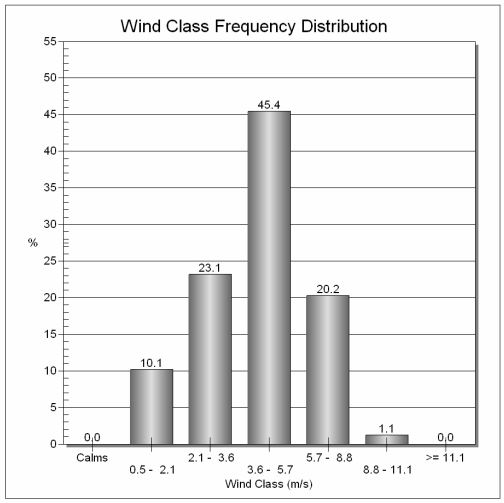




Klaipėda

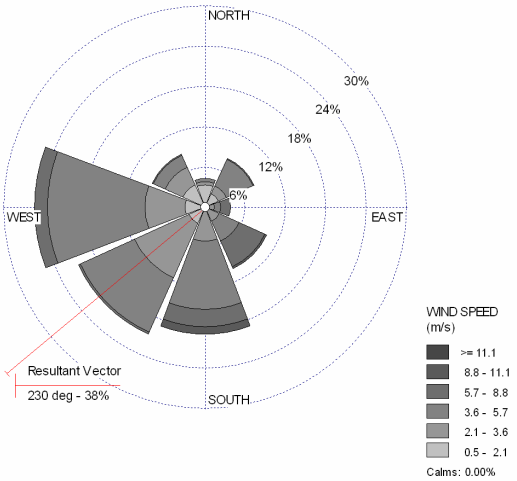
2011 01 06 - 2011 02 03

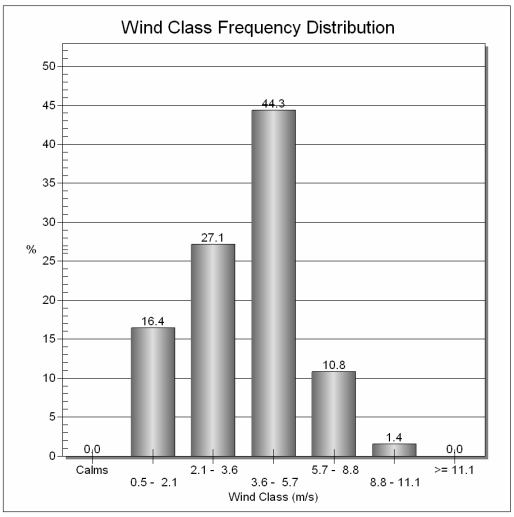




Laukuva

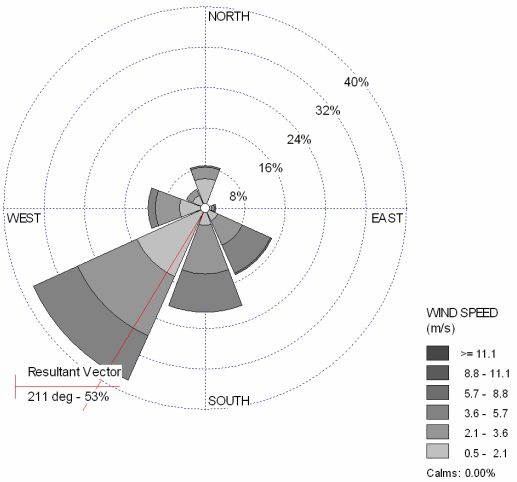
2011 01 06 - 2011 02 03

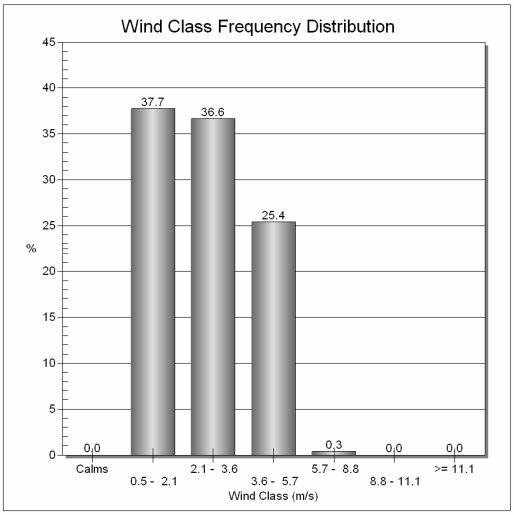




Šiauliai

2011 01 06 - 2011 02 03





Utena

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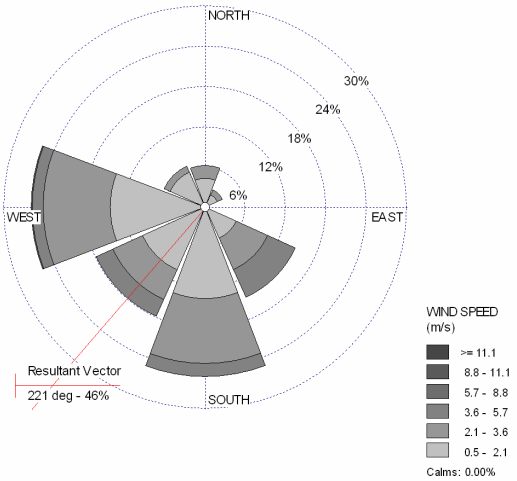
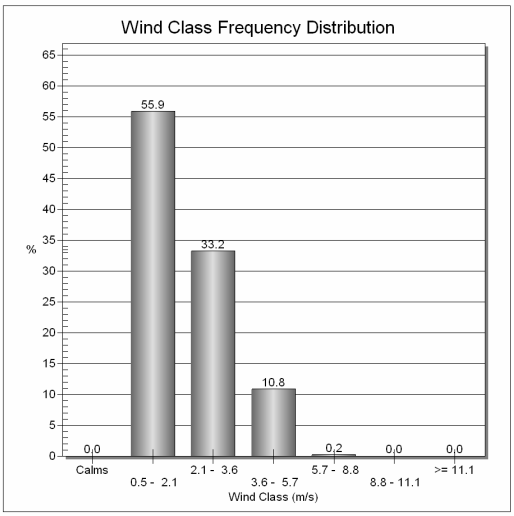
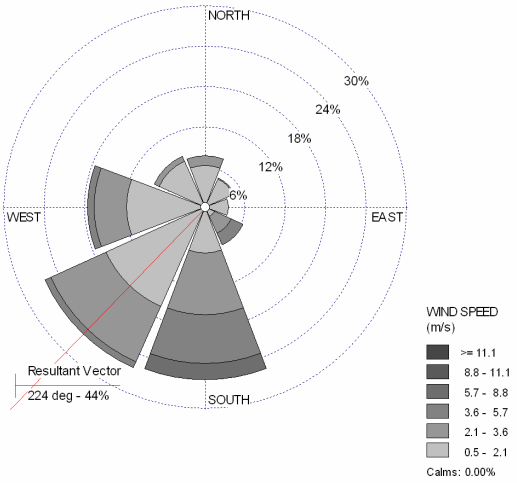
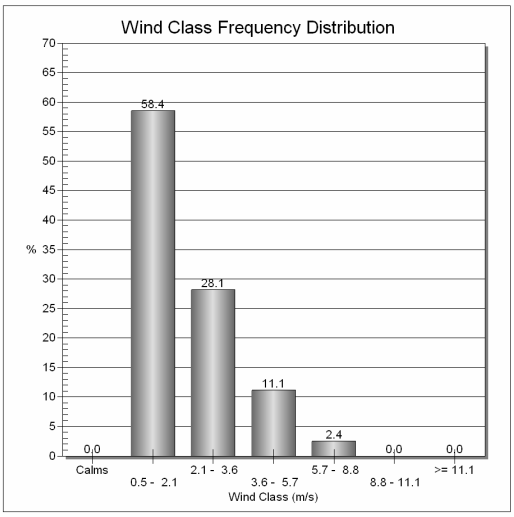




Varėna





Vilnius

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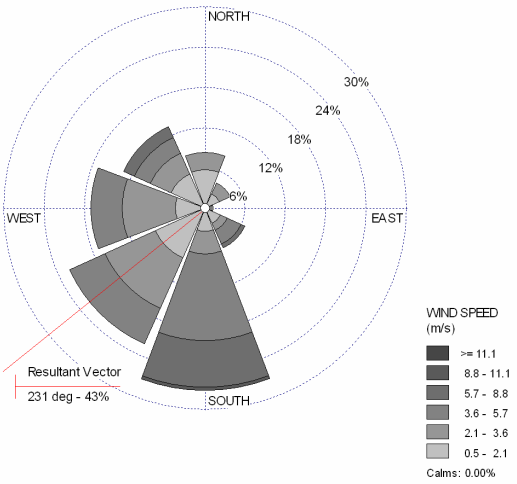
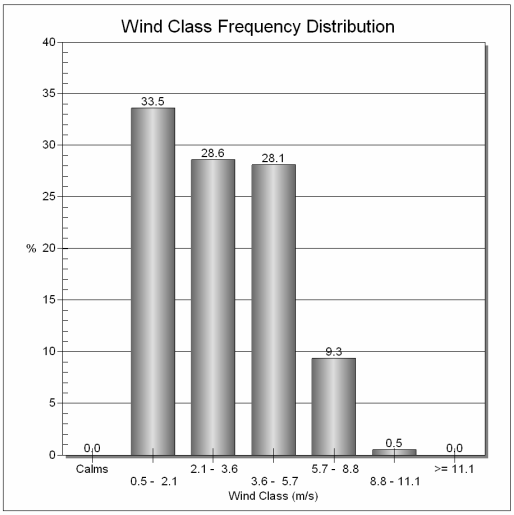
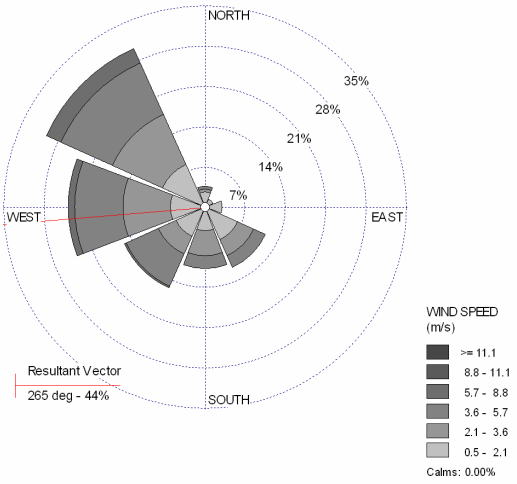
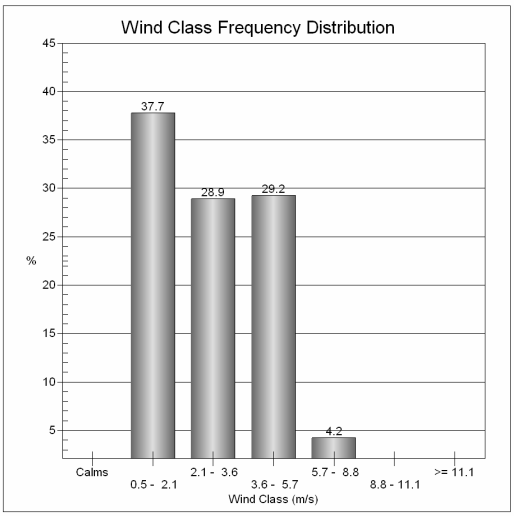




Biržai

2011 03 25 - 2011 04 22





Kaunas

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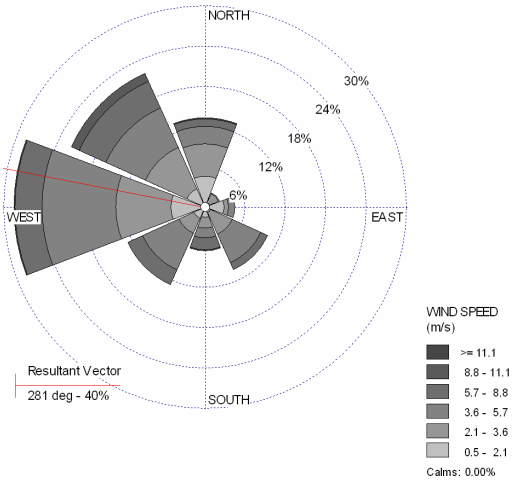
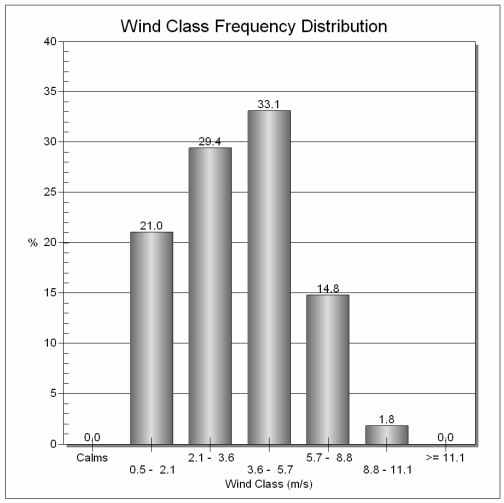
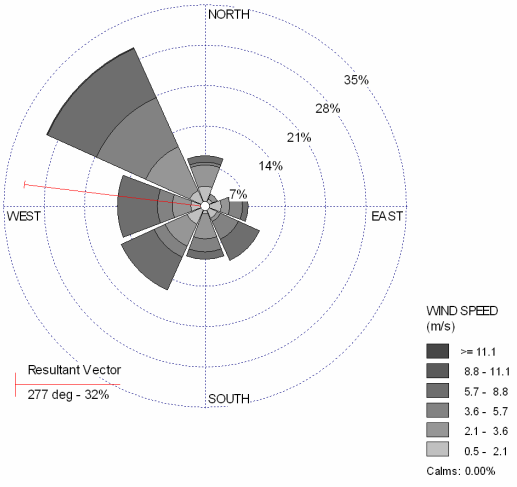
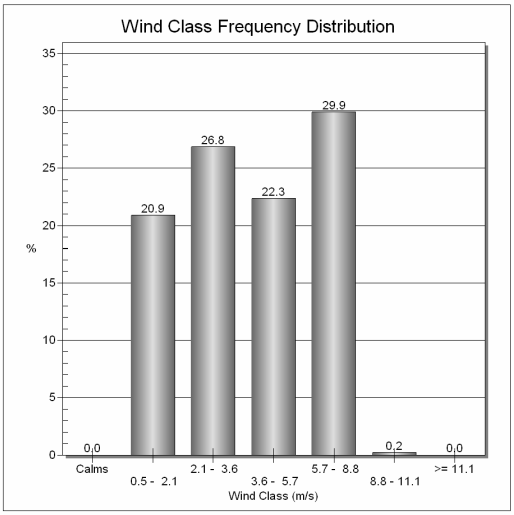




Klaipėda

2011 03 25 - 2011 04 22





Laukuva

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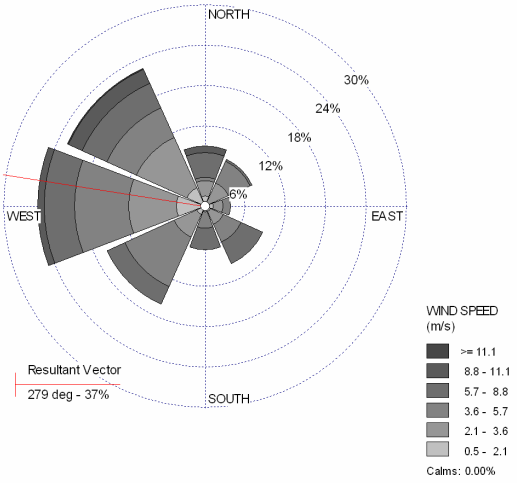
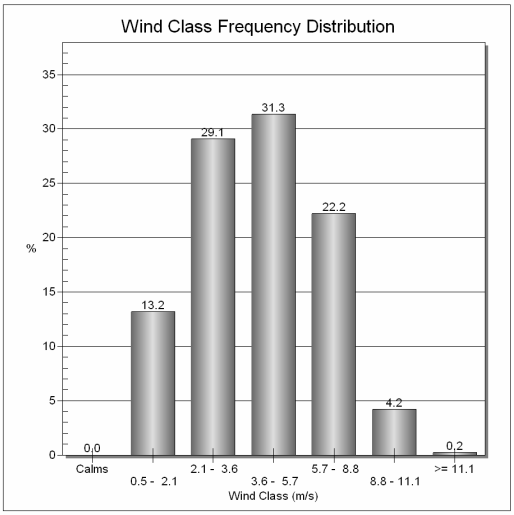
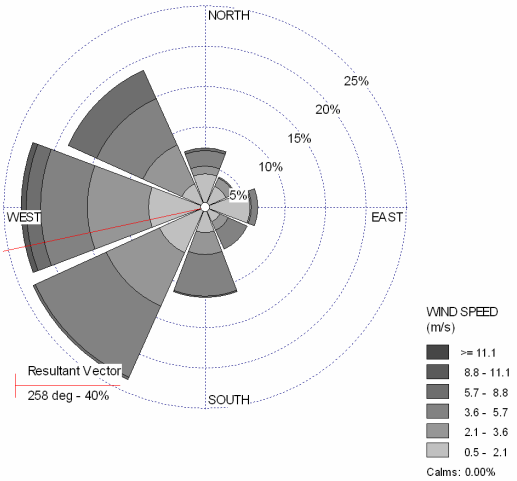
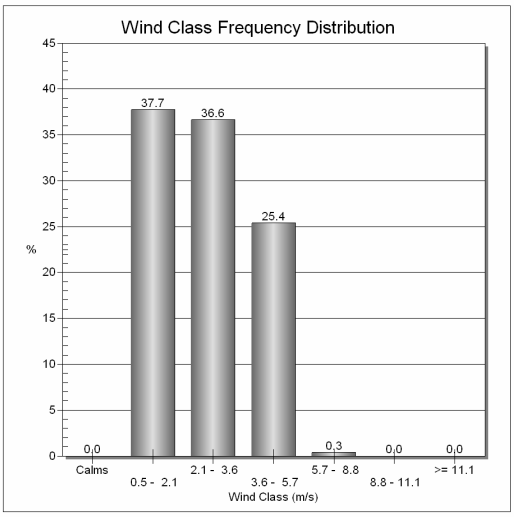




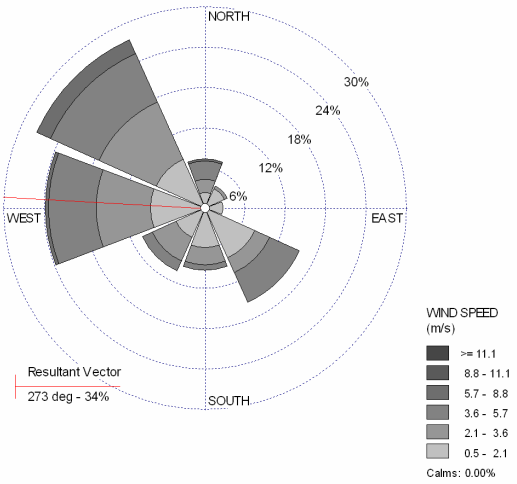
Šiauliai

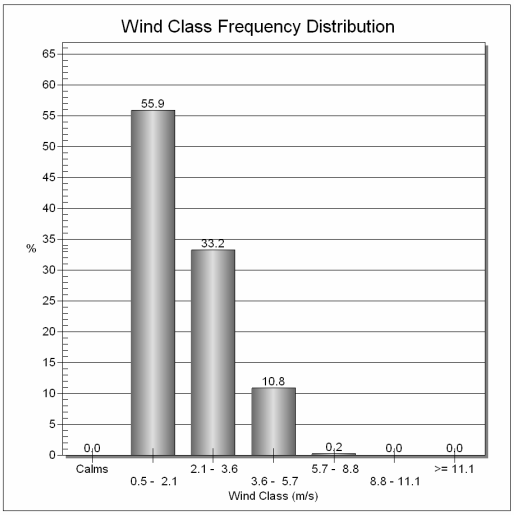
2011 03 25 - 2011 04 22





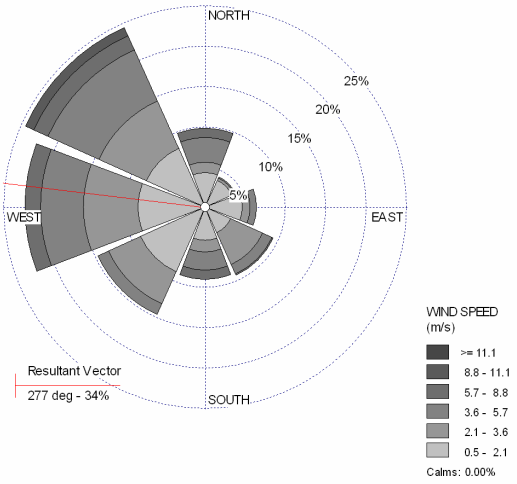
Utena

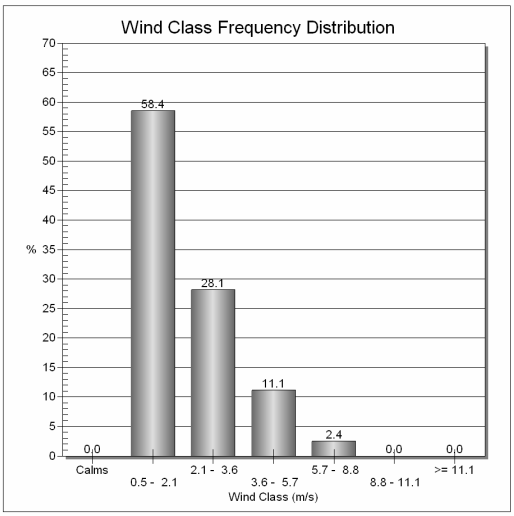




Varėna

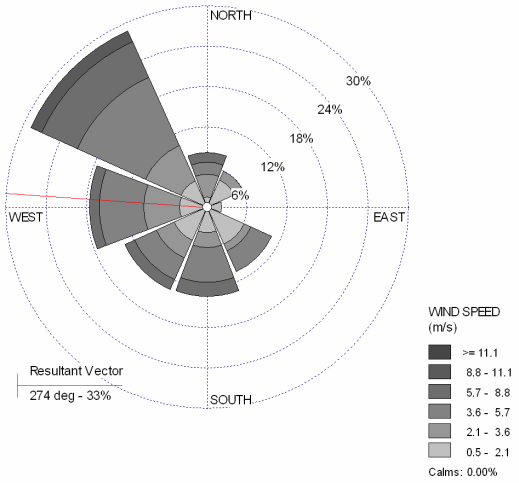
2011 03 25 - 2011 04 22

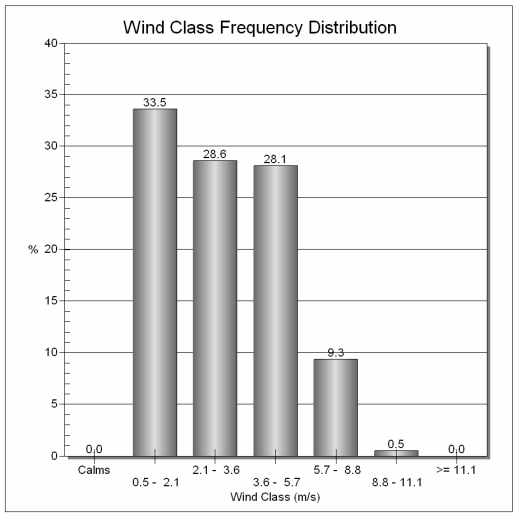




Vilnius

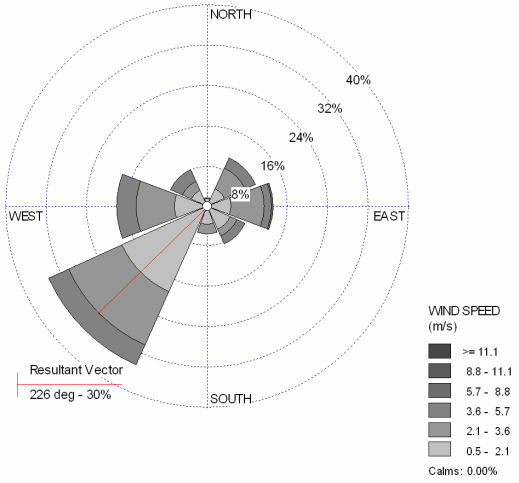
2011 03 25 - 2011 04 22

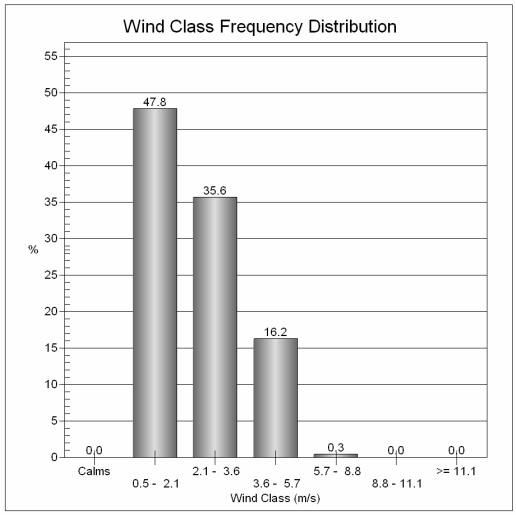




Biržai

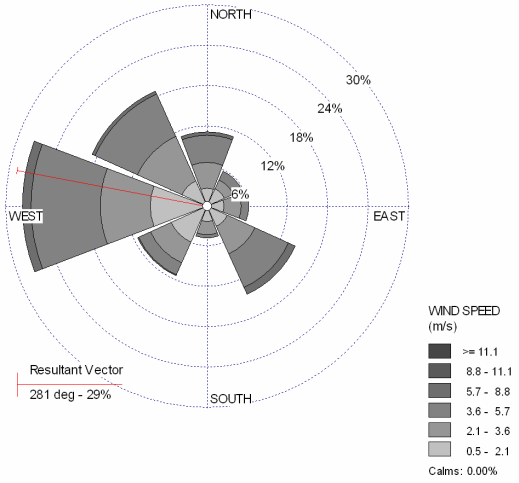
2011 06 06 - 2011 07 04

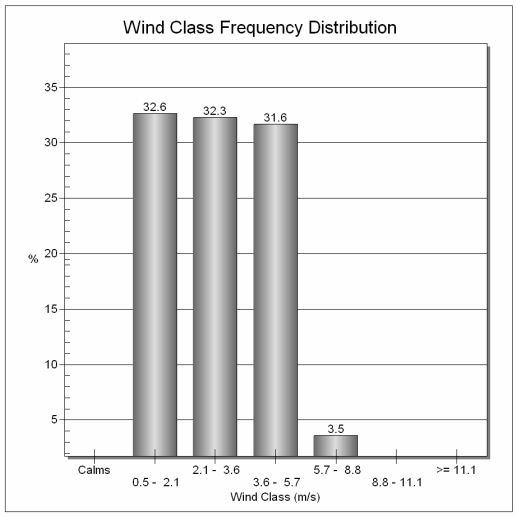




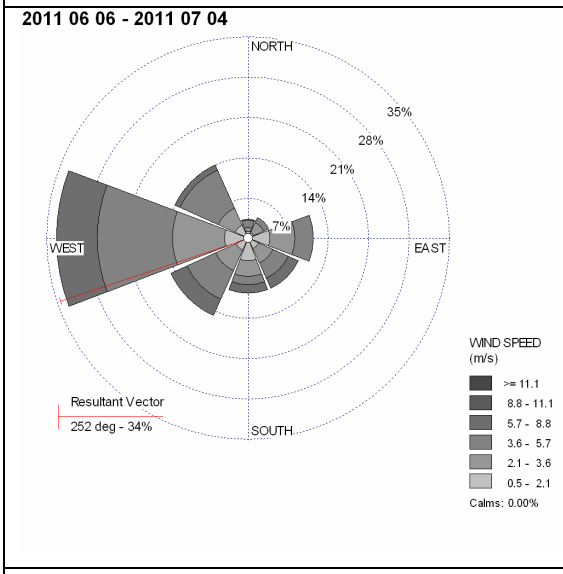
Kaunas

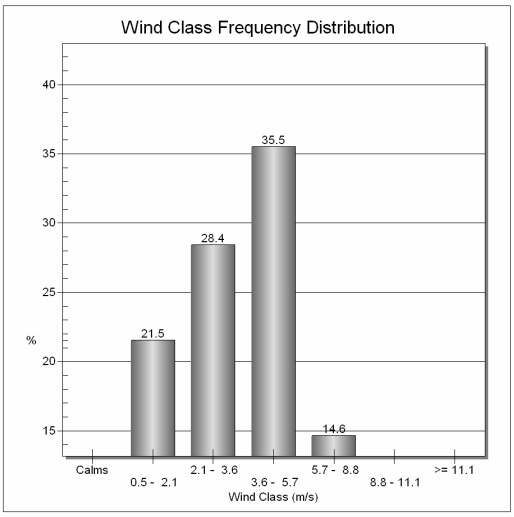
2011 06 06 - 2011 07 04



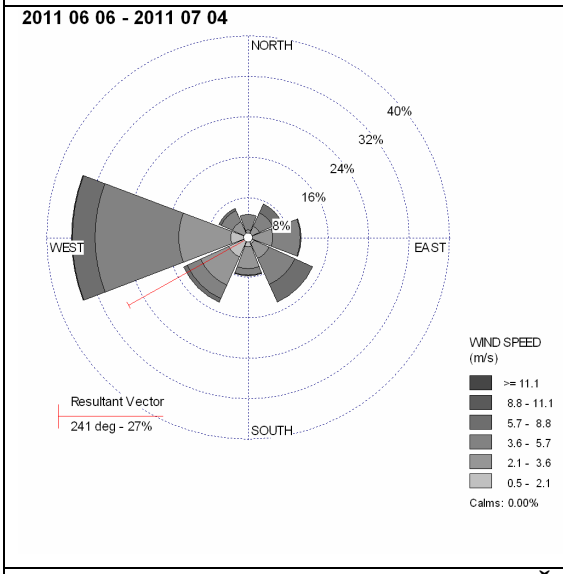


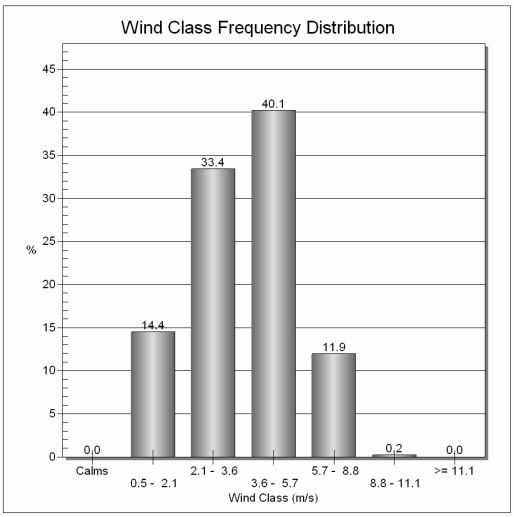
Klaipėda



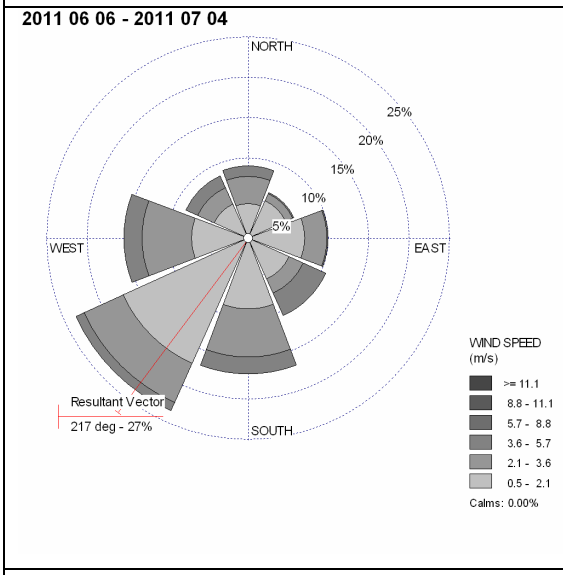


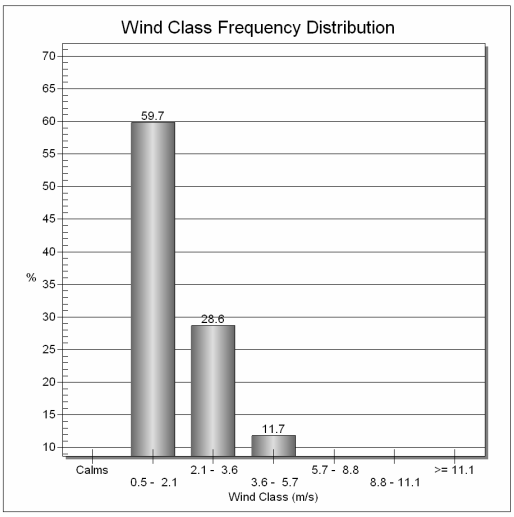
Laukuva





Šiauliai





Utena

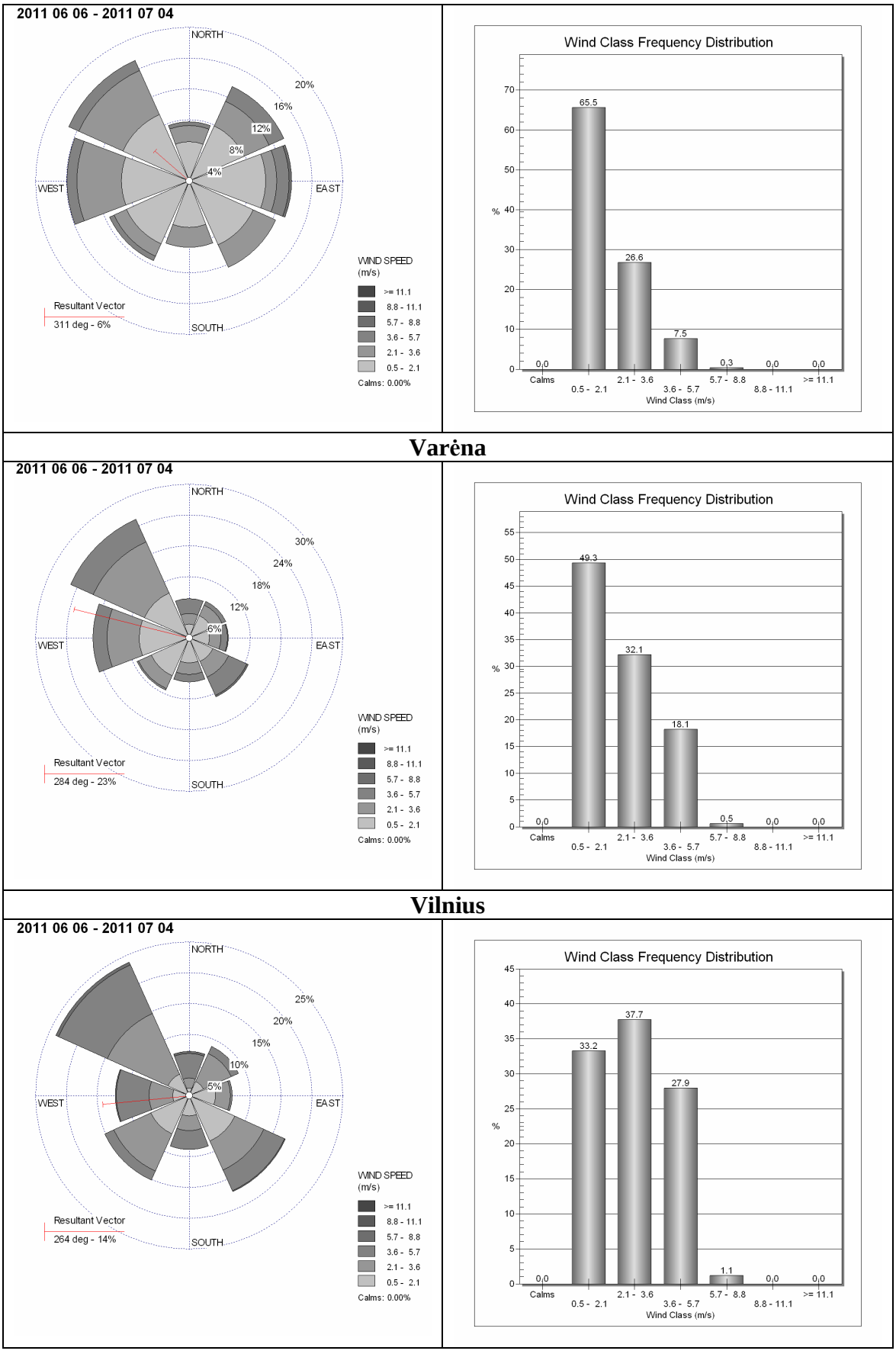


Figure 4. Wind Roses 2010.11.03-2011.07.04 (repeatability of wind directions, %).

4.3 The assessment of airborne pollutants: nitrogen dioxide, sulfur dioxide and volatile organic compounds distribution of average concentrations in the agglomerations of Vilnius and Kaunas, as well as in 58 towns, where population do not exceed 5 thousand people

4.3.1 Vilnius agglomeration

4.3.1.1 The location of diffusive samplers in Vilnius agglomeration

Fig. 5. Location of diffusive samplers in Vilnius agglomeration

4.3.1.2 Coordinates of study places and data capture in Vilnius agglomeration

Table 7. Data capture (%) in Vilnius agglomeration ("-" *not measured*).

Site code	Address	Coordinates (LKS-94)		Data capture, %		
		X	Y	NO_2	SO_2	LOJ
VILNIUS01	Žirmūnų g. 10 Žirmūnai	583758	6063283	100	-	100
VILNIUS02	Klinikų g. 7 Antakalnis	584763	6064354	100	-	-
VILNIUS03	Koklių g. 37 Dvarčionys	588156	6066315	100	100	-
VILNIUS04	Valakampių 2 pliažas	583365	6068074	100	-	100
VILNIUS05	Kareivių g. 1 Žirmūnai	583080	6065084	100	-	-
VILNIUS06	Kviečių g. 15A Jeruzalė	581970	6068079	100	100	-
VILNIUS07	Stanevičiaus g. 56 Fabijoniškės	580681	6066187	100	-	100
VILNIUS08	Ukmergės g. P. Žadeikos g. Pašilaičiai	579739	6066697	100	-	-
VILNIUS09	Vokiečių g. 1 Senamiestis	582959	6060975	100	100	100
VILNIUS10	Stoties transporto žiedas	582796	6060109	100	-	-
VILNIUS11	Švitrigailos g. Panerių g.	581960	6059972	100	100	100
VILNIUS12	Darbininkų g. 11 Naujininkai	582010	6059221	100	100	-
VILNIUS13	Žirnių g. 35 Naujininkai	582415	6058371	100	-	100
VILNIUS14	Žibuoklių g. 26 Markučiai	584931	6060496	100	-	-
VILNIUS15	Karklėnų g. 15 N. Vilnia	591991	6062292	88	100	88
VILNIUS16	Šventaragio g. 1 Senamiestis	583063	6061719	100	-	-
VILNIUS17	Lvovo g. 21A Šnipiškės	582512	6062879	100	100	-
VILNIUS18	Ukmergės g. G. Vilko g.	581427	6063545	100	-	100
VILNIUS19	Kęstučio g. Sėlių g. Žvėrynas	580579	6063083	100	2	-
VILNIUS20	Pamėnkalnio g. Kudirkos g.	581758	6061964	100	-	100
VILNIUS21	Savanorių per. 41 G. Vilko g. 19	580262	6060396	100	88	-
VILNIUS22	Vingio Parko estrada Naujamiestis	579704	6061515	88	100	-
VILNIUS23	Oslo g. Erfurto g. Lazdynai	577147	6060074	100	-	100
VILNIUS24	Architektų g. 49 Lazdynai	577530	6060653	100	100	-
VILNIUS25	R. Jankausko g. 1 Karoliniškės	577926	6062234	100	-	-
VILNIUS26	Pajautos g. 11 Pilaitė	575873	6064366	100	-	100
VILNIUS27	Laisvės per. Justiniškių g. Virsuliškės	578885	6063708	100	100	-
VILNIUS28	Justiniškių g. 101 Justiniškės	578896	6065447	100	-	100
VILNIUS29	Karališkių g. 1 Tarandė	577304	6068799	100	100	-
VILNIUS30	Gelvonų g. 18 Šeškinė	580925	6064834	100	-	100
VILNIUS31	Laisvės per. Architektų g.	578744	6060775	100	100	-
VILNIUS32	Savanorių per. Vilkpėdės g.	578744	6060775	100	-	100
VILNIUS33	Gariūnų g. ties turgumi	574710	6058627	88	100	-
VILNIUS34	Žaliųjų ež. G.	583365	6068074	100	-	-
VILNIUS35	Durpių g. Kalno g.	577762	6049785	100	-	100

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**
Photographic documentation of the sampling location is presented in **Annex II.**
The protocols of chemical analysis are presented in **Annex III**.
Raw data are presented in **Annex IV**.

4.3.1.3 Summary tables of data Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011

Table 8. Sulfur dioxide concentrations in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		SO2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
VILNIUS03	Koklių g. 37 Dvarčionys	588156	6066315	2.60	0.40	1.00	1.20	1.90	1.40	*0.15*	*0.15*
VILNIUS06	Kviečių g. 15A Jeruzalė	581972	6068079	1.10	2.50	0.50	0.50	1.50	1.70	*0.15*	0.70
VILNIUS09	Vokiečių g. 1 Senamiestis	582959	6060975	2.00	0.50	3.70	2.20	2.40	1.60	0.50	1.40
VILNIUS11	Švitrigailos g. Panerių g.	581960	6059972	2.10	0.40	2.50	0.60	0.30	0.50	*0.15*	1.10
VILNIUS12	Darbininkų g. 11 Naujininkai	582010	6059221	1.80	0.90	3.40	0.40	1.80	0.70	*0.15*	1.00
VILNIUS15	Karklėnų g. 15 N. Vilnia	591991	6062292	1.80	0.70	2.00	4.10	2.30	*0.15*	*0.15*	
VILNIUS17	Lvovo g. 21A Šnipiškės	582548	6062873	0.50	0.40	0.60	1.10	1.50	0.90	*0.15*	0.40
VILNIUS19	Kęstučio g. Sėlių g. Žvėrynas	580579	6063083	1.30	0.80	1.10	1.10	4.10	1.90	0.70	0.30
VILNIUS21	Savanorių per. 41 G. Vilko g. 19	580262	6060396	1.90	0.60	1.20	0.40	0.40	0.40		0.50
VILNIUS22	Vingio Parko estrada Naujamiestis	579704	6061515	2.20	1.40	1.30	0.70	1.60	*0.15*	0.80	0.40
VILNIUS24	Architektų g. 49 Lazdynai	577530	6060653	1.20	0.60	1.30	0.80	1.40	1.20	0.80	1.60
VILNIUS27	Laisvės per. Justiniškių g. Virsuliškės	578871	6063710	0.40	0.50	1.60	0.80	"12.3"	1.30	0.60	*0.15*
VILNIUS29	Karališkių g. 1 Tarandė	577304	6068799	0.80	0.90	1.90	1.20	3.80	1.40	*0.15*	0.60
VILNIUS31	Laisvės per. Architektų g.	578744	6060752	1.40	0.50	0.60	0.70	"10.1"	1.70	0.30	2.10
VILNIUS33	Gariūnų g. ties turgumi	574529	6058544	1.70	0.60	1.00	*0.15*	3.00	0.50	1.00	0.70
OKTS02	Vilnius_Lazdynai	578075	6061735	0.8	0.3	1.2	0.6	9.0	2.5	0.4	1.3
OKTS03	Vilnius_Žirmūnai	583078	6065086	0.4	0.3	1.2	1.1	"14.2"	1.0	0.15	0.8

	lost or stolen
<0.3 = n.d.	half of detection limit = n.d.
"14.4"	outlier according Grubbs Test, replaced by mean

Table 9. Nitrogen dioxide concentrations in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		NO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
VILNIUS01	Žirmūnų g. 10 Žirmūnai	583758	6063331	24.0	18.1	23.6	21.6	21.4	20.7	18.3	14.2
VILNIUS02	Klinikų g. 7 Antakalnis	584763	6064354	26.5	18.3	29.4	26.1	23.9	20.5	18.3	15.3
VILNIUS03	Koklių g. 37 Dvarčionys	588156	6066315	14.8	11.3	13.6	13.2	9.9	7.5	6.0	4.9
VILNIUS04	Valakampių 2 pliažas	583365	6068074	19.5	10.7	15.3	12.3	12.2	9.4	8.5	5.7
VILNIUS05	Kareivių g. 1 Žirmūnai	583089	6065103	31.3	29.3	42.3	40.2	40.9	47.1	37.8	32.9
VILNIUS06	Kviečių g. 15A Jeruzalė	581972	6068079	19.8	15.5	21.6	15.9	18.2	14.3	13.5	9.4
VILNIUS07	Stanevičiaus g. 56 Fabijoniškės	580681	6066187	22.3	18.4	23.2	18.5	19.6	18.8	17.1	15.0
VILNIUS08	Ukmergės g. P. Žadeikos g. Pašilaičiai	579739	6066685	32.8	31.1	24.9	26.5	32.8	30.9	39.6	29.1
VILNIUS09	Vokiečių g. 1 Senamiestis	582959	6060975	32.7	24.2	32.5	37.6	36.3	44.8	31.6	35.8
VILNIUS10	Stoties transporto žiedas	582796	6060109	40.9	32.3	45.5	50.0	40.9	47.1	36.0	44.4
VILNIUS11	Švitrigailos g. Panerių g.	581960	6059972	45.9	29.3	44.0	53.2	50.5	55.9	38.7	46.9
VILNIUS12	Darbininkų g. 11 Naujininkai	582010	6059221	21.8	18.9	23.9	24.2	21.2	25.7	21.2	24.1
VILNIUS13	Žirnių g. 35 Naujininkai	582415	6058371	49.2	40.4	53.8	56.4	57.0	51.7	55.2	57.8
VILNIUS14	Žibuoklių g. 26 Markučiai	584931	6060496	14.6	12.7	19.3	21.0	17.1	18.7	10.5	13.9
VILNIUS15	Karklėnų g. 15 N. Vilnia	591991	6062292	14.5	11.5	14.0	14.4	12.2	13.3	10.2	
VILNIUS16	Šventaragio g. 1 Senamiestis	583063	6061719	28.3	20.9	28.5	28.2	25.8	27.3	19.4	25.9
VILNIUS17	Lvovo g. 21A Šnipiškės	582548	6062873	33.6	25.6	35.2	28.8	30.6	30.2	27.5	22.8
VILNIUS18	Ukmergės g. G. Vilko g.	581427	6063505	61.6	40.7	62.2	52.6	56.1	64.0	66.5	41.4
VILNIUS19	Kęstučio g. Sėlių g. Žvėrynas	580579	6063083	29.9	27.6	32.8	28.8	31.8	34.3	32.8	25.5
VILNIUS20	Pamėnkalnio g. Kudirkos g.	581758	6061964	58.1	49.4	50.0	47.4	55.2	57.0	52.7	65.8
VILNIUS21	Savanorių per. 41 G. Vilko g. 19	580262	6060396	27.5	21.2	27.1	23.9	26.6	24.2		7.8
VILNIUS22	Vingio Parko estrada Naujamiestis	579704	6061515	15.3	14.6	18.0	13.4	12.7	11.8	9.5	11.4
VILNIUS23	Oslo g. Erfurto g. Lazdynai	577161	6059998	31.8	22.8	30.1	24.2	25.6	28.3	26.7	24.1
VILNIUS24	Architektų g. 49 Lazdynai	577530	6060653	26.1	18.5	19.0	16.3	15.9	18.5	12.0	13.4
VILNIUS25	R. Jankausko g. 1 Karoliniškės	577897	6062249	26.7	23.3	21.7	16.2	17.9	16.0	22.1	19.4
VILNIUS26	Pajautos g. 11 Pilaitė	575851	6064365	16.0	15.6	12.5	12.4	10.9	12.8	14.0	10.5
VILNIUS27	Laisvės per. Justiniškių g. Virsuliškės	578871	6063710	55.6	34.1	46.2	32.4	39.8	33.0	46.3	32.7
VILNIUS28	Justiniškių g. 101 Justiniškės	578896	6065424	22.2	17.4	20.0	14.8	15.8	13.8	14.6	14.0
VILNIUS29	Karališkių g. 1 Tarandė	577304	6068799	12.2	12.8	11.1	8.0	9.0	6.6	7.6	5.6
VILNIUS30	Gelvonų g. 18 Šeškinė	580925	6064834	31.8	27.9	34.0	25.8	30.3	28.4	31.0	25.5
VILNIUS31	Laisvės per. Architektų g.	578744	6060752	47.7	31.6	46.5	40.1	44.7	49.9	49.8	36.2
VILNIUS32	Savanorių per. Vilkpėdės g.	580302	6059215	20.0	17.1	20.5	22.6	20.3	25.2	17.6	19.3
VILNIUS33	Gariūnų g. ties turgumi	574529	6058544	33.0	29.5	"-1.3"	24.4	32.1	31.0	26.9	33.9
VILNIUS34	Žaliųjų ež. G.	585735	6071814	13.0	11.2	13.8	10.9	11.6	7.9	8.1	5.6

VILNIUS35	Durpių g. Kalno g.	577762	6049785	10.1	9.1	10.5	13.1	10.1	11.8	15.6	8.9
OKTS02	Vilnius_Lazdynai	578075	6061735	16.9	14.8	18.1	15.0	12.0	13.8	11.8	10.7
OKTS03	Vilnius_Žirmūnai	583078	6065086	41.1	28.9	41.1	39.2	47.0	50.2	43.9	35.5

	lost or stolen
0.20	half of detection limit = n.d.
"14.4"	outlier according Grubbs Test, replaced by mean

Table 10. Benzene concentrations in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
VILNIUS01	Žirmūnų g. 10 Žirmūnai	583758	6063331	1.3	1.6	2.5	2.1	1.5	1.3	0.8	0.9
VILNIUS04	Valakampių 2 pliažas	583365	6068074	1.5	1.6	2.5	2.1	1.1	1.1	0.5	4.8
VILNIUS07	Stanevičiaus g. 56 Fabijoniškės	580681	6066187	1.0	1.6	2.6	2.1	1.5	1.3	0.8	1.0
VILNIUS09	Vokiečių g. 1 Senamiestis	582959	6060975	1.7	1.8	2.3	2.5	1.7	1.9	0.9	1.3
VILNIUS11	Švitrigailos g. Panerių g.	581960	6059972	2.0	1.7	2.6	2.8	1.9	2.0	0.7	1.8
VILNIUS13	Žirnių g. 35 Naujininkai	582415	6058371	2.1	2.2	3.0	2.9	2.2	1.7	1.0	1.7
VILNIUS15	Karklėnų g. 15 N. Vilnia	591991	6062292	2.1	1.5	2.1	2.7	1.3	1.4	0.6	
VILNIUS18	Ukmergės g. G. Vilko g.	581427	6063505	2.0	2.3	3.7	3.1	2.1	2.3	1.3	1.6
VILNIUS20	Pamėnkalnio g. Kudirkos g.	581758	6061964	2.1	2.7	2.7	2.7	1.7	2.1	2.3	2.3
VILNIUS23	Oslo g. Erfurto g. Lazdynai	577161	6059998	1.6	1.4	2.1	2.1	1.2	1.20	0.5	1.2
VILNIUS26	Pajautos g. 11 Pilaitė	575851	6064365	2.6	1.6	2.0	2.2	1.4	1.3	0.6	2.3
VILNIUS28	Justiniškių g. 101 Justiniškės	578896	6065424	1.0	1.5	3.0	2.0	1.3	1.1	0.6	2.6
VILNIUS30	Gelvonų g. 18 Šeškinė	580925	6064834	1.4	2.0	2.4	2.3	1.8	1.4	0.9	1.4
VILNIUS32	Savanorių per. Vilkpėdės g.	580302	6059215	1.4	2.4	2.2	2.2	1.4	1.4	0.6	0.8
VILNIUS35	Durpių g. Kalno g.	577762	6049785	1.0	1.8	2.2	2.0	1.4	1.2	0.6	1.7
OKTS02	Vilnius_Lazdynai	578075	6061735	0.8	1.3	0.4	2.2	1.2	1.4	0.4	0.9
OKTS03	Vilnius_Žirmūnai	583078	6065086	1.6	2.0	3.4	2.8	1.8	1.7	0.6	1.3

	lost or stolen
	duplicates

4.3.1.4 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide and benzene concentrations in Vilnius agglomeration

Sulfur dioxide

The bi-weekly concentrations of SO_2 in ambient air were measured at 15 sites. The list of stations can be found in Table 7. The obtained data during the all study period are presented in the Table 8. For the entire study period (from 3 November 2010 to 4 July 2011), the mean annual concentrations of SO_2 ranged between 0.69 and 1.79 μg/m^3 (Fig.6). The exceedance above the annual limit value of 20.0 μg/m^3 for the ecosystems was not observed neither at the sites in the urban nor in suburban background areas.

Annual means of SO_2 were significantly below the annual limit value and even below the lower assessment threshold value of 8.0 μg/m^3 (Fig.6, Table 11).

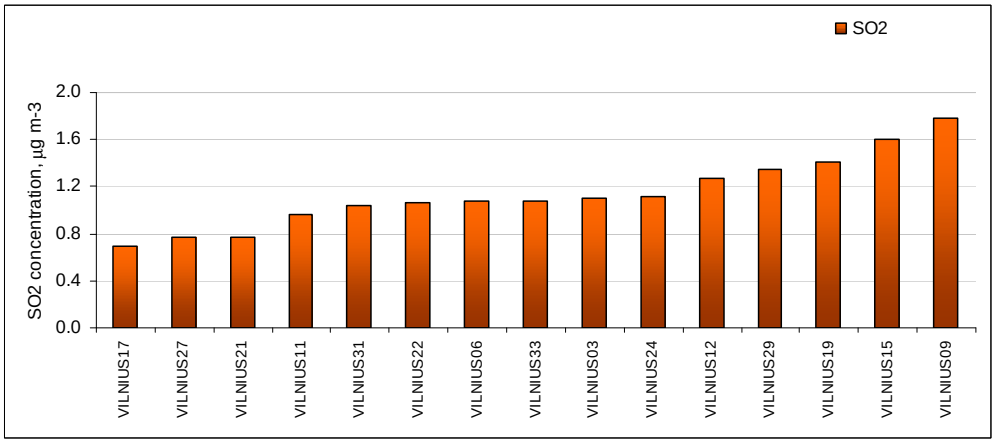


Fig. 6. Annual mean concentrations of sulfur dioxide in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011.

Table11. Statistics for the sulfur dioxide atmospheric concentrations inside Vilnius agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	SO_2 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
VILNIUS03	Dvarčionys	1.50	1.10	1.65	0.15	0.15	2.60	1.10
VILNIUS06	Jeruzalė	1.80	0.50	1.60	0.43	0.15	2.50	1.08
VILNIUS09	Senamiestis	1.25	2.95	2.00	0.95	0.50	3.70	1.79
VILNIUS11	Švitrigailos-Panerių g.	1.25	1.55	0.40	0.63	0.15	2.50	0.96
VILNIUS12	Naujininkai	1.35	1.90	1.25	0.58	0.15	3.40	1.27
VILNIUS15	N. Vilnia	1.25	3.05	1.23	0.15	0.15	4.10	1.60
VILNIUS17	Šnipiškės	0.45	0.85	1.20	0.28	0.15	1.50	0.69
VILNIUS19	Kęstučio-Sėlių g.	1.05	1.10	3.00	0.50	0.30	4.10	1.41
VILNIUS21	Naujamiestis	1.25	0.80	0.40	0.50	0.40	1.90	0.77
VILNIUS22	Vingio parkas	1.80	1.00	0.88	0.60	0.15	2.20	1.07
VILNIUS24	Lazdynai	0.90	1.05	1.30	1.20	0.60	1.60	1.11
VILNIUS27	Laisvės pr.- Justiniškių g	0.45	1.20	1.30	0.38	0.15	1.60	0.76
VILNIUS29	Tarandė	0.85	1.55	2.60	0.38	0.15	3.80	1.34
VILNIUS31	Laisvės pr.- Architektų g .	0.95	0.65	1.70	1.20	0.30	2.10	1.04
VILNIUS33	Gariūnų g	1.2	0.6	1.8	0.9	0.2	3.0	1.1

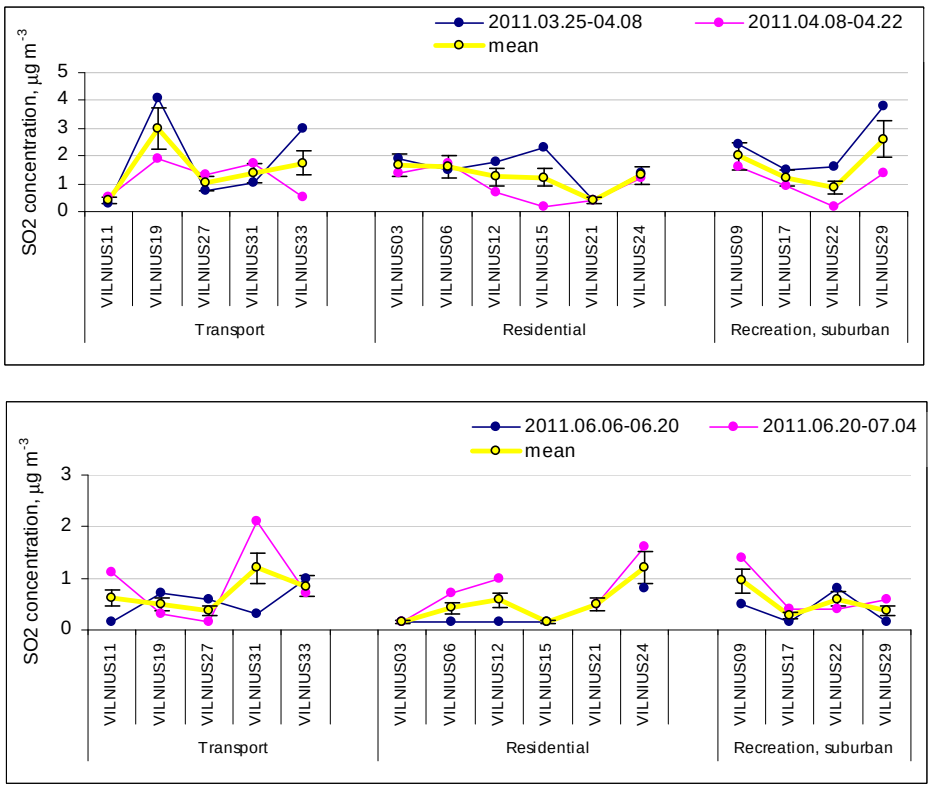
The measured SO_2 values were averaged over the autumn, winter, spring and summer periods (Table 11). Data indicate that mean SO_2 concentrations did not exceed air quality limit

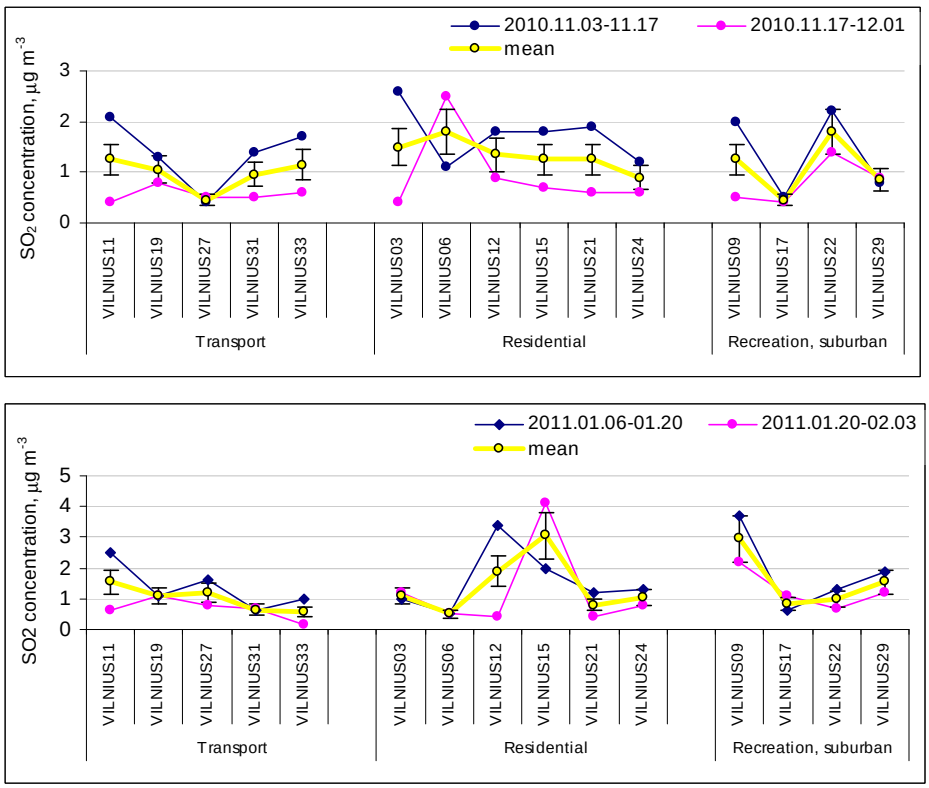
value for the ecosystems and even were below the lower assessment threshold value (Table 1). Overall, SO_2 concentrations were similar measured in the spatial pattern and the magnitude of the variability. As can be seen (Fig.7), during autumn (3 November – 1 December 2010) the averaged SO_2 concentration had the highest value of 1.80 μg/m^3 at two sites (Vilnius06 and Vilnius22) located in the residential and recreation area, respectively. The mean concentrations of SO_2 were quite similar at the rest sites in transport and recreation/background areas ranging from 0.45 μg/m^3 to 1.25 μg/m^3. However, residential area had slightly elevated levels (0.90 – 1.50 μg/m^3) compared to sites in the transport and recreation areas. The lowest mean concentration of SO_2 was 0.45 μg/m^3 at sites Vilnius17 and Vilnius27.

In winter (6 January– 3 February 2011), SO_2 concentrations ranged from 0.50 to 4.10 μg/m^3. The highest mean values for this study period were 3.05 μg/m^3 and 2.95 μg/m^3 at the sites Vilnius15 and Vilnius09. SO_2 concentrations were somewhat lower at the sites in transport area with the mean values in the range between 0.58 and 1.55 μg/m^3. The lowest mean concentration (0.50 μg/m^3) was at the site Vilnius06.

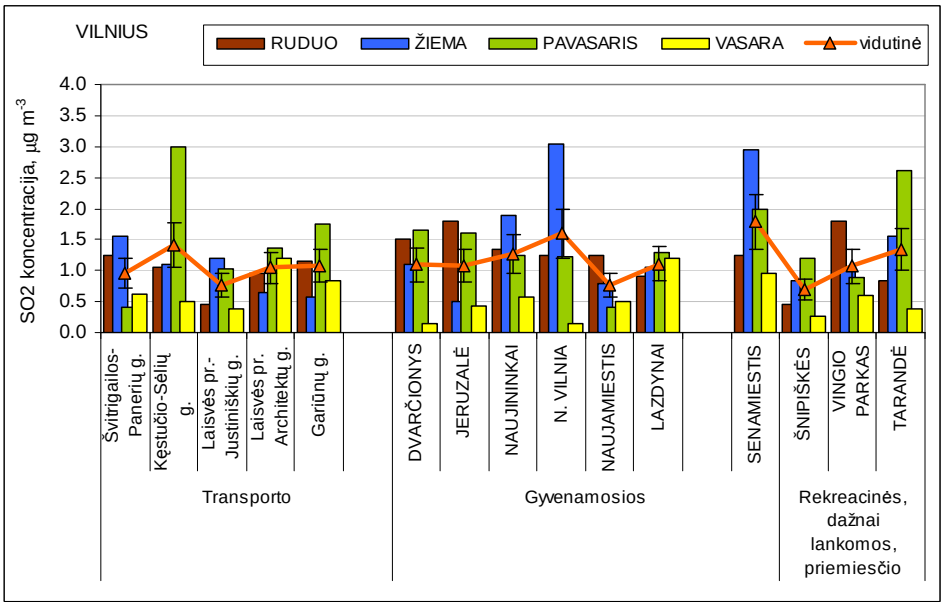
The results indicate, that in the springtime (25 March – 22 April 2011) SO_2 concentrations ranged from 0.15 to 4.10 μg/m^3. The minimum mean value (0.40 μg/m^3) of SO_2 concentration was measured at a site (Vilnius22) in a residential area and the maximum (3.0 μg/m^3) at traffic–exposed site (Vilnius19).

During the summer study (6 June – 4 July 2011), SO_2 concentrations ranged between 0.15 and 2.10 μg/m^3. The highest mean value of 1.20 μg/m^3 for this period was reached at two sites (Vilnius31 and Vilnius23), while the lowest mean SO_2 value of 0.15 μg/m^3 was at the site Vilnius03 and Vilnius15.





7 pav. Site-specific seasonal variation of sulfur dioxide concentrations for the period from 3 November 2010 to 4 July 2011 (bar lines show ± 22.1% expanded uncertainty)



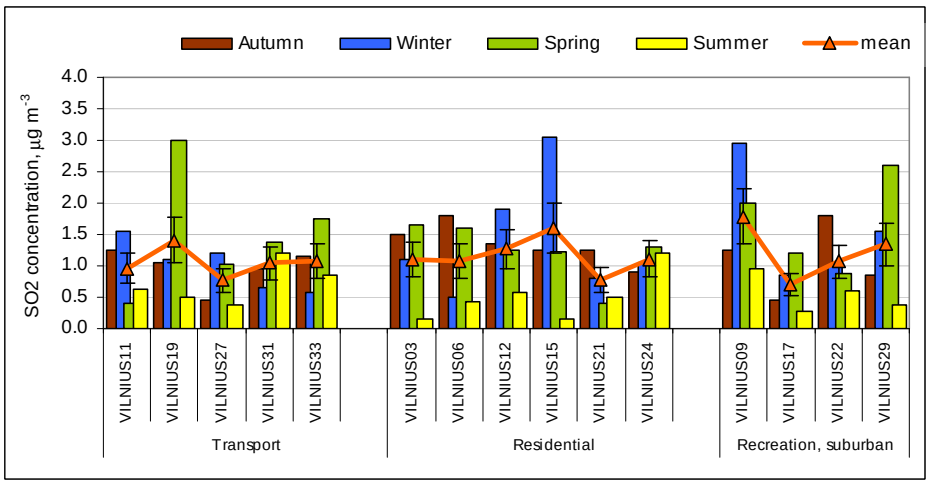


Fig.8. Seasonal variation of mean sulfur dioxide concentrations for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 22.1% expanded uncertainty)

Fig. 8 and Fig. 9 present the summarized results for the seasonal variation of sulfur dioxide concentrations in different areas of Vilnius agglomeration. The results may have a limited representability due to a study time period of just 1 year; however, the differences between the various sites and seasons are obvious. In an overall sense, the seasonal pattern showed an adequate similarity at sites in the traffic, residential and recreation areas. Data indicate that at sites in the residential and recreation areas the higher SO_2 levels were recorded in autumn, winter and spring, when the emissions from energy production are at their highest level. Conversely, the lowest SO_2 levels were measured in summer. Therefore, the seasonal variability of concentrations should be interpreted using existing knowledge on emission and meteorological patterns. In summary, the mean sulfur dioxide concentration in Vilnius agglomeration ranged from 0.15 to 3.05 µg/m^3 with an annual mean of 1.13 µg/m^3.

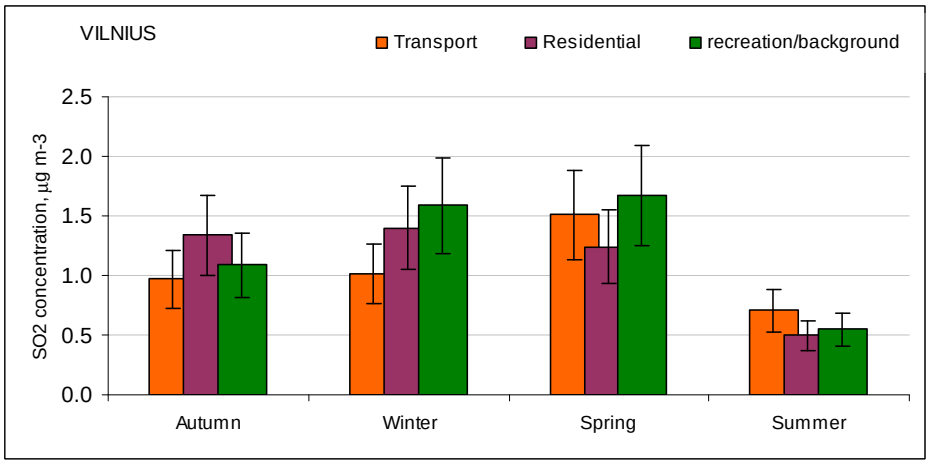


Fig.9. Seasonal variation of mean sulfur dioxide concentrations at site-specific areas for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 22.1% expanded uncertainty)

Nitrogen dioxide

Nitrogen dioxide atmospheric concentrations were measured using diffusive samplers at 35 sites in Vilnius agglomeration. The list of stations can be found in Table 7. The obtained data during the all study period are presented in the Table 9. Nitrogen dioxide concentrations may vary considerably within city from time to time and, in general, depend on the distance of the measurement site from main streets and roads. For the entire study period, the mean

concentration for the NO_2 ranged between 9.1 and 55.6 μg/m^3 (Fig. 10) The NO_2 concentrations demonstrate a large spatial gradient of about a factor of 5, which indicate that road traffic is an important contributor to the NO_2 concentration, especially in a city environment. The mean values for the NO_2 concentration at the sites with the high traffic density (Vilnius18, Vilnius20, Vilnius13, Vilnius11, Vilnius31 and Vilnius05) were generally higher than that at the sites in the rest area of Vilnius, and were above the NO_2 limit value of 40 ug/m3. The mean concentrations of NO_2 at sites with the minor traffic density (Vilnius23, Vilnius33, Vilnius19 and Vilnius08) were close to the upper assessment value of 32 μg/m^3. NO_2 concentrations were less than 26 μg/m^3 at the most of sites in the residential and recreation areas. However, at sites (Vilnius16, Vilnius17 Vilnius09 and Vilnius10) in the most visited areas with high density of motor vehicles and in one residential area (Vilnius30) the mean concentration of NO_2 ranged between 26.0 and 42.1 μg/m^3. Thus, an exposure to those NO_2 concentrations represents a serious risk to human health. The variability and large number of exceedences of EU standards for NO_2 reflect the impact of emissions from the motor transport in a city.

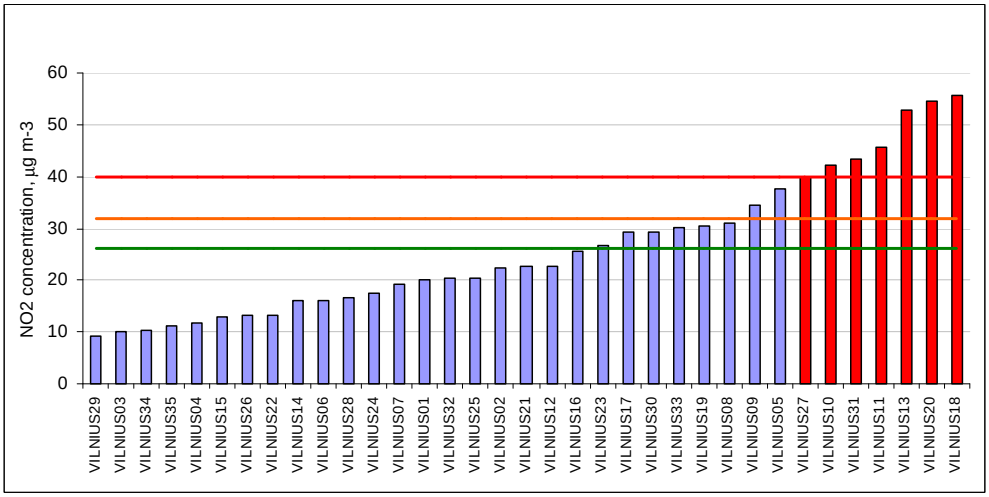


Fig. 10. Annual mean concentrations of nitrogen dioxide in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011.

Data indicate (Fig.11) that the mean NO_2 concentration during the first campaign (3 November – 1 December 2010) ranged from 9.6 μg/m^3 to 53.8 μg/m^3 depending on the site character. The NO_2 concentrations measured at almost all traffic sites were higher than those at residential or urban background sites and ranged between 18.6 and 53.8 μg/m^3. The limit value of 40 μg/m^3 as annual mean concentration of NO_2 was exceeded at 5 sites: Vilnius13, Vilnius18, Vilnius20, Vilnius27 and Vilnius31. Those sites are characterized as sites with intensive traffic flow and mean concentration of NO_2 reached value of 46.9 μg/m^3. Taking into account ± 21.6% uncertainty of measured NO_2 values, the limit value should be exceeded or achieved at others two traffic sites (Vilnius08 and Vilnius33). The exceedances above the NO_2 limit value (40 μg/m^3) were not observed at sites in the residential area and they ranged from 13.0 to 29.9 μg/m^3. The NO_2 concentrations at sites in recreation and suburban background areas were in the range 9.6 – 36.6 μg/m^3 and were below the lower assessment threshold (26 μg/m3). However, at the background sites in the most visited areas of the city (Vilnius09, Vilnius10, Vilnius16 and Vilnius17), the mean concentration of NO_2 ranged between 24.5 and 36.6 μg/m^3.

Table 12. Statistics for the nitrogen dioxide atmospheric concentrations inside Vilnius agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	NO_2 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
VILNIUS01	Žirmūnų g. 10 Žirmūnai	21.1	22.6	21.1	16.3	14.2	24.0	20.2
VILNIUS02	Klinikų g. 7 Antakalnis	22.4	27.8	22.2	16.8	15.3	29.4	22.3
VILNIUS03	Koklių g. 37 Dvarčionys	13.1	13.4	8.7	5.5	4.9	14.8	10.2
VILNIUS04	Valakampių 2 pliažas	15.1	13.8	10.8	7.1	5.7	19.5	11.7
VILNIUS05	Kareivių g. 1 Žirmūnai	30.3	41.3	44.0	35.4	29.3	47.1	37.7
VILNIUS06	Kviečių g. 15A Jeruzalė	17.7	18.8	16.3	11.5	9.4	21.6	16.0
VILNIUS07	Stanevičiaus g. 56 Fabijoniškės	20.4	20.9	19.2	16.1	15.0	23.2	19.1
VILNIUS08	Ukmergės g. P. Žadeikos g. Pašilaičiai	32.0	25.7	31.9	34.4	24.9	39.6	31.0
VILNIUS09	Vokiečių g. 1 Senamiestis	28.5	35.1	40.6	33.7	24.2	44.8	34.4
VILNIUS10	Stoties transporto žiedas	36.6	47.8	44.0	40.2	32.3	50.0	42.1
VILNIUS11	Švitrigailos g. Panerių g.	37.6	48.6	53.2	42.8	29.3	55.9	45.6
VILNIUS12	Darbininkų g. 11 Naujininkai	20.4	24.1	23.5	22.7	18.9	25.7	22.6
VILNIUS13	Žirnių g. 35 Naujininkai	44.8	55.1	54.4	56.5	40.4	57.8	52.7
VILNIUS14	Žibuoklių g. 26 Markučiai	13.7	20.2	17.9	12.2	10.5	21.0	16.0
VILNIUS15	Karklėnų g. 15 N. Vilnia	13.0	14.2	12.8	10.2	10.2	14.5	12.9
VILNIUS16	Šventaragio g. 1 Senamiestis	24.6	28.4	26.6	22.7	19.4	28.5	25.5
VILNIUS17	Lvovo g. 21A Šnipiškės	29.6	32.0	30.4	25.2	22.8	35.2	29.3
VILNIUS18	Ukmergės g. G. Vilko g.	51.2	57.4	60.1	54.0	40.7	66.5	55.6
VILNIUS19	Kęstučio g. Sėlių g. Žvėrynas	28.8	30.8	33.1	29.2	25.5	34.3	30.4
VILNIUS20	Pamėnkalnio g. Kudirkos g.	53.8	48.7	56.1	59.3	47.4	65.8	54.5
VILNIUS21	Savanorių per. 41 G. Vilko g. 19	24.4	25.5	25.4	7.8	7.8	27.5	22.6
VILNIUS22	Vingio Parko estrada Naujamiestis	15.0	15.7	12.3	10.5	9.5	18.0	13.3
VILNIUS23	Oslo g. Erfurto g. Lazdynai	27.3	27.2	27.0	25.4	22.8	31.8	26.7
VILNIUS24	Architektų g. 49 Lazdynai	22.3	17.7	17.2	12.7	12.0	26.1	17.5
VILNIUS25	R. Jankausko g. 1 Karoliniškės	25.0	19.0	17.0	20.8	16.0	26.7	20.4
VILNIUS26	Pajautos g. 11 Pilaitė	15.8	12.5	11.9	12.3	10.5	16.0	13.1
VILNIUS27	Laisvės per. Justiniškių g. Viršuliškės	44.9	39.3	36.4	39.5	32.4	55.6	40.0
VILNIUS28	Justiniškių g. 101 Justiniškės	19.8	17.4	14.8	14.3	13.8	22.2	16.6
VILNIUS29	Karališkių g. 1 Tarandė	12.5	9.6	7.8	6.6	5.6	12.8	9.1
VILNIUS30	Gelvonų g. 18 Šeškinė	29.9	29.9	29.4	28.3	25.5	34.0	29.3
VILNIUS31	Laisvės per. Architektų g.	39.7	43.3	47.3	43.0	31.6	49.9	43.3
VILNIUS32	Savanorių per. Vilkpėdės g.	18.6	21.6	22.8	18.5	17.1	25.2	20.3
VILNIUS33	Gariūnų g. ties turgumi	31.3	24.4	31.6	30.4	24.4	33.9	30.1
VILNIUS34	Žaliųjų ež. G.	12.1	12.4	9.8	6.9	5.6	13.8	10.3
VILNIUS35	Durpių g. Kalno g.	9.6	11.8	11.0	12.3	8.9	15.6	11.2

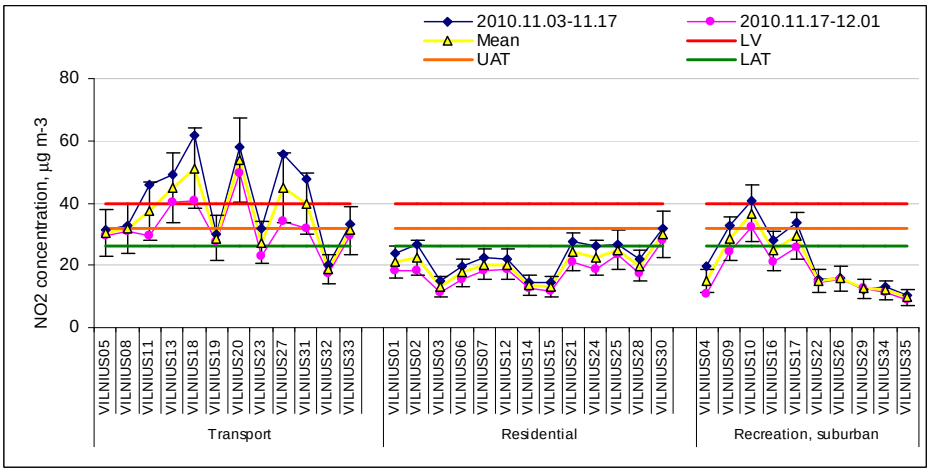


Fig.11 Site-specific variation of nitrogen dioxide concentrations for the period from 3 November to 1 December 2010 (bar lines show ± 21.6% expanded uncertainty)

In the wintertime (6 January – 3 February 2011), mean NO_2 levels ranged from 9.6 to 57.4 µg/m^3 (Fig. 12). The highest mean values of NO_2 for this study period achieved or exceeded the limit value of 40 µg/m^3 at 7 sites in transport area (Vilnius05, Vilnius111, Vilnius13, Vilnius18, Vilnius20, Vilnius27 and Vilnius31). Taking into account ± 21.6 % expanded uncertainty of measured NO_2 values, the limit value should be exceeded at the other traffic site Vilnius19. The upper assessment threshold value of 32.0 µg/m^3 should be exceeded at 3 sites in a transport area (Vilnius08, Vilnius23 and Vilnius33). The mean NO_2 concentrations at the sites in a residential and recreation/suburban background areas were in the range 13.4 – 29.9 µg/m^3 and 9.6 – 47.8 µg/m^3, respectively. Regarding the lower assessment threshold (26 µg/m3), it was exceeded at 3 sites (Vilnius02, Vilnius12 and Vilnius30) while at two sites (Vilnius07 and Vilnius14) it was marginally achieved. Figure 8 also shows that mean NO_2 concentrations are significantly higher at sites Vilnius09, Vilnius10, Vilnius16 and Vilnius17 than at the others sites in recreation/suburban background areas, mainly due to the high frequency of motor vehicles at those sites.

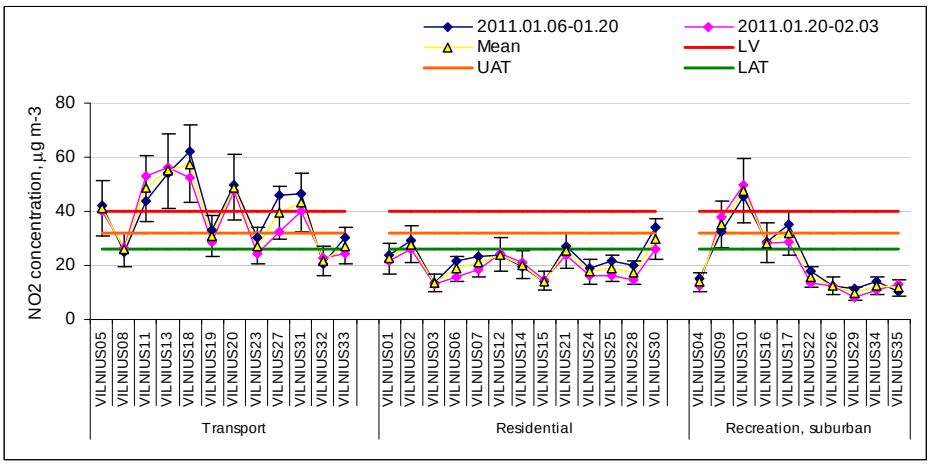


Fig. 12. Site-specific variation of nitrogen dioxide concentrations for the period from 6 January to 2 March 2011 (bar lines show ± 21.6% expanded uncertainty)

In spring (25 March – 22 April 2011), mean values of NO_2 varied from 7.8 to 60.1 µg/m^3 (Fig. 13). Regarding the annual limit value of 40 µg/m^3 for NO_2, it was exceeded or achieved by the mean NO_2 concentration for this season at 10 sites in transport area (Vilnius05, Vilnius08, Vilnius11, Vilnius18, Vilnius19, Vilnius20, Vilnius27, Vilnius31 and Vilnius33), while at 2 sites (Vilnius23 and Vilnius32) it was around the lower assessment

threshold value of 26 μg/m^3. The annual limit value was also violated at three sites (Vilnius09, Vilnius10 and Vilnius17) that are the most visitable in the recreation area, while the mean concentration of NO_2 was significantly lower at the rest of sites in this area. Mean values of NO_2 were in the range of 8.7 – 29.4 μg/m^3 at the sites in residential area. Taking into account ± 21.6% expanded uncertainty of measured NO_2 concentration, the lower assessment threshold value should be exceeded in this area at sites Vilnius01, Vilnius02, Vilnius12, Vilnius21 and Vilnius30, because its are closer to streets with higher density of road traffic.

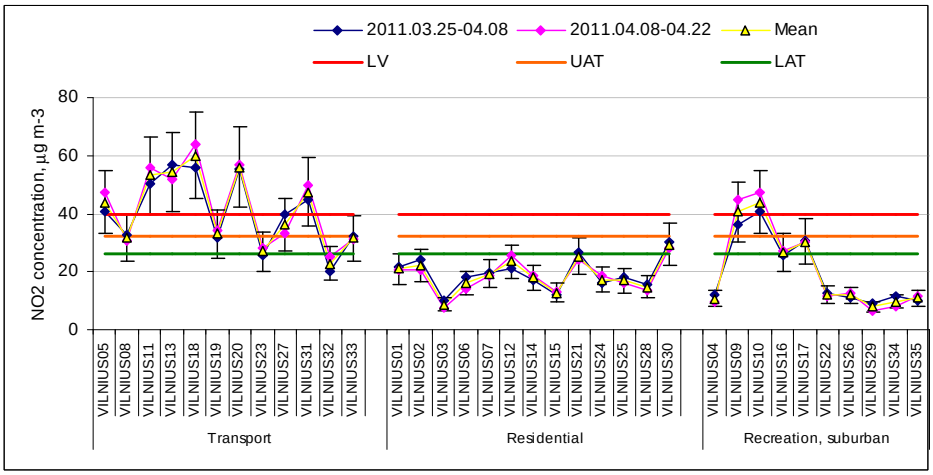


Fig. 13. Site-specific variation of nitrogen dioxide concentrations for the period from 25 March to 22 April 2011 (bar lines show ± 21.6% expanded uncertainty)

NO_2 mean concentrations differed from site to site and ranged from 5.5 to 59.3 μg/m^3 during the study period from 6 June to 4 July 2011 (Fig.14). Remarkably higher NO_2 concentrations with values of 42.8, 43.0, 54.0 56.5 and 59.3 μg/m^3 were observed, respectively, at the traffic-exposed sites Vilnius 11, Vilnius31, Vilnius18, Vilnius13 and Vilnius20. By assessing ± 21.6 % expanded uncertainty of measured NO_2 concentration, the limit value of 40 μg/m^3 should be also achieved at three sites (Vilnius27, Vilnius05 and Vilnius08) in a transport area. As can be seen from Fig. 14, higher levels of NO_2 were measured during summer at some sites in residential and recreation areas (20.8 – 28.3 and 22.7 – 40.2 μg/m^3, respectively). As expected, NO_2 concentration was significantly higher in residential and recreation areas at the sites influenced by traffic emissions: Vilnius12, Vilnius25, Vilnius30, Vilnius09, Vilnius10, Vilnius16 and Vilnius17.

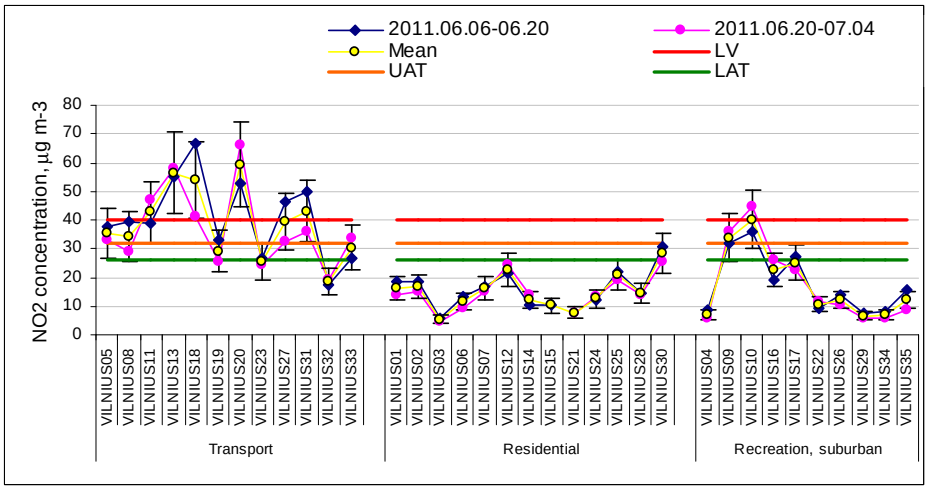


Fig.14. Site-specific variation of nitrogen dioxide concentrations for the period from 6 June to 4 July 2011 (bar lines show ± 21.6% expanded uncertainty)

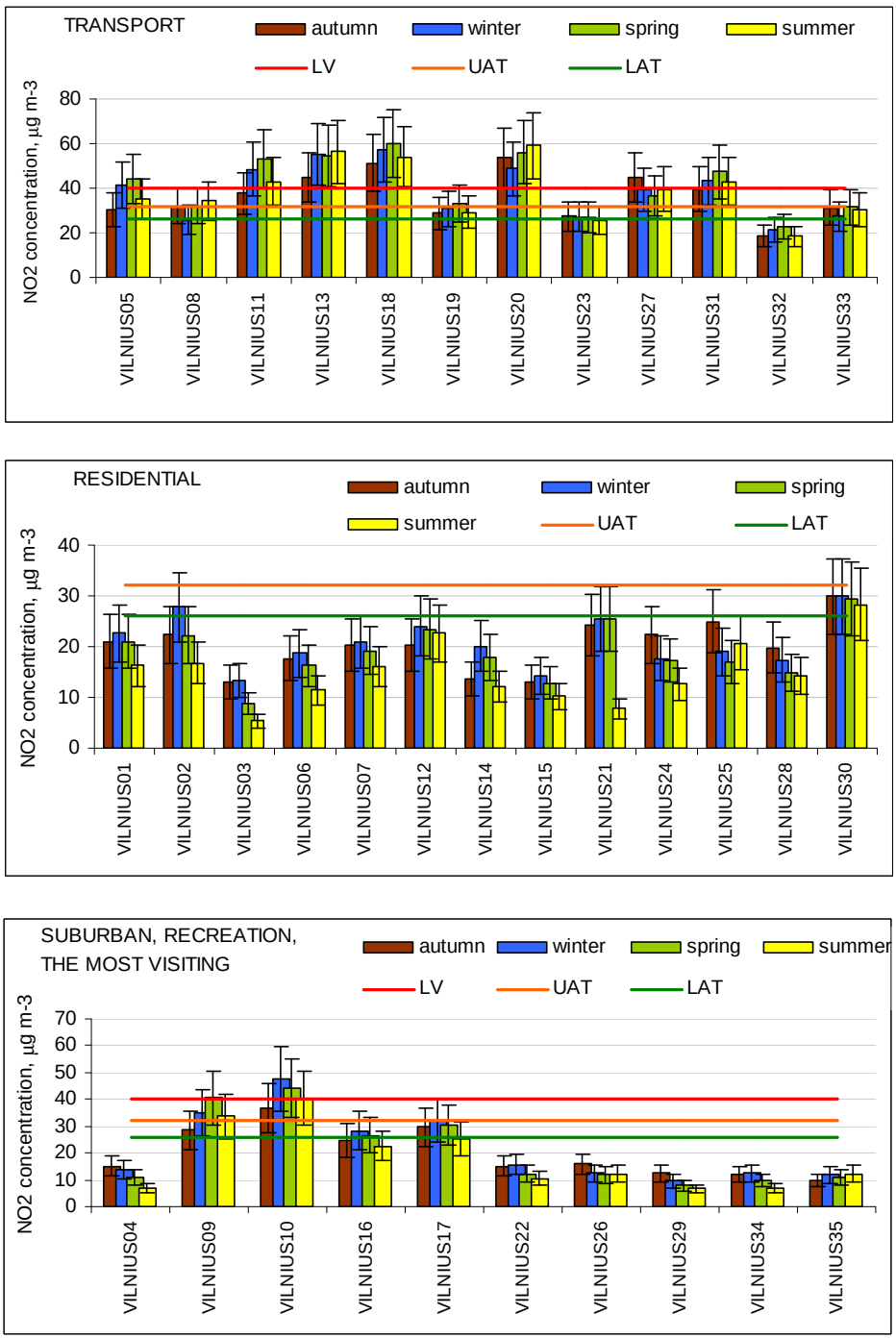


Fig.15. Seasonal variation of mean nitrogen dioxide concentrations at site-specific areas for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 21.6% expanded uncertainty)

Figure 15 shows the statistical distributions of mean NO_2 concentrations at the sites in three areas during all seasons of the year. Seasonally averaged concentrations of NO_2 were generally higher during winter and spring nearly at all sites. Conversely, the lowest NO_2 levels were measured in summer. The winter and spring maximum of NO_2 concentrations can be explained by seasonal change in the meteorological conditions, such as wind speed, wind direction, and restricted atmospheric mixing conditions. Besides, winter and summer obviously differ in their light intensity and length of days, which impact indirect photochemical conversion processes of NO*x* to NO*y* species (e.g., reactions of NO_2 with OH and RO_2 radicals). On the whole, NO_2 levels (annual mean concentration) in Vilnius agglomeration ranged from 5.5 to 60.1 µg/m^3. A comparison of NO_2 mean concentrations

from the sites in residential – recreation and in transport areas indicates significantly higher concentrations at sites in transport area during the study period: mean concentrations of NO_2 are less than half of those in the transport area.

Benzene

Benzene atmospheric concentrations were measured using passive samplers at 15 sites in Vilnius agglomeration. Benzene is considered as an indicator of others volatile organic compounds and its limit value of 5 μg/m^3 has been adopted since 2010. The list of stations can be found in Table 7. The obtained data during the all study period are presented in the Table 10. For the entire study period (3 November 2010 to 4 July 2011), the annual mean values for the benzene concentrations were in the range of 1.4 to 2.3 μg/m^3 and they almost were lower by factor of 2 – 3.5 than the annual limit value of 5.0 μg/m^3 (Fig. 16). Benzene concentrations were higher than the lower assessment threshold value of 2.0 μg/m^3 at three sites in the high traffic areas (Vilnius13, Vilnius18 and Vilnius20). The sites Vilnius18 and Vilnius20 are in the area with the high density of vehicle traffic and commercial activities, therefore, annual mean benzene value of 2.3 μg/m^3 at those sites suggests that benzene concentrations are controlled by local sources. Data indicate that the concentration of benzene is mostly determined by automobile emissions in the city.

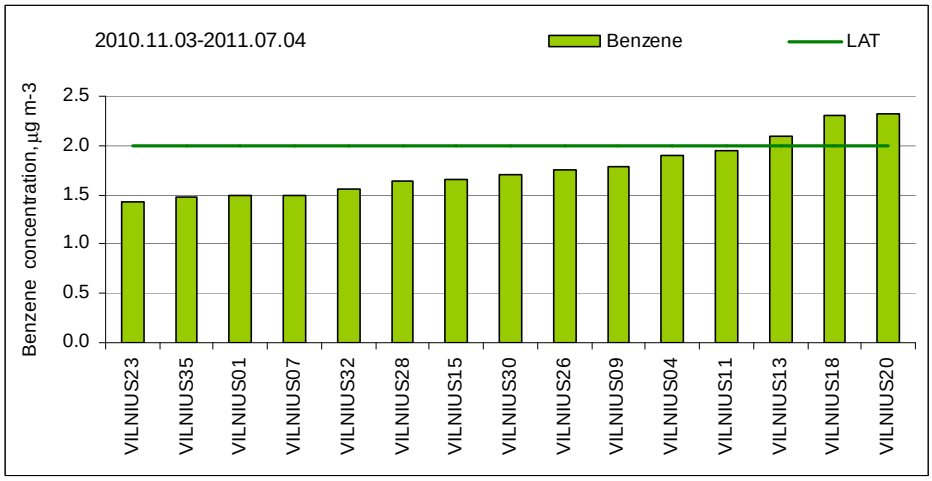


Fig. 16. Anual mean concentrations of benzene in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011.

Data indicate (Fig. 17) that benzene concentrations during the first study period (3 November – 1 December 2010) did not reached the annual limit value (5.0 μg/m^3) and ranged from 1.3 μg/m^3 to 2.4 μg/m^3. The mean concentration of benzene at all sites in residential and recreation areas were below the lower assessment threshold value of 2.0 μg/m^3, however, taking into account ±28.2% expanded uncertainty of measured benzene concentration, it should be achieved at the sites Vilnius30, Vilnius15, Vilnius16 and Vilnius26. Vilnius30, in a transport area. Mean benzene concentrations almost at all sites in transport area were above the lower assessment threshold value and varied from 1.5 to 2.4 μg/m^3.

Table 13. Statistics for the benzene atmospheric concentrations inside Vilnius agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	Benzene concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
VILNIUS01	Žirmūnų g. 10 Žirmūnai	1.5	2.3	1.4	0.8	0.8	2.5	1.5
VILNIUS04	Valakampių 2 pliažas	1.6	2.3	1.1	2.6	0.5	4.8	1.9
VILNIUS07	Stanevičiaus g. 56	1.3	2.4	1.4	0.9	0.8	2.6	1.5

	Fabijoniškės							
VILNIUS09	Vokiečių g. 1 Senamiestis	1.8	2.4	1.8	1.1	0.9	2.5	1.8
VILNIUS11	Švitrigailos g. Panerių g.	1.9	2.7	1.9	1.3	0.7	2.8	1.9
VILNIUS13	Žirnių g. 35 Naujininkai	2.2	2.9	1.9	1.4	1.0	3.0	2.1
VILNIUS15	Karklėnų g. 15 N. Vilnia	1.8	2.4	1.3	0.6	0.6	2.7	1.7
VILNIUS18	Ukmergės g. G. Vilko g.	2.2	3.4	2.2	1.4	1.3	3.7	2.3
VILNIUS20	Pamėnkalnio g. Kudirkos g.	2.4	2.7	1.9	2.3	1.7	2.7	2.3
VILNIUS23	Oslo g. Erfurto g. Lazdynai	1.5	2.1	1.2	0.9	0.5	2.1	1.4
VILNIUS26	Pajautos g. 11 Pilaitė	2.1	2.1	1.4	1.4	0.6	2.6	1.8
VILNIUS28	Justiniškių g. 101 Justiniškės	1.3	2.5	1.2	1.6	0.6	3.0	1.6
VILNIUS30	Gelvonų g. 18 Šeškinė	1.7	2.4	1.6	1.1	0.9	2.4	1.7
VILNIUS32	Savanorių per. Vilkpėdės g.	1.9	2.2	1.4	0.7	0.6	2.4	1.6
VILNIUS35	Durpių g. Kalno g.	1.4	2.1	1.3	1.1	0.6	2.2	1.5

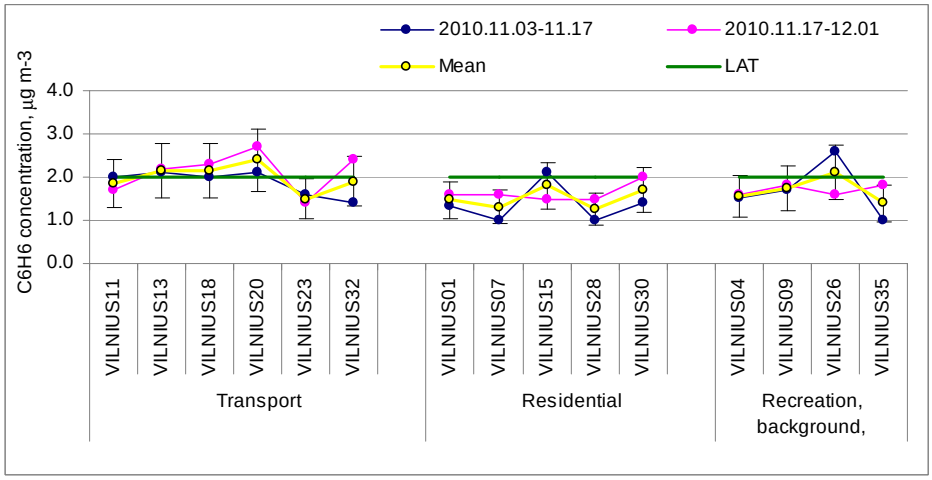


Fig. 17. Site-specific variation of benzene concentrations for the period from 3 November to 1 December 2010 (bar lines show ± 28.2% expanded uncertainty)

In the wintertime (6 January– 3 February 2011), benzene concentrations ranged from 2.1 to 3.4 µg/m^3 and were above the lower assessment threshold value of 2.0 µg/m^3 (Fig. 18) at all sites in Vilnius agglomeration. For this study period the highest mean values of benzene at four sites in transport area (Vilnius11, Vilnius20, Vilnius13 and Vilnius18) were near to the upper assessment threshold value of 3.5 µg/m^3

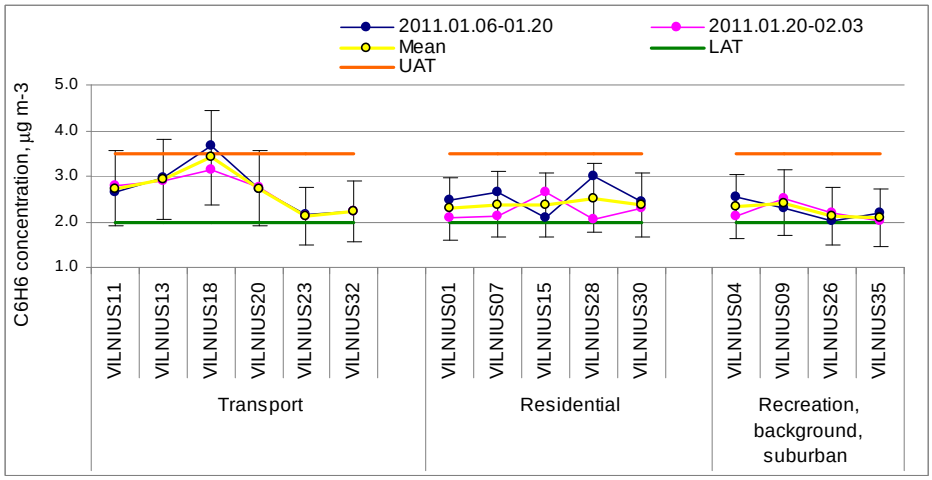


Fig. 18 Site-specific variation of benzene concentrations for the period from 6 January to 2 March 2011 (bar lines show ± 28.2% expanded uncertainty)

Data in Fig. 19 show that mean values of benzene varied from 1.1 μg/m^3 (Vilnius04) to 2.2 μg/m^3 (Vilnius18) during the study period from 25 March to 22 April 2011. Generally, spring concentrations of benzene almost at all sites were below 2.0 μg/m^3 (i.e. the lower assessment threshold value), but it could be achieved at the sites Vilnius20, Vilnius13, Vilnius11, Vilnius18 and Vilnius09.

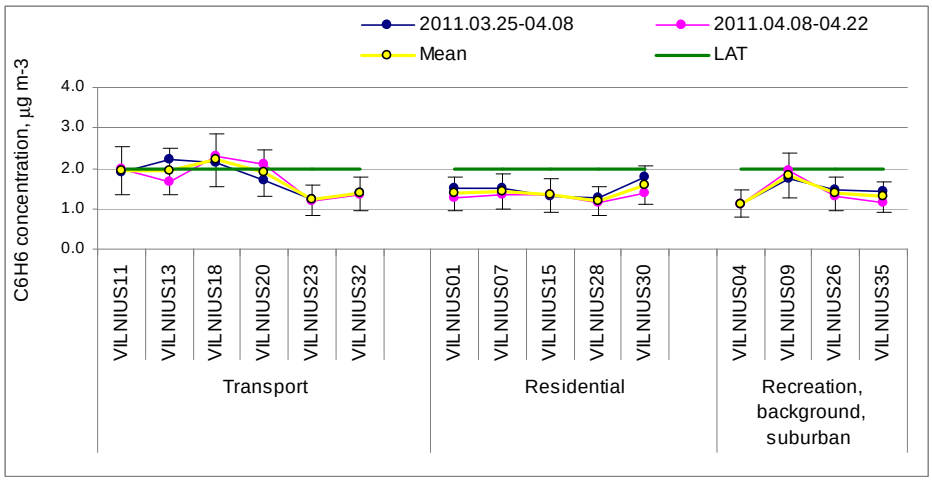


Fig. 19. Site-specific variation of benzene concentrations for the period from 25 March to 22 April 2011 (bar lines show ± 28.2% expanded uncertainty)

Benzene concentrations differed from site to site and ranged from 0.5 to 4.8 μg/m^3 during the summer period from 6 June to 4 July 2011 (Fig. 20). The highest summer value of 4.8 μg/m^3 was measured at the site Vilnius04 in a recreation area during the period from 20 June to 4 July 2011. Figure 20 also shows that mean benzene concentrations were higher at the sites Vilnius20 and Vilnius04, respectively, 2.3 and 2.6 μg/m^3; while at the rest of sites mean values of benzene did not exceed the lower assessment threshold value (2.0 μg/m^3).

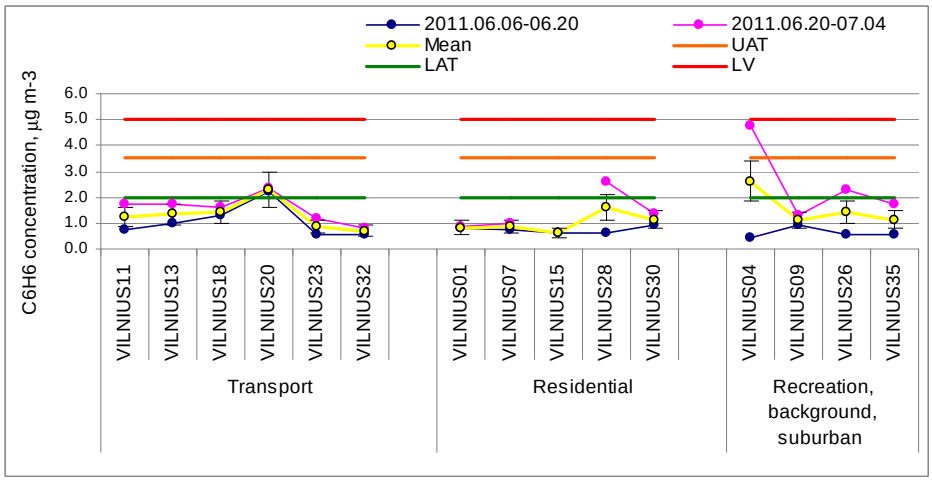


Fig. 20. Site-specific variation of benzene concentrations for the period from 6 June to 4 July 2011 (bar lines show ± 28.2% expanded uncertainty)

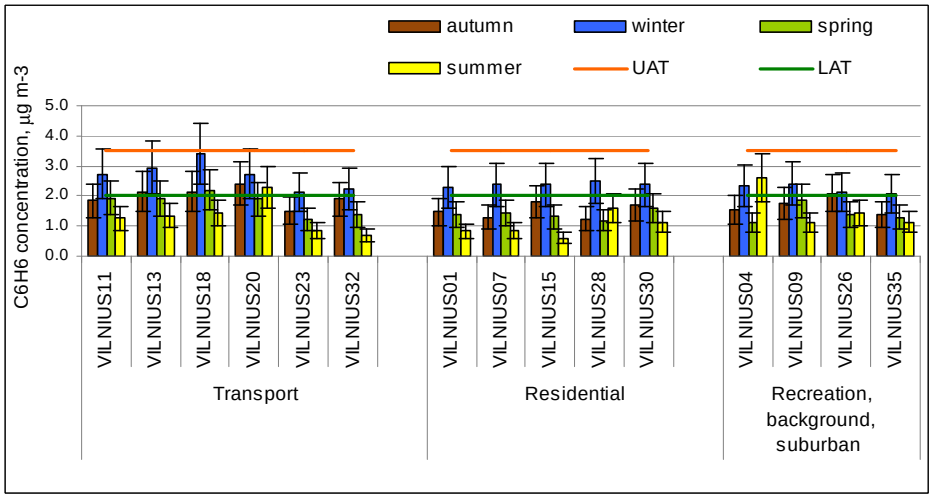


Fig. 21. Seasonal variation of mean benzene concentrations for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 28.2% expanded uncertainty)

As can be seen from Fig. 21**,** elevated mean concentrations of benzene were observed during winter season and they exceeded the lower assessment threshold value of 2.0 µg/m^3 at all sites in Vilnius. Benzene concentrations measured at traffic sites were higher than those at residential or recreation/suburb sites because the traffic is the major contributor of benzene to atmospheric pollution.

Comparison diffusive samplers and continuous measurements of sulfur dioxide and nirogen dioxide concentrations

Study period	Vilnius_Lazdynai OKTS data	Diffusive samplers data	Difference relative, %
		Sulfur dioxide, µg/m^3	
2010.11.03-2010.11.17	2.2	0.8	-64
2010.11.17-2010.12.01	1.5	0.3	-80
2011.01.06-2011.01.20	2.1	1.2	-42
2011.01.20-2011.02.03	1.5	0.6	-60
2011.03.25-2011.04.08			
2011.04.08-2011.04.22	2.9	2.5	-14
2011.06.06-2011.06.20	3.8	0.4	-90
2011.06.20-2011.07.04	1.2	1.3	10
Mean 4 seasons	2.2	2.0	-53
		Nitrogen dioxide, µg/m^3	
2010.11.03-2010.11.17	13.1	16.9	29
2010.11.17-2010.12.01	14.8	14.8	0
2011.01.06-2011.01.20	4.8	18.1	276
2011.01.20-2011.02.03	5.7	15.0	165
2011.03.25-2011.04.08	10.2	12.0	17
2011.04.08-2011.04.22	12.1	13.8	14
2011.06.06-2011.06.20	7.9	11.8	49
2011.06.20-2011.07.04			
Mean 4 seasons	9.8	14.6	49

Study period	Vilnius_Zirmunai OKTS data	Diffusive samplers data	Difference relative, %
		Nitrogen dioxide, µg/m^3	
2010.11.03-2010.11.17	21.2	41.1	94
2010.11.17-2010.12.01	17.2	28.9	68
2011.01.06-2011.01.20	19.1	41.1	116
2011.01.20-2011.02.03	10.7	39.2	266
2011.03.25-2011.04.08	31.8	47.0	48

2011.04.08-2011.04.22	36.2	50.2	39
2011.06.06-2011.06.20	27.8	43.9	58
2011.06.20-2011.07.04	22.9	35.5	55
Mean 4 seasons	23.4	40.9	75

Conclusion

The mean concentrations of sulfur dioxide in Vilnius agglomeration during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m3. The number of automated urban air monitoring stations is sufficient for the atmospheric air quality assessment.

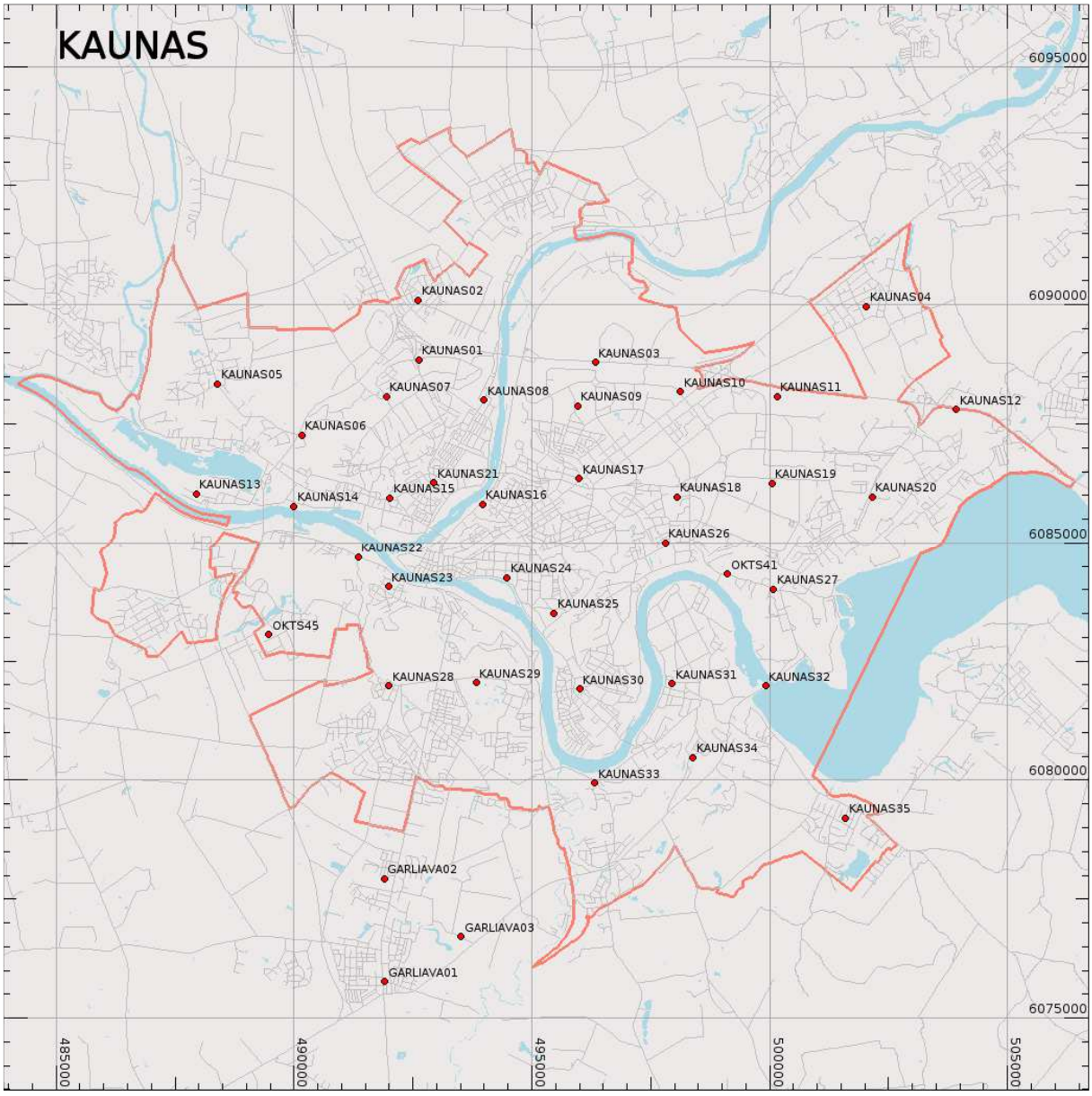
The mean concentration of nitrogen dioxide in Vilnius agglomeration during the study period varied within 9.1 and 55.6 μg/m^3.

1) The mean concentrations of NO_2 exceeded the annual limit value of 40 μg/m^3 at seven sites exposed to intensive traffic flow: Laisvės pr. – Justiniškių g. (VILNIUS27), Laisvės pr. – Architektų str. (VILNIUS31), Švitrigailos – Panerių crossing. (VILNIUS11), Žirnių str. (VILNIUS13), Pamėnkalnio – V. Kudirkos (VILNIUS20), Ukmergės – G. Vilko crossing (VILNIUS18), near the terminals of railway and bus (VILNIUS10).
2) The mean concentrations of NO_2 exceeded the NO_2 upper assessment threshold value (32 μg/m^3) at two sites: Vokiečių str. (the most visited part) (VILNIUS09) and Kareivių str. (VILNIUS05).
3) The mean concentrations of NO_2 ranged between the lower (26 μg/m^3) and upper (32 μg/m^3) assessment threshold values at six sites: Oslo-Erfurto str. (VILNIUS23), Lvovo str. (Snipiskes) (VILNIUS17), Gelvonų str. (Seskine) (VILNIUS30), Gariunu str. (VILNIUS33), Kestucio-Seliu str. (VILNIUS19) and Ukmerges-P. Zadeikos str. (VILNIUS08).

The mean concentrations of benzene in Vilnius agglomeration during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. However, benzene concentrations exceeded the upper assessment threshold value of 2.0 μg/m^3 at sites: Zirniu str. (VILNIUS137), crossing of Ukmerges – G. Vilko (VILNIUS18) and Pamenkalnio – V. Kudirkos (VILNIUS20).

4.3.2 Kaunas agglomeration

4.3.2.1 The location of diffusive samplers in Kaunas agglomeration



22 pav. Location of diffusive samplers in Kaunas agglomeration

4.3.2.2 Coordinates of study places and data capture in Kaunas agglomeration

Table 14. Data capture (%) in Vilnius agglomeration ("-" *not measured*).

Site code	Address	Coordinates (LKS-94)		Data capture, %		
		X	Y	NO_2	SO_2	LOJ
KAUNAS01	IX Forto g.-Kuršių g. prie prekybos centro automobilių aikštelės	492569	6088853	100	100	-
KAUNAS02	Vandžiogalos g. Vytėnų g. Sargėnuose	492626	6090104	100	-	100
KAUNAS03	Prie A1 kelio (Islandijos plentas), ties Kleboniškio mišku ir automobilių stovėjimo aikštele	496265	6088822	88	100	-
KAUNAS04	Ramučiai, Liepų g. (Jonavos plentas)	502000	6090000	88	-	100
KAUNAS05	Romainių g. Medekšinės g.	488394	6088347	100	100	-
KAUNAS06	Šilainių plentas-Vakarinis lankstas ant viaduko	490130	6087273	100	-	100
KAUNAS07	IX Forto g. Mosėdžio g.	491948	6088078	100	100	-
KAUNAS08	Panerių g. Skaudvilės g. Neris	494000	6088000	100	-	-
KAUNAS09	Ukmergės g.	496000	6088000	100	-	100
KAUNAS10	Šiaurės pr. Savanorių pr.	498105	6088101	100	100	-
KAUNAS11	Tarp Partizanų g. ir A1 kelio	500000	6088000	100	-	100
KAUNAS12	Prie A1 kelio, šalia Ateities pl.	503402	6087889	88	-	-
KAUNAS13	Gintaro g. prie Nemuno	488000	6086000	100	100	-
KAUNAS14	Netoli Kulautuvos g. prie Nemuno	489968	6085774	100	-	100
KAUNAS15	Kėdainių g. Tilžės g. Vilijampolėje	492000	6086000	100	-	100
KAUNAS16	Jonavos g. prie Neries	494000	6086000	100	100	-
KAUNAS17	Savanorių pr., Tvirtovės al., Taikos pr.	495970	6086290	100	-	-
KAUNAS18	Vokės g. prie 26 vid. mokyklos stadiono	498000	6086000	100	-	100
KAUNAS19	Tarp Draugystės g. Elektrėnų g. tarp įmonių teritorijų	500000	6086000	100	100	-
KAUNAS20	Ateities plentas prie įmonių	502068	6085964	100	-	100
KAUNAS21	Panerių g. Linkuvos g. link parkelio	492902	6086217	100	-	-
KAUNAS22	Kybartų g., Marvelės g., Marvelėje	491346	6084709	100	100	-
KAUNAS23	Žvaigždžių g. Planetų g. Dariaus ir Girėno g.	492000	6084000	100	-	100
KAUNAS24	S.Daukanto g. link pėsčiųjų tilto į Nemuno salą	494433	6084258	100	-	100
KAUNAS25	Vytauto pr. M.K. Čiurlionio g. prie geležinkelio stoties	495504	6083481	100	100	-
KAUNAS26	K. Baršausko g. Popieriaus g.	497803	6084963	100	-	100
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	500130	6084010	100	100	100
KAUNAS28	Julijanavos g. Yliškėse	492000	6082000	100	-	-
KAUNAS29	Europos pr. , Barkūnų g.	494000	6082000			

	Saulėgrąžų g.			100	100	-
KAUNAS30	Skuodo g. Juozapavičiaus g. Siūlų g. Šančiuose	496000	6082000	100	-	-
KAUNAS31	Vaidilos g. Gailutės g.	498000	6082000	100	100	100
KAUNAS32	Pažaislio vienuolynas T. Masiulio g.	500000	6082000	88	88	-
KAUNAS33	Jiesios pl. Vaidoto g.	496308	6079980	88	-	88
KAUNAS34	Balčkalnio g. aikštelėje	498364	6080491	100	-	-
KAUNAS35	Dubravų g. Vaišvydo g.	501353	6079215	100	100	-

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**

Photographic documentation of the sampling location is presented in **Annex II** (CD).

The protocols of chemical analysis are presented in **Annex III**.

Raw data are presented in **Annex IV** (CD).

4.3.2.3 Summary tables of data Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011

Table 15. Sulfur dioxide concentrations in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		SO2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KAUNAS01	IX Forto g.-Kuršių g. prie prekybos centro automobilių aikštelės	492623	6088847	1.6	5.8	1.7	0.6	0.9	0.8	0.3	2.8
KAUNAS03	Prie A1 kelio (Islandijos plentas), ties Kleboniškio mišku ir automobilių stovėjimo aikštele	496331	6088790	1.6	0.8	1.2	0.8	0.4	1.8	0.9	*0.15*
KAUNAS05	Romainių g. Medekšinės g.	488393	6088343	1.6	0.6	1.7	0.6	0.6	0.6	1.2	0.5
KAUNAS07	IX Forto g. Mosėdžio g.	491938	6088081	1.7	0.7	0.6	0.7	0.5	1.3	0.5	*0.15*
KAUNAS10	Šiaurės pr. Savanorių pr.	498130	6088176	2.1	1.0	0.5	0.5	0.7	1.3	0.5	0.4
KAUNAS13	Gintaro g. prie Nemuno	487939	6086031	1.3	0.7	0.6	0.6	1.3	0.5	0.8	0.5
KAUNAS16	Jonavos g. prie Neries	493964	6085815	"6.5"	0.7	*0.15*	0.8	0.7	2.1	1.2	*0.15*
KAUNAS19	Tarp Draugystės g. Elektrėnų g. tarp įmonių teritorijų	500051	6086253	1.6	0.6	0.6	1.9	0.3	0.6	0.7	1.2
KAUNAS22	Kybartų g., Marvelės g., Marvelėje	491351	6084691	1.6	0.6	0.7	0.7	1.9	1.5	1.5	0.6
KAUNAS25	Vytauto pr. M.K. Čiurlionio g. prie geležinkelio stoties	495467	6083510	1.7	0.7	2.2	2.9	0.6	0.6	0.9	0.5
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	500078	6084015	2.3	0.8	0.8	0.7	0.5	0.6	0.8	0.3
KAUNAS29	Europos pr. , Barkūnų g. Saulėgrąžų g.	493827	6082050	1.7	0.8	0.6	"43.5"	0.9	0.7	0.9	0.8
KAUNAS31	Vaidilos g. Gailutės g.	497951	6082027	1.5	*0.15*	1.4	2.9	0.6	0.3	0.5	0.6
KAUNAS32	Pažaislio vienuolynas T. Masiulio g.	499916	6081980	1.2	0.9	1	0.8	1.7	0.7		0.5
KAUNAS35	Dubravų g. Vaišvydo g.	501601	6079204	2.1	0.7	0.7	0.6	0.5	*0.15*	0.8	0.8
OKTS41	Kaunas_Petrašiunai	499116	6084335	2.1	1.2	0.7	0.6	0.3	1.2	0.8	0.7
OKTS45	Kaunas_Noreikiskės	489475	6083056	2.8	1.4	0.5	0.8	0.5	2.6	0.8	0.15

	lost or stolen
<0.3 = n.d.	half of detection limit = n.d.
"14.4"	outlier according Grubbs Test, replaced by mean

Table 16. Nitrogen dioxide concentrations in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		NO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KAUNAS01	IX Forto g.-Kuršių g. prie prekybos centro automobilių aikštelės	492623	6088847	29.2	28.3	32.6	31.9	27.3	38.0	30.7	27.8
KAUNAS02	Vandžiogalos g. Vytėnų g. Sargėnuose	492615	6090103	26.4	22.7	30.7	30.6	26.0	31.4	22.7	22.2
KAUNAS03	Prie A1 kelio (Islandijos plentas), ties Kleboniškio mišku ir automobilių stovėjimo aikštele	496331	6088790		36.6	39.5	40.1	37.1	63.1	60.3	51.0
KAUNAS04	Ramučiai, Liepų g. (Jonavos plentas)	502034	6089967	13.1	12.3	16.4		10.6	11.2	7.6	7.0
KAUNAS05	Romainių g. Medekšinės g.	488393	6088343	17.8	16.0	20.0	17.0	14.7	16.7	15.7	12.7
KAUNAS06	Šilainių plentas-Vakarinis lankstas ant viaduko	490165	6087262	27.6	20.9	27.8	29.3	25.3	35.0	35.0	27.1
KAUNAS07	IX Forto g. Mosėdžio g.	491938	6088081	20.7	18.2	23.7	20.4	16.3	19.7	16.6	13.4
KAUNAS08	Panerių g. Skaudvilės g. Neris	494000	6088000	24.1	19.5	29.8	26.3	21.7	20.9	15.4	13.3
KAUNAS09	Ukmergės g.	495956	6087875	20.6	21.6	22.5	21.8	15.4	18.8	13.9	11.4
KAUNAS10	Šiaurės pr. Savanorių pr.	498130	6088176	29.4	24.5	35.8	26.9	29.1	29.0	30.6	21.6
KAUNAS11	Tarp Partizanų g. ir A1 kelio	500160	6088074	18.8	16.2	21.9	21.6	18.8	24.0	19.5	15.1
KAUNAS12	Prie A1 kelio, šalia Ateities pl.	503927	6087804	27.8	23.5	33.0	38.8	32.7		42.4	22.0
KAUNAS13	Gintaro g. prie Nemuno	487939	6086031	9.7	13.4	11.1	8.9	6.9	6.9	6.4	6.0
KAUNAS14	Netoli Kulautuvos g. prie Nemuno	489996	6085770	17.5	18.8	19.2	19.6	12.1	14.5	11.0	10.7
KAUNAS15	Kėdainių g. Tilžės g. Vilijampolėje	492014	6085948	27.8	24.1	31.8	28.9	23.8	28.8	21.0	20.1
KAUNAS16	Jonavos g. prie Neries	493964	6085815	27.3	26.3	29.6	27.9	22.7	27.7	19.3	19.5
KAUNAS17	Savanorių pr., Tvirtovės al., Taikos pr.	495997	6086351	26.1	22.9	26.3	25.3	21.4	20.6	17.2	16.2
KAUNAS18	Vokės g. prie 26 vid. mokyklos stadiono	498051	6085969	19.5	16.8	21.7	22.9	14.7	17.5	11.1	10.5
KAUNAS19	Tarp Draugystės g. Elektrėnų g. tarp įmonių teritorijų	500051	6086253	17.1	16.0	20.0	19.9	12.8	17.5	10.7	9.3
KAUNAS20	Ateities plentas prie įmonių	502155	6085972	19.2	15.8	24.9	25.0	18.5	21.0	15.8	12.6
KAUNAS21	Panerių g. Linkuvos g. link parkelio	492937	6086262	28.7	22.4	27.8	28.1	19.7	26.6	19.5	19.0
KAUNAS22	Kybartų g., Marvelės g., Marvelėje	491351	6084691	16.8	20.1	17.8	17.2	11.5	15.7	9.2	10.3
KAUNAS23	Žvaigždžių g. Planetų g. Dariaus ir Girėno g.	491986	6084074	14.7	17.9	15.9	16.4	9.4	13.6	7.7	6.7
KAUNAS24	S.Daukanto g. link pėsčiųjų tilto į Nemuno salą	494479	6084259	30.1	23.4	35.0	29.4	27.4	26.3	25.8	17.7
KAUNAS25	Vytauto pr. M.K. Čiurlionio g. prie geležinkelio stoties	495467	6083510	41.2	40.6	39.4	37.7	37.7	50.2	40.4	41.9
KAUNAS26	K. Baršausko g. Popieriaus g.	497805	6085005	26.2	23.0	27.7	26.4	24.2	22.1	24.4	20.6
KAUNAS27	R. Kalantos M. Gimbutienės g. prie	500078	6084015	23.5	23.8	24.4	23.9	22.1	29.5	26.6	37.0

	transporto žiedo										
KAUNAS28	Julijanavos g. Yliškėse	491995	6081984	14.9	17.7	16.6	16.3	10.7	16.9	12.7	13.0
KAUNAS29	Europos pr. , Barkūnų g. Saulėgrąžų g.	493827	6082050	15.9	16.7	17.8	21.1	12.7	17.0	10.4	10.2
KAUNAS30	Skuodo g. Juozapavičiaus g. Siūlų g. Šančiuose	496006	6081911	27.3	24.1	32.5	30.6	25.4	31.6	25.5	20.9
KAUNAS31	Vaidilos g. Gailutės g.	497951	6082027	12.5	12.3	16.3	18.3	11.2	10.3	7.3	7.0
KAUNAS32	Pažaislio vienuolynas T. Masiulio g.	499916	6081980	24.6	20.3	15.4	24.9	18.4	22.6		13.1
KAUNAS33	Jiesios pl. Vaidoto g.	496325	6079938	19.8	19.3	19.7	21.2		15.5	6.4	5.7
KAUNAS34	Balčkalnio g. aikštelėje	498391	6080481	10.5	11.3	12.0	16.1	9.0	11.3	7.2	16.4
KAUNAS35	Dubravų g. Vaišvydo g.	501601	6079204	12.9	12.1	13.8	15.7	11.6	12.7	9.5	8.0
OKTS41	Kaunas_Petrašiunai	499116	6084335	20.8	17.3	24.8	25.9	22.6	19.6	19.9	15.0
OKTS45	Kaunas_Noreikiskės	489475	6083056	12.8	12.8	13.3	14.3	8.6	13.2	7.0	7.2

lost or stolen

Table 17. Benzene concentrations in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KAUNAS02	Vandžiogalos g. Vytėnų g. Sargėnuose	492615	6090103	2.1	3.1	4.1	4.9	2.2	1.4	0.7	1.5
KAUNAS04	Ramučiai, Liepų g. (Jonavos plentas)	502034	6089967	1.7	2.7	3.3	3.9	1.7	1.9	1.0	0.9
KAUNAS06	Šilainių plentas-Vakarinis lankstas ant viaduko	490165	6087262	1.1	1.8	2.6	2.6	1.1	1.1	0.6	1.4
KAUNAS09	Ukmergės g.	495956	6087875	1.4	1.8	2.8	3.0	1.2	1.3	0.7	1.3
KAUNAS11	Tarp Partizanų g. ir A1 kelio	500160	6088074	1.2	1.5	2.9	3.2	1.1	1.1	0.5	0.7
KAUNAS14	Netoli Kulautuvos g. prie Nemuno	489996	6085770	1.3	2.3	2.8	2.8	1.1	1.3	0.9	0.9
KAUNAS15	Kėdainių g. Tilžės g. Vilijampolėje	492014	6085948	2.1	2.5	4.0	3.7	1.9	2.3	2.3	2.2
KAUNAS18	Vokės g. prie 26 vid. mokyklos stadiono	498051	6085969	1.3	1.6	2.9	3.0	1.3	1.2	0.7	1.2
KAUNAS20	Ateities plentas prie įmonių	502155	6085972	1.3	1.8	2.8	2.9	1.5	1.4	1.4	2.0
KAUNAS23	Žvaigždžių g. Planetų g. Dariaus ir Girėno g.	491986	6084074	1.4	2.2	3.0	3.2	1.4	1.5	0.4	1.0
KAUNAS24	S.Daukanto g. link pėsčiųjų tilto į Nemuno salą	494479	6084259	1.8	2.0	3.4	3.1	1.6	1.7	0.7	1.0
KAUNAS26	K. Baršausko g. Popieriaus g.	497805	6085005	1.6	2.3	3.0	3.5	1.5	1.4	0.8	1.3
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	500078	6084015	1.7	2.1	3.6	3.6	3.8	1.8	0.7	1.3
KAUNAS31	Vaidilos g. Gailutės g.	497951	6082027	1.4	1.9	3.1	3.7	1.6	1.3	0.5	1.2
KAUNAS33	Jiesios pl. Vaidoto g.	496325	6079938	1.5	1.9	2.9	3.5		0.8	0.6	0.6

OKTS41	Kaunas_Petrašiunai	499116	6084335	1.8	1.8	3.4	3.9	1.9	1.8	0.9	1.3
OKTS45	Kaunas_Noreikiskės	489475	6083056	1.1	1.4	2.7	2.3	1.1	1.1	0.5	0.8

	lost or stolen
	duplicates

4.3.2.4 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide and benzene concentrations in Kaunas agglomeration

Sulfur dioxide

At 15 sites, the bi-weekly concentrations of SO_2 in ambient air were measured with passive samplers. For the entire study period (from 3 November 2010 to 4 July 2011), the mean concentrations of SO_2 ranged between 0.77 and 1.81 μg/m^3 (Fig. 23) and were significantly below the annual limit value of 20.0 μg/m^3 for the vegetation as well as below the lower assessment threshold value of 8.0 μg/m^3 (Table 1).

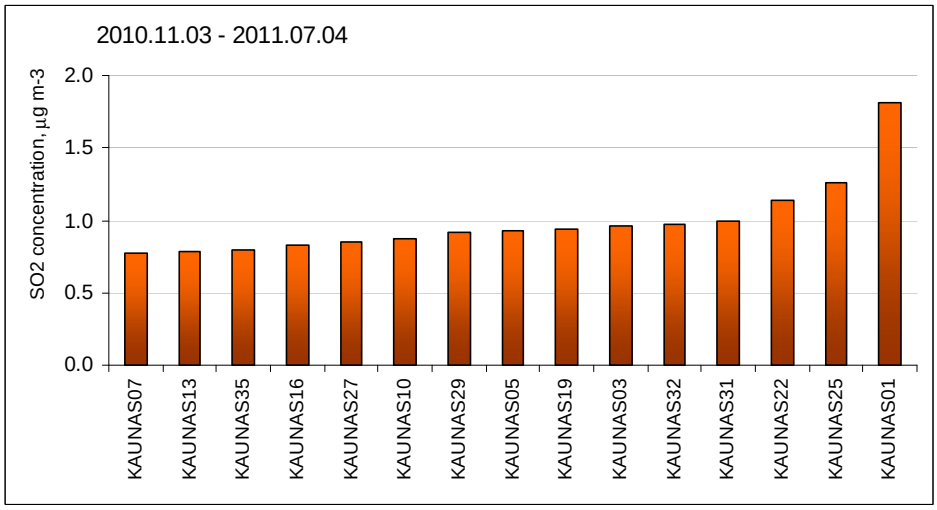


Fig. 23. Average concentration of sulfur dioxide in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011.

The measured SO_2 values during the entire study period (3 November 2010 - 4 July 2011) were averaged over the autumn, winter, spring and summer periods. Data indicate that mean SO_2 concentrations did not exceed air quality limit value aimed to protect vegetation and even was below the lower assessment threshold value (Table 1). The highest SO_2 value of 3.7 μg/m^3 was reached at site Kaunas01, while SO_2 concentrations had the range of 0.3 – 2.6 μg/m^3 at the others sampling sites.

As can be seen (Fig.27), during autumn (3 November – 1 December 2010) the averaged SO_2 concentration had the highest value of 3.7 μg/m^3 at the site (Kaunas01) located in area with the high traffic density, whereas the concentrations of SO_2 were quite similar at the rest sites in agglomeration and ranged from 0.7 μg/m^3 to 1.6 μg/m^3. The lowest mean concentrations of SO_2 were obtained at sites Kaunas16 and Kaunas31, respectively, 0.70 μg/m^3 and 0.83 μg/m^3.

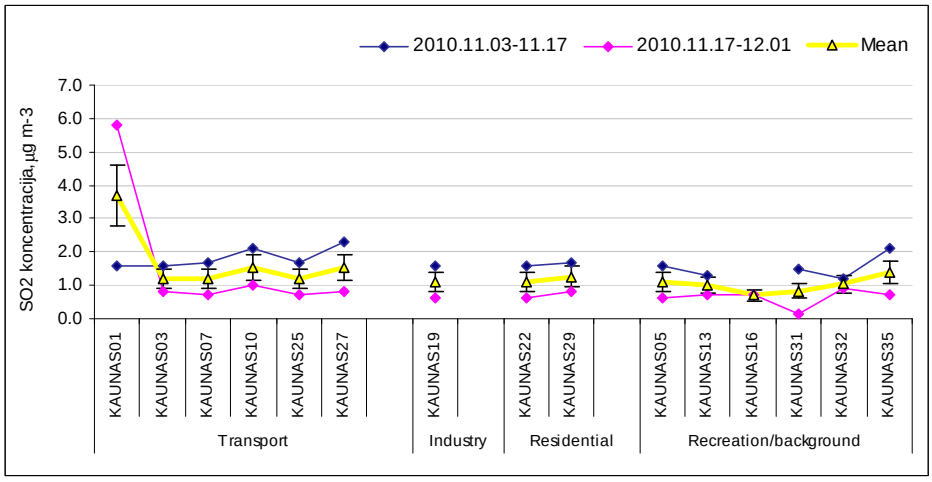
In winter (6 January – 3 February 2011), SO_2 concentrations ranged from 0.15 to 2.90 μg/m^3. The highest mean values for this study period were 2.55 μg/m^3 and 2.15 μg/m^3 at the site Kaunas25 and Kaunas31, respectively. The lowest mean concentration (0.48 μg/m^3) was at the site Kaunas16.

The results indicate, that in the springtime (25 March – 22 April 2011) the minimum mean value (0.30 μg/m^3) of SO_2 concentration was calculated at a site in a suburb (Kaunas35) and the maximum (2.1 μg/m^3) at a site in a residential area (Kaunas16).

During the summer study (6 June – 4 July 2011), SO_2 concentrations ranged between 0.15 and 2.80 μg/m^3. The highest mean value of 1.55 μg/m^3 for this period reached at the site Kaunas01 and the lowest mean SO_2 value of 0.33 μg/m^3 was at the site Kaunas07.

Table 18. Statistics for the sulfur dioxide atmospheric concentrations inside Kaunas agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	SO_2 concentration, µg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KAUNAS01	IX Forto g.-Kuršių g. prie prekybos centro automobilių aikštelės	3.7	1.2	0.9	1.6	0.3	5.8	1.8
KAUNAS03	Prie A1 kelio (Islandijos plentas), ties Kleboniškio mišku ir automobilių stovėjimo aikštele	1.2	1.0	1.1	0.5	0.2	1.8	1.0
KAUNAS05	Romainių g. Medekšinės g.	1.1	1.2	0.6	0.9	0.5	1.7	0.9
KAUNAS07	IX Forto g. Mosėdžio g.	1.2	0.7	0.9	0.3	0.2	1.7	0.8
KAUNAS10	Šiaurės pr. Savanorių pr.	1.6	0.5	1.0	0.5	0.4	2.1	0.9
KAUNAS13	Gintaro g. prie Nemuno	1.0	0.6	0.9	0.7	0.5	1.3	0.8
KAUNAS16	Jonavos g. prie Neries	0.7	0.5	1.4	0.7	0.2	2.1	0.8
KAUNAS19	Tarp Draugystės g. Elektrėnų g. tarp įmonių teritorijų	1.1	1.3	0.5	1.0	0.3	1.9	0.9
KAUNAS22	Kybartų g., Marvelės g., Marvelėje	1.1	0.7	1.7	1.1	0.6	1.9	1.1
KAUNAS25	Vytauto pr. M.K. Čiurlionio g. prie geležinkelio stoties	1.2	2.6	0.6	0.7	0.5	2.9	1.3
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	1.6	0.8	0.6	0.6	0.3	2.3	0.9
KAUNAS29	Europos pr. , Barkūnų g. Saulėgrąžų g.	1.3	0.6	0.8	0.9	0.6	1.7	0.9
KAUNAS31	Vaidilos g. Gailutės g.	0.8	2.2	0.5	0.6	0.2	2.9	1.0
KAUNAS32	Pažaislio vienuolynas T. Masiulio g.	1.1	0.9	1.2	0.5	0.5	1.7	1.0
KAUNAS35	Dubravų g. Vaišvydo g.	1.4	0.7	0.3	0.8	0.2	2.1	0.8



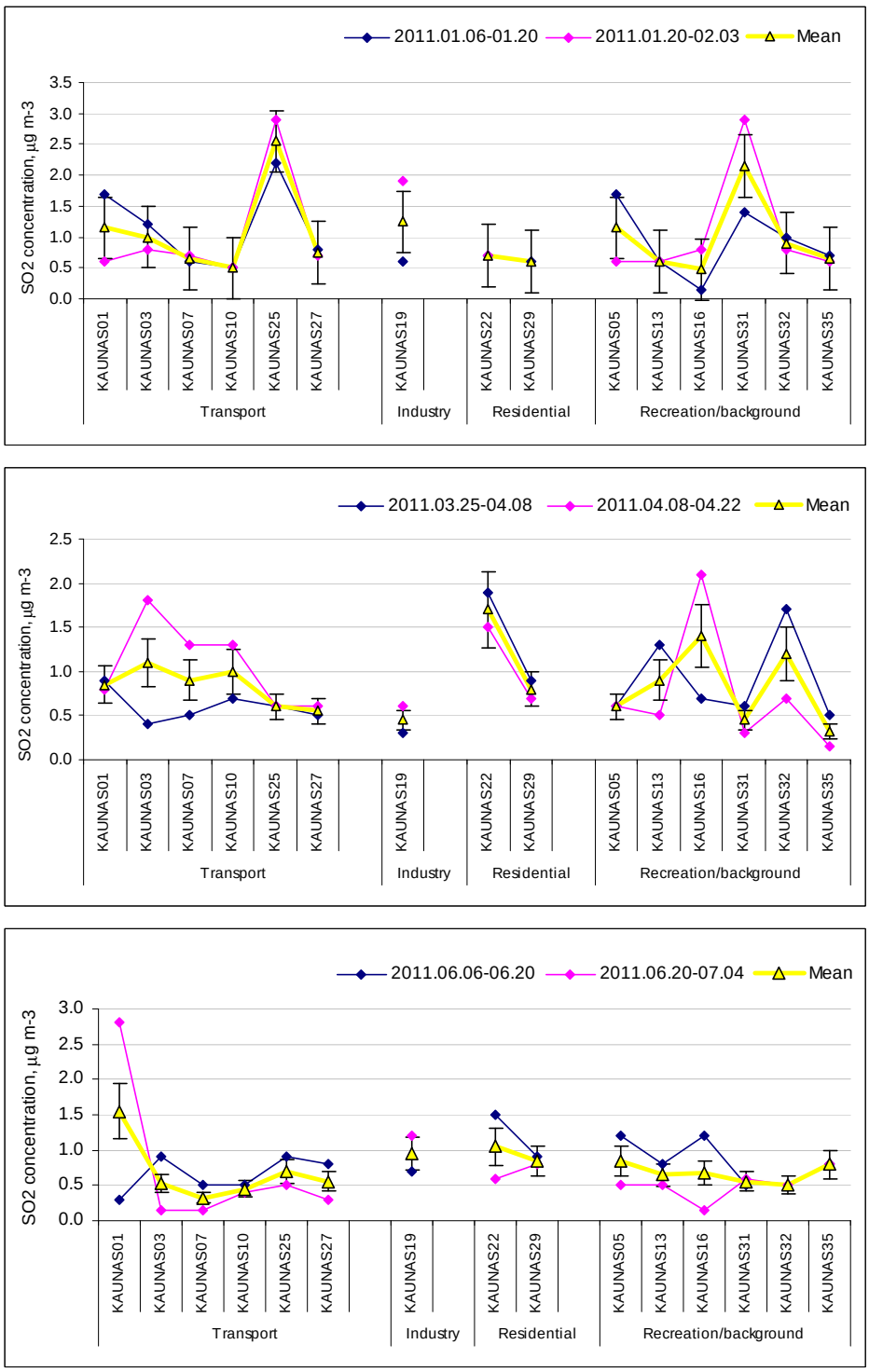


Fig. 24. Seasonal variation of mean sulfur dioxide concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 22.1% expanded uncertainty)

Figure 25 presents the mean concentrations of SO_2 measured at roadside, urban, residential and suburbs sites for the entire study period from 3 November 2010 to 4 July 2011. As can be seen from Table 18, higher levels of SO_2 were observed during autumn and winter, respectively, (0.7–3.7 µg/m^3 and 0.5–2.6 µg/m^3), whereas the lower levels of SO_2 were observed in summer (0.3– 1.6 µg/m^3). Seasonal variations indicate that SO_2 mean value for the autumn period at the traffic–exposed sites was by 36 – 61 % higher than that for the

winter, spring and summer study periods. Overall, the SO_2 concentration ranged from 0.3–3.7 $\mu g/m^3$ with an annual average of 1.0 $\mu g/m^3$.

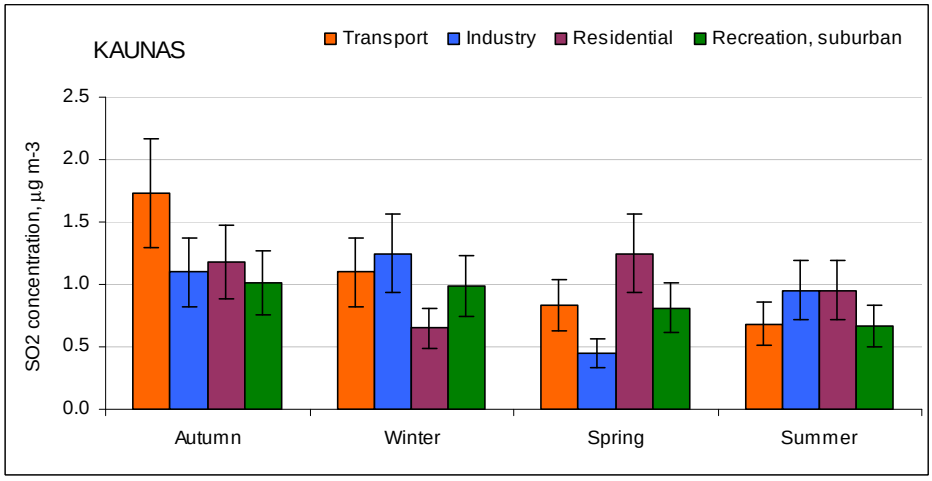


Fig. 25. Seasonal variation of mean sulfur dioxide concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 22.1% expanded uncertainty)

Nitrogen dioxide

At 35 sites, the bi-weekly concentrations of NO_2 in ambient air were measured with passive samplers. The list of stations can be found in Table 14. The obtained data during the all study period are presented in the Table 15. The study shows that mean concentrations of NO_2 for the entire study period (from 3 November 2010 to 4 July 2011) were in the wide range of 8.7 – 46.8 $\mu g/m^3$ (Fig. 26). The limit value (40 $\mu g/m^3$) was exceeded at two sites with the high traffic density. The mean value for the NO_2 concentrations at Kaunas25 was 41.1 $\mu g/m^3$, while that at the site Kaunas03 was 46.8 $\mu g/m^3$. Concentrations of NO_2 were lower at sites in the residential area of city, in the suburban area and nearby streets with the lower traffic flow and, in general, were below the lower assessment thresholds for NO_2 (Table 1).

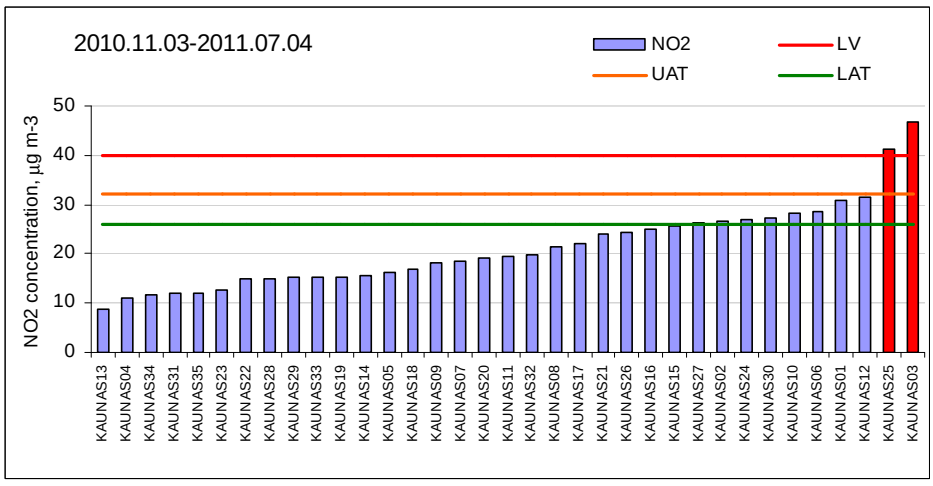


Fig. 26. Average concentration of nitrogen dioxide in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011.

Seasonal variations in concentrations of NO_2 are shown in Fig. 27 and Table 19. Data indicate that NO_2 concentrations during the first study period (3 November – 1 December 2010) ranged from 9.8 $\mu g/m^3$ to 41.6 $\mu g/m^3$ depending on the site character. The limit value of 40 $\mu g/m^3$ as annual mean concentration of NO_2 was exceeded at a site Kaunas25 in the area of

railway station. This site is characterized as site with intensive traffic flow and mean concentration of NO_2 reached value of 40.9 μg/m^3. The NO_2 concentrations at other transport sites ranged between the lower and upper assessment threshold and was below the lower assessment threshold at the sites with less intensive traffic and in the suburb and recreation area. Taking into account ± 21.6% expanded uncertainty of measured NO_2 values, the limit value should be exceeded at two sites (Kaunas03 and Kaunas25).

In the wintertime (6 January – 3 February 2011), NO_2 levels ranged from 8.9 to 40.1 μg/m^3. The highest mean values of NO_2 for this study period nearly reached the limit value at the sites in transport area (Kaunas03, Kaunas12 and Kaunas25). Taking into account ± 21.6% expanded uncertainty of measured NO_2 values, the upper assessment threshold value of 32.0 μg/m^3 should be also exceeded at the most sites in transport area (Kaunas01, Kaunas02, Kaunas06, Kaunas08, Kaunas10, Kaunas15, Kaunas17, Kaunas20, Kaunas21, Kaunas26 and Kaunas27) and at several sites of residential area (Kaunas16, Kaunas24 and Kaunas30). NO_2 concentrations were below the value of 26.0 μg/m^3 at the other sites in agglomeration.

In spring (25 March – 22 April 2011), the mean values of NO_2 varied from 6.9 to 63. 1 μg/m^3 (Fig.27). The maximum (63, 1 μg/m^3) NO_2 was measured at traffic-exposed site Kaunas03. Taking into account ± 21.6% expanded uncertainty of measured NO_2 concentration, the limit value should be also exceeded at sites Kaunas01 and Kaunas12.

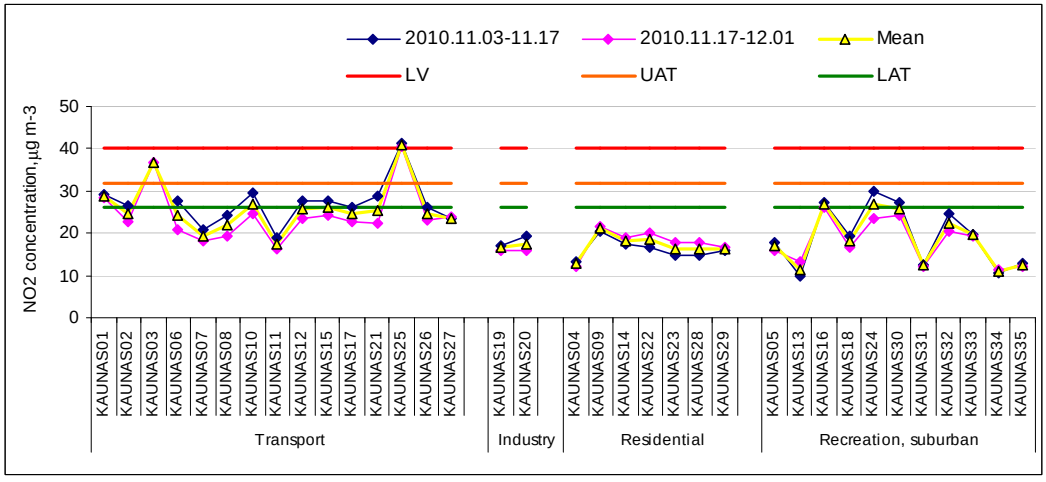
NO_2 mean concentrations differed from site to site and ranged from 4.9 to 66.5 μg/m^3 during the study period from 6 June to 4 July 2011. Remarkably higher NO_2 concentrations with values of 55.7 μg/m^3 and 41.2 μg/m^3 were observed at the sites with a heavy traffic, respectively, Kaunas03 and Kaunas25. Taking into account ± 21.6% expanded uncertainty of measured NO_2 concentration, the limit value should be also reached at three sites (Kaunas06, Kaunas12 and Kaunas27) in a transport area.

As can be seen from Fig. 27, the site-specific characteristics are responsible for the spatial variation in NO_2 concentrations. The higher levels of NO_2 were observed for the sites with a heavy traffic and point to a relatively high contribution from the traffic. NO_2 mean values at the sites characterized as traffic-exposed sites is by 35 – 61 % higher than those at the sites in the recreation area and suburb. The seasonal variation of atmospheric mean values of NO_2 in Kaunas agglomeration showed a winter maximum and a summer minimum. Generally, the higher NO_2 concentration in winter and spring may be due to unfavourable dissemination conditions for pollutants, particularly in the winter period, and to the formation of a temperature-inversion layer in spring. The destruction of NO_2 by a photochemical reaction with OH radicals in summer may be the reason of lower mean values of NO_2 in the summertime.

Table 19. Statistics for the nitrogen dioxide atmospheric concentrations inside Kaunas agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	NO_2 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KAUNAS01	IX Forto g.-Kuršių g. prie prekybos centro automobilių aikštelės	28.8	32.3	32.7	29.3	27.3	38.0	30.7
KAUNAS02	Vandžiogalos g. Vytėnų g. Sargėnuose	24.6	30.7	28.7	22.5	22.2	31.4	26.6
KAUNAS03	Prie A1 kelio (Islandijos plentas), ties Kleboniškio mišku ir automobilių stovėjimo aikštele	36.6	39.8	50.1	55.7	36.6	63.1	46.8
KAUNAS04	Ramučiai, Liepų g. (Jonavos plentas)	12.7	16.4	10.9	7.3	7.0	16.4	11.2
KAUNAS05	Romainių g. Medekšinės g.	16.9	18.5	15.7	14.2	12.7	20.0	16.3
KAUNAS06	Šilainių plentas-Vakarinis lankstas ant viaduko	24.3	28.6	30.2	31.1	20.9	35.0	28.5

KAUNAS07	IX Forto g. Mosėdžio g.	19.5	22.1	18.0	15.0	13.4	23.7	18.6
KAUNAS08	Panerių g. Skaudvilės g. Neris	21.8	28.1	21.3	14.4	13.3	29.8	21.4
KAUNAS09	Ukmergės g.	21.1	22.2	17.1	12.7	11.4	22.5	18.3
KAUNAS10	Šiaurės pr. Savanorių pr.	27.0	31.4	29.1	26.1	21.6	35.8	28.4
KAUNAS11	Tarp Partizanų g. ir A1 kelio	17.5	21.8	21.4	17.3	15.1	24.0	19.5
KAUNAS12	Prie A1 kelio, šalia Ateities pl.	25.7	35.9	32.7	32.2	22.0	42.4	31.5
KAUNAS13	Gintaro g. prie Nemuno	11.6	10.0	6.9	6.2	6.0	13.4	8.7
KAUNAS14	Netoli Kulautuvos g. prie Nemuno	18.2	19.4	13.3	10.9	10.7	19.6	15.4
KAUNAS15	Kėdainių g. Tilžės g. Vilijampolėje	26.0	30.4	26.3	20.6	20.1	31.8	25.8
KAUNAS16	Jonavos g. prie Neries	26.8	28.8	25.2	19.4	19.3	29.6	25.0
KAUNAS17	Savanorių pr., Tvirtovės al., Taikos pr.	24.5	25.8	21.0	16.7	16.2	26.3	22.0
KAUNAS18	Vokės g. prie 26 vid. mokyklos stadiono	18.2	22.3	16.1	10.8	10.5	22.9	16.8
KAUNAS19	Tarp Draugystės g. Elektrėnų g. tarp įmonių teritorijų	16.6	20.0	15.2	10.0	9.3	20.0	15.4
KAUNAS20	Ateities plentas prie įmonių	17.5	25.0	19.8	14.2	12.6	25.0	19.1
KAUNAS21	Panerių g. Linkuvos g. link parkelio	25.6	28.0	23.2	19.3	19.0	28.7	24.0
KAUNAS22	Kybartų g., Marvelės g., Marvelėje	18.5	17.5	13.6	9.8	9.2	20.1	14.8
KAUNAS23	Žvaigždžių g. Planetų g. Dariaus ir Girėno g.	16.3	16.2	11.5	7.2	6.7	17.9	12.8
KAUNAS24	S.Daukanto g. link pėsčiųjų tilto į Nemuno salą	26.8	32.2	26.9	21.8	17.7	35.0	26.9
KAUNAS25	Vytauto pr. M.K. Čiurlionio g. prie geležinkelio stoties	40.9	38.6	44.0	41.2	37.7	50.2	41.1
KAUNAS26	K. Baršausko g. Popieriaus g.	24.6	27.1	23.2	22.5	20.6	27.7	24.3
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	23.7	24.2	25.8	31.8	22.1	37.0	26.4
KAUNAS28	Julijanavos g. Yliškėse	16.3	16.5	13.8	12.9	10.7	17.7	14.9
KAUNAS29	Europos pr. , Barkūnų g. Saulėgrąžų g.	16.3	19.5	14.9	10.3	10.2	21.1	15.2
KAUNAS30	Skuodo g. Juozapavičiaus g. Siūlų g. Šančiuose	25.7	31.6	28.5	23.2	20.9	32.5	27.2
KAUNAS31	Vaidilos g. Gailutės g.	12.4	17.3	10.8	7.2	7.0	18.3	11.9
KAUNAS32	Pažaislio vienuolynas T. Masiulio g.	22.5	20.2	20.5	13.1	13.1	24.9	19.9
KAUNAS33	Jiesios pl. Vaidoto g.	19.6	20.5	15.5	6.1	5.7	21.2	15.4
KAUNAS34	Balčkalnio g. aikštelėje	10.9	14.1	10.2	11.8	7.2	16.4	11.7
KAUNAS35	Dubravų g. Vaišvydo g.	12.5	14.8	12.2	8.8	8.0	15.7	12.0



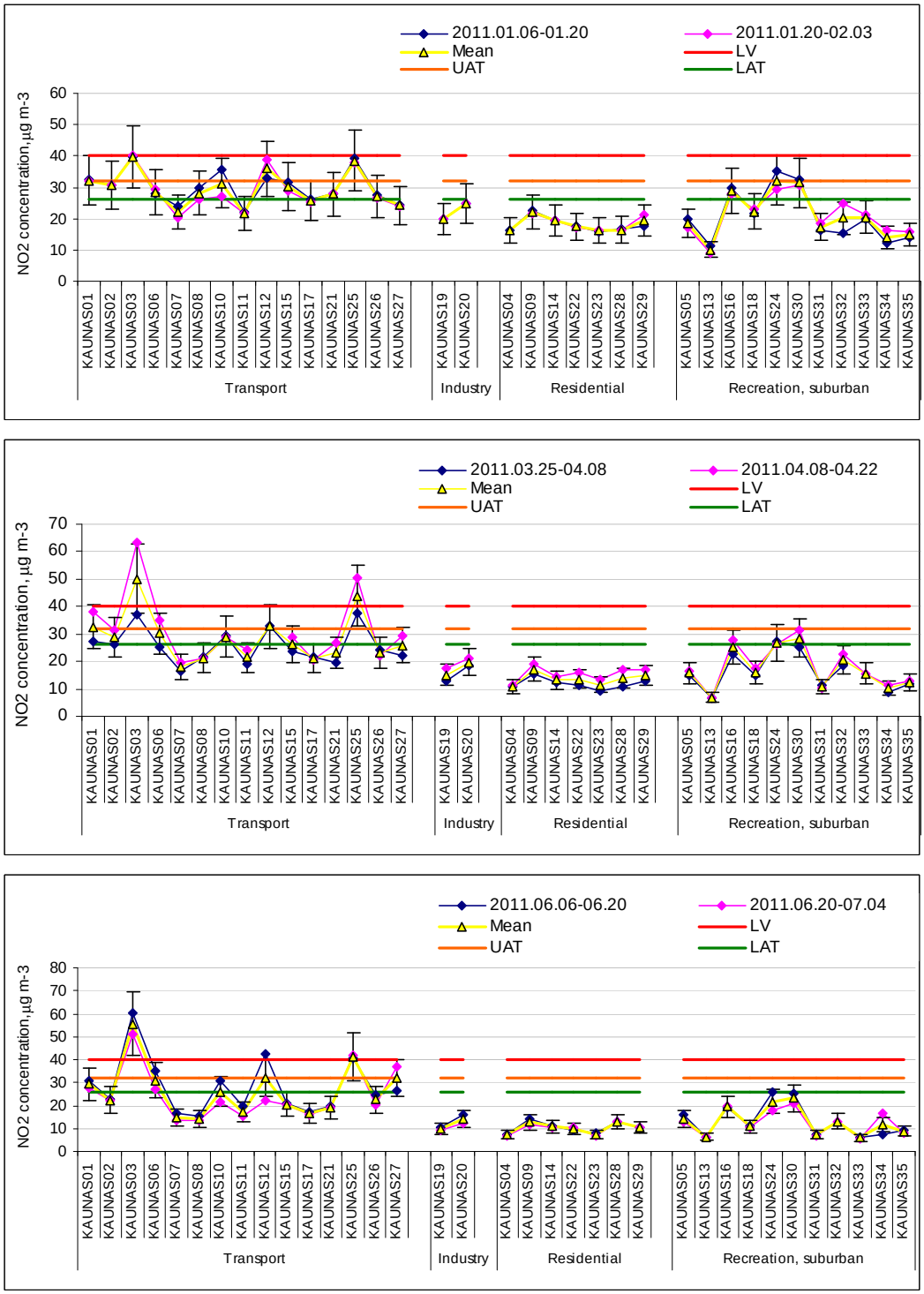


Fig. 27. Seasonal variation of mean nitrogen dioxide concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 21.6% expanded uncertainty)

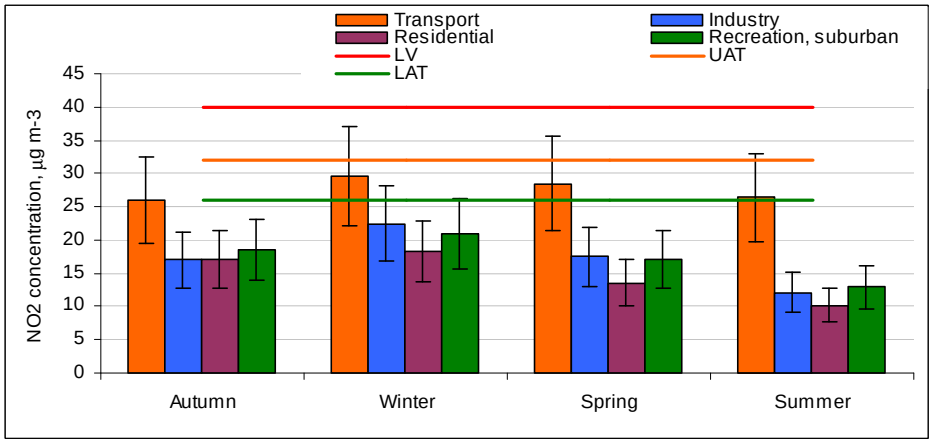


Fig. 28. Seasonal variation of mean nitrogen dioxide concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 21.6% expanded uncertainty)

Benzene

At 15 sites, the bi-weekly concentrations of benzene in ambient air were measured with passive samplers. The study shows that the mean concentration of benzene for the entire study period (from 3 November 2010 to 4 July 2011) was 1.9 µg/m^3 with the range of 1.5 and 2.61 µg/m^3 (Fig. 29). The highest benzene concentrations at sites Kaunas04, Kaunas27, Kaunas02 and Kaunas15 did not exceed the annual limit value for the protection for human health (5.0 µg/m^3), but were higher than the lower assessment threshold value of 2.0 µg/m^3 and ranged between 2.14 and 2.61 µg/m^3.

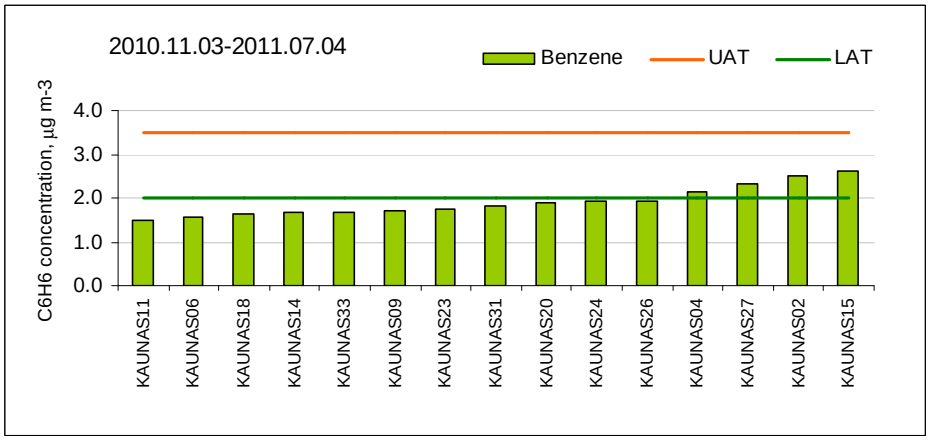


Fig. 29. Average concentrations of benzene in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011.

Seasonal variations in concentrations of benzene are shown in Fig. 30 and Table 20. Data indicate that benzene concentrations during the first study period (3 November – 1 December 2010) did not reached the annual limit value for the protection for human health (5.0 µg/m^3) and ranged from 1.1 µg/m^3 to 3.1 µg/m^3. The mean concentrations of benzene were lower than the reported as the higher assessment threshold value of 3.5 µg/m^3, however, taking into account ± 28.2% expanded uncertainty of measured benzene concentration, it should be reached at the site Kaunas02 in a transport area. The mean benzene concentrations were below the lower assessment threshold value of 2.0 µg/m^3 almost at the rest sites of the agglomeration.

In the wintertime (6 January – 3 February 2011), benzene concentrations ranged from 2.6 to 4.9 μg/m^3. The highest mean values of benzene for this study period nearly reached the limit value at two sites in transport area. Taking into account ± 28.2% benzene concentration in and near streets (red columns) is on average 2 times higher than in background areas uncertainty of measured benzene concentration, the limit value of 5.0 μg/m^3 should be exceeded at the sites Kaunas02 and Kaunas15, whereas at the most of sites benzene concentration will exceed the higher assessment threshold value of 3.5 μg/m^3. The winter concentrations of benzene were higher by the factor of 1.6 – 2.1 compared to the autumn concentrations.

In spring (25 March – 22 April 2011), the mean values of benzene varied from 0.8 (Kaunas33) to 2.8 μg/m^3 (Kaunas15). Generally, spring concentrations of benzene almost at all sites were below 2.0 μg/m^3 (i.e. the lower assessment threshold value).

Benzene concentrations differed from site to site and ranged from 0.4 to 2.3 μg/m^3 during the study period from 6 June to 4 July 2011. The highest summer mean value of 2.2 μg/m^3 was at the site Kaunas15, while at the other study sites of the agglomeration benzene concentrations ranged nearly about 1.0 μg/m^3.

The present study shows that atmospheric mean values of benzene exhibited a seasonal pattern with a maximum in winter and a minimum in summer: winter concentrations was on average 2 times higher than summer (Fig. 31). As expected, benzene concentrations were on average 20 % higher at the sites influenced by traffic emissions because traffic is the major contributor of benzene to atmospheric pollution.

Table 20. Statistics for the benzene atmospheric concentrations inside Kaunas agglomeration during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	Benzene concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KAUNAS02	Vandžiogalos g. Vytėnų g. Sargėnuose	2.6	4.5	1.8	1.1	0.7	4.9	2.5
KAUNAS04	Ramučiai, Liepų g. (Jonavos plentas)	2.2	3.6	1.8	1.0	0.9	3.9	2.1
KAUNAS06	Šilainių plentas-Vakarinis lankstas ant viaduko	1.5	2.6	1.1	1.0	0.6	2.6	1.5
KAUNAS09	Ukmergės g.	1.6	2.9	1.3	1.0	0.7	3.0	1.7
KAUNAS11	Tarp Partizanų g. ir A1 kelio	1.4	3.0	1.1	0.6	0.5	3.2	1.5
KAUNAS14	Netoli Kulautuvos g. prie Nemuno	1.8	2.8	1.2	0.9	0.9	2.8	1.7
KAUNAS15	Kėdainių g. Tilžės g. Vilijampolėje	2.3	3.8	2.1	2.2	1.9	4.0	2.6
KAUNAS18	Vokės g. prie 26 vid. mokyklos stadiono	1.5	2.9	1.3	1.0	0.7	3.0	1.6
KAUNAS20	Ateities plentas prie įmonių	1.6	2.9	1.4	1.7	1.3	2.9	1.9
KAUNAS23	Žvaigždžių g. Planetų g. Dariaus ir Girėno g.	1.8	3.1	1.4	0.7	0.4	3.2	1.7
KAUNAS24	S.Daukanto g. link pėsčiųjų tilto į Nemuno salą	1.9	3.3	1.7	0.9	0.7	3.4	1.9
KAUNAS26	K. Baršausko g. Popieriaus g.	2.0	3.3	1.5	1.1	0.8	3.5	1.9
KAUNAS27	R. Kalantos M. Gimbutienės g. prie transporto žiedo	1.9	3.6	2.8	1.0	0.7	3.8	2.3
KAUNAS31	Vaidilos g. Gailutės g.	1.7	3.4	1.4	0.8	0.5	3.7	1.8

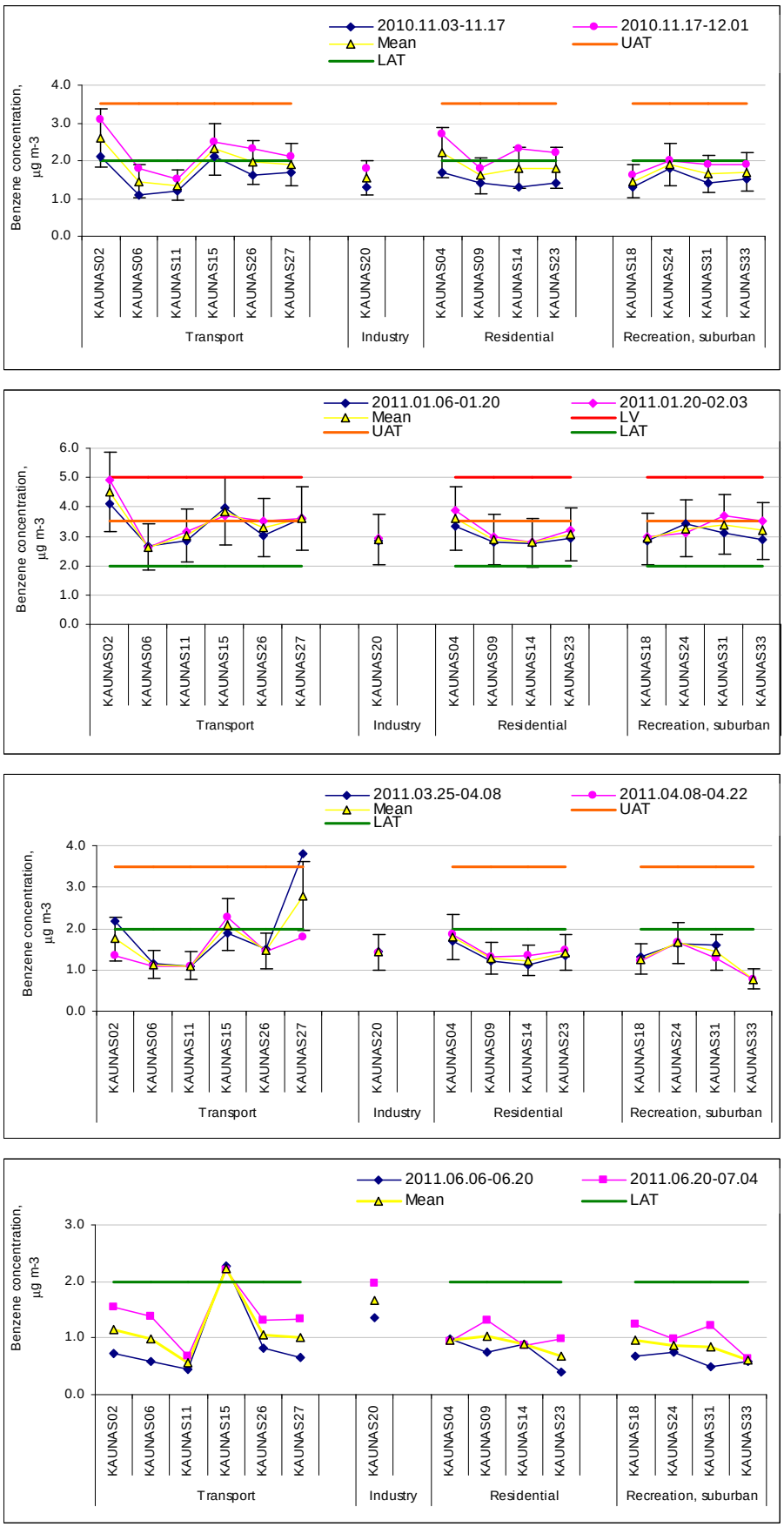


Fig.30. Seasonal variation of mean benzene concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 28.2% expanded uncertainty)

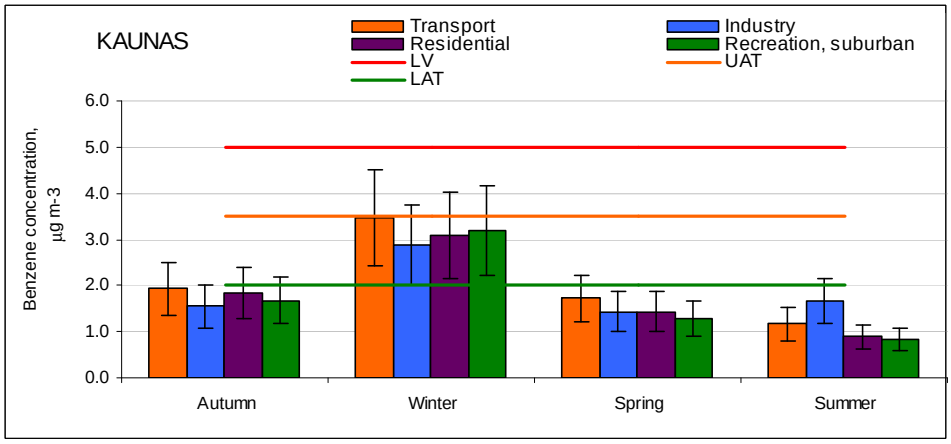


Fig. 31. Seasonal variation of mean benzene concentrations calculated for the entire study period from 3 November 2010 to 4 July 2011(bar lines show ± 28.2% expanded uncertainty)

Comparison diffusive samplers and continuous measurements of sulfur dioxide and nirogen dioxide concentrations

Study period	Kaunas_Noreikiskes OKTS data	Diffusive samplers data	Difference relative, %
		Sulfur dioxide, µg/m^3	
2010.11.03-2010.11.17	1.9	2.8	48
2010.11.17-2010.12.01	2.5	1.4	-44
2011.01.06-2011.01.20	2.8	0.5	-82
2011.01.20-2011.02.03	3.3	0.8	-76
2011.03.25-2011.04.08	5.2	0.5	-90
2011.04.08-2011.04.22			
2011.06.06-2011.06.20	0.6	0.8	39
2011.06.20-2011.07.04	0.8	0.2	-81
Mean 4 seasons	2.4	1.0	-59
		Nitrogen dioxide, µg/m^3	
2010.11.03-2010.11.17	9.9	12.8	29
2010.11.17-2010.12.01	11.8	12.8	9
2011.01.06-2011.01.20	12.3	13.3	8
2011.01.20-2011.02.03	12.4	14.3	15
2011.03.25-2011.04.08	5.6	8.6	55
2011.04.08-2011.04.22	9.5	13.2	38
2011.06.06-2011.06.20	3.9	7.0	80
2011.06.20-2011.07.04	4.0	7.2	79
Mean 4 seasons	8.7	11.2	29

Study period	Kaunas_Petrasiunai OKTS duomenys	Diffusive samplers data	Difference relative, %
		Nitrogen dioxide, µg/m^3	
2010.11.03-2010.11.17	12.0	20.8	73
2010.11.17-2010.12.01	9.6	17.3	81
2011.01.06-2011.01.20	16.2	24.8	53
2011.01.20-2011.02.03	15.2	25.9	70
2011.03.25-2011.04.08	11.9	22.6	90
2011.04.08-2011.04.22	11.3	19.6	73
2011.06.06-2011.06.20	10.9	19.9	82
2011.06.20-2011.07.04	6.8	15.0	121
Mean 4 seasons	11.7	20.7	77

Conclusion

The mean concentrations of **sulfur dioxide** in Kaunas agglomeration during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m^3.

The mean concentration of **nitrogen dioxide** in Kaunas agglomeration during the study period ranged between 8.7 μg/m^3 and 45.6 μg/m^3.

1) The mean concentrations of NO_2 exceeded the annual limit value of 40 μg/m^3 at two sites exposed to intensive traffic flow: crossing of Vytauto ave.-M.K. Ciurlionio (KAUNAS25) and near A1 road in the area Kleboniskis forest - parking lot (KAUNAS03).
2) The mean concentrations of NO_2 ranged between the lower (26 μg/m^3) and upper (32 μg/m^3) assessment threshold values at eight sites: R. Kalantos - M. Gimbutienes str. (KAUNAS27), Vandziogalos - Vytenu str. (KAUNAS02), S.Daukanto str. (KAUNAS24), Skuodo - Juozapaviciaus - Siulu str. (Sanciai) (KAUNAS30), Siaures ave. - Savanoriu ave. (KAUNAS10), Silainiu road-Vakarinis detour (KAUNAS06), IX Forto -Kursiu str. (KAUNAS01), near road A1 and Ateities (KAUNAS12)

The mean concentrations of **benzene** in Kaunas agglomeration during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. Benzene concentrations exceeded the upper assessment threshold value of 2.0 μg/m^3 at four sites near crossings: Liepu str. (Ramuciai) (KAUNAS04), R. Kalantos-M. Gimbutienes (KAUNAS27), Vandziogalos - Vytenu (KAUNAS02), Kedainiu - Tilzes (Vilijampole) (KAUNAS15).

4.3.3 ZONE (the rest part of Lithuania)

4.3.3.1 The location of diffusive samplers in zone

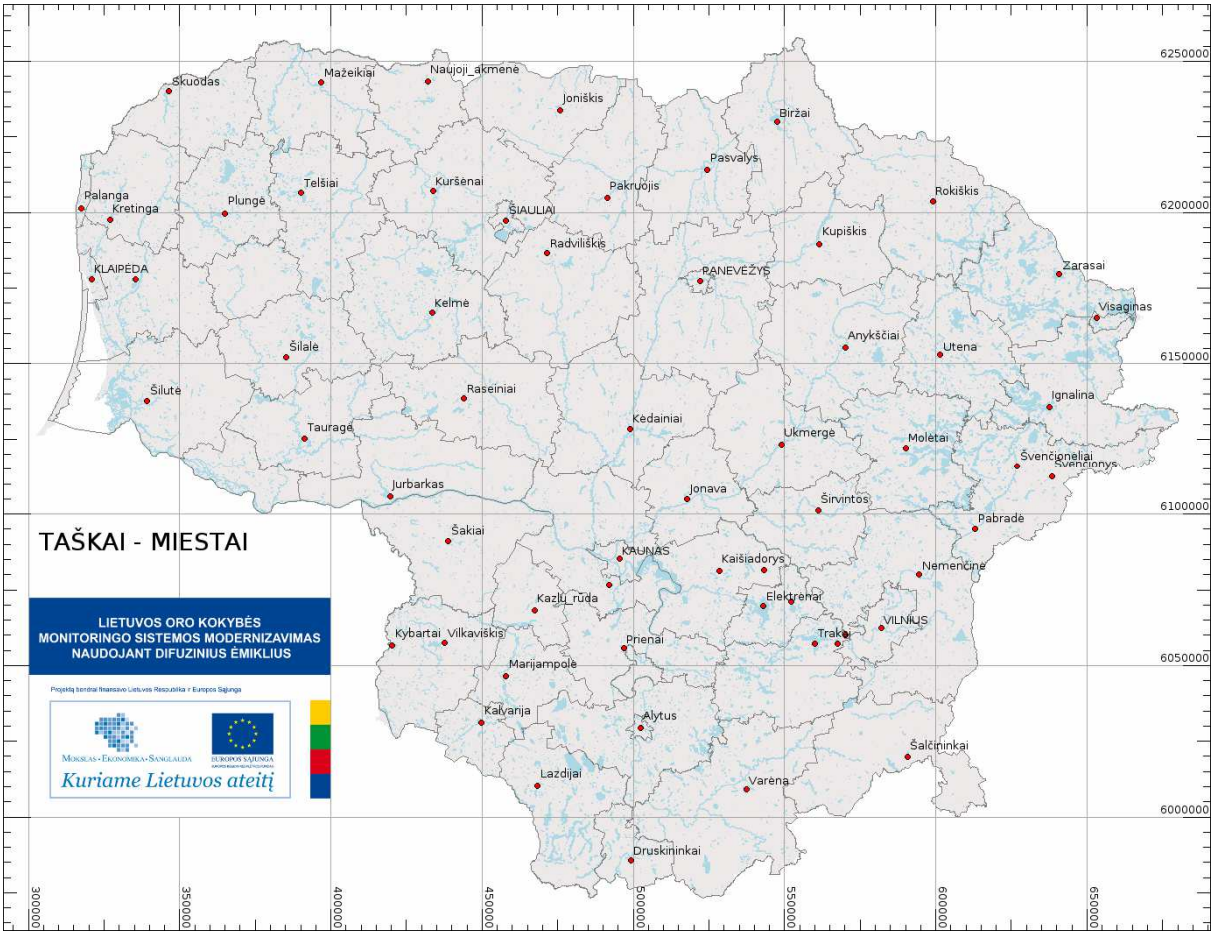


Fig.32. Location of diffusive samplers in Zone.

4.3.3.2 Coordinates of study places and data capture in zone

Tabele 21. Coordinates of study places and data capture (%) in zone

Site code	Address	Coordinates (LKS-94)		Data capture, %		
		X	Y	NO_2	SO_2	LOJ
ALYTUS01	Pramonės g.	501064	6031636	100	100	100
ALYTUS02	Likikėlių g. 14	500948	6028780	100	100	100
ALYTUS03	Rūtų g. Naujoji g.	502507	6028699	100	100	100
ALYTUS04	Dainavos g. Sūduvos g.	502481	6027689	25	100	100
ALYTUS05	Kalniškės g. Naujoji g.	500760	6030579	100	-	-
ANYKSCIAI01	Netoli Paupio g. A. Baranausko aikštė	569720	6155059	100	100	100
ANYKSCIAI02	Netoli Liudiškių g. Statybininkų g.	570411	6154873	100	100	100
ANYKSCIAI03	Prie upės Anykšta pėsčiųjų takas	570422	6155535	100	100	100
BIRZAI01	Netoli Vabalninko g. Kęstučio g. sankryžos	545801	6230034	100	100	100
BIRZAI02	Apasčios kranto Žemaitės g.	547160	6229710	100	100	100
BIRZAI03	Biržų pilies parkas	546712	6230471	100	100	100
DRUSKININKAI01	M.K. Čiurlionio g. Antakalnio g.	498076	5986661	100	100	100
DRUSKININKAI02	M.K. Čiurlionio g. Veisiejų g.	499569	5985934	100	100	100
DRUSKININKAI03	Kultūros poilsio parkas	497817	5987765	100	100	100
ELEKTRENAI01	Šviesos g. netoli A1 kelias prie stadiono	543513	6072650	100	100	88
ELEKTRENAI02	Literatūros meno muziejus, stadionas	542208	6071913	88	88	88
ELEKTRENAI03	Prie gatvės ties „Ledo arena“	543165	6072363	100	100	100
GARGZDAI01	Klaipėdos g. Kvietinių g.	336571	6178121	100	100	100
GARGZDAI02	Skinijos takas	336174	6176731	100	75	100
GARGZDAI03	Prie Minijos upės, netoli stadionas Kvietinių g.	337246	6178871	88	88	88
GARLIAVA01	Vytauto g. K. Aglinskio g.	491879	6075809	100	100	100
GARLIAVA02	Pažangos g. R. Mizaros g.	491917	6077854	100	100	100
GARLIAVA03	Garliavos I tvenkinys 500 m nuo kelio 139 nr.	492984	6076550	100	100	100
GRIGISKES01	Vilniaus g. A1 Kunigiškių g.	570551	6060175	100	100	100
GRIGISKES02	Netoli Vokės upės Afindevičių g.	570768	6059352	100	100	100
GRIGISKES03	Tarp Vokės upės, Neries upės	569604	6061114	100	100	100
IGNALINA01	Geležinkelio g. Aukštaičių g.	637293	6135997	100	100	100
IGNALINA02	Agarinio g.	637539	6134697	100	100	100
IGNALINA03	Prie žiemos sporto centro	638000	6135303	100	100	100
JONAVA01	J. Ralio g. J. Basanavičiaus g. Žeimių g. žiedas	517876	6104155	100	100	100
JONAVA02	Pramonės g. netoli Skarulių bažnyčios	520157	6104288	100	100	88

JONAVA03	Prie Jonavos tv. Poliklinika rajono	516967	6104728	100	100	100
JONISKIS01	Livonijos g. netoli bažnyčios	476255	6234367	100	100	100
JONISKIS02	Turgaus g., Šiaulių senoji g.	476301	6232823	100	100	100
JONISKIS03	Prie Joniškio I tv. netoli stadiono	475054	6235031	100	100	88
JURBARKAS01	Dariaus Girėno g. Ugniagesių g.	421549	6105385	100	100	100
JURBARKAS02	A. Giedraičio-Giedriaus g. Bartkūnų g.	420149	6104669	100	100	100
JURBARKAS03	Mintuva, Parke prie cerkvės	420468	6105588	100	88	100
KAISIADORYS01	Gedimino g. Bažnyčios g.	529248	6080719	100	100	100
KAISIADORYS02	Upė Lomena Vilniaus g. Priemiesčio g.	529903	6081460	100	100	100
KAISIADORYS03	Girelės miškas	527457	6080740	100	100	100
KALVARIJA01	Dariaus ir Girėno g. Laisvės g.	449782	6031126	100	100	100
KALVARIJA02	J. Basanavičiaus Naujoji g.	449289	6031733	100	100	100
KALVARIJA03	Prie Šešupės upės	448655	6030985	100	100	100
KAZLU RUDA01	Atgimimo g. V. Kudirkos g.	467613	6068553	100	100	100
KAZLU RUDA02	Kęstučio g. Maironio g. Gedimino g.	466820	6068691	100	100	100
KAZLU RUDA03	S. Daukanto g. Marijampolės g.	467627	6067733	100	100	100
KEDAINIAI01	Kauno g. Ryto g.	498730	6127043	100	100	100
KEDAINIAI02	Šėtos g. 106	499692	6128746	100	100	100
KEDAINIAI03	J. Basanavičiaus g. 53	498374	6128074	88	100	100
KELME01	Vytauto g. Laisvės g. Gynėjų g.	432856	6166747	100	100	100
KELME02	Liolių g. Pakalnės g.	433676	6165518	100	88	100
KELME03	Kelmės dvaro parkas Vilbeno upės užtvanka	433105	6167710	100	100	88
KLAIPEDA01	Molo g. 2	317388	6181548	-	100	100
KLAIPEDA02	Liepojos g. P. Lideikio g.	319447	6181143	100	100	100
KLAIPEDA03	Kretingos g. 4	319748	6180136	100	88	100
KLAIPEDA04	Baltijos pr. 1 Šilutės pl.	322689	6176440	100	-	-
KLAIPEDA05	Sportininkų g. Stadiono g.	318570	6180453	100	100	100
KLAIPEDA06	Liepų g. 41	320408	6179290	100	-	-
KLAIPEDA07	Smiltelės g I. Simonaitytės g.	323146	6174130	100	-	100
KLAIPEDA08	Tiltų g. Turgaus g.	319978	6178655	100	100	100
KLAIPEDA09	H. Manto g. S. Daukanto g.	319612	6179416	100	100	-
KLAIPEDA10	Taikos pr. 52	320915	6176939	88	-	75
KLAIPEDA11	Minijos g. Naikupės g.	320937	6175175	88	88	-
KLAIPEDA12	Statybininkų g. Šilutės pl.	323160	6175092	100	100	100
KRETINGA01	Rotušės aikštė	327437	6198384	100	88	100
KRETINGA02	Nemuno g. netoli Akmena	326908	6197661	100	88	100
KRETINGA03	Kretingos parko I tv. Kretingos muz.	328091	6199563	75	67	75
KUPISKIS01	Gedimino g. Matulionio g.	561145	6189986	100	100	100
KUPISKIS02	Technikos g. Krasnavos g.	562419	6189089	100	100	100
KUPISKIS03	Aukštupėnuose, Vėžionių g.	561086	6190821	100	100	100
KURSENAI01	Vytauto g. V. Kudirkos g.	433837	6208744	100	100	100
KURSENAI02	Daugėlių g. Klevų g.	434414	6206891	100	100	100

KURSENAI03	Ventos g. prie tilto	433417	6207873	100	100	100
KYBARTAI01	J. Basanavičiaus g. Žemaitės g.	421168	6056083	100	100	100
KYBARTAI02	Vienybės g. Sodų g.	419564	6057289	100	100	100
KYBARTAI03	Vasario 16-osios g.	420373	6056257	100	100	100
LAZDIJAI01	Kauno g. Vytauto g.	468422	6011033	100	100	100
LAZDIJAI02	Tarp Turistų g. ir Vytauto g.	469115	6010411	100	100	100
LAZDIJAI03	Palazdijo Baltajo ež.	467917	6008752	100	100	88
LENTVARIS01	Fabriko g. Geležinkelio g.	567994	6056942	100	100	100
LENTVARIS02	Trumpoji g. Gėlių g. Stadionas	567357	6056391	100	100	100
LENTVARIS03	Lentvario dvaras Lentvario ež.	567006	6058501	100	100	100
MARIJAMPOLE01	V. Kudirkos g. Gedimino g.	458284	6046887	100	-	100
MARIJAMPOLE02	Pavasario g. Liepų g.	459490	6047155	100	100	100
MARIJAMPOLE03	Liepynų g. Maironio g.	458027	6045273	100	100	100
MARIJAMPOLE04	Statybininkų g.	460081	6049195	100	100	100
MARIJAMPOLE05	Pašešupio parkas, stadionas	458412	6048422	100	50	-
MAZEIKIAI01	Laisvės g. 22	397642	6243366	100	100	100
MAZEIKIAI02	Naftininkų g. Žemaitijos g.	397138	6242374	100	100	100
MAZEIKIAI03	Algirdo g. Gamyklos g.	395905	6243888	100	100	100
MOLETAI01	Aikštė Vilniaus g.	590258	6122701	100	100	100
MOLETAI02	Ąžuolų g. Liepų g.	589831	6121930	100	100	100
MOLETAI03	Prie Pastovio ež.	591143	6122813	100	100	100
N AKMENE01	Respublikos g. V. Kudirkos g.	430831	6243673	100	100	100
N AKMENE02	Parko g. Žalioji g.	431892	6243162	100	100	100
N AKMENE03	Taikos g. Klykolių g.	430367	6243951	100	100	100
NEMENCINE01	Švenčionių g. Bažnyčios g.	594100	6079944	100	100	88
NEMENCINE02	Kranto g.	594539	6079751	100	100	100
NEMENCINE03	Bažnyčios g.	593881	6080176	88	100	100
PABRADE01	Vilniaus g. Arnionių g.	613240	6095522	100	100	100
PABRADE02	Molėtų g. Architektų g.	612264	6095546	100	100	100
PABRADE03	Bažnyčios g.	613140	6094715	100	100	100
PAKRUOJIS01	Statybininkų g. Vilniaus g. Vytauto g.	491076	6205127	88	100	100
PAKRUOJIS02	S. Ušinskio g. Vienybės g.	490416	6204655	100	100	100
PAKRUOJIS03	Kruojos g. Saulėtekio g.	490659	6205559	100	100	100
PALANGA01	Plytų g. Kretingos g.	316933	6201937	100	100	100
PALANGA02	Sodų g. 63	317850	6202263	100	100	100
PALANGA03	Birutės al.	316110	6202109	100	100	100
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	523002	6176838	100	100	100
PANEVEZYS02	Dariaus ir Girėno g 15A	520296	6177590	100	-	100
PANEVEZYS03	Elektros g. 4	522820	6177240	100	-	100
PANEVEZYS04	J. Janonio g. prie duonos kepyklos	520470	6178603	100	-	100
PANEVEZYS05	Spartuoliu g. Pušaloto g.	520408	6179278	100	100	-
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	522725	6179895	100	88	100
PANEVEZYS07	Vytauto g. Aukštaičių g.	523595	6176700	100	-	100
PANEVEZYS08	Medžiotojų g. Molainiuose	520104	6175198	100	100	-
PANEVEZYS09	Paplentės g. Didžioji g. Staniūnuose	525019	6175895	-	100	100

	Gėlių g. Dambavos g.			100	100	-
PANEVEZYS10	Dambavoje	525715	6177681			
	Vaivadėlių g. Lėvens g. prie			88	100	-
PANEVEZYS11	Vaivadų	524809	6179644			
PANEVEZYS12	Pušaloto g. Raginėnų g.	521642	6178714	100	100	100
	Panevėžio g. Vilniaus g.				100	
PASVALYS01	Taikos g. Vyšnių g.	525136	6213975	100		100
PASVALYS02	Šermukšnių g. P. Cvirkos g.	525921	6214653	100	100	100
	Stoties g. prie kapinių,					
PASVALYS03	autoserviso	524204	6214730	100	88	100
	Senamiesčio a. Dariaus ir			100		100
PLUNGE01	Girėno g. Vytauto g.	365355	6199715		100	
PLUNGE02	Lankos g. Saulėtekio g.	365777	6198566	100	100	100
	Stoties g. priešais Plungės			100		100
PLUNGE03	dvaro parką	365270	6200614		100	
	J. Basanavičiaus g. N					
PRIENAI01	Gyvenimo g.	496449	6055773	100	100	100
PRIENAI02	Pramonės g. Stadiono g.	496923	6056783	100	100	100
PRIENAI03	Prie Nemuno tilto parkas	496553	6054724	100	100	100
	Šiaulių g. Gedimino g.			100		100
RADVILISKIS01	Autobusų st	471600	6186571		100	
	J. Marcinkevičiaus g.					
RADVILISKIS02	Purienų g.	470377	6187433	88	100	100
	Gedimino g. prie					100
RADVILISKIS03	Geležinkelio stoties	470974	6185929	100	100	
	Vilniaus g. Vytauto					
RASEINIAI01	Didžiojo g.	443798	6138673	100	100	100
RASEINIAI02	Pirmūnų g.	445032	6137877	100	100	100
	Netoli Žemaičių g. Vilkupės					
RASEINIAI03	upė, Parkas	444479	6139538	88	88	100
ROKISKIS01	Respublikos g. Pramonės g.	599296	6202853	100	100	100
ROKISKIS02	Parko g. 11	598642	6203746	100	100	100
ROKISKIS03	Nepriklausomybės a. 11	599172	6204528	100	100	100
SAKIAI01	V. Kudirkos g. Šaulių g.	438390	6091370	100	100	100
SAKIAI02	Jazminų g.	439476	6090547	100	100	100
	Vasario 16-osios g.					
SAKIAI03	Bažnyčios g., skveras	438797	6091545	100	100	100
	Nepriklausomybės g.					
SALCININKAI01	Vilniaus g.	590076	6019702	100	88	88
SALCININKAI02	K. Vagnerio g.	590885	6020330	75	75	88
SALCININKAI03	Prie Šv. Petro bažnyčios	590850	6019410	100	88	75
	Salduvės parkas Talšos ež.					
SIAULIAI01	paplūdimys	458575	6199964	100	100	-
SIAULIAI02	Aušros al. Tilžės g.	457339	6200075	100	-	100
SIAULIAI03	V. Kudirkos g. Margytės g.	455956	6200626	100	-	-
	Žeimių g. Rasos g. Aušros			100		
SIAULIAI04	g.	459786	6202380		100	100
SIAULIAI05	Vaidoto g. Merkinės g.	458431	6202359	100	100	-
SIAULIAI06	Miško g. prie Vijolės upės	456040	6202290	88	88	88
SIAULIAI07	Lyros g. Dainų g.	453917	6198083	100	100	-
SIAULIAI08	Tilžės g. Aukštabalio g.	455327	6198364	100	-	100
SIAULIAI09	K. Donelaičio g. Šilėnų g.	456723	6198665	0	88	100
SIAULIAI10	Pramonės g. Metalistų g.	457400	6197433	88	88	100
SIAULIAI11	Šaukėnų g. Alksnių g.	458577	6197351	100	100	100

SIAULIAI12	Pročiūnų g P. Motiekaičio g.	460335	6197553	88	88	88
SILALE01	Vytauto g. J. Basanavičiaus g.	385097	6152243	100	100	100
SILALE02	Kovo 11-osios g.	385593	6151684	100	100	100
SILALE03	Prie Lokystos upės	384458	6151839	100	100	100
SILUTE01	Lietuvninkų g. Gudobelių g.	339312	6137016	100	100	100
SILUTE02	Sodų g. prie stadiono	340019	6137703	100	100	100
SILUTE03	Šyša upė Netoli geležinkelio tiltas	340742	6136478	100	88	100
SIRVINTOS01	Plento g. Musninkų g.	561915	6100080	100	100	100
SIRVINTOS02	Jaunimo g. 16	560582	6101375	100	100	100
SIRVINTOS03	Vilniaus g. I. Šeiniaus g.	561297	6100918	100	100	100
SKUODAS01	Vytauto g. Gedimino g.	347054	6240123	100	100	100
SKUODAS02	Šatrijos g. 5	346955	6240458	100	100	100
SKUODAS03	Dariaus ir Girėno g. 46	347681	6240032	100	100	100
SVENCIONELIAI01	Priestočio g. Kaltinėnų g.	627250	6116098	100	100	88
SVENCIONELIAI02	Lauko g. – daugiaaukščiai namai	628040	6116567	88	100	100
SVENCIONELIAI03	Prie geležinkelio ties AB „Švenčionėlių Maltosa“	626860	6114475	100	100	100
SVENCIONYS01	Vilniaus g. Lentupio g.	637716	6113085	100	100	100
SVENCIONYS02	Saulėtekio g. Pakalnės g.	637804	6112316	100	100	88
SVENCIONYS03	Lietupio g. prie kapinių	638338	6112914	88	100	100
TAURAGE01	Dariaus ir Girėno g. Gedimino g.	391417	6125837	100	100	100
TAURAGE02	Laisvės g. Malūno g., stadionas netoli	391046	6124459	100	100	100
TAURAGE03	M.K. Čiurlionio g. Ganyklų g.	391400	6126905	100	75	100
TELSIAI01	Turgaus alėja Respublikos g.	390805	6206888	100	100	88
TELSIAI02	Vyšnių g.	391220	6207676	100	100	100
TELSIAI03	Parko g. link Masčio ež.	390525	6205335	100	100	100
TRAKAI01	Gedimino g. Aukštadvario g.	560350	6055510	88	100	88
TRAKAI02	Birutės g.	560464	6056382	100	100	100
TRAKAI03	Karaimų g. Galvės g. Žalioji g.	559692	6057525	100	100	100
UKMERGE01	Kęstučio al. Vilniaus g.	548663	6124158	88	88	100
UKMERGE02	L. Giros g A. Smetonos g.	547746	6124310	100	100	100
UKMERGE03	Nuotekų g. Laukų g. Jaunimo g.	549813	6123637	100	100	100
UTENA01	Aušros g. J. Basanavičiaus g.	601292	6152729	100	100	100
UTENA02	Aušros g. 79	601239	6153604	100	100	100
UTENA03	Algirdo g. prie vaikų darželio	601208	6152115	100	100	100
VARENA01	J. Basanavičiaus g. Vytauto g.	537138	6008441	100	100	100
VARENA02	J. Basanavičiaus g. Spaustuvės g.	537510	6009003	100	100	100
VARENA03	Alytaus g. Pramonės g.	538380	6009357	100	100	100
VIEVIS01	Kauno g., A1 netoli pėsčiųjų viaduko	552637	6070998	100	100	88

VIEVIS02	Tarp Stoties g. ir A1 kelio	552096	6071491	100	100	100
VIEVIS03	Prie Vievio ež.	553043	6070218	100	100	75
VILKAVISKIS01	Vytauto g. Gedimino g.	437794	6057269	100	100	100
VILKAVISKIS02	Vienybės g. tarp dviejų stadionų	437815	6058407	100	100	100
VILKAVISKIS03	Šeimena upėJ. Basanavičiaus g.	438465	6056803	100	100	100
VISAGINAS01	Taikos pr. Veteranų g.	653686	6165642	100	100	100
VISAGINAS02	Jaunystės g.	654141	6164150	88	88	88
VISAGINAS03	Visagino ež. Stadionas Savivaldybė	652665	6164888	88	100	100
ZARASAI01	Vytauto g. Sėlių aikštė	641043	6179669	100	100	100
ZARASAI02	P. Širvio g.	642179	6180530	75	75	75
ZARASAI03	J. Gruodžio g. K. Donelaičio g.	641069	6180616	88	88	100

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**

Photographic documentation of the sampling location is presented in **Annex II.**

The protocols of chemical analysis are presented in **Annex III**.

Raw data are presented in **Annex IV**.

4.3.3.3 Summary tables of data in Zone for the study period from 3 November 2010 to 4 July 2011

Table 22. Sulfur dioxide concentrations in zone for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		SO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KLAIPEDA01	Molo g. 2	317356	6181537	*0.15*	1.4	1.7	0.3	0.7	0.9	1.6	0.5
KLAIPEDA02	Liepojos g. P. Lideikio g.	319434	6181140	0.6	1.4	1.2	1.3	0.3	1.5	1.1	0.7
KLAIPEDA03	Kretingos g. 4	319756	6180136	1.5		0.9	0.7	0.6	1.1	0.8	0.9
KLAIPEDA05	Sportininkų g. Stadiono g.	318437	6180451	*0.15*	1.7	3.5	1.3	0.5	1	1.3	0.9
KLAIPEDA08	Tiltų g. Turgaus g.	320004	6178668	*0.15*	1.8	1.2	1.4	*0.15*	1.3	0.5	0.6
KLAIPEDA09	H. Manto g. S. Daukanto g.	319612	6179416	0.8	1.9	2	0.5	0.5	1.4	1.7	1.1
KLAIPEDA11	Minijos g. Naikupės g.	320937	6175175	0.6	1.1	5.4	0.6	0.4	0.9		0.7
KLAIPEDA12	Statybininkų g. Šilutės pl.	323159	6175127	*0.15*	1.1	1.1	0.7	0.4	0.7	1.1	1.1
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	522977	6176841	5.00	0.9	1.8	0.1	0.6	1.8	1.1	0.6
PANEVEZYS05	Spartuoliu g. Pusaloto g.	520411	6179265	1.30	5.0	0.6	0.6	0.4	0.6	0.6	0.4
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	522728	617900	1.30	1.8	1.7	0.3	0.6	0.8	0.4	0.3
PANEVEZYS08	Medžiotojų g. Molainiuose	520088	6175197		0.9	0.8	0.5	0.5	1.2	0.6	0.4
PANEVEZYS09	Paplentės g. Didžioji g. Staniūnuose	525040	6175873	0.80	1.0	2.1	0.3	0.9	0.3	0.9	*0.15*
PANEVEZYS10	Gėlių g. Dembavos g. Dembavoje	525743	6177700	1.90	4.3	2	0.5	0.4	0.6	0.4	*0.15*
PANEVEZYS11	Vaivadėlių g. Lėvens g. prie Vaivadų	524838	6179646	1.40	0.9	0.9	0.8	0.9	0.8	0.6	*0.15*
PANEVEZYS12	Pušaloto g. Raginėnų g.	521653	6178724	1.20	0.6	1.2	0.7	3.6	1.3	1.2	0.5
SIAULIAI01	Salduvės parkas Talšos ež. paplūdimys	458612	6199957	1.4	1.6	1.4	2.6	0.6	8.6	0.6	*0.15*
SIAULIAI04	Žeimių g. Rasos g. Aušros g.	459807	6202377	*0.15*	1.1	0.9	1.5	0.6	*0.15*	0.7	0.4
SIAULIAI05	Vaidoto g. Merkinės g.	458435	6202358	0.5	1.7	0.9	1.9	0.7	6.8	1.3	0.7
SIAULIAI06	Miško g. prie Vijolės upės	456048	6202293		1.3	0.9	1.3	*0.15*	1	0.9	0.5
SIAULIAI07	Lyros g. Dainų g.	453918	6198085	0.7	1.8	0.7	2.1	0.6	*0.15*	1.9	*0.15*
SIAULIAI09	K. Donelaičio g. Šilėnų g.	456720	6198676	*0.15*		0.6	2.4	0.9	1.4	1.7	*0.15*
SIAULIAI11	Šaukėnų g. Alksnių g.	458564	6197330	*0.15*	1.3	0.8	2.1	0.4	*0.15*	1.1	0.4
SIAULIAI12	Pročiūnų g P. Motiekaičio g.	460338	6197599		1.4	1.3	1.7	1.1	2.7	2.1	0.7
OKTS12	Panevežys_Centras	522965	6176770	3.0	0.6	0.8	0.5	8.2	0.15	1.9	0.9
OKTS22	Šiauliai	456774	6200607	0.15	2.3	1.0	2.4	0.6	1.2	1.2	0.15
OKTS33-Klaipeda	Klaipėda_Šilutės plentas	322661	6176421	1.7	2.5	1.7	1.0	1.0	1.8	1.3	1.2

	lost or stolen
<0.3 = n.d.	half of detection limit = n.d.

Site code	Address	Coordinates (LKS-94)		SO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
ALYTUS01	Pramonės g.	501105	6031759	3.4	2.4	1.8	1.3	0.7	0.9	1.0	0.7
ALYTUS02	Likikėlių g. 14	500959	6028806	2.9	1.0	0.9	1.4	0.9	1	0.9	0.6
ALYTUS03	Rūtų g. Naujoji g.	502507	6028699	2.5	2.7	1.1	1	0.6	1.1	1.4	*0.15*
ALYTUS04	Dainavos g. Sūduvos g.	502481	6027689	1.4	1.5	0.9	2.6	1	0.8	1.3	*0.15*
ALYTUS05	Kalniškės g. Naujoji g.	500741	6030624								
ANYKSCIAI01	Netoli Paupio g. A. Baranausko aikštė	569750	6155073	0.6	0.5	0.5	0.8	0.7	0.5	0.5	2.7
ANYKSCIAI02	Netoli Liudiškių g. Statybininkų g.	570383	6154900	*0.15*	1.5	14.6	0.9	0.3	0.7	0.5	*0.15*
ANYKSCIAI03	Prie upės Anykšta pėsčiųjų takas	570224	6155363	0.7	0.7	10.5	0.7	0.4	3.2	0.4	*0.15*
BIRZAI01	Netoli Vabalninko g. Kęstučio g. sankryžos	55760	6230044	1.1	1.5	0.4	*0.15*	1.4	0.9	1.1	*0.15*
BIRZAI02	Apasčios kranto Žemaitės g.	547187	6229695	0.9	4.1	*0.15*	0.3	0.6	0.6	0.9	*0.15*
BIRZAI03	Biržų pilies parkas	546908	6230479	0.9	0.4	*0.15*	0.3	8.5	0.3	0.5	*0.15*
DRUSKININKAI01	M.K. Čiurlionio g. Antakalnio g.	498072	5986666	2.2	3.9	0.8	1.4	1.1	1	2.6	0.4
DRUSKININKAI02	M.K. Čiurlionio g. Veisiejų g.	499530	5985856	2.1	1.0	0.9	1	0.5	1.1	2.8	*0.15*
DRUSKININKAI03	Kultūros poilsio parkas	497901	5987822	2.8	1.2	1.3	1.6	1	1.1	1.5	0.5
ELEKTRENAI01	Šviesos g. netoli A1 kelias prie stadiono	543513	6072650	0.8	0.5	1.2	0.3	0.3	1.5	1.2	*0.15*
ELEKTRENAI02	Literatūros meno muziejus, stadionas	542208	6071913	0.6	0.7	1.7	*0.15*		1.1	1.0	1
ELEKTRENAI03	Prie gatvės ties „Ledo arena“	543165	6072363	0.9	0.6	1.9	*0.15*	*0.15*	1.8	1.5	0.4
GARGZDAI01	Klaipėdos g. Kvietinių g.	336544	6178116	0.4	1.4	1.8	0.5	0.7	0.9	*0.15*	0.8
GARGZDAI02	Skinijos takas	336199	6176738	*0.15*	1.0	2.3		0.5	1.2	*0.15*	
GARGZDAI03	Prie Minijos upės, netoli stadionas Kvietinių g.	337262	6178840	*0.15*	0.9	1.1	0.3	2.4	2.2		0.7
GARLIAVA01	Vytauto g. K. Aglinskio g.	491907	6075767	1.8	1.4	0.8	0.8	1.3	1.3	0.7	*0.15*
GARLIAVA02	Pažangos g. R. Mizaros g.	491902	6077928	2.2	*0.15*	0.6	0.6	0.3	1.4	0.6	*0.15*
GARLIAVA03	Garliavos I tvenkinys 500 m nuo kelio 139 nr.	493517	6076708	2.1	1.7	0.8	1.4	0.3	0.7	0.5	0.7
GRIGISKES01	Vilniaus g. A1 Kunigiškių g.	570551	6060175	2.1	1.5	1.2	0.6	*0.15*	1.4	0.9	0.4
GRIGISKES02	Netoli Vokės upės Afindevičių g.	570768	6059352	1.7	1.1	1.4	*0.15*	0.4	0.7	0.3	1.1
GRIGISKES03	Tarp Vokės upės, Neries upės	569660	6061180	2.6	0.6	1.5	0.9	0.3	1.4	*0.15*	0.8
IGNALINA01	Geležinkelio g. Aukštaičių g.	637268	6135970	1.1	0.8	1	0.3	0.4	1.5	1.8	*0.15*
IGNALINA02	Agarinio g.	637639	6135044	1.9	1.2	0.9	0.3	1.7	0.9	0.1	*0.15*
IGNALINA03	Prie žiemos sporto centro	638065	6136145	*0.15*	1.0	0.5	2	0.5	0.6	1.8	*0.15*

JONAVA01	J. Ralio g. J. Basanavičiaus g. Žeimių g. žiedas	517864	6104172	1.0	0.7	0.3	1.4	0.3	1.2	1.8	1.1
JONAVA02	Pramonės g. netoli Skarulių bažnyčios	520066	6104559	0.7	0.7	*0.15*	0.9	0.5	0.8	1.9	*0.15*
JONAVA03	Prie Jonavos tv. Poliklinika rajono	517111	6104606	2.8	0.7	0.9	1.4	4.5	1.5	1.7	*0.15*
JONISKIS01	Livonijos g. netoli bažnyčios	476252	6234371	*0.15*	1.0	1.5	0.7	0.7	*0.15*	1.1	*0.15*
JONISKIS02	Turgaus g., Šiaulių senoji g.	476336	6232886	*0.15*	1.2	0.9	0.7	0.6	0.4	1.5	*0.15*
JONISKIS03	Prie Joniškio I tv. netoli stadiono	475194	6234842	*0.15*	1.3	1.2	0.4	0.6	*0.15*	1.2	0.7
JURBARKAS01	Dariaus Girėno g. Ugniagesių g.	421550	6105388	0.3	0.4	0.6	0.8	0.5	*0.15*	1.2	0.8
JURBARKAS02	A. Giedraičio-Giedriaus g. Bartkūnų g.	420104	6104683	0.7	1.9	0.5	2	0.7	1	0.3	2.9
JURBARKAS03	Mintuva, Parke prie cerkvės	420464	6105578	0.9	1.9	1	1.2		*0.15*	0.4	0.3
KAISIADORYS01	Gedimino g. Bažnyčios g.	529295	6080725	1.7	1.3	0.7	*0.15*	0.9	0.8	0.8	0.9
KAISIADORYS02	Upė Lomena Vilniaus g. Priemiesčio g.	529928	6081486	1.7	1.3	1	0.5	0.3	2.4	0.3	*0.15*
KAISIADORYS03	Girelės miškas	527506	6080785	1.6	1.3	2.9	0.3	0.6	0.5	0.4	0.4

Site code	**Address**	**Coordinates (LKS-94)**		**SO_2 concentration, µg/m^3**							
		X	**Y**	**2010.11.03-2010.11.17**	**2010.11.17-2010.12.01**	**2011.01.06-2011.01.20**	**2011.01.20-2011.02.03**	**2011.03.25-2011.04.08**	**2011.04.08-2011.04.22**	**2011.06.06-2011.06.20**	**2011.06.20-2011.07.04**
KALVARIJA01	Dariaus ir Girėno g. Laisvės g.	449850	6031119	2.6	2.7	6	0.9	0.3	0.9	0.5	1.3
KALVARIJA02	J. Basanavičiaus Naujoji g.	449284	6031771	2.4	2.7	1.5	1	0.7	0.4	0.6	1.2
KALVARIJA03	Prie Šešupės upės	448659	6031042	3.3	1.3	1.1	1.6	0.4	*0.15*	0.8	"15.3"
KAZLU RUDA01	Atgimimo g. V. Kudirkos g.	467619	6068546	1.9	1.8	1.8	0.5	0.4	1.1	1.6	*0.15*
KAZLU RUDA02	Kęstučio g. Maironio g. Gedimino g.	466796	6068741	2.4	1.4	1.5	2.4	0.4	0.6	0.8	0.3
KAZLU RUDA03	S. Daukanto g. Marijampolės g.	467613	6067755	2.4	2.2	0.8	3.7	0.7	0.3	1.5	0.3
KEDAINIAI01	Kauno g. Ryto g.	498731	6127025	0.9	1.8	0.5	1.2	0.6	0.4	1.1	0.8
KEDAINIAI02	Šėtos g. 106	499694	6128749	1.4	0.7	0.4	1.2	0.6	1	1.5	*0.15*
KEDAINIAI03	J. Basanavičiaus g. 53	498358	6128078	1.1	1.3	0.7	1	0.6	1	1.3	0.4
KELME01	Vytauto g. Laisvės g. Gynėjų g.	432882	6166778	*0.15*	*0.15*	2.3	1.4	0.5	1.7	2.1	*0.15*
KELME02	Liolių g. Pakalnės g.	433687	6165589	*0.15*	1.3	2.6	1	0.7		*0.15*	*0.15*
KELME03	Kelmės dvaro parkas Vilbeno upės užtvanka	433150	6167648	*0.15*	1.5	0.7	1.1	1.3	*0.15*	0.4	0.5
KRETINGA01	Rotušės aikštė	327453	6198340	*0.15*	1.1	1.1	0.5	3.9	1.5	0.3	0.3
KRETINGA02	Nemuno g. netoli Akmena	326918	6197661	0.6	2.4	5.2	1	2.9	1.3	1.4	
KRETINGA03	Kretingos parko I tv. Kretingos muz.	328177	6199537	1.2		1.2	2.3	0.3		1.0	
KUPISKIS01	Gedimino g. Matulionio g.	561136	6189987	1.7	3.1	1.8	0.3	5.5	1.1		1
KUPISKIS02	Technikos g. Krasnavos g.	562418	6188987	1.0	1.1	*0.15*	*0.15*	0.6	1.5	0.6	1.3
KUPISKIS03	Aukštupėnuose, Vėžionių g.	560962	6190603	0.9	1.1	1	0.6	2.5	*0.15*	0.3	6

KURSENAI01	Vytauto g. V. Kudirkos g.	433829	6208758	*0.15*	1.6	0.6	0.9	0.8	4.8	0.4	0.7
KURSENAI02	Daugėlių g. Klevų g.	434399	6206864	0.15	1.7	0.4	0.7	0.4	0.4	0.5	0.6
KURSENAI03	Ventos g. prie tilto	433353	6207866	*0.15*	2.1	0.6	1.3	*0.15*	*0.15*	0.8	*0.15*
KYBARTAI01	J. Basanavičiaus g. Žemaitės g.	421185	6056084	2.3	2.0	1.4	1.8	1	1.8	1.4	0.6
KYBARTAI02	Vienybės g. Sodų g.	419802	6057354	1.8	2.1	1.6	2.5	1.5	1.8	1.9	0.4
KYBARTAI03	Vasario 16-osios g.	420321	6056179	2.5	2.9	4	5.6	2.2	1.6	1.3	0.5
LAZDIJAI01	Kauno g. Vytauto g.	468376	6011044	2.4	2.4	2.6	1.9	1	1.7	1.3	0.5
LAZDIJAI02	Tarp Turistų g. ir Vytauto g.	469108	6010510	2.7	2.4	0.9	1.8	2.4	0.7	1.1	*0.15*
LAZDIJAI03	Palazdijo Baltajo ež.	467888	6008769	1.9	1.4	0.3	1.9	0.8	1	2.1	0.3
LENTVARIS01	Fabriko g. Geležinkelio g.	567994	6056942	1.1	0.8	4.3	0.8	*0.15*	"17.3"	*0.15*	1.3
LENTVARIS02	Trumpoji g. Gėlių g. Stadionas	567357	6056391	1.5	0.8	2.4	0.9	0.5	2	4.2	*0.15*
LENTVARIS03	Lentvario dvaras Lentvario ež.	567006	6058501	0.9	0.7	1.3	0.3	*0.15*	1.9	0.5	0.6
MARIJAMPOLE01	V. Kudirkos g. Gedimino g.	458278	6046875	*0.15*							
MARIJAMPOLE02	Pavasario g. Liepų g.	459492	6047161	2.6	1.7	0.6	4.2	*1.5*	1.2	2.1	0.5
MARIJAMPOLE03	Liepynų g. Maironio g.	458048	6045276	4.0	2.7	0.3	4.1	0.9	1.2	2.0	0.5
MARIJAMPOLE04	Statybininkų g.	460094	6049221	3.2	1.4	*0.15*	1.8	1.2	1.3	1.6	0.5
MARIJAMPOLE05	Pašešupio parkas, stadionas	458424	6049301	2.5	1.8	0.3	2.7			4.8	
MAZEIKIAI01	Laisvės g. 22	397648	6243360	*0.15*	1.0	0.5	0.3	0.7	0.7	1.6	0.6
MAZEIKIAI02	Naftininkų g. Žemaitijos g.	397138	6242374	*0.15*	1.8	2.1	1	5.7	0.9	0.7	0.3
MAZEIKIAI03	Algirdo g. Gamyklos g.	395905	6243888	*0.15*	1.9	1	2.2	0.4	0.8	1.5	0.8

Site code	**Address**	**Coordinates (LKS-94)**		**SO_2 concentration, µg/m^3**							
		X	**Y**	**2010.11.03-2010.11.17**	**2010.11.17-2010.12.01**	**2011.01.06-2011.01.20**	**2011.01.20-2011.02.03**	**2011.03.25-2011.04.08**	**2011.04.08-2011.04.22**	**2011.06.06-2011.06.20**	**2011.06.20-2011.07.04**
MOLETAI01	Aikštė Vilniaus g.	590287	6122720	0.9	0.6	0.3	0.9	2.7	0.4	1.0	*0.15*
MOLETAI02	Ąžuolų g. Liepų g.	589813	6121936	2.9	0.8	1	0.7	0.7	0.3	2.2	*0.15*
MOLETAI03	Prie Pastovio ež.	591063	6122567	1.4	0.3	*0.15*	0.8	0.6	*0.15*	1.1	0.3
N AKMENE01	Respublikos g. V. Kudirkos g.	430823	6243672	*0.15*	9.2	0.8	0.9	0.8	0.3	0.4	0.3
N AKMENE02	Parko g. Žalioji g.	431849	6243134	0.7	2.2	0.7	0.9	0.5	*0.15*	*0.15*	1
N AKMENE03	Taikos g. Klykolių g.	430365	6243947	*0.15*	1.4	0.8	0.6	0.4	0.4	0.3	0.9
NEMENCINE01	Švenčionių g. Bažnyčios g.	594112	6079969	0.6	*0.15*	0.7	0.9	1.8	0.7	*0.15*	0.6
NEMENCINE02	Kranto g.	594522	6079708	0.9	1.6	0.8	2.4	2.9	1	*0.15*	0.6
NEMENCINE03	Bažnyčios g.	593881	6080176	0.7	0.7	4	0.9	6.5	1.5	*0.15*	*0.15*
PABRADE01	Vilniaus g. Arnioniu g.	613273	6095443	*0.15*	1.4	0.4	0.8	5.7	0.9	*0.15*	*0.15*

PABRADE02	Molėtų g. Architektų g.	612180	6095543	0.6	1.7	1.6	*0.15*	6.4	0.7	0.4	1
PABRADE03	Bažnyčios g.	613183	6094800	0.4	0.4	1	0.9	1.1	0.9	*0.15*	0.5
PAKRUOJIS01	Statybininkų g. Vilniaus g. Vytauto g.	491076	6205127	*0.15*	2.0	1.6	0.3	0.6	*0.15*	*0.15*	0.6
PAKRUOJIS02	S. Ušinskio g. Vienybės g.	490425	6204644	0.6	1.6	0.8	0.9	0.6	4.3	4.2	0.9
PAKRUOJIS03	Kruojos g. Saulėtekio g.	490659	6205559	0.5	0.9	2.5	1.8	0.5	1.2	*0.15*	0.5
PALANGA01	Plytų g. Kretingos g.	316940	6201970	1.3	1.7	2.1	0.3	0.4	0.9	0.3	0.3
PALANGA02	Sodų g. 63	317902	6202273	0.9	1.7	1.4	0.4	1	1.2	1.2	0.6
PALANGA03	Birutės al.	316128	6202122	*0.15*	1.9	1.1	0.6	0.7	0.4	0.4	*0.15*
PASVALYS01	Panevėžio g. Vilniaus g. Taikos g. Vyšnių g.	525116	6213980	1.1	0.9	0.8	0.6	7.5	0.9	1.0	0.4
PASVALYS02	Šermukšnių g. P. Cvirkos g.	525906	6214670	1.1	*0.15*	*0.15*	0.4	"11.4"	1.2	0.5	0.4
PASVALYS03	Stoties g. prie kapinių, autoserviso	524218	6214718	1.2	0.9	1	*0.15*		0.7	0.8	1.2
PLUNGE01	Senamiesčio a. Dariaus ir Girėno g. Vytauto g.	365373	6199726	0.3	0.7	0.5	1.2	0.4	4.9	*0.15*	0.4
PLUNGE02	Lankos g. Saulėtekio g.	365775	6198557	*0.15*	1.8	0.5	1.7	1.3	2.2	*0.15*	0.8
PLUNGE03	Stoties g. priešais Plungės dvaro parką	365228	6200559	*0.15*	6.2	0.9	1.3	0.6	*0.15*	*0.15*	1.3
PRIENAI01	J. Basanavičiaus g. N Gyvenimo g.	496445	6055839	2.3	1.1	1	0.5	0.5	*0.15*	1.0	*0.15*
PRIENAI02	Pramonės g. Stadiono g.	496923	6056783	1.9	1.0	0.5	0.6	0.4	4.4	0.5	0.6
PRIENAI03	Prie Nemuno tilto parkas	496593	6054813	1.7	1.5	0.8	2.3	0.5	1.3	0.3	0.5
RADVILISKIS01	Šiaulių g. Gedimino g. Autobusų st	471591	6186580	2.8	2.2	0.4	2	0.4	0.3	*0.15*	*0.15*
RADVILISKIS02	J. Marcinkevičiaus g. Purienų g.	470380	6187426	*0.15*		0.8	2.3	0.4	*0.15*	*0.15*	1.6
RADVILISKIS03	Gedimino g. prie Geležinkelio stoties	470973	6185949	*0.15*	1.3	1.8	3.9	0.4	0.6	*0.15*	0.5
RASEINIAI01	Vilniaus g. Vytauto Didziojo g.	443808	6138665	0.6	1.3	0.7	2	0.3	1.5	0.7	*0.15*
RASEINIAI02	Pirmūnų g.	445048	6137865	*0.15*	1.8	1	1.7	0.3	0.9	*0.15*	1
RASEINIAI03	Netoli Žemaičių g. Vilkupės upė, Parkas	444609	6139532	0.3	1.5	0.5	1.4		*0.15*	0.9	0.8
ROKISKIS01	Respublikos g. Pramonės g.	599289	6202848	*0.15*	1.2	0.5	0.7	0.7	2	2.4	0.4
ROKISKIS02	Parko g. 11	598633	6203755	*0.15*	0.9	0.4	0.5	0.6	1.4	0.8	2
ROKISKIS03	Nepriklausomybės a. 11	599219	6204530	0.8	0.6	5.7	0.4	0.6	1	1.1	0.5
SAKIAI01	V. Kudirkos g. Šaulių g.	438310	6091371	3.3	1.9	1.2	1.2	0.8	0.6	"59.8"	*0.15*
SAKIAI02	Jazminų g.	438440	6090614	2.4	1.1	1.1	2.3	0.8	0.8	0.9	0.3
SAKIAI03	Vasario 16-osios g. Bažnyčios g., skveras	438787	6091553	2.9	1.8	1.4	1.5	1	*0.15*	1.1	0.7

Site code	Address	Coordinates (LKS-94)		SO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
SALCININKAI01	Nepriklausomybės g. Vilniaus g.	590076	6019702	1.9	0.4		0.4	2.6	0.4	0.6	0.5
SALCININKAI02	K. Vagnerio g.	590885	6020330	2.7	1.0	1.1	0.5	*0.15*	0.9		
SALCININKAI03	Prie Šv. Petro bažnyčios	590850	6019410	4.8	0.7		0.8	*0.15*	1.1	0.3	*0.15*
SILALE01	Vytauto g. J. Basanavičiaus g.	385094	6152233	0.7	1.2	0.5	1.8	0.5	*0.15*	0.8	0.7
SILALE02	Kovo 11-osios g.	385610	6151648	*0.15*	2.2	0.7	2.1	*0.15*	*0.15*	1.1	*0.15*
SILALE03	Prie Lokystos upės	384588	6151845	*0.15*	2.9	0.9	2	0.5	0.6	0.8	0.9
SILUTE01	Lietuvninkų g. Gudobelių g.	339294	6137016	*0.15*	1.6	0.8	1.5	0.4	*0.15*	1.3	*0.15*
SILUTE02	Sodų g. prie stadiono	340054	6137714	*0.15*	1.4	1	1.5	0.6	0.3	1.0	0.4
SILUTE03	Šyša upė Netoli geležinkelio tiltas	340797	6136362	*0.15*	4.1	1.2	1.6	0.9	0.6		0.3
SIRVINTOS01	Plento g. Musninkų g.	561915	6100023	0.4	0.3	0.4	0.8	"14.4"	1.2	1.0	1.4
SIRVINTOS02	Jaunimo g. 16	560582	6101375	*0.15*	0.7	1	0.9	9.3	1	*0.15*	1.4
SIRVINTOS03	Vilniaus g. I. Šeiniaus g.	561286	6100805	0.7	0.4	0.7	0.6	1.5	0.8	0.8	0.5
SKUODAS01	Vytauto g. Gedimino g.	347054	6240123	*0.15*	1.3	1.1	2.4	0.8	3.5	0.8	0.8
SKUODAS02	Šatrijos g. 5	346964	6240461	*0.15*	0.8	1.8	1.7	0.5	4.3	1.2	*0.15*
SKUODAS03	Dariaus ir Girėno g. 46	347681	6240032	*0.15*	1.9	0.9	1.9	0.8	*0.15*	0.9	*0.15*
SVENCIONELIAI01	Priestočio g. Kaltinėnų g.	627258	6116083	1.1	0.7	0.7	0.4	*0.15*	0.7	2.1	0.3
SVENCIONELIAI02	Lauko g. – daugiaaukščiai namai	628095	6117835	2.4	1.1	0.4	1.1	0.4	0.5	*0.15*	*0.15*
SVENCIONELIAI03	Prie geležinkelio ties AB „Švenčionėlių Maltosa“	626857	6114407	1.4	0.9	0.3	0.6	0.8	2.9	2.0	*0.15*
SVENCIONYS01	Vilniaus g. Lentupio g.	637700	6113686	0.8	1.1	1.1	0.7	0.4	1.1	2.0	*0.15*
SVENCIONYS02	Saulėtekio g. Pakalnės g.	637814	6112290	1.4	1.7	0.7	0.3	0.5	0.3	1.5	*0.15*
SVENCIONYS03	Lietupio g. prie kapinių	638463	6112618	2.4	1.0	0.7	0.3	0.4	1.2	1.9	*0.15*
TAURAGE01	Dariaus ir Girėno g. Gedimino g.	391422	6125855	*0.15*	2.0	1	1.8	0.4	0.6	0.9	1.1
TAURAGE02	Laisvės g. Malūno g., stadionas netoli	391009	6124468	*0.15*	2.2	1.3	2.2	7.8	0.6	1.8	0.9

TAURAGE03	M.K. Čiurlionio g. Ganyklų g.	391404	6126893	0.3	1.8	0.8	2	0.8	0.3	0.9	0.5
TELSIAI01	Turgaus alėja Respublikos g.	390822	6206865	*0.15*	1.8	1.3	1.8		0.8	1.6	
TELSIAI02	Vyšnių g.	391253	6207678	*0.15*	1.8	1	2.1	1	1.6	1.5	0.7
TELSIAI03	Parko g. link Masčio ež.	390399	6205322	*0.15*	1.5	1.2	1.7	0.5	0.3	1.1	*0.15*
TRAKAI01	Gedimino g. Aukštadvario g.	560350	6055510	1.0	0.9	1	0.3	0.9	2.1	*0.15*	*0.15*
TRAKAI02	Birutės g.	560464	6056382	1.4	0.6	1.1	0.4	1.3	1.5	*0.15*	*0.15*
TRAKAI03	Karaimų g. Galvės g. Žalioji g.	559692	6057525	0.8	0.9	1.5	*0.15*	0.3	1.4	0.7	0.3
UKMERGE01	Kęstučio al. Vilniaus g.	548658	6124135	0.6	0.5	0.3	1.3		*0.15*	1.6	0.4
UKMERGE02	L. Giros g A. Smetonos g.	547745	6124320	1.6	0.6	0.4	1	0.8	0.4	1.5	1.3
UKMERGE03	Nuotekų g. Laukų g. Jaunimo g.	549809	6123631	1.1	0.9	1.1	1.1	5.3	*0.15*	1.4	*0.15*
UTENA01	Aušros g. J. Basanavičiaus g.	601284	6152751	0.9	1.0	0.3	0.9	0.7	0.5	0.7	0.5
UTENA02	Aušros g. 79	601222	6153609	1.1	0.5	0.4	0.4	0.5	0.4	2.0	*0.15*
UTENA03	Algirdo g. prie vaikų darželio	601211	6152092	0.8	0.7	0.6	0.6	7.1	0.8	0.7	1.4
VARENA01	J. Basanavičiaus g. Vytauto g.	537113	6008500	2.7	1.2	1	1.2	1	2.2	*0.15*	0.5
VARENA02	J. Basanavičiaus g. Spaustuvės g.	537547	6009036	2.5	1.2	0.9	1.1	0.9	1.2	0.8	*0.15*
VARENA03	Alytaus g. Pramonės g.	538496	6009306	"15.1"	2.0	1.2	1	0.6	0.3	0.3	0.4
OKTS42	Jonava	518192	6104083	1.1	0.3	0.4	0.15	1.5	1.2	0.6	0.4

lost or stolen

<0.3 = n.d. half of detection limit = n.d.

"14.4" outlier according Grubbs Test, replaced by mean

Table 23. Nitrogen dioxide concentrations in zone for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		NO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KLAIPEDA01	Molo g. 2	317356	6181537								
KLAIPEDA02	Liepojos g. P. Lideikio g.	319434	6181140	30.0	21.5	33.0	35.4	30.6	34.7	32.4	29.1
KLAIPEDA03	Kretingos g. 4	319756	6180136	22.4			32.3	24.9	23.1	24.9	17.1
KLAIPEDA04	Baltijos pr. 1 Šilutės pl.	322484	6176444	41.1	39.0	41.3	45.7	40.6	50.1	54.3	44.3
KLAIPEDA05	Sportininkų g. Stadiono g.	318437	6180451	17.8	17.1	25.2	26.9	21	17	20.6	16.2
KLAIPEDA06	Liepų g. 41	320418	6179292	22.3	21.2	26.6	29.9	23.8	26.2	26.2	21.8
KLAIPEDA07	Smiltelės g I. Simonaitytės g.	323146	6174130	25.5	24.5	27.5	21.7	30.1	34.2	27.5	23.3
KLAIPEDA08	Tiltų g. Turgaus g.	320004	6178668	25.7	21.1	39.3	36.4	35.2	34.9	27.2	20.6

KLAIPEDA09	H. Manto g. S. Daukanto g.	319612	6179416	42.2	33.5	46.4	47.1	42.3	51.4	50.2	43.8
KLAIPEDA10	Taikos pr. 52	320946	6176889	23.2	28.2	26.7	"0.3"	23.1	27.8	21	20.9
KLAIPEDA11	Minijos g. Naikupės g.	320937	6175175	49.8	32.9	49.6	49.5	52.3	59.8		59.6
KLAIPEDA12	Statybininkų g. Šilutės pl.	323159	6175127	32.9	27.8	34.9	36.1	33.4	40.7	39.6	32
PANEVEZYS 01	Vilniaus g. J. Basanavičiaus g.	522977	6176841	21.00	29.3	27.3	26.3	23.2	32.5	28.9	29.6
PANEVEZYS 02	Dariaus ir Girėno g 15A	520298	6177592	11.40	17.3	13.3	10.9	9.5	15.8	9.3	8.6
PANEVEZYS 03	Elektros g. 4	522818	6177223	16.00	19.5	21.1	18.1	15.5	17.8	14.3	13.2
PANEVEZYS 04	J. Janonio g. prie duonos kepyklos	520468	6178607	15.90	21.6	21.7	17.7	17.2	26.5	16	15.4
PANEVEZYS 05	Spartuoliu g. Pušaloto g.	520411	6179265	12.20	18.5	14.4	15.0	12.6	16.3	11.5	9.9
PANEVEZYS 06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	522728	617900	14.50	16.7	17.9	16.5	11.8	11.3	7.2	6.6
PANEVEZYS 07	Vytauto g. Aukštaičių g.	523598	6176706	13.40	15.7	16.8	18.2	13.9	15.8	10	7.7
PANEVEZYS 08	Medžiotojų g. Molainiuose	520088	6175197	9.00	13.4	11.8	10.6	8.2	10.2	8.1	8
PANEVEZYS 09	Paplentės g. Didžioji g. Staniūnuose	525040	6175873								
PANEVEZYS 10	Gėlių g. Dembravos g. Dembravoje	525743	6177700	10.30	9.4	12.9	13.3	10.3	9.6	6.4	5.6
PANEVEZYS 11	Vaivadėlių g. Lėvens g. prie Vaivadų	524838	6179646	14.00	11.4	16.3		12.2	11.4	7.6	2.4
PANEVEZYS 12	Pušaloto g. Raginėnų g.	521653	6178724	18.90	21.3	24.0	20.9	18.4	21.6	17.6	13
SIAULIAI01	Salduvės parkas Talšos ež. paplūdimys	458612	6199957	10.0	7.7	16.3	12.4	9.5	6	6.4	4.1
SIAULIAI02	Aušros al. Tilžės g.	457379	6200069	34.8	31.8	39.7	33.4	33.8	29.5	37.6	30.8
SIAULIAI03	V. Kudirkos g. Margytės g.	455927	6200651	15.3	17.9	18.5	13.7	12.6	11.9	10.3	7.6
SIAULIAI04	Žeimių g. Rasos g. Aušros g.	459807	6202377	19.5	18.6	24.1	19.2	17.7	17.4	22.4	14.3
SIAULIAI05	Vaidoto g. Merkinės g.	458435	6202358	19.0	21.1	22.7	20.9	19.7	23.7	23	17.3
SIAULIAI06	Miško g. prie Vijolės upės	456048	6202293		16.2	16.0	11.9	10.1	8.9	7.1	7.7
SIAULIAI07	Lyros g. Dainų g.	453918	6198085	24.9	25.0	29.1	21.4	20.3	20.1	27.8	21.7
SIAULIAI08	Tilžės g. Aukštabalio g.	455323	6193355	35.1	35.8	36.1	26.9	29.8	26.6	35.9	28.9
SIAULIAI09	K. Donelaičio g. Šilėnų g.	456720	6198676								
SIAULIAI10	Pramonės g. Metalistų g.	457398	6197424	21.9	24.1	29.2	25.2	30.7	32.7		18.2
SIAULIAI11	Šaukėnų g. Alksnių g.	458564	6197330	12.8	15.1	16.0	15.0	10.1	13.3	7.6	5.9
SIAULIAI12	Pročiūnų g P. Motiekaičio g.	460338	6197599		8.8	10.9	10.6	8.6	7.7	5	3.6

Site code	Address	Coordinates (LKS-94)		NO_2 concentration, μg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
ALYTUS01	Pramonės g.	501105	6031759	13.1	14.3	13.3	13.5	8.9	11.6	10.1	8.6
ALYTUS02	Likikėlių g. 14	500959	6028806	10.6	12.7	11.1	10.9	7.0	9.1	7.0	7.0
ALYTUS03	Rūtų g. Naujoji g.	502507	6028699	19.6	22.1	21.7	19.1	18.7	22.8	16.7	17.2
ALYTUS04	Dainavos g. Sūduvos g.	502481	6027689		21.4		19.1				
ALYTUS05	Kalniškės g. Naujoji g.	500741	6030624	20.2	21.4	20.4	19.1	17.0	20.5	19.4	18.3
ANYKSCIAI01	Netoli Paupio g. A. Baranausko aikštė	569750	6155073	15.4	15.4	17.9	17.5	15.8	9.8	14.0	11.7
ANYKSCIAI02	Netoli Liudiškių g. Statybininkų g.	570383	6154900	10.7	10.0	12.1	12.8	10.7	9.5	9.5	6.7
ANYKSCIAI03	Prie upės Anykšta pėsčiųjų takas	570224	6155363	8.6	7.7	10.6	11.0	7.3	4.8	3.7	3.1
BIRZAI01	Netoli Vabalninko g. Kęstučio g. sankryžos	545760	6230044	9.3	13.8	11.8	10.6	7.6	9.1	7.3	7.9
BIRZAI02	Apasčios kranto Žemaitės g.	547187	6229695	9.5	10.0	11.0	13.7	7.6	6.4	5.4	5.0
BIRZAI03	Biržų pilies parkas	546908	6230479	8.4	9.1	9.0	8.7	5.1	4.1	4.0	3.5
DRUSKININKAI01	M.K. Čiurlionio g. Antakalnio g.	498072	5986666	9.6	11.9	12.8	11.0	10.3	12.0	10.6	10.3
DRUSKININKAI02	M.K. Čiurlionio g. Veisiejų g.	499530	5985856	18.8	17.1	19.9	18.8	18.8	19.4	19.0	15.5
DRUSKININKAI03	Kultūros poilsio parkas	497901	5987822	5.8	5.7	6.7	5.0	2.8	3.6	2.1	2.0
ELEKTRENAI01	Šviesos g. netoli A1 kelias prie stadiono	543513	6072650	10.4	13.0	11.5	12.6	8.4	14.2	11.6	8.0
ELEKTRENAI02	Literatūros meno muziejus, stadionas	542208	6071913	8.1	9.0	8.8	9.1		7.1	7.0	4.0
ELEKTRENAI03	Prie gatvės ties „Ledo arena“	543165	6072363	14.4	14.7	17.6	15.6	13.1	18.3	16.0	8.9
GARGZDAI01	Klaipėdos g. Kvietinių g.	336544	6178116	16.0	13.6	15.5	18.0	12.3	15.4	9.6	10.4
GARGZDAI02	Skinijos takas	336199	6176738	9.2	8.1	10.1	11.5	7.3	9.2	4.5	4.1
GARGZDAI03	Prie Minijos upės, netoli stadionas Kvietinių g.	337262	6178840	8.6	6.9	11.6	11.9	7.5	7.8		3.8
GARLIAVA01	Vytauto g. K. Aglinskio g.	491907	6075767	20.3	19.3	23.3	26.5	20.0	24.9	19.1	15.1
GARLIAVA02	Pažangos g. R. Mizaros g.	491902	6077928	13.0	16.0	16.3	16.0	9.8	12.7	8.3	7.7
GARLIAVA03	Garliavos I tvenkinys 500 m nuo kelio 139 nr.	493517	6076708	10.7	10.4	12.5	14.9	8.7	10.8	9.2	7.0
GRIGISKES01	Vilniaus g. A1 Kunigiškių g.	570551	6060175	42.6	44.4	46.4	51.7	52.8	45.0	24.2	15.4
GRIGISKES02	Netoli Vokės upės Afindevičių g.	570768	6059352	9.2	11.3	8.6	8.7	7.1	9.5	6.8	4.5
GRIGISKES03	Tarp Vokės upės, Neries upės	569660	6061180	10.9	11.4	12.0	7.9	8.7	7.5	9.1	6.3
IGNALINA01	Geležinkelio g. Aukštaičių g.	637268	6135970	11.1	13.1	16.1	14.8	11.5	14.3	10.7	10.1
IGNALINA02	Agarinio g.	637639	6135044	7.5	9.7	8.6	8.9	6.8	9.6	8.3	8.2
IGNALINA03	Prie žiemos sporto centro	638065	6136145	3.9	4.9	7.7	8.6	5.8	5.8	4.1	4.6
JONAVA01	J. Ralio g. J. Basanavičiaus g. Žeimių g. žiedas	517864	6104172	28.3	23.0	31.3	32.3	28.4	31.2	28.5	23.7
JONAVA02	Pramonės g. netoli Skarulių bažnyčios	520066	6104559	9.8	13.1	11.4	14.0	8.8	11.0	7.7	6.4
JONAVA03	Prie Jonavos tv. Poliklinika rajono	517111	6104606	10.6	13.2	11.4	12.3	7.3	8.9	5.7	5.9

JONISKIS01	Livonijos g. netoli bažnyčios	476252	6234371	17.5	18.4	22.6	18.1	15.2	16.1	14.7	14.2
JONISKIS02	Turgaus g., Šiaulių senoji g.	476336	6232886	6.6	9.6	9.6	9.1	5.0	6.4	4.2	4.3
JONISKIS03	Prie Joniškio I tv. netoli stadiono	475194	6234842	6.1	9.2	9.8	6.4	5.4	4.8	5.4	4.2
JURBARKAS01	Dariaus Girėno g. Ugniagesių g.	421550	6105388	19.0	18.6	22.3	21.4	19.3	19.6	20.0	19.0
JURBARKAS02	A. Giedraičio-Giedriaus g. Bartkūnų g.	420104	6104683	6.0	9.3	8.2	8.0	6.1	6.0	3.7	4.2
JURBARKAS03	Mintuva, Parke prie cerkvės	420464	6105578	6.6	9.1	9.9	9.2	5.8	4.5	3.6	3.7
KAISIADORYS01	Gedimino g. Bažnyčios g.	529295	6080725	12.8	13.2	16.5	17.0	10.8	14.7	10.5	9.2
KAISIADORYS02	Upė Lomena Vilniaus g. Priemiesčio g.	529928	6081486	10.1	9.5	12.7	10.9	7.3	9.1	6.6	5.3
KAISIADORYS03	Girelės miškas	527506	6080785	6.6	8.7	10.9	9.0	4.3	5.0	4.4	3.7

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KALVARIJA01	Dariaus ir Girėno g. Laisvės g.	449850	6031119	13.8	12.8	17.6	18.1	10.8	13.2	12.0	9.6
KALVARIJA02	J. Basanavičiaus Naujoji g.	449284	6031771	11.0	11.8	12.6	13.8	8.3	10.1	8.2	9.0
KALVARIJA03	Prie Šešupės upės	448659	6031042	11.6	11.8	13.4	14.4	10.6	11.9	9.1	7.0
KAZLU RUDA01	Atgimimo g. V. Kudirkos g.	467619	6068546	12.5	12.6	15.4	16.5	10.1	10.1	6.1	6.4
KAZLU RUDA02	Kęstučio g. Maironio g. Gedimino g.	466796	6068741	12.6	11.1	14.2	10.8	8.8	7.0	5.0	4.5
KAZLU RUDA03	S. Daukanto g. Marijampolės g.	467613	6067755	10.7	10.1	12.5	15.3	10.9	11.0	8.9	7.8
KEDAINIAI01	Kauno g. Ryto g.	498731	6127025	11.7	12.6	14.6	15.1	10.1	14.3	12.1	8.6
KEDAINIAI02	Šėtos g. 106	499694	6128749	13.6	11.6	13.3	12.6	8.2	14.8	8.8	7.8
KEDAINIAI03	J. Basanavičiaus g. 53	498358	6128078	30.6	27.0	36.6	35.7	31.2	36.1		24.5
KELME01	Vytauto g. Laisvės g. Gynėjų g.	432882	6166778	25.4	24.1	25.8	22.0	22.7	20.3	25.9	20.4
KELME02	Liolių g. Pakalnės g.	433687	6165589	7.5	11.9	10.5	10.1	7.1	8.3	8.3	7.6
KELME03	Kelmės dvaro parkas Vilbeno upės užtvanka	433150	6167648	7.5	8.9	-1.3	9.4	8.4	4.7	3.7	2.8
KRETINGA01	Rotušės aikštė	327453	6198340	18.7	16.1	18.5	20.1	16.0	18.9	15.7	12.6
KRETINGA02	Nemuno g. netoli Akmena	326918	6197661	9.8	9.4	10.3	11.5	8.2	10.2	4.4	4.2
KRETINGA03	Kretingos parko I tv. Kretingos muz.	328177	6199537	11.1		10.8	11.1	9.4		5.5	4.6
KUPISKIS01	Gedimino g. Matulionio g.	561136	6189987	13.1	16.0	18.5	16.5	15.0	15.4	18.5	15.6
KUPISKIS02	Technikos g. Krasnavos g.	562418	6188987	6.5	9.2	10.5	10.6	7.7	7.5	4.8	4.4
KUPISKIS03	Aukštupėnuose, Vėžionių g.	560962	6190603	5.4	7.0	7.7	5.9	4.3	3.2	2.5	2.1
KURSENAI01	Vytauto g. V. Kudirkos g.	433829	6208758	15.8	20.8	19.7	15.9	15.6	14.0	14.8	12.6
KURSENAI02	Daugėlių g. Klevų g.	434399	6206864	14.8	14.9	9.1	13.4	13.1	13.9	13.7	9.7
KURSENAI03	Ventos g. prie tilto	433353	6207866	8.8	17.6	13.0	11.2	7.7	8.8	8.1	7.2
KYBARTAI01	J. Basanavičiaus g. Žemaitės g.	421185	6056084	11.8	10.8	17.2	15.3	12.8	13.0	14.3	10.8
KYBARTAI02	Vienybės g. Sodų g.	419802	6057354	11.5	10.6	14.8	13.0	8.4	10.2	7.6	5.9
KYBARTAI03	Vasario 16-osios g.	420321	6056179	10.2	11.6	12.5	13.2	8.7	11.7	6.9	5.5
LAZDIJAI01	Kauno g. Vytauto g.	468376	6011044	11.7	12.5	13.8	13.6	9.3	12.3	13.4	10.9

LAZDIJAI02	Tarp Turistų g. ir Vytauto g.	469108	6010510	10.1	7.8	11.2	10.1	6.9	8.3	5.5	4.1
LAZDIJAI03	Palazdijo Baltajo ež.	467888	6008769	5.2	5.9	7.3	7.3	3.9	5.8	4.1	4.2
LENTVARIS01	Fabriko g. Geležinkelio g.	567994	6056942	17.9	18.9	20.5	16.6	16.6	21.2	21.6	13.8
LENTVARIS02	Trumpoji g. Gėlių g. Stadionas	567357	6056391	11.6	12.1	12.1	13.8	9.2	12.2	6.9	7.2
LENTVARIS03	Lentvario dvaras Lentvario ež.	567006	6058501	8.9	9.5	9.3	7.6	6.9	7.8	6.2	4.2
MARIJAMPOLE01	V. Kudirkos g. Gedimino g.	458278	6046875	25.5	21.7	29.5	30.2	24.3	27.0	20.0	15.7
MARIJAMPOLE02	Pavasario g. Liepų g.	459492	6047161	15.7	15.2	20.3	20.2	13.6	16.5	12.9	10.8
MARIJAMPOLE03	Liepynų g. Maironio g.	458048	6045276	13.7	14.1	14.4	15.5	9.1	12.0	8.3	7.7
MARIJAMPOLE04	Statybininkų g.	460094	6049221	15.3	14.0	20.1	23.6	14.9	20.4	15.9	14.2
MARIJAMPOLE05	Pašešupio parkas, stadionas	458424	6049301								
MAZEIKIAI01	Laisvės g. 22	397648	6243360	19.9	24.9	23.2		14.3	16.5	13.2	10.1
MAZEIKIAI02	Naftininkų g. Žemaitijos g.	397138	6242374	25.6	29.3	30.7	24.6	26.5	29.1	29.6	23.9
MAZEIKIAI03	Algirdo g. Gamyklos g.	395905	6243888	14.2	26.2	17.6	13.6	13.1	15.8	17.2	14.4

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MOLETAI01	Aikštė Vilniaus g.	590287	6122720	12.3	14.7	15.1	15.5	12.2	12.0	14.2	11.4
MOLETAI02	Ąžuolų g. Liepų g.	589813	6121936	10.0	8.7	10.4	12.2	8.0	7.8	8.7	6.7
MOLETAI03	Prie Pastovio ež.	591063	6122567	7.3	6.4	9.4	8.0	5.4	3.0	3.6	2.8
N AKMENE01	Respublikos g. V. Kudirkos g.	430823	6243672	11.3	13.8	13.4	12.0	9.3	11.9	10.4	9.4
N AKMENE02	Parko g. Žalioji g.	431849	6243134	5.7	9.0	6.9	6.8	4.8	7.3	3.3	7.0
N AKMENE03	Taikos g. Klykolių g.	430365	6243947	8.9	11.4	10.9	9.7	6.2	6.7	5.2	4.8
NEMENCINE01	Švenčionių g. Bažnyčios g.	594112	6079969	16.7	11.6	12.1	14.8	12.0	13.4	12.5	7.9
NEMENCINE02	Kranto g.	594522	6079708	10.7	9.8	9.7	9.5	8.0	7.5	6.7	3.1
NEMENCINE03	Bažnyčios g.	593881	6080176	14.0	10.9	11.8	8.8	8.9	5.9		4.0
PABRADE01	Vilniaus g. Arnionių g.	613273	6095443	19.7	14.2	16.0	18.9	16.5	14.6	18.1	11.9
PABRADE02	Molėtų g. Architektų g.	612180	6095543	9.7	7.3	7.8	6.2	5.8	4.2	4.8	3.1
PABRADE03	Bažnyčios g.	613183	6094800	9.3	7.6	8.4	7.7	6.4	5.6	5.4	3.8
PAKRUOJIS01	Statybininkų g. Vilniaus g. Vytauto g.	491076	6205127	11.4	14.9	17.5	14.2	13.5	11.1	16.0	7.2
PAKRUOJIS02	S. Ušinskio g. Vienybės g.	490425	6204644	8.5	10.7	10.2	9.6		7.2	6.0	5.5
PAKRUOJIS03	Kruojos g. Saulėtekio g.	490659	6205559	9.9	12.8	12.8	10.9	9.0	8.4	8.7	5.9
PALANGA01	Plytų g. Kretingos g.	316940	6201970	15.7	12.8	17.3	20.3	16.6	19.5	19.4	15.8
PALANGA02	Sodų g. 63	317902	6202273	13.1	13.7	15.0	15.2	11.9	12.6	11.4	9.2
PALANGA03	Birutės al.	316128	6202122	6.6	11.6	7.6	7.9	5.7	7.1	5.5	6.3
PASVALYS01	Panevėžio g. Vilniaus g. Taikos g. Vyšnių g.	525116	6213980	14.0	18.0	16.4	16.1	13.6	16.2	19.2	18.7
PASVALYS02	Šermukšnių g. P. Cvirkos g.	525906	6214670	10.9	11.4	12.5	12.7	12.0	15.2	9.3	8.2
PASVALYS03	Stoties g. prie kapinių, autoserviso	524218	6214718	8.1	13.8	10.0	8.5	7.9	10.2	3.8	9.7

PLUNGE01	Senamiesčio a. Dariaus ir Girėno g. Vytauto g.	365373	6199726	25.9	23.8	29.2	28.3	25.2	31.1	26.3	24.1
PLUNGE02	Lankos g. Saulėtekio g.	365775	6198557	8.8	12.0	11.3	12.4	8.6	8.4	5.0	4.4
PLUNGE03	Stoties g. priešais Plungės dvaro parką	365228	6200559	12.5	15.4	15.8	16.8	11.3	13.2	10.3	9.5
PRIENAI01	J. Basanavičiaus g. N Gyvenimo g.	496445	6055839	15.2	13.8	17.1	14.3	11.0	11.1	8.4	8.0
PRIENAI02	Pramonės g. Stadiono g.	496923	6056783	10.5	10.5	12.0	13.1	7.3	9.2	6.0	4.9
PRIENAI03	Prie Nemuno tilto parkas	496593	6054813	9.5	10.0	11.8	12.8	7.7	11.6	8.3	7.1
RADVILISKIS01	Šiaulių g. Gedimino g. Autobusų st	471591	6186580	19.1	18.0	26.5	22.7	23.3	16.7	25.1	15.3
RADVILISKIS02	J. Marcinkevičiaus g. Purienų g.	470380	6187426	14.0		17.7	13.8	12.1	9.9	11.2	8.9
RADVILISKIS03	Gedimino g. prie Geležinkelio stoties	470973	6185949	14.5	15.8	18.7	19.1	16.6	14.9	16.3	12.3
RASEINIAI01	Vilniaus g. Vytauto Didžiojo g.	443808	6138665	14.1	24.4	17.1	18.1	14.4	16.1	13.2	14.8
RASEINIAI02	Pirmūnų g.	445048	6137865	9.0	9.1	12.0	13.3	9.0	6.4	4.7	4.1
RASEINIAI03	Netoli Žemaičių g. Vilkupės upė, Parkas	444609	6139532	8.2	10.1	11.2	10.5	7.6	"-1.2"	5.6	4.3
ROKISKIS01	Respublikos g. Pramonės g.	599289	6202848	16.8	18.0	19.4	20.4	17.4	17.1	15.6	17.3
ROKISKIS02	Parko g. 11	598633	6203755	9.6	13.3	10.9	10.6	8.8	8.6	6.6	6.4
ROKISKIS03	Nepriklausomybės a. 11	599219	6204530	12.8	16.9	17.4	17.1	12.9	11.1	10.1	10.4
SAKIAI01	V. Kudirkos g. Šaulių g.	438310	6091371	9.9	12.5	13.6	11.4	8.8	8.2	7.8	7.5
SAKIAI02	Jazminų g.	438440	6090614	6.7	11.2	9.8	10.0	6.0	5.8	4.4	3.8
SAKIAI03	Vasario 16-osios g. Bažnyčios g., skveras	438787	6091553	10.0	9.7	14.0	11.9	8.3	5.8	6.5	5.2

Site code	Address	Coordinates (LKS-94)		NO_2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
SALCININKAI01	Nepriklausomybės g. Vilniaus g.	590076	6019702	14.1	13.9	17.4	16.4	14.4	19.4	16.6	18.5
SALCININKAI02	K. Vagnerio g.	590885	6020330	7.1	7.8	8.2	8.0	5.3	4.9		
SALCININKAI03	Prie Šv. Petro bažnyčios	590850	6019410	7.5	8.5		8.4	5.9	5.9	5.6	7.6
SILALE01	Vytauto g. J. Basanavičiaus g.	385094	6152233	11.9	10.7	14.7	16.3	12.7	11.0	8.7	6.4
SILALE02	Kovo 11-osios g.	385610	6151648	8.4	11.0	11.3	14.1	7.7	7.3	6.4	4.4
SILALE03	Prie Lokystos upės	384588	6151845	6.9	13.2	9.9	9.9	6.0	4.5	4.5	3.7
SILUTE01	Lietuvninkų g. Gudobelių g.	339294	6137016	18.3	14.9	20.4	21.5	19.0	21.7	18.9	16.6
SILUTE02	Sodų g. prie stadiono	340054	6137714	14.8	14.7	15.2	18.0	15.7	14.9	12.7	9.3
SILUTE03	Šyša upė Netoli geležinkelio tiltas	340797	6136362	7.0	7.8	8.2	12.1	7.6	7.2	3.6	2.8
SIRVINTOS01	Plento g. Musninkų g.	561915	6100023	9.5	8.8	10.8	9.4	6.9	7.0	7.6	5.0
SIRVINTOS02	Jaunimo g. 16	560582	6101375	11.0	10.4	11.0	10.5	6.9	6.4	7.7	4.6
SIRVINTOS03	Vilniaus g. I. Šeiniaus g.	561286	6100805	10.4	7.5	10.1	8.0	6.0	3.3	4.3	2.3
SKUODAS01	Vytauto g. Gedimino g.	347054	6240123	15.9	17.4	21.6	20.3	16.2	19.3	16.7	17.0
SKUODAS02	Šatrijos g. 5	346964	6240461	8.7	12.3	12.0	9.9	7.6	7.1	6.4	5.0
SKUODAS03	Dariaus ir Girėno g. 46	347681	6240032	9.2	13.2	13.5	11.0	9.2	9.8	8.0	6.5
SVENCIONELIAI01	Priestočio g. Kaltinėnų g.	627258	6116083	10.6	11.3	13.7	14.2	10.5	13.3	10.0	10.3
SVENCIONELIAI02	Lauko g. – daugiaaukščiai namai	628095	6117835	7.2	8.8	7.4	9.1		5.7	4.1	4.8

SVENCIONELIAI03	Prie geležinkelio ties AB „Švenčionėlių Maltosa“	626857	6114407	3.5	6.1	2.6	6.1	4.2	3.8	1.9	2.9
SVENCIONYS01	Vilniaus g. Lentupio g.	637700	6113686	8.7	11.2	13.3	13.3	11.9	15.2	10.1	9.9
SVENCIONYS02	Saulėtekio g. Pakalnės g.	637814	6112290	6.1	7.9	7.5	8.0	5.0	4.9	3.0	3.1
SVENCIONYS03	Lietupio g. prie kapinių	638463	6112618		8.8	6.5	7.6	4.2	5.5	4.9	5.1
TAURAGE01	Dariaus ir Girėno g. Gedimino g.	391422	6125855	31.0	30.6	38.7	33.5	33.9	36.5	37.5	33.1
TAURAGE02	Laisvės g. Malūno g., stadionas netoli	391009	6124468	14.5	17.0	17.2	17.5	12.7	10.4	11.9	12.4
TAURAGE03	M.K. Čiurlionio g. Ganyklų g.	391404	6126893	11.4	16.2	15.8	15.3	11.0	7.9	6.7	4.9
TELSIAI01	Turgaus alėja Respublikos g.	390822	6206865	25.9	30.3	29.6	25.2	26.6	29.0	30.4	
TELSIAI02	Vyšnių g.	391253	6207678	10.4	14.5	14.6	12.5	9.2	10.4	7.5	5.2
TELSIAI03	Parko g. link Masčio ež.	390399	6205322	4.3	8.2	7.3	5.4	4.3	4.6	2.2	1.9
TRAKAI01	Gedimino g. Aukštadvario g.	560350	6055510	25.1	20.0	28.1	26.1	29.2	30.1	36.3	19.7
TRAKAI02	Birutės g.	560464	6056382	10.1	11.0	9.7	8.5	7.3	6.9	6.2	5.3
TRAKAI03	Karaimų g. Galvės g. Žalioji g.	559692	6057525	11.9	8.8	7.6	10.0	5.8	6.7	6.1	3.9
UKMERGE01	Kęstučio al. Vilniaus g.	548658	6124135		16.3	19.6	18.0	14.9	21.0	17.1	15.2
UKMERGE02	L. Giros g A. Smetonos g.	547745	6124320	8.8	10.5	10.3	12.0	7.1	8.4	6.0	4.4
UKMERGE03	Nuotekų g. Laaukų g. Jaunimo g.	549809	6123631	10.6	9.3	12.6	12.1	8.6	23.1	6.2	5.0
UTENA01	Ausros g. J. Basanavičiaus g.	601284	6152751	26.3	23.6	33.8	26.3	24.9	23.4	30.8	24.1
UTENA02	Aušros g. 79	601222	6153609	10.0	11.0	10.8	10.4	7.3	8.3	7.1	6.1
UTENA03	Algirdo g. prie vaikų darželio	601211	6152092	12.6	13.6	13.7	16.0	9.5	9.7	6.4	5.4
VARENA01	J. Basanavičiaus g. Vytauto g.	537113	6008500	12.5	15.0	15.0	12.3	13.9	13.0	6.6	6.3
VARENA02	J. Basanavičiaus g. Spaustuvės g.	537547	6009036	9.2	10.6	10.1	8.6	8.0	8.0	6.1	4.7
VARENA03	Alytaus g. Pramonės g.	538496	6009306	11.9	11.0	13.3	12.7	10.4	11.7	11.2	8.7
OKTS42	Jonava	518192	6104083	12.8	11.2	14.1	16.0	11.7	12.5	9.5	7.3

	lost or stolen
0.20	half of detection limit = n.d.
"14.4"	outlier according Grubbs Test, replaced by mean

Table 24. Benzene concentrations in zone for the study period from 3 November 2010 to 4 July 2011

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KLAIPEDA01	Molo g. 2	317356	6181537	1.0	2.1	2.6	2.0	1.6	1.3	0.7	0.5
KLAIPEDA02	Liepojos g. P. Lideikio g.	319434	6181140	1.4	1.5	2.4	2.3	1.4	1.4	1.5	1.0
KLAIPEDA03	Kretingos g. 4	319756	6180136	1.2		2.7	2.9	1.3	2.6	1.4	1.4
KLAIPEDA04	Baltijos pr. 1 Šilutės pl.	322484	6176444				2.5				
KLAIPEDA05	Sportininkų g. Stadiono g.	318437	6180451	1.7	1.5	2.5	2.4	2.0	1.9	1.9	1.7
KLAIPEDA06	Liepų g. 41	320418	6179292								
KLAIPEDA07	Smiltelės g l. Simonaitytės g.	323146	6174130	1.1	1.6	1.8	1.7	1.4	1.4	0.9	0.9

KLAIPEDA08	Tiltų g. Turgaus g.	320004	6178668	1.0	1.5	2.1	1.9	1.3	1.3	0.8	0.7
KLAIPEDA09	H. Manto g. S. Daukanto g.	319612	6179416								
KLAIPEDA10	Taikos pr. 52	320946	6176889	1.0	1.7	1.8		1.2		0.5	2.3
KLAIPEDA11	Minijos g. Naikupės g.	320937	6175175								
KLAIPEDA12	Statybininkų g. Šilutės pl.	323159	6175127	1.1	1.6	2.1	2.0	1.3	1.5	1.1	0.9
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	522977	6176841	1.40	2.3	3.3	2.6	1.7	1.7	1.1	1.0
PANEVEZYS02	Dariaus ir Girėno g 15A	520298	6177592	0.90	1.8	2.4	1.6	1.0	1.2	0.8	0.7
PANEVEZYS03	Elektros g. 4	522818	6177223	1.20	1.7	3.1	2.4	1.3	1.5	0.6	0.8
PANEVEZYS04	J. Janonio g. prie duonos kepyklos	520468	6178607	1.00	2.5	3.3	1.8	1.2	1.4	0.4	1.5
PANEVEZYS05	Spartuoliu g. Pusaloto g.	520411	6179265								
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	522728	617900	2.60	5.0	5.6	5.4	2.9	2.6	0.6	0.9
PANEVEZYS07	Vytauto g. Aukštaičių g.	523598	6176706	1.50	2.4	3.5	3.6	1.8	1.9	0.6	0.8
PANEVEZYS08	Medžiotojų g. Molainiuose	520088	6175197								
PANEVEZYS09	Paplentės g. Didžioji g. Staniūnuose	525040	6175873	1.30	3.2	3.0	2.7	1.8	1.8	0.4	0.7
PANEVEZYS10	Gėlių g. Dembavos g. Dembavoje	525743	6177700								
PANEVEZYS11	Vaivadėlių g. Lėvens g. prie Vaivadų	524838	6179646								
PANEVEZYS12	Pušaloto g. Raginėnų g.	521653	6178724	1.80	1.8	4.6	3.3	2.1	2.1	0.5	1.1
SIAULIAI01	Salduvės parkas Talšos ež. paplūdimys	458612	6199957								
SIAULIAI02	Aušros al. Tilžės g.	457379	6200069	1.6	2.3	2.7	2.4	1.8	1.4	0.9	1.0
SIAULIAI03	V. Kudirkos g. Margytės g.	455927	6200651								
SIAULIAI04	Žeimių g. Rasos g. Aušros g.	459807	6202377	1.4	1.9	2.7	2.6	2.9	1.3	0.8	0.6
SIAULIAI05	Vaidoto g. Merkinės g.	458435	6202358								
SIAULIAI06	Miško g. prie Vijolės upės	456048	6202293		3.8	4.3	3.7	2.1	2.0	0.5	1.7
SIAULIAI07	Lyros g. Dainų g.	453918	6198085								
SIAULIAI08	Tilžės g. Aukštabalio g.	455323	6193355	1.5	2.5	2.5	2.0	1.4	1.5	0.7	1.7
SIAULIAI09	K. Donelaičio g. Šilėnų g.	456720	6198676	1.7	3.4	3.6	2.8	2.0	1.7	0.4	0.9
SIAULIAI10	Pramonės g. Metalistų g.	457398	6197424	1.1	2.3	2.5	2.2	1.8	1.2		2.6
SIAULIAI11	Šaukėnų g. Alksnių g.	458564	6197330	2.4	3.2	4.4	4.2	2.2	1.7	0.9	0.8
SIAULIAI12	Pročiūnų g P. Motiekaičio g.	460338	6197599		1.3	1.9	2.3	1.4	1.3	0.4	0.6

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
ALYTUS01	Pramonės g.	501105	6031759	1.0	1.7	2.4	2.3	1.0	1.0	0.5	1.8

ALYTUS02	Likikėlių g. 14	500959	6028806	0.9	2.2	2.3	2.4	1.1	0.9	0.4	1.6
ALYTUS03	Rūtų g. Naujoji g.	502507	6028699	1.6	3.2	3.3	2.6	1.7	1.5	0.8	1.8
ALYTUS04	Dainavos g. Sūduvos g.	502481	6027689	1.9	2.8	3.7	3.2	1.6	1.3	0.5	1.1
ALYTUS05	Kalniškės g. Naujoji g.	500741	6030624	1.6							
ANYKSCIAI01	Netoli Paupio g. A. Baranausko aikštė	569750	6155073	1.4	1.9	1.9	2.7	1.6	1.4	1.5	1.3
ANYKSCIAI02	Netoli Liudiškių g. Statybininkų g.	570383	6154900	1.2	2.0	2.8	3.1	1.5	1.4	0.7	0.7
ANYKSCIAI03	Prie upės Anykšta pėsčiųjų takas	570224	6155363	1.2	1.6	2.8	3.1	1.7	1.1	0.5	0.6
BIRZAI01	Netoli Vabalninko g. Kęstučio g. sankryžos	55760	6230044	1,9	2.7	4.2	3.2	2.1	1.3	0.5	0.8
BIRZAI02	Apasčios kranto Žemaitės g.	547187	6229695	2.1	3.1	4.0	3.8	2.4	1.6	0.8	0.7
BIRZAI03	Biržų pilies parkas	546908	6230479	1.3	1.9	2.9	2.2	1.3	1.1	0.5	0.6
DRUSKININKAI01	M.K. Čiurlionio g. Antakalnio g.	498072	5986666	1.1	1.6	2.5	2.6	1.5	1.3	0.5	0.8
DRUSKININKAI02	M.K. Čiurlionio g. Veisiejų g.	499530	5985856	2.0	2.1	3.2	2.7	1.5	1.5	1.0	1.5
DRUSKININKAI03	Kultūros poilsio parkas	497901	5987822	2.1	1.3	2.5	1.8	1.0	0.8	0.9	2.4
ELEKTRENAI01	Šviesos g. netoli A1 kelias prie stadiono	543513	6072650		1.2	1.8	2.0	1.1	0.9	0.5	1.7
ELEKTRENAI02	Literatūros meno muziejus, stadionas	542208	6071913		1.9	1.7	1.7	1.7	0.8	0.4	0.6
ELEKTRENAI03	Prie gatvės ties „Ledo arena“	543165	6072363	1.1	2.2	1.8	2.0	1.1	1.0	0.6	1.3
GARGZDAI01	Klaipėdos g. Kvietinių g.	336544	6178116	1.6	1.8	2.4	2.7	1.7	1.6	0.6	1.1
GARGZDAI02	Skinijos takas	336199	6176738	1.7	2.4	3.1	3.7	2.2	1.7	0.5	1.0
GARGZDAI03	Prie Minijos upės, netoli stadionas Kvietinių g.	337262	6178840	1.1	1.1	2.3	2.4	1.7	1.4		0.6
GARLIAVA01	Vytauto g. K. Aglinskio g.	491907	6075767	2.4	3.7	4.9	5.2	2.4	2.5	1.0	2.2
GARLIAVA02	Pažangos g. R. Mizaros g.	491902	6077928	1.6	3.4	3.7	3.5	1.7	1.5	1.2	1.0
GARLIAVA03	Garliavos I tvenkinys 500 m nuo kelio 139 nr.	493517	6076708	1.1	1.5	2.6	2.9	1.3	1.2	0.4	0.5
GRIGISKES01	Vilniaus g. A1 Kunigiškių g.	570551	6060175	1.5	1.9	2.0	2.7	1.5	1.6	2.2	1.4
GRIGISKES02	Netoli Vokės upės Afindevičių g.	570768	6059352	1.3	1.4	2.0	2.0	1.7	1.1	0.5	0.7
GRIGISKES03	Tarp Vokės upės, Neries upės	569660	6061180	1.0	1.3	2.0	2.1	1.3	1.2	0.4	0.7
IGNALINA01	Geležinkelio g. Aukštaičių g.	637268	6135970	1.4	1.9	0.5	2.9	1.6	1.7	0.7	0.9
IGNALINA02	Agarinio g.	637639	6135044	0.8	2.4	1.7	1.8	1.1	1.0	0.9	0.8
IGNALINA03	Prie žiemos sporto centro	638065	6136145	1.1	1.3	2.9	2.5	0.7	1.8	0.8	1.4
JONAVA01	J. Ralio g. J. Basanavičiaus g. Žeimių g. žiedas	517864	6104172	1.4	1.9	2.9	2.9	1.6	1.2	1.3	1.0
JONAVA02	Pramonės g. netoli Skarulių bažnyčios	520066	6104559	1.0	1.6	2.4	2.5	1.1		0.5	0.7

JONAVA03	Prie Jonavos tv. Poliklinika rajono	517111	6104606	0.9	1.6	2.4	2.4	1.2	1.2	0.4	0.8
JONISKIS01	Livonijos g. netoli bažnyčios	476252	6234371	1.7	2.6	3.5	3.2	1.7	1.7	0.5	0.4
JONISKIS02	Turgaus g., Šiaulių senoji g.	476336	6232886	1.0	1.9	2.5	2.5	1.3	1.3	0.4	1.0
JONISKIS03	Prie Joniškio I tv. netoli stadiono	475194	6234842	1.0	2.2	2.1	1.6	1.1		0.7	1.8
JURBARKAS01	Dariaus Girėno g. Ugniagesių g.	421550	6105388	1.8	2.5	3.4	3.7	2.0	2.4	0.7	2.9
JURBARKAS02	A. Giedraičio-Giedriaus g. Bartkūnų g.	420104	6104683	0.9	1.4	2.1	2.4	1.4	1.5	1.0	0.9
JURBARKAS03	Mintuva, Parke prie cerkvės	420464	6105578	1.2	1.6	2.4	2.6	1.2	1.4	0.4	0.5
KAISIADORYS01	Gedimino g. Bažnyčios g.	529295	6080725	1.1	2.0	2.8	2.8	1.3	1.2	0.6	0.9
KAISIADORYS02	Upė Lomena Vilniaus g. Priemiesčio g.	529928	6081486	1.9	2.1	3.2	3.3	1.7	1.3	1.6	0.9
KAISIADORYS03	Girelės miškas	527506	6080785	1.1	1.2	1.7	1.9	1.0	0.9	0.5	1.9

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
KALVARIJA01	Dariaus ir Girėno g. Laisvės g.	449850	6031119	1.9	2.9	3.3	2.8	1.6	1.3	0.8	1.0
KALVARIJA02	J. Basanavičiaus Naujoji g.	449284	6031771	1.7	2.0	2.9	2.9	1.4	1.2	2.0	0.5
KALVARIJA03	Prie Šešupės upės	448659	6031042	0.9	1.6	2.1	1.9	1.1	1.0	1.0	1.2
KAZLU RUDA01	Atgimimo g. V. Kudirkos g.	467619	6068546	1.9	2.4	3.0	3.3	1.7	1.4	0.6	1.6
KAZLU RUDA02	Kęstučio g. Maironio g. Gedimino g.	466796	6068741	1.6	2.2	3.2	3.3	1.7	1.3	0.5	1.2
KAZLU RUDA03	S. Daukanto g. Marijampolės g.	467613	6067755	1.1	1.8	2.5	2.9	1.1	1.5	0.5	0.6
KEDAINIAI01	Kauno g. Ryto g.	498731	6127025	1.1	1.8	2.7	2.3	1.3	1.4	0.4	0.7
KEDAINIAI02	Šėtos g. 106	499694	6128749	1.4	1.7	2.8	3.6	1.7	1.4	0.4	3.4
KEDAINIAI03	J. Basanavičiaus g. 53	498358	6128078	1.6	2.3	5.3	3.3	2.1	2.1	0.8	1.0
KELME01	Vytauto g. Laisvės g. Gynėjų g.	432882	6166778	2.5	3.1	2.8	4.2	2.8	2.0	0.8	1.1
KELME02	Liolių g. Pakalnės g.	433687	6165589	1.6	1.9	2.6	2.8	1.6	1.9	0.4	0.7
KELME03	Kelmės dvaro parkas Vilbeno upės užtvanka	433150	6167648	1.7	2.1		2.9	1.5	1.1	0.8	0.9
KRETINGA01	Rotušės aikštė	327453	6198340	2.0	2.8	3.1	3.2	2.0	1.8	0.5	0.7
KRETINGA02	Nemuno g. netoli Akmena	326918	6197661	2.2	2.7	3.6	2.7	2.1	2.0	0.1	1.2
KRETINGA03	Kretingos parko I tv. Kretingos muz.	328177	6199537	1.5		2.8	3.4	1.5		0.6	0.9
KUPISKIS01	Gedimino g. Matulionio g.	561136	6189987	1.5	2.6	3.7	3.3	2.1	1.7	1.4	0.9
KUPISKIS02	Technikos g. Krasnavos g.	562418	6188987	0.9	1.4	2.2	2.1	1.2	1.0	0.7	0.6

KUPISKIS03	Aukštupėnuose, Vėžionių g.	560962	6190603	1.0	1.8	2.7	2.2	1.4	0.9	0.4	0.6
KURSENAI01	Vytauto g. V. Kudirkos g.	433829	6208758	1.8	3.4	4.4	4.0	2.4	2.0	0.6	0.7
KURSENAI02	Daugėlių g. Klevų g.	434399	6206864	1.5	1.9	2.9	2.9	2.0	1.6	0.7	0.9
KURSENAI03	Ventos g. prie tilto	433353	6207866	1.0	2.0	2.6	2.3	1.4	1.1	0.8	0.5
KYBARTAI01	J. Basanavičiaus g. Žemaitės g.	421185	6056084	1.3	1.6	2.6	2.5	1.5	1.4	0.8	1.2
KYBARTAI02	Vienybės g. Sodų g.	419802	6057354	1.8	2.5	3.4	3.0	1.4	1.4	0.7	1.1
KYBARTAI03	Vasario 16-osios g.	420321	6056179	1.6	2.0	4.5	4.8	1.9	1.6	0.5	1.2
LAZDIJAI01	Kauno g. Vytauto g.	468376	6011044	1.7	2.1	3.3	3.6	1.6	1.4	0.6	1.5
LAZDIJAI02	Tarp Turistų g. ir Vytauto g.	469108	6010510	1.2	1.5	2.7	2.9	1.5	1.2	0.5	0.7
LAZDIJAI03	Palazdijo Baltajo ež.	467888	6008769	1.0	1.4	2.6	2.3	1.1		0.6	1.0
LENTVARIS01	Fabriko g. Geležinkelio g.	567994	6056942	1.7	2.1	0.3	3.2	2.2	2.0	1.0	4.1
LENTVARIS02	Trumpoji g. Gėlių g. Stadionas	567357	6056391	1.9	2.8	3.4	4.7	3.3	2.2	1.0	0.7
LENTVARIS03	Lentvario dvaras Lentvario ež.	567006	6058501	1.0	1.4	2.6	2.2	1.3	1.3	0.5	0.5
MARIJAMPOLE01	V. Kudirkos g. Gedimino g.	458278	6046875	2.0	2.6	3.7	3.8	1.7	1.5	0.6	1.3
MARIJAMPOLE02	Pavasario g. Liepų g.	459492	6047161	1.9	2.7	5.1	4.9	2.1	1.6	0.6	1.6
MARIJAMPOLE03	Liepynų g. Maironio g.	458048	6045276	1.6	2.4	3.0	3.5	1.7	1.5	0.7	1.2
MARIJAMPOLE04	Statybininkų g.	460094	6049221	1.1	1.5	2.8	2.8	1.2	1.0	0.7	1.0
MARIJAMPOLE05	Pašešupio parkas, stadionas	458424	6049301						1.5	0.7	
MAZEIKIAI01	Laisvės g. 22	397648	6243360	1.7	3.5	2.9	2.5	1.6	1.5	1.7	0.9
MAZEIKIAI02	Naftininkų g. Žemaitijos g.	397138	6242374	1.4	2.8	3.1	2.1	1.5	1.5	0.9	1.1
MAZEIKIAI03	Algirdo g. Gamyklos g.	395905	6243888	1.3	3.1	3.2	2.1	1.1	1.3	0.6	0.6

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
MOLETAI01	Aikštė Vilniaus g.	590287	6122720	1.6	2.1	3.7	3.4	2.3	1.6	0.9	1.1
MOLETAI02	Ąžuolų g. Liepų g.	589813	6121936	0.9	1.7	2.3	2.3	1.3	1.2	0.6	0.8
MOLETAI03	Prie Pastovio ež.	591063	6122567	1.8	1.9	4.2	3.2	2.4	1.1	0.4	0.7
N AKMENE01	Respublikos g. V. Kudirkos g.	430823	6243672	1.1	1.8	2.2	2.2	1.3	1.4	0.5	0.7
N AKMENE02	Parko g. Žalioji g.	431849	6243134	1.5	1.8	2.6	2.9	1.7	1.5	0.8	1.0
N AKMENE03	Taikos g. Klykolių g.	430365	6243947	2.1	3.3	4.4	4.1	2.0	1.7	0.5	0.7
NEMENCINE01	Švenčionių g. Bažnyčios g.	594112	6079969	1.8	1.7	2.7		2.0	1.3	0.7	1.9
NEMENCINE02	Kranto g.	594522	6079708	1.5	1.8	2.5	2.6	1.6	1.5	0.5	2.2
NEMENCINE03	Bažnyčios g.	593881	6080176	1.9	1.8	2.9	2.5	2.0	1.4	0.8	0.7
PABRADE01	Vilniaus g. Arnioniu g.	613273	6095443	2.2	1.9	2.8	3.2	1.9	1.3	0.7	2.2
PABRADE02	Molėtų g. Architektų g.	612180	6095543	1.5	1.6	2.2	1.7	1.3	0.8	0.4	0.9
PABRADE03	Bažnyčios g.	613183	6094800	1.7	1.5	2.6	2.2	1.5	2.0	0.4	2.3

PAKRUOJIS01	Statybininkų g. Vilniaus g. Vytauto g.	491076	6205127	1.3	2.0	2.9	2.7	1.8	1.7	0.5	1.0
PAKRUOJIS02	S. Ušinskio g. Vienybės g.	490425	6204644	2.0	2.5	4.0	3.7	1.9	2.6	0.5	0.7
PAKRUOJIS03	Kruojos g. Saulėtekio g.	490659	6205559	1.8	3.1	3.5	3.3	1.9	1.6	1.0	1.0
PALANGA01	Plytų g. Kretingos g.	316940	6201970	0.9	1.7	2.3	2.1	1.5	1.2	1.8	0.6
PALANGA02	Sodų g. 63	317902	6202273	1.0	2.4	2.3	2.1	1.1	1.4	0.7	0.7
PALANGA03	Birutės al.	316128	6202122	0.8	1.6	1.7	1.5	1.0	0.9	1.6	1.9
PASVALYS01	Panevėžio g. Vilniaus g. Taikos g. Vyšnių g.	525116	6213980	1.6	2.0	3.4	3.1	1.6	1.5	0.6	5.6
PASVALYS02	Šermukšnių g. P. Cvirkos g.	525906	6214670	1.5	2.2	3.2	3.7	1.8	1.3	0.8	1.2
PASVALYS03	Stoties g. prie kapinių, autoserviso	524218	6214718	1.2	1.6	2.7	1.8	1.3	1.1	0.4	1.5
PLUNGE01	Senamiesčio a. Dariaus ir Girėno g. Vytauto g.	365373	6199726	2.2	3.4	3.4	4.2	2.9	2.1	0.7	0.9
PLUNGE02	Lankos g. Saulėtekio g.	365775	6198557	2.2	3.8	3.6	4.0	2.2	2.3	0.9	0.6
PLUNGE03	Stoties g. priešais Plungės dvaro parką	365228	6200559	1.1	2.0	2.1	2.7	1.3	1.1	1.7	0.5
PRIENAI01	J. Basanavičiaus g. N Gyvenimo g.	496445	6055839	1.8	2.4	3.3	3.1	1.7	1.5	0.5	2.1
PRIENAI02	Pramonės g. Stadiono g.	496923	6056783	1.2	1.7	2.7	2.6	1.7	1.2	0.6	1.4
PRIENAI03	Prie Nemuno tilto parkas	496593	6054813	1.9	2.1	4.4	3.5	1.9	1.5	0.9	1.5
RADVILISKIS01	Šiaulių g. Gedimino g. Autobusų st	471591	6186580	1.4	2.7	3.1	2.8	1.6	1.7	0.6	1.3
RADVILISKIS02	J. Marcinkevičiaus g. Purienų g.	470380	6187426	1.1	2.6	2.9	2.0	1.4	1.1	0.5	1.1
RADVILISKIS03	Gedimino g. prie Geležinkelio stoties	470973	6185949	1.2	2.0	2.5	2.3	1.5	1.4	0.7	0.9
RASEINIAI01	Vilniaus g. Vytauto Didziojo g.	443808	6138665	0.8	2.8	3.7	4.0	2.7	1.8	0.8	0.8
RASEINIAI02	Pirmūnų g.	445048	6137865	2.7	2.6	3.9	4.9	3.1	2.2	0.7	0.8
RASEINIAI03	Netoli Žemaičių g. Vilkupės upė, Parkas	444609	6139532	1.4	2.0	3.0	3.0	1.8	1.1	0.4	0.6
ROKISKIS01	Respublikos g. Pramonės g.	599289	6202848	1.0	1.7	2.0	2.0	1.3	1.3	1.2	1.0
ROKISKIS02	Parko g. 11	598633	6203755	1.9	3.5	3.9	3.1	2.1	2.1	0.6	0.8
ROKISKIS03	Nepriklausomybės a. 11	599219	6204530	1.7	2.4	3.9	3.6	2.7	2.7	0.6	0.8
SAKIAI01	V. Kudirkos g. Šaulių g.	438310	6091371	1.1	1.9	3.0	3.1	1.4	1.3	0.6	1.2
SAKIAI02	Jazminų g.	438440	6090614	1.5	1.6	2.7	2.9	1.3	1.1	0.5	1.1
SAKIAI03	Vasario 16-osios g. Bažnyčios g., skveras	438787	6091553	1.3	1.9	2.9	2.7	1.4	1.1	0.7	1.1

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04

SALCININKAI01	Nepriklausomybės g. Vilniaus g.	590076	6019702	2.3	2.5	3.9	3.1	2.5		0.7	1.4
SALCININKAI02	K. Vagnerio g.	590885	6020330	1.8	2.2	2.8	2.8	1.7	1.3	0.5	
SALCININKAI03	Prie Šv. Petro bažnyčios	590850	6019410	1.4	1.9		3.2	1.6	1.4		0.9
SILALE01	Vytauto g. J. Basanavičiaus g.	385094	6152233	1.4	2.0	2.7	4.2	2.6	1.4	0.7	0.7
SILALE02	Kovo 11-osios g.	385610	6151648	1.0	1.8	2.2	1.7	1.3	1.0	0.4	0.6
SILALE03	Prie Lokystos upės	384588	6151845	1.1	2.0	2.3	2.5	1.2	1.1	0.4	0.5
SILUTE01	Lietuvninkų g. Gudobelių g.	339294	6137016	1.7	2.1	2.4	3.3	1.8	1.5	1.2	1.1
SILUTE02	Sodų g. prie stadiono	340054	6137714	1.6	2.2	3.6	4.0	1.9	1.7	0.6	1.1
SILUTE03	Šyša upė Netoli geležinkelio tiltas	340797	6136362	1.3	1.7	2.2	2.8	1.2	1.3	0.4	1.0
SIRVINTOS01	Plento g. Musninkų g.	561915	6100023	1.4	1.7	2.2	2.8	1.5	1.2	1.0	0.6
SIRVINTOS02	Jaunimo g. 16	560582	6101375	1.5	1.4	2.3	2.1	1.1	0.9	0.7	1.0
SIRVINTOS03	Vilniaus g. I. Šeiniaus g.	561286	6100805	1.8	1.7	2.6	2.4	1.5	0.8	0.5	0.4
SKUODAS01	Vytauto g. Gedimino g.	347054	6240123	1.7	3.1	2.9	2.4	1.4	1.6	1.4	0.7
SKUODAS02	Šatrijos g. 5	346964	6240461	1.9	2.8	2.6	2.5	1.4	1.6	0.6	0.7
SKUODAS03	Dariaus ir Girėno g. 46	347681	6240032	1.5	1.9	2.4	2.2	1.7	1.3	0.8	0.8
SVENCIONELIAI01	Priestočio g. Kaltinėnų g.	627258	6116083	1.6		3.2	2.6	1.7	1.7	0.7	1.1
SVENCIONELIAI02	Lauko g. – daugiaaukščiai namai	628095	6117835	1.6	1.6	2.6	2.6	2.0	2.7	0.6	2.4
SVENCIONELIAI03	Prie geležinkelio ties AB „Švenčionėlių Maltosa“	626857	6114407	0.7	1.7	2.2	1.6	1.1	0.9	0.5	1.2
SVENCIONYS01	Vilniaus g. Lentupio g.	637700	6113686	1.2	1.8	2.0	1.8	1.7	1.4	0.6	1.0
SVENCIONYS02	Saulėtekio g. Pakalnės g.	637814	6112290	1.1		2.7	2.2	2.2	1.8	0.8	1.1
SVENCIONYS03	Lietupio g. prie kapinių	638463	6112618	0.7	1.2	2.1	2.0	1.3	0.9	0.4	0.9
TAURAGE01	Dariaus ir Girėno g. Gedimino g.	391422	6125855	2.7	3.4	3.8	6.3	2.7	2.6	1.8	1.3
TAURAGE02	Laisvės g. Malūno g., stadionas netoli	391009	6124468	2.3	3.6	3.8	5.6	2.5	1.0	0.9	1.2
TAURAGE03	M.K. Čiurlionio g. Ganyklų g.	391404	6126893	3.4	4.2	5.4	6.8	3.2	2.4	0.9	0.7
TELSIAI01	Turgaus alėja Respublikos g.	390822	6206865	2.3	4.4	3.5	3.4	2.3	1.9	0.9	
TELSIAI02	Vyšnių g.	391253	6207678	2.1	4.2	3.8	2.9	1.8	1.6	0.5	0.6
TELSIAI03	Parko g. link Masčio ež.	390399	6205322	0.8	2.2	2.1	1.6	1.7	1.0	0.3	1.2
TRAKAI01	Gedimino g. Aukštadvario g.	560350	6055510	1.4		2.6	2.8	1.9	1.8	0.8	1.1
TRAKAI02	Birutės g.	560464	6056382	1.3	1.4	2.3	2.0	1.3	0.9	0.4	2.4
TRAKAI03	Karaimų g. Galvės g. Žalioji g.	559692	6057525	1.3	1.4	1.8	1.9	1.3	1.0	0.4	2.6
UKMERGE01	Kęstučio al. Vilniaus g.	548658	6124135	1.7	2.3	3.9	3.5	1.9	2.1	0.7	0.9
UKMERGE02	L. Giros g A. Smetonos g.	547745	6124320	1.3	2.0	3.1	2.8	1.7	1.8	0.8	0.8
UKMERGE03	Nuotekų g. Laaukų g. Jaunimo g.	549809	6123631	1.5	1.9	3.3	3.3	1.7	1.5	1.1	0.7
UTENA01	Ausros g. J. Basanavičiaus g.	601284	6152751	2.0	2.5	3.5	3.5	1.9	1.7	1.1	1.1
UTENA02	Aušros g. 79	601222	6153609	1.2	1.4	2.6	2.4	1.3	1.2	0.5	0.8
UTENA03	Algirdo g. prie vaikų darželio	601211	6152092	2.5	3.1	3.2	5.1	2.7	2.1	0.4	0.7
VARENA01	J. Basanavičiaus g. Vytauto g.	537113	6008500	1.4	2.2	2.8	2.7	1.6	1.6	1.0	0.9

VARENA02	J. Basanavičiaus g. Spaustuvės g.	537547	6009036	1.7	1.9	2.7	2.7	1.4	1.1	0.6	1.5
VARENA03	Alytaus g. Pramonės g.	538496	6009306	1.1	1.6	2.5	2.9	1.3	0.8	0.8	0.8

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
VIEVIS01	Kauno g., A1 netoli pėsčiųjų viaduko	552637	6070998	1.7	2.50	2.5		2.0	1.7	0.5	0.6
VIEVIS02	Tarp Stoties g. ir A1 kelio	552096	6071491	1.5	1.30	2.0	2.3	1.3	1.4	0.4	1.4
VIEVIS03	Prie Vievio ež.	553120	6070240		1.40	1.7	2.1	1.2		0.4	0.8
VILKAVISKIS01	Vytauto g. Gedimino g.	438061	6057325	1.8	2.10	3.8	3.6	2.1	1.4	0.6	2.1
VILKAVISKIS02	Vienybės g. tarp dviejų stadionų	437860	6058369	1.4	1.60	3.0	2.9	1.2	1.2	1.3	1.1
VILKAVISKIS03	Šeimena upėJ. Basanavičiaus g.	438396	6056739	1.6	3.00	3.5	3.6	1.5	1.4	0.5	1.4
VISAGINAS01	Taikos pr. Veteranų g.	657720	6048875	0.8	1.30	1.4	1.7	0.9	0.8	0.8	0.9
VISAGINAS02	Jaunystės g.	654198	6164025	0.8	1.20	1.4	1.3	1.1	1.1	0.7	
VISAGINAS03	Visagino ež. Stadionas Savivaldybė	652531	6165080	0.6	1.20	1.5	1.3	0.8	0.7	0.4	1.8
ZARASAI01	Vytauto g. Sėlių aikštė	641050	6179639	1.0	2.00	2.1	1.9	1.2	1.1	0.5	0.6
ZARASAI02	P. Širvio g.	642143	6180479	1.0	1.50			1.4	1.1	0.6	1.0
ZARASAI03	J. Gruodžio g. K. Donelaičio g.	641058	6180594	1.9	2.40	3.4	3.7	2.0	3.5	0.8	
OKTS42	Jonava	518192	6104083	1.0	1.5	2.3	2.4	0.9	1.0	0.4	0.7

lost or stolen

dublicate

4.3.3.4 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide and benzene concentrations in zone

Sulfur dioxide

Sulfur dioxide is derived from the combustion of sulfur-containing fossil fuel and is a major air pollutant in many parts of the world. In urban areas, man-made contributions are of the greatest concern. The diffusive air samplers were located at sites in the different areas of the zone in order to get the information about the air pollution level from the emission sources of SO_2. The diffusive air samplers for SO_2 were set up at eight sites in Klaipeda, Panevezys and Siauliai, at four sites in Alytus and Mariajampole, while at three sites in each 53 smaller towns. On the whole, SO_2 concentrations at sites in zone did not exceed air quality limit value aimed to protect human health and even were smaller than the lower air quality limit value. For the entire study period (from 3 November 2010 to 4 July 2011), the mean annual concentrations of SO_2 ranged from 0.68 µg/m^3 to 2.58 µg/m^3 (Fig.33).

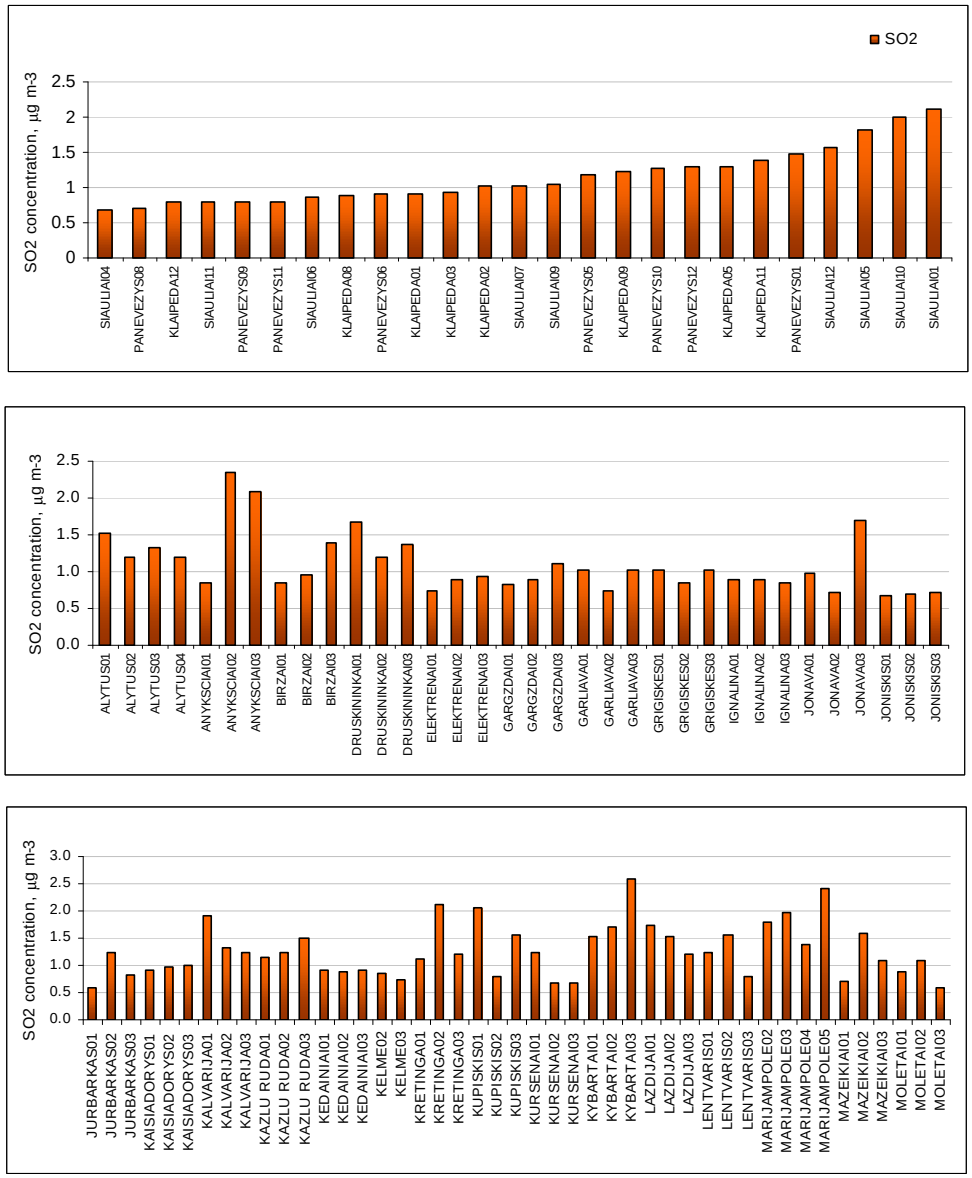


Fig. 33. Annual mean concentrations of sulfur dioxide in the zone for the study period from 3 November 2010 to 4 July 2011.

As can be seen (Fig. 34, 35), during autumn (3 November – 1 December 2010), the averaged SO_2 concentration had the highest value of 5.0 μg/m^3 at site Panevezys01 (crossing of streets). In a residential area the highest values of SO_2 were 5.0 μg/m^3 and 4.3 μg/m^3, respectively, at sites Panevezys05 and Panevezys10. At the rest sites in zone, average concentrations of SO_2 ranged from 0.20 μg/m^3 to 3.5 μg/m^3, with an exception for the site N. Akmene01 of 4.7 μg/m^3.

In winter (6 January– 3 February 2011), SO_2 concentrations ranged from 0.30 to 5.40 μg/m^3, from 0.10 to 2.10 μg/m^3 and from 0.60 to 2.60 μg/m^3, respectively, at sites in Klaipeda, Panevezys and Siauliai. Overall, the SO_2 concentration ranged from 0.2 to 4.8 μg/m^3 at the rest sites in Zone, but it was 7.8 μg/m^3 at site in Anyksciai in a residential area very likely due to local source (Fig 34,35).

The results indicate (Fig 34,35), that in the springtime (25 March – 22 April 2011) SO_2 mean concentrations ranged from 0.20 to 1.50 μg/m^3, from 0.30 to 2.50 μg/m^3 and from 0.20 to 4.80 μg/m^3, respectively, at sites in Klaipeda, Panevezys and Siauliai, with the highest mean values of 2.5 μg/m^3 (Panevezys12 - traffic site), 3.8 μg/m^3 (Siauliai05 - traffic site) and 4.6 μg/m^3 (Siauliai01 – recreation area). For this period SO_2 levels reached 5.2, 3.9 and 5.7 μg/m^3 at sites in residential area Kretinga02, Radviliskis03 and Rokiskis03, respectively. The high level of SO_2 were at sites in Sirvintos02, Pasvalys01, Taurage02 and Utena03 with mean concentrations of SO_2, respectively, 5.2, 4.2, 4.2 and 4.0 μg/m^3.

During the summer study (6 June – 4 July 2011), SO_2 concentrations ranged between 0.50 and 1.70 μg/m^3, between 0.20 and 1.20 μg/m^3 and between 0.20 and 2.10 μg/m^3 at sites in Klaipeda, Panevezys and Siauliai. For this period the highest mean values of 4.8, 3.2 and 2.6 μg/m^3 were reached at the sites Marijampole05, Kupiskis03 and Pakruojis02, respectively.

Data indicate that higher SO_2 levels were measured during autumn, winter and spring at sites in the residential and recreation areas in Zone when the emissions from energy production and heating are at their highest level. Conversely, the lowest SO_2 levels were measured in summer.

Table25. Statistics for the sulfur dioxide atmospheric concentrations at sites in Klaipeda, Panevezys and Siauliai during the entire study period (3 November 2010 – 4 July 2011)

Site code	Address	SO_2 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KLAIPEDA01	Molo g. 2	0.8	1.0	0.8	1.1	0.2	1.7	0.9
KLAIPEDA02	Liepojos g. P. Lideikio g.	1.0	1.3	0.9	0.9	0.3	1.5	1.0
KLAIPEDA03	Kretingos g. 4	1.5	0.8	0.9	0.9	0.6	1.5	0.9
KLAIPEDA05	Sportininkų g. Stadiono g.	0.9	2.4	0.8	1.1	0.2	3.5	1.3
KLAIPEDA08	Tiltų g. Turgaus g.	1.0	1.3	0.7	0.6	0.2	1.8	0.9
KLAIPEDA09	H. Manto g. S. Daukanto g.	1.4	1.3	1.0	1.4	0.5	2.0	1.2
KLAIPEDA11	Minijos g. Naikupės g.	0.9	3.0	0.7	0.7	0.4	5.4	1.4
KLAIPEDA12	Statybininkų g. Šilutės pl.	0.6	0.9	0.6	1.1	0.2	1.1	0.8
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	3.0	1.0	1.2	0.9	0.1	5.0	1.5
PANEVEZYS05	Spartuoliu g. Pušaloto g.	3.2	0.6	0.5	0.5	0.4	5.0	1.2
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	1.6	1.0	0.7	0.4	0.3	1.8	0.9
PANEVEZYS08	Medžiotojų g.	0.9	0.7	0.9	0.5	0.4	1.2	0.7

	Molainiuose							
PANEVEZYS09	Paplentės g. Didžioji g. Staniūnuose	0.9	1.2	0.6	0.5	0.2	2.1	0.8
PANEVEZYS10	Gėlių g. Dembravos g. Dembravoje	3.1	1.3	0.5	0.3	0.2	4.3	1.3

Table 26. Statistics for the sulfur dioxide atmospheric concentrations at sites in zone for the period from 3 November 2010 to 4 July 2011

Site code	SO_2 concentration, μg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
ALYTUS01	2.90	1.55	0.80	0.85	0.7	3.4	1.53
ALYTUS02	1.95	1.15	0.95	0.75	0.6	2.9	1.20
ALYTUS03	2.60	1.05	0.85	0.78	0.15	2.7	1.32
ALYTUS04	1.45	1.75	0.90	0.73	0.15	2.6	1.21
ANYKSCIAI01	0.55	0.65	0.60	1.60	0.5	2.7	0.85
ANYKSCIAI02	0.83	7.75	0.50	0.33	0.15	14.6	2.35
ANYKSCIAI03	0.70	5.60	1.80	0.28	0.15	10.5	2.09
BIRZAI01	1.30	0.28	1.15	0.63	0.15	1.5	0.84
BIRZAI02	2.50	0.23	0.60	0.53	0.15	4.1	0.96
BIRZAI03	0.65	0.23	4.40	0.33	0.15	8.5	1.40
DRUSKININKAI01	3.05	1.10	1.05	1.50	0.4	3.9	1.68
DRUSKININKAI02	1.55	0.95	0.80	1.48	0.15	2.8	1.19
DRUSKININKAI03	2.00	1.45	1.05	1.00	0.5	2.8	1.38
ELEKTRENAI01	0.65	0.75	0.90	0.68	0.15	1.5	0.74
ELEKTRENAI02	0.65	0.93	1.10	1.00	0.15	1.7	0.89
ELEKTRENAI03	0.75	1.03	0.98	0.95	0.15	1.9	0.93
GARGZDAI01	0.90	1.15	0.80	0.48	0.15	1.8	0.83
GARGZDAI02	0.58	2.30	0.85	0.15	0.15	2.3	0.88
GARGZDAI03	0.53	0.70	2.30	0.70	0.15	2.4	1.11
GARLIAVA01	1.60	0.80	1.30	0.43	0.15	1.8	1.03
GARLIAVA02	1.18	0.60	0.85	0.38	0.15	2.2	0.75
GARLIAVA03	1.90	1.10	0.50	0.60	0.3	2.1	1.03
GRIGISKES01	1.80	0.90	0.78	0.65	0.15	2.1	1.03
GRIGISKES02	1.40	0.78	0.55	0.70	0.15	1.7	0.86
GRIGISKES03	1.60	1.20	0.85	0.48	0.15	2.6	1.03
IGNALINA01	0.95	0.65	0.95	0.98	0.15	1.8	0.88
IGNALINA02	1.55	0.60	1.30	0.13	0.1	1.9	0.89
IGNALINA03	0.58	1.25	0.55	0.98	0.15	2	0.84
JONAVA01	0.85	0.85	0.75	1.45	0.3	1.8	0.98
JONAVA02	0.70	0.53	0.65	1.03	0.15	1.9	0.73
JONAVA03	1.75	1.15	3.00	0.93	0.15	4.5	1.71
JONISKIS01	0.58	1.10	0.43	0.63	0.15	1.5	0.68
JONISKIS02	0.68	0.80	0.50	0.83	0.15	1.5	0.70
JONISKIS03	0.73	0.80	0.38	0.95	0.15	1.3	0.71
JURBARKAS01	0.35	0.70	0.33	1.00	0.15	1.2	0.59
JURBARKAS02	1.30	1.25	0.85	1.60	0.3	2.9	1.25
JURBARKAS03	1.40	1.10	0.15	0.35	0.15	1.9	0.84
KAISIADORYS01	1.50	0.43	0.85	0.85	0.15	1.7	0.91
KAISIADORYS02	1.50	0.75	1.35	0.23	0.15	2.4	0.96
KAISIADORYS03	1.45	1.60	0.55	0.40	0.3	2.9	1.00
KALVARIJA01	2.65	3.45	0.60	0.90	0.3	6	1.90
KALVARIJA02	2.55	1.25	0.55	0.90	0.4	2.7	1.31
KALVARIJA03	2.30	1.35	0.28	1.02	0.15	3.3	1.24
KAZLU RUDA01	1.85	1.15	0.75	0.88	0.15	1.9	1.16

KAZLU RUDA02	1.90	1.95	0.50	0.55	0.3	2.4	1.23
KAZLU RUDA03	2.30	2.25	0.50	0.90	0.3	3.7	1.49
KEDAINIAI01	1.35	0.85	0.50	0.95	0.4	1.8	0.91
KEDAINIAI02	1.05	0.80	0.80	0.83	0.15	1.5	0.87
KEDAINIAI03	1.20	0.85	0.80	0.85	0.4	1.3	0.93
KELME01	0.15	1.85	1.10	1.13	0.15	2.3	
KELME02	0.73	1.80	0.70	0.15	0.15	2.6	0.86
KELME03	0.83	0.90	0.73	0.45	0.15	1.5	0.73
KRETINGA01	0.63	0.80	2.70	0.30	0.15	3.9	1.11
KRETINGA02	1.50	3.10	2.10	1.40	0.6	5.2	2.11
KRETINGA03	1.20	1.75	0.30	1.00	0.3	2.3	1.20
KUPISKIS01	2.40	1.05	3.30	1.00	0.3	5.5	2.07
KUPISKIS02	1.05	0.15	1.05	0.95	0.15	1.5	0.80
KUPISKIS03	1.00	0.80	1.33	3.15	0.15	6	1.57
KURSENAI01	0.88	0.75	2.80	0.55	0.15	4.8	1.24
KURSENAI02	1.70	0.55	0.40	0.55	0.4	1.7	0.67
KURSENAI03	1.13	0.95	0.15	0.48	0.15	2.1	0.68
KYBARTAI01	2.15	1.60	1.40	1.00	0.6	2.3	1.54
KYBARTAI02	1.95	2.05	1.65	1.15	0.4	2.5	1.70
KYBARTAI03	2.70	4.80	1.90	0.90	0.5	5.6	2.58
LAZDIJAI01	2.40	2.25	1.35	0.90	0.5	2.6	1.73
LAZDIJAI02	2.55	1.35	1.55	0.63	0.15	2.7	1.52
LAZDIJAI03	1.65	1.10	0.90	1.20	0.3	2.1	1.21
LENTVARIS01	0.95	2.55	0.69	0.73	0.15	4.3	1.23
LENTVARIS02	1.15	1.65	1.25	2.18	0.15	4.2	1.56
LENTVARIS03	0.80	0.80	1.03	0.55	0.15	1.9	0.79
MARIJAMPOLE02	2.15	2.40	1.35	1.30	0.5	4.2	1.80
MARIJAMPOLE03	3.35	2.20	1.05	1.25	0.3	4.1	1.96
MARIJAMPOLE04	2.30	0.98	1.25	1.05	0.15	3.2	1.39
MARIJAMPOLE05	2.15	1.50	-	4.80	0.3	4.8	2.42
MAZEIKIAI01	0.58	0.40	0.70	1.10	0.15	1.6	0.69
MAZEIKIAI02	0.98	1.55	3.30	0.50	0.15	5.7	1.58
MAZEIKIAI03	1.03	1.60	0.60	1.15	0.15	2.2	1.09
MOLETAI01	0.75	0.60	1.55	0.58	0.15	2.7	0.87
MOLETAI02	1.85	0.85	0.50	1.18	0.15	2.9	1.09
MOLETAI03	0.85	0.48	0.38	0.70	0.15	1.4	0.60
N AKMENE01	4.68	0.85	0.55	0.35	0.15	9.2	1.61
N AKMENE02	1.45	0.80	0.33	0.58	0.15	2.2	0.79
N AKMENE03	0.78	0.70	0.40	0.60	0.15	1.4	0.62
NEMENCINE01	0.38	0.80	1.25	0.38	0.15	1.8	0.70
NEMENCINE02	1.25	1.60	1.95	0.38	0.15	2.9	1.29
NEMENCINE03	0.70	2.45	4.00	0.15	0.15	6.5	1.83
PABRADE01	0.78	0.60	3.30	0.15	0.15	5.7	1.21
PABRADE02	1.15	0.88	3.55	0.70	0.15	6.4	1.57
PABRADE03	0.40	0.95	1.00	0.33	0.15	1.1	0.67
PAKRUOJIS01	1.08	0.95	0.38	0.38	0.15	2	0.69
PAKRUOJIS02	1.10	0.85	2.45	2.55	0.6	4.3	1.74
PAKRUOJIS03	0.70	2.15	0.85	0.33	0.15	2.5	1.01
PALANGA01	1.50	1.20	0.65	0.30	0.3	2.1	0.91
PALANGA02	1.30	0.90	1.10	0.90	0.4	1.7	1.05
PALANGA03	1.03	0.85	0.55	0.28	0.15	1.9	0.68
PASVALYS01	1.00	0.70	4.20	0.70	0.4	7.5	1.65
PASVALYS02	0.63	0.28	0.88	0.45	0.15	1.2	0.56
PASVALYS03	1.05	0.58	0.70	1.00	0.15	1.2	0.85

PLUNGE01	0.50	0.85	2.65	0.28	0.15	4.9	1.07
PLUNGE02	0.98	1.10	1.75	0.48	0.15	2.2	1.08
PLUNGE03	3.18	1.10	0.38	0.73	0.15	6.2	1.34
PRIENAI01	1.70	0.75	0.33	0.58	0.15	2.3	0.84
PRIENAI02	1.45	0.55	2.40	0.55	0.4	4.4	1.24
PRIENAI03	1.60	1.55	0.90	0.40	0.3	2.3	1.11
RADVILISKIS01	2.50	1.20	0.35	0.15	0.15	2.8	1.05
RADVILISKIS02	0.15	1.55	0.28	0.88	0.15	2.3	0.79
RADVILISKIS03	0.73	2.85	0.50	0.33	0.15	3.9	1.10
RASEINIAI01	0.95	1.35	0.90	0.43	0.15	2	0.91
RASEINIAI02	0.98	1.35	0.60	0.58	0.15	1.8	0.88
RASEINIAI03	0.90	0.95	0.15	0.85	0.15	1.5	0.79
ROKISKIS01	0.68	0.60	1.35	1.40	0.15	2.4	1.01
ROKISKIS02	0.53	0.45	1.00	1.40	0.15	2	0.84
ROKISKIS03	0.70	3.05	0.80	0.80	0.4	5.7	1.34
SAKIAI01	2.60	1.20	0.70	0.73	0.15	3.3	1.31
SAKIAI02	1.75	1.70	0.80	0.60	0.3	2.4	1.21
SAKIAI03	2.35	1.45	0.58	0.90	0.15	2.9	1.32
SALCININKAI01	1.15	0.40	1.50	0.55	0.4	2.6	0.97
SALCININKAI02	1.85	0.80	0.53	-	0.15	2.7	1.06
SALCININKAI03	2.75	0.80	0.63	0.23	0.15	4.8	1.14
SILALE01	0.95	1.15	0.33	0.75	0.15	1.8	0.79
SILALE02	1.18	1.40	0.15	0.63	0.15	2.2	0.84
SILALE03	1.53	1.45	0.55	0.85	0.15	2.9	1.09
SILUTE01	0.88	1.15	0.28	0.73	0.15	1.6	0.76
SILUTE02	0.78	1.25	0.45	0.70	0.15	1.5	0.79
SILUTE03	2.13	1.40	0.75	0.30	0.15	4.1	1.26
SIRVINTOS01	0.35	0.60	1.00	1.20	0.3	1.4	0.79
SIRVINTOS02	0.43	0.95	5.15	0.78	0.15	9.3	1.83
SIRVINTOS03	0.55	0.65	1.15	0.65	0.4	1.5	0.75
SKUODAS01	0.73	1.75	2.15	0.80	0.15	3.5	1.36
SKUODAS02	0.48	1.75	2.40	0.68	0.15	4.3	1.33
SKUODAS03	1.03	1.40	0.48	0.53	0.15	1.9	0.86
SVENCIONELIAI01	0.90	0.55	0.43	1.20	0.15	2.1	0.77
SVENCIONELIAI02	1.75	0.75	0.45	0.15	0.15	2.4	0.78
SVENCIONELIAI03	1.15	0.45	1.85	1.08	0.15	2.9	1.13
SVENCIONYS01	0.95	0.90	0.75	1.08	0.15	2	0.92
SVENCIONYS02	1.55	0.50	0.40	0.83	0.15	1.7	0.82
SVENCIONYS03	1.70	0.50	0.80	1.03	0.15	2.4	1.01
TAURAGE01	1.08	1.40	0.50	1.00	0.15	2	0.99
TAURAGE02	1.18	1.75	4.20	1.35	0.15	7.8	2.12
TAURAGE03	1.05	1.40	0.55	0.70	0.3	2	0.93
TELSIAI01	0.98	1.55	0.80	1.60	0.15	1.8	1.24
TELSIAI02	0.98	1.55	1.30	1.10	0.15	2.1	1.23
TELSIAI03	0.83	1.45	0.40	0.63	0.15	1.7	0.83
TRAKAI01	0.95	0.65	1.50	0.15	0.15	2.1	0.81
TRAKAI02	1.00	0.75	1.40	0.15	0.15	1.5	0.83
TRAKAI03	0.85	0.83	0.85	0.50	0.15	1.5	0.76
UKMERGE01	0.55	0.80	0.15	1.00	0.15	1.6	0.69
UKMERGE02	1.10	0.70	0.60	1.40	0.4	1.6	0.95
UKMERGE03	1.00	1.10	2.73	0.78	0.15	5.3	1.40
UTENA01	0.95	0.60	0.60	0.60	0.3	1	0.69
UTENA02	0.80	0.40	0.45	1.08	0.15	2	0.68
UTENA03	0.75	0.60	3.95	1.05	0.6	7.1	1.59

VARENA01	1.95	1.10	1.60	0.33	0.15	2.7	1.24
VARENA02	1.85	1.00	1.05	0.48	0.15	2.5	1.09
VARENA03	1.42	1.10	0.45	0.35	0.3	2	0.83
VIEVIS01	1.30	0.60	1.00	0.23	0.15	1.7	0.78
VIEVIS02	0.95	0.53	1.00	0.70	0.15	1.5	0.79
VIEVIS03	0.75	0.85	0.73	0.75	0.15	1.3	0.77
VILKAVISKIS01	2.35	2.95	1.40	2.55	1.3	4.5	2.31
VILKAVISKIS02	2.10	1.90	1.35	1.20	0.4	2.8	1.64
VILKAVISKIS03	2.05	1.35	0.90	0.98	0.15	2.2	1.32
VISAGINAS01	0.65	0.50	1.83	0.58	0.15	3.5	0.89
VISAGINAS02	2.30	0.48	0.95	0.80	0.15	3.7	1.18
VISAGINAS03	2.85	0.60	0.70	1.35	0.4	4	1.38
ZARASAI01	0.58	0.48	0.60	0.95	0.15	1.6	0.65
ZARASAI02	1.40	-	0.45	0.33	0.15	1.6	0.73
ZARASAI03	0.53	1.15	0.63	2.00	0.15	2	0.94

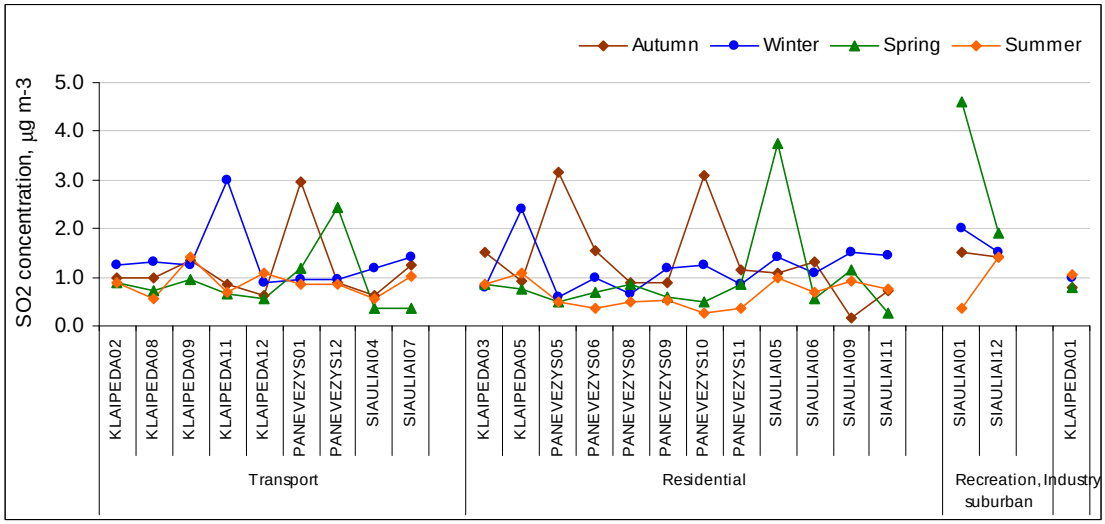
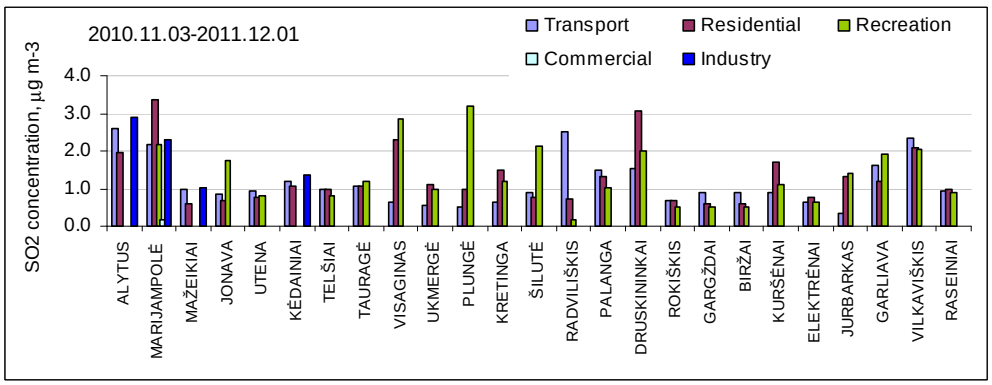
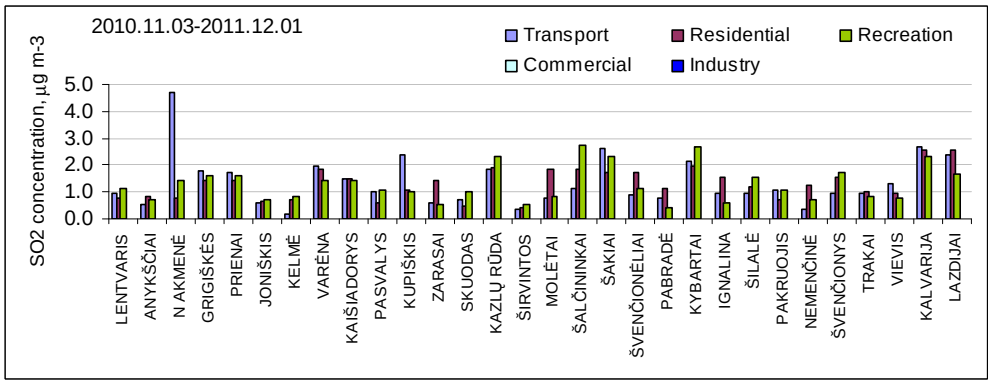


Fig. 34. Site-specific seasonal variation of sulfur dioxide concentrations at sites in Klaipeda, Panevezys and Siauliai for the period from 3 November 2010 to 4 July 2011


2010.11.03-2011.12.01
Transport
Residential
Recreation
Commercial
Industry
SO2 concentration, µg m-3
4.0
3.0
2.0
1.0
0.0
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
BIRŽAI
KURŠĖNAI
ELEKTRĖNAI
JURBARKAS
GARLIAVA
VILKAVIŠKIS
RASEINIAI


2010.11.03-2011.12.01
Transport
Residential
Recreation
Commercial
Industry
SO2 concentration, µg m-3
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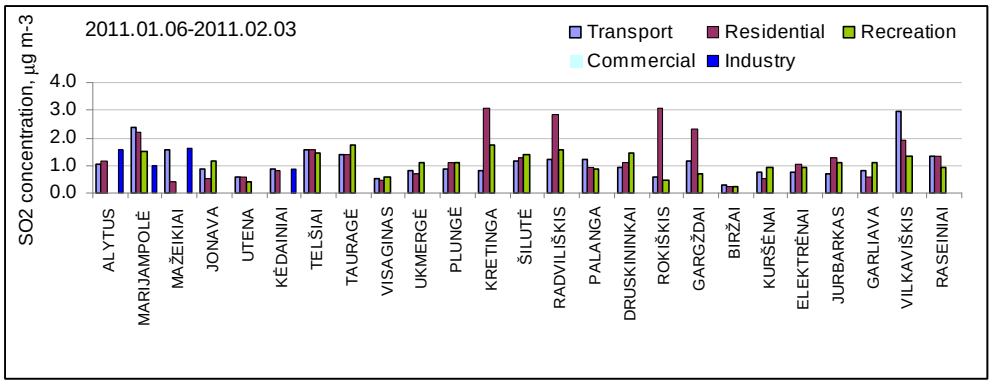
4.0
3.0
2.0
1.0
0.0
LENTVARIS
ANYKŠČIAI
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI
IGNALINA
ŠILALĖ
PAKRUOJIS
NEMENČINĖ
ŠVENČIONYS
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI


2011.01.06-2011.02.03
Transport
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Recreation
Commercial
Industry
SO2 concentration, µg m-3
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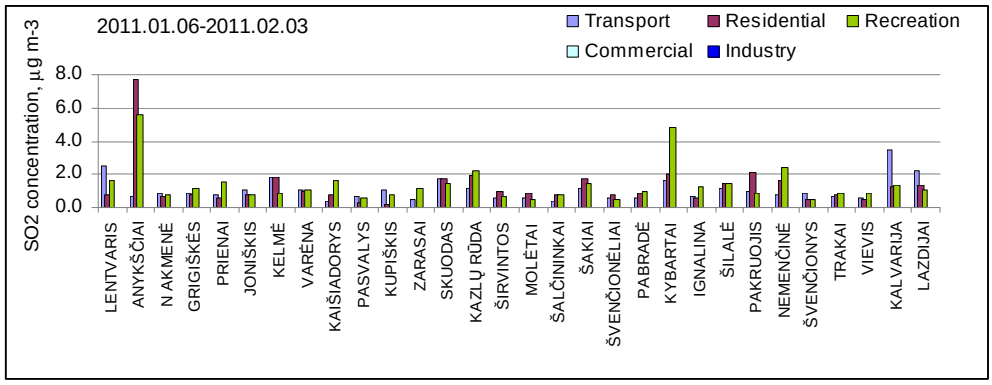
3.0
2.0
1.0
0.0
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
BIRŽAI
KURŠĖNAI
ELEKTRĖNAI
JURBARKAS
GARLIAVA
VILKAVIŠKIS
RASEINIAI


2011.01.06-2011.02.03
Transport
Residential
Recreation
Commercial
Industry
SO2 concentration, µg m-3
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6.0
4.0
2.0
0.0
LENTVARIS
ANYKŠČIAI
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI
IGNALINA
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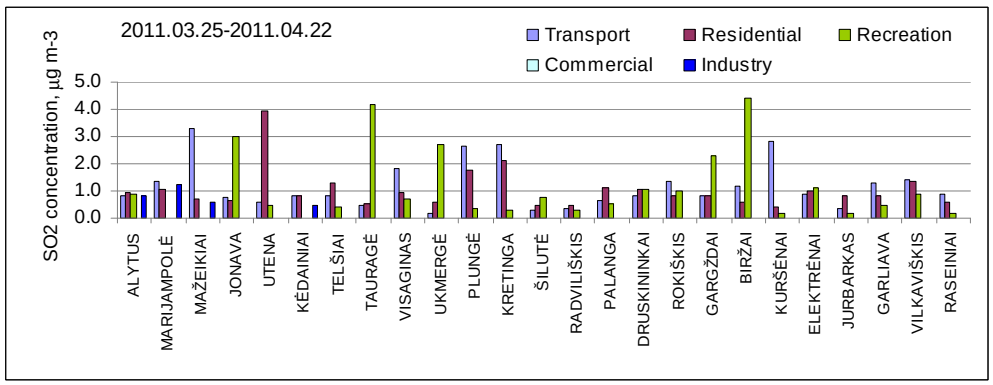
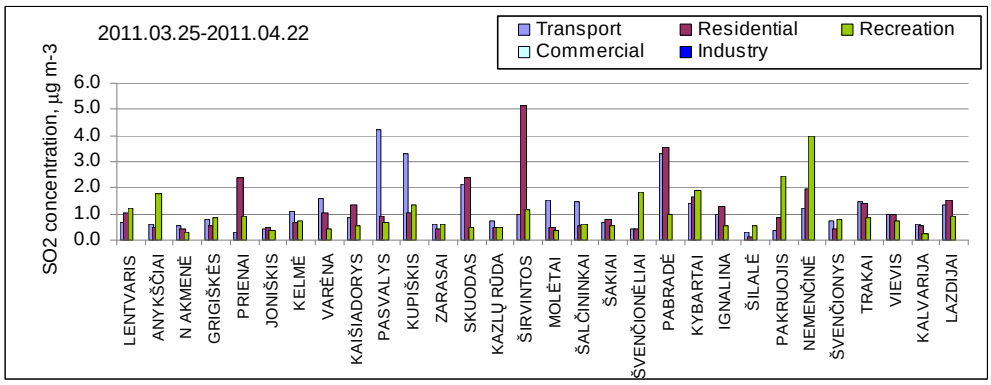
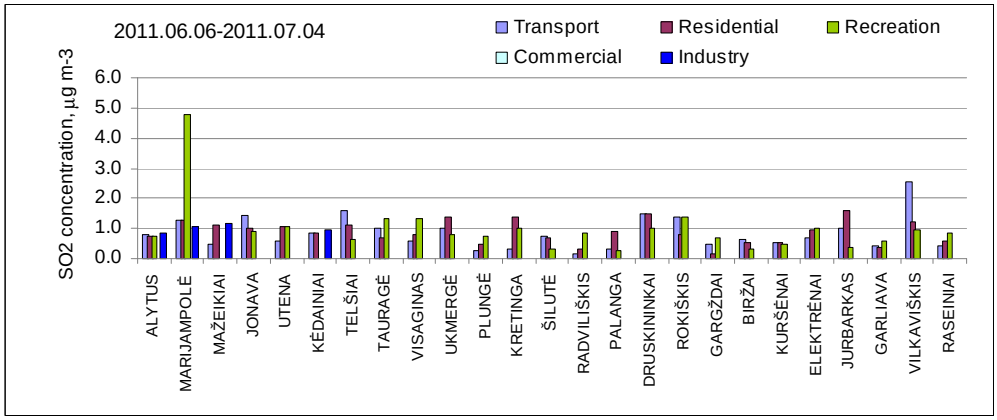
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI







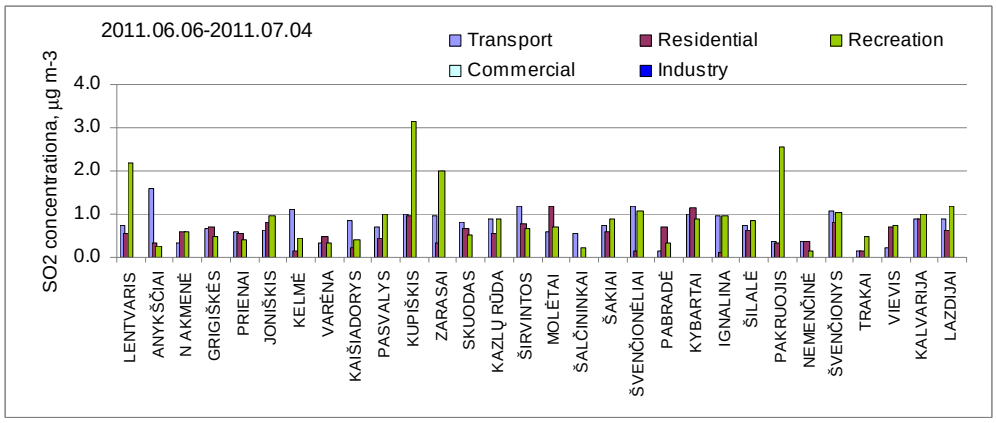
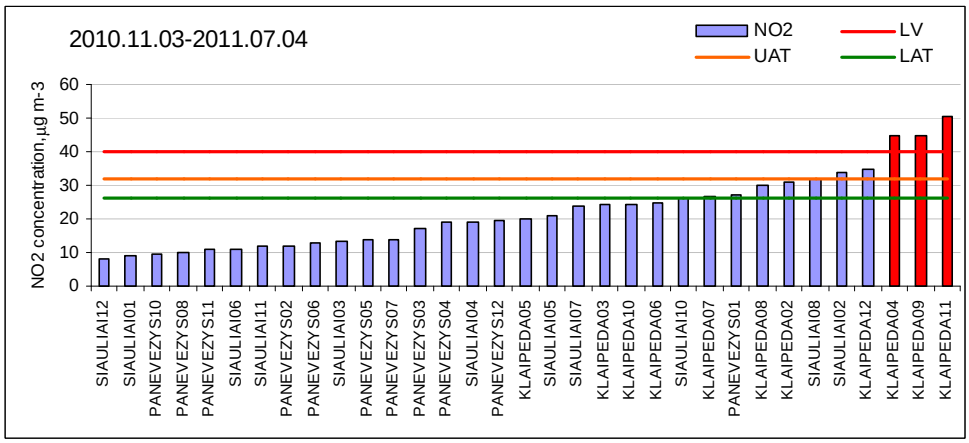
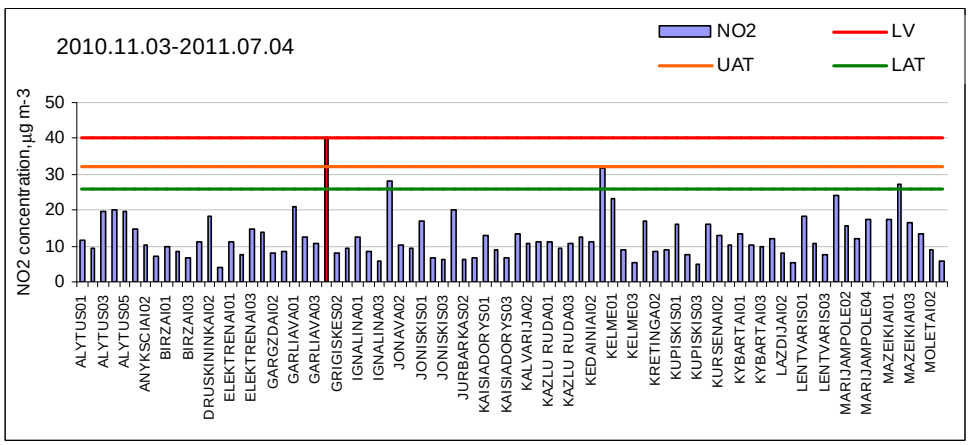


Fig. 35. Site-specific seasonal variation of sulfur dioxide concentrations at sites in Zone for the period from 3 November 2010 to 4 July 2011

Nitrogen dioxide

The principal sources of nitrogen dioxide are traffic and to a lesser extent industry and house holds. High NO_2 levels, combined with other oxidants, have become one of the major air pollution problems in urban areas. For the entire study period (from 6 November 2010 to 4 July 2011), the mean annual concentrations of NO_2 at different sites in the Zone were in the range from 3.6 μg/m^3 to 59.6 μg/m^3 (Fig.36). Regarding the annual limit value of 40 μg/m^3, it was exceeded at three sites with high traffic flow in Klaipeda04 (44.6 μg/m^3), Klaipeda09 (44.7 μg/m^3) and Klaipeda11 (51.7 μg/m^3). At site Klaipeda12, the annual average nitrogen dioxide concentration (34.7 μg/m^3) exceeded the upper assessment threshold value. Annual average NO_2 concentrations at sites Klaipeda08 and Klaipeda02 were, respectively, 30.1 μg/m^3 and 30.2 μg/m^3 and ranged between the lower (26.0 μg/m$^{3)}$ and the upper (32.0 μg/m^3) assessment threshold values. At the sites Panevezys01 and Siauliai02, which were in an area with the relatively intensive traffic flow, annual mean NO_2 concentrations were measured 27.3 μg/m^3 and 33,9 μg/m^3, respectively. The exceedances above the NO_2 limit values were not observed at sites in residential or the suburb areas. Data indicate that the influence of heavy traffic flows reflected on the annual average NO_2 concentrations at sites Grigiskes01 and Vievis located near to highway A1. Annual average NO_2 concentrations in Grigiskes01 and Vievis, respectively, were 40.3 μg/m^3 and 33.5 μg/m^3. Annual average NO_2 concentrations were between the lower and the upper assessment threshold values at sites exposed to traffic in the towns Mazeikiai (27.4 μg/m^3), Kedainiai (31.7 μg/m^3), Telsiai (28.1 μg/m^3) and Taurage (34.4 μg/m^3). At sites Jonava01 (25.3 μg/m^3), Trakai01 (26,8 μg/m^3), Utena01 (26,7 μg/m^3) and Plunge01 (26,7 μg/m^3) annual average NO_2 concentrations were close or slightly exceeded the lower assessment threshold value. The annual average NO_2 concentrations at major sites in the other towns of Zone were in the range from 3.6 to 20.0 μg/m^3.





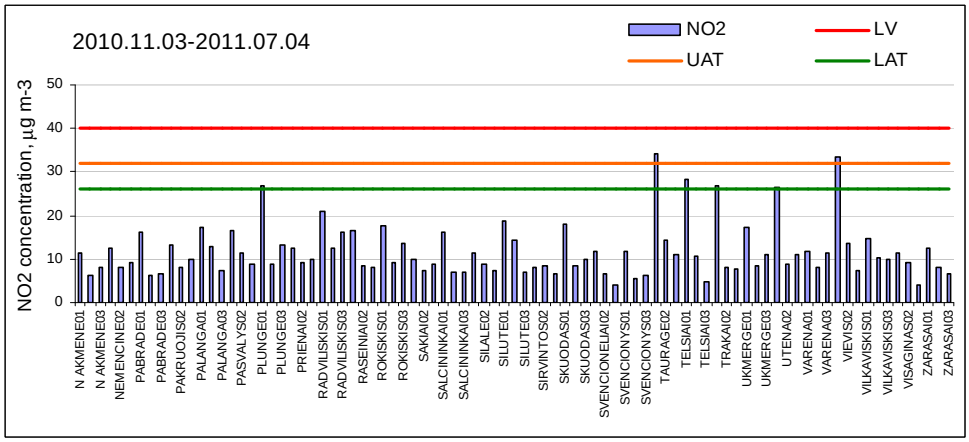


Fig. 36. Annual mean concentrations of nitrogen dioxide in the Zone for the study period from 3 November 2010 to 4 July 2011.

Evaluation of obtained data from the measurement campaigns in Klaipeda indicated that annual limit value for NO_2 was exceeded at three sites near by streets with intensive traffic flow, while at other sites in this area NO_2 concentration varied between the lower (26 µg/m^3) and upper (32 µg/m^3) assessment threshold values. The highest NO_2 concentrations at site in Klaipėda11 varied between 41.4 and 59.6 µg/m^3 with the inter-seasonal variation, expressed by the coefficients of variation, less than 13%. The annual limit value for NO_2 was also exceeded at two other sites located near by crossings with intensive traffic flow Klaipėda04 and Klaipėda09. Seasonal mean NO_2concentrations ranged between 41.1 and 49.3 µg/m^3 and between 37.9 and 47.0 µg/m^3, respectively, at Klaipėda04 and Klaipėda09, and inter-seasonal variability was not more than 9%. Remarkably higher NO_2 levels were determined for the sites with the intensive traffic flow at sites Panevėžys01 (25.2 – 29.3 µg/m^3), Siauliai02 (31.7 – 36.6 µg/m^3) and Siauliai08 (28.2 – 35.5 µg/m^3) with inter-seasonal variability less than 8%. Seasonal variations indicate that NO_2 values for the autumn and winter periods at the traffic–exposed sites were 10 – 40 % higher than that for the spring and summer periods. The NO_2 concentrations measured at all sites in residential and recreation areas of Klaipeda, Panevezys and Siauliai were significantly lower than those at traffic sites and did not exceed the lower (26 µg/m^3) assessment threshold value. The higher concentrations of NO_2 than the annual limit value were obtained at site Grigiskes01, which is located near to highway A1. During autumn, winter and spring, NO_2 concentrations at that site were, respectively, 43.5, 49.1 and 48.9 µg/m^3; while about twice lower concentration of NO_2 (19.8 µg/m^3) was in spring. Pollutants emission from motor vehicles also was the marked contributor to the atmospheric NO_2 concentration at site Vievis01 located near by the road A1: NO_2 concentrations were 32.0, 35.0, 38.0 and 32.0 µg/m^3, respectively, in autumn, winter, spring and summer. It can be seen from the data (Table 27,28, and Fig. 37,38) that the contribution by the traffic emissions to NO_2 concentration is evident also at sites in the smaller towns. Data show that the seasonally averaged concentration of NO_2 varied between the lower (26.0 µg/m^3) and the upper (32.0 µg/m^3) assessment threshold values at sites Mazeikiai01 (27.8, 26.0, 27.8 and 26.8 µg/m^3), Kedainiai01 (28.8, 36.2, 33.7 and 28.0 µg/m^3), Telsiai01 (28.1 26.0, 27.8 and 30.4 µg/m^3), Taurage01 (30.8, 36.1, 35.2 and 34.1 µg/m^3), Jonava01 (24.9, 31.8, 29.8 and 26.1 µg/m^3), Trakai01 (23.0, 27.1, 27.8 and 28.0 µg/m^3), Plunge01 (25.0, 28.8, 27.2 and 26.0 µg/m^3), Kedainiai01 (28.8, 36.2, 33.7 and 25.8 µg/m^3). Seasonally averaged concentration of NO_2 at traffic exposed sites in other towns ranged from 6.0 µg/m^3 to 25.2 µg/m^3, while it varied between 5.0 and 20.0 µg/m^3 at sites in residential and recreation areas.

Table 27. Statistics for the nitrogen dioxide atmospheric concentrations in Klaipeda, Panevezys and Siauliai during the period (3 November 2010 – 4 July 2011)

Site code	Address	NO_2 concentration, µg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KLAIPEDA02	Liepojos g. P. Lideikio g.	25.8	34.2	32.7	30.8	21.5	35.4	30.8
KLAIPEDA03	Kretingos g. 4	22.4	32.3	24.0	21.0	17.1	32.3	24.1
KLAIPEDA04	Baltijos pr. 1 Šilutės pl.	40.1	43.5	45.4	49.3	39.0	54.3	44.6
KLAIPEDA05	Sportininkų g. Stadiono g.	17.5	26.1	19.0	18.4	16.2	26.9	20.2
KLAIPEDA06	Liepų g. 41	21.8	28.3	25.0	24.0	21.2	29.9	24.8
KLAIPEDA07	Smiltelės g I. Simonaitytės g.	25.0	24.6	32.2	25.4	21.7	34.2	26.8
KLAIPEDA08	Tiltų g. Turgaus g.	23.4	37.9	35.1	23.9	20.6	39.3	30.1
KLAIPEDA09	H. Manto g. S. Daukanto g.	37.9	46.8	46.9	47.0	33.5	51.4	44.6
KLAIPEDA10	Taikos pr. 52	25.7	25.4	25.5	21.0	20.9	28.2	24.4
KLAIPEDA11	Minijos g. Naikupės g.	41.4	49.6	56.1	59.6	32.9	59.8	50.5
KLAIPEDA12	Statybininkų g. Šilutės pl.	30.4	35.5	37.1	35.8	27.8	40.7	34.7
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	25.2	26.8	27.9	29.3	21.0	32.5	27.3
PANEVEZYS02	Dariaus ir Girėno g 15A	14.4	12.1	12.7	9.0	8.6	17.3	12.0
PANEVEZYS03	Elektros g. 4	17.8	19.6	16.7	13.8	13.2	21.1	16.9
PANEVEZYS04	J. Janonio g. prie duonos kepyklos	18.8	19.7	21.9	15.7	15.4	26.5	19.0
PANEVEZYS05	Spartuoliu g. Pušaloto g.	15.4	14.7	14.5	10.7	9.9	18.5	13.8
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	15.6	17.2	11.6	6.9	6.6	17.9	12.8
PANEVEZYS07	Vytauto g. Aukštaičių g.	14.6	17.5	14.9	8.9	7.7	18.2	13.9
PANEVEZYS08	Medžiotojų g. Molainiuose	11.2	11.2	9.2	8.1	8.0	13.4	9.9
PANEVEZYS10	Gėlių g. Dembravos g. Dembravoje	9.9	13.1	10.0	6.0	5.6	13.3	9.7
PANEVEZYS11	Vaivadėlių g. Lėvens g. prie Vaivadų	12.7	16.3	11.8	5.0	2.4	16.3	10.8
PANEVEZYS12	Pušaloto g. Raginėnų g.	20.1	22.5	20.0	15.3	13.0	24.0	19.5
SIAULIAI01	Salduvės parkas Talšos ež. paplūdimys	8.9	14.4	7.8	5.3	4.1	16.3	9.1
SIAULIAI02	Aušros al. Tilžės g.	33.3	36.6	31.7	34.2	29.5	39.7	33.9
SIAULIAI03	V. Kudirkos g. Margytės g.	16.6	16.1	12.3	9.0	7.6	18.5	13.5
SIAULIAI04	Žeimių g. Rasos g. Aušros g.	19.1	21.7	17.6	18.4	14.3	24.1	19.2
SIAULIAI05	Vaidoto g. Merkinės g.	20.1	21.8	21.7	20.2	17.3	23.7	20.9
SIAULIAI06	Miško g. prie Vijolės upės	16.2	14.0	9.5	7.4	7.1	16.2	11.1
SIAULIAI07	Lyros g. Dainų g.	25.0	25.3	20.2	24.8	20.1	29.1	23.8
SIAULIAI08	Tilžės g. Aukštabalio g.	35.5	31.5	28.2	32.4	26.6	36.1	31.9
SIAULIAI10	Pramonės g. Metalistų g.	23.0	27.2	31.7	18.2	18.2	32.7	26.0
SIAULIAI11	Šaukėnų g. Alksnių g.	14.0	15.5	11.7	6.8	5.9	16.0	12.0
SIAULIAI12	Pročiūnų g P. Motiekaičio g.	8.8	10.8	8.2	4.3	3.6	10.9	7.9

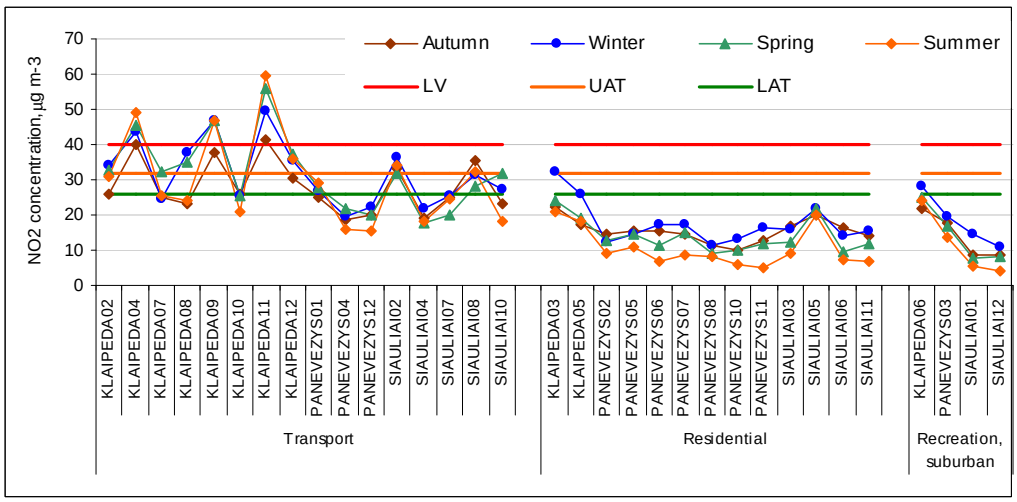


Fig.37 Seasonal variation of mean nitrogen dioxide concentrations at site-specific areas in Klaipeda, Panevezys and Siauliai during the period from 3 November 2010 to 4 July 2011

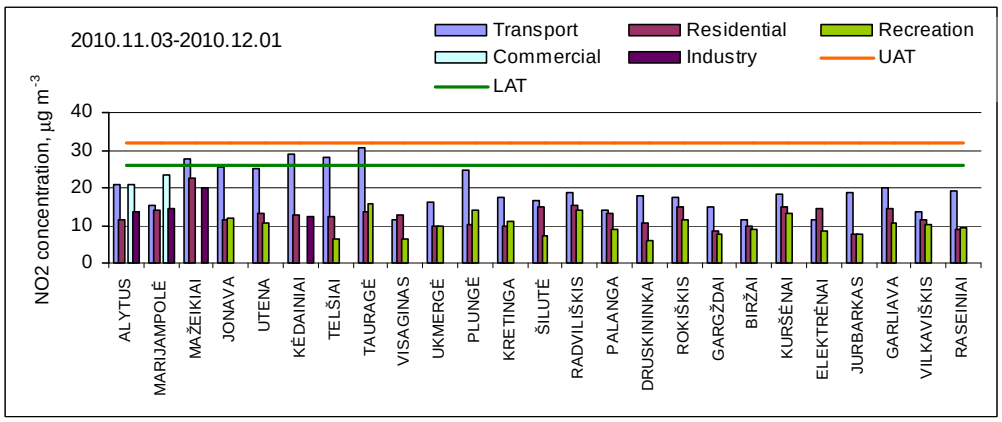
Table 28. Statistics for the nitrogen dioxide atmospheric concentrations in towns of zone during the period from 3 November 2010 to 4 July 2011

Site code	NO_2 concentration, µg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
ALYTUS01	13.7	13.4	10.3	9.4	8.6	14.3	11.7
ALYTUS02	11.7	11.0	8.1	7.0	7.0	12.7	9.4
ALYTUS03	20.9	20.4	20.8	17.0	16.7	22.8	19.7
ALYTUS05	20.8	19.8	18.8	18.9	17.0	21.4	19.5
ANYKSCIAI01	15.4	17.7	12.8	12.9	9.8	17.9	14.7
ANYKSCIAI02	10.4	12.5	10.1	8.1	6.7	12.8	10.3
ANYKSCIAI03	8.2	10.8	6.1	3.4	3.1	11.0	7.1
BIRZAI01	11.6	11.2	8.4	7.6	7.3	13.8	9.7
BIRZAI02	9.8	12.4	7.0	5.2	5.0	13.7	8.6
BIRZAI03	8.8	8.9	4.6	3.8	3.5	9.1	6.5
DRUSKININKAI01	10.8	11.9	11.2	10.5	9.6	12.8	11.1
DRUSKININKAI02	18.0	19.4	19.1	17.3	15.5	19.9	18.4
DRUSKININKAI03	5.8	5.9	3.2	2.1	2.0	6.7	4.2
ELEKTRENAI01	11.7	12.1	11.3	9.8	8.0	14.2	11.2
ELEKTRENAI02	8.6	9.0	7.1	5.5	4.0	9.1	7.6
ELEKTRENAI03	14.6	16.6	15.7	12.5	8.9	18.3	14.8
GARGZDAI01	14.8	16.8	13.9	10.0	9.6	18.0	13.9
GARGZDAI02	8.7	10.8	8.3	4.3	4.1	11.5	8.0
GARGZDAI03	7.8	11.8	7.7	3.8	3.8	11.9	8.3
GARLIAVA01	19.8	24.9	22.5	17.1	15.1	26.5	21.1
GARLIAVA02	14.5	16.2	11.3	8.0	7.7	16.3	12.5
GARLIAVA03	10.6	13.7	9.8	8.1	7.0	14.9	10.5
GRIGISKES01	43.5	49.1	48.9	19.8	15.4	52.8	40.3
GRIGISKES02	10.3	8.7	8.3	5.7	4.5	11.3	8.2
GRIGISKES03	11.2	10.0	8.1	7.7	6.3	12.0	9.2
IGNALINA01	12.1	15.5	12.9	10.4	10.1	16.1	12.7
IGNALINA02	8.6	8.8	8.2	8.3	6.8	9.7	8.5
IGNALINA03	4.4	8.2	5.8	4.4	3.9	8.6	5.7
JONAVA01	25.7	31.8	29.8	26.1	23.0	32.3	28.3
JONAVA02	11.5	12.7	9.9	7.1	6.4	14.0	10.3

JONAVA03	11.9	11.9	8.1	5.8	5.7	13.2	9.4
JONISKIS01	18.0	20.4	15.7	14.5	14.2	22.6	17.1
JONISKIS02	8.1	9.4	5.7	4.3	4.2	9.6	6.9
JONISKIS03	7.7	8.1	5.1	4.8	4.2	9.8	6.4
JURBARKAS01	18.8	21.9	19.5	19.5	18.6	22.3	19.9
JURBARKAS02	7.7	8.1	6.1	4.0	3.7	9.3	6.4
JURBARKAS03	7.9	9.6	5.2	3.7	3.6	9.9	6.6
KAISIADORYS01	13.0	16.8	12.8	9.9	9.2	17.0	13.1
KAISIADORYS02	9.8	11.8	8.2	6.0	5.3	12.7	8.9
KAISIADORYS03	7.7	10.0	4.7	4.1	3.7	10.9	6.6
KALVARIJA01	13.3	17.9	12.0	10.8	9.6	18.1	13.5
KALVARIJA02	11.4	13.2	9.2	8.6	8.2	13.8	10.6
KALVARIJA03	11.7	13.9	11.3	8.1	7.0	14.4	11.2
KAZLU RUDA01	12.6	16.0	10.1	6.3	6.1	16.5	11.2
KAZLU RUDA02	11.9	12.5	7.9	4.8	4.5	14.2	9.3
KAZLU RUDA03	10.4	13.9	11.0	8.4	7.8	15.3	10.9
KEDAINIAI01	12.2	14.9	12.2	10.4	8.6	15.1	12.4
KEDAINIAI02	12.6	13.0	11.5	8.3	7.8	14.8	11.3
KEDAINIAI03	28.8	36.2	33.7	24.5	24.5	36.6	31.7
KELME01	24.8	23.9	21.5	23.2	20.3	25.9	23.3
KELME02	9.7	10.3	7.7	8.0	7.1	11.9	8.9
KELME03	8.2	7.5	6.6	3.3	2.8	9.4	6.4
KRETINGA01	17.4	19.3	17.5	14.2	12.6	20.1	17.1
KRETINGA02	9.6	10.9	9.2	4.3	4.2	11.5	8.5
KRETINGA03	11.1	11.0	9.4	5.1	4.6	11.1	8.8
KUPISKIS01	14.6	17.5	15.2	17.1	13.1	18.5	16.1
KUPISKIS02	7.9	10.6	7.6	4.6	4.4	10.6	7.7
KUPISKIS03	6.2	6.8	3.8	2.3	2.1	7.7	4.8
KURSENAI01	18.3	17.8	14.8	13.7	12.6	20.8	16.2
KURSENAI02	14.9	11.3	13.5	11.7	9.1	14.9	12.8
KURSENAI03	13.2	12.1	8.3	7.7	7.2	17.6	10.3
KYBARTAI01	11.3	16.3	12.9	12.6	10.8	17.2	13.3
KYBARTAI02	11.1	13.9	9.3	6.8	5.9	14.8	10.3
KYBARTAI03	10.9	12.9	10.2	6.2	5.5	13.2	10.0
LAZDIJAI01	12.1	13.7	10.8	12.2	9.3	13.8	12.2
LAZDIJAI02	9.0	10.7	7.6	4.8	4.1	11.2	8.0
LAZDIJAI03	5.6	7.3	4.9	4.2	3.9	7.3	5.5
LENTVARIS01	18.4	18.6	18.9	17.7	13.8	21.6	18.4
LENTVARIS02	11.9	13.0	10.7	7.1	6.9	13.8	10.6
LENTVARIS03	9.2	8.5	7.4	5.2	4.2	9.5	7.6
MARIJAMPOLE01	23.6	29.9	25.7	17.9	15.7	30.2	24.2
MARIJAMPOLE02	15.5	20.3	15.1	11.9	10.8	20.3	15.7
MARIJAMPOLE03	13.9	15.0	10.6	8.0	7.7	15.5	11.9
MARIJAMPOLE04	14.7	21.9	17.7	15.1	14.0	23.6	17.3
MAZEIKIAI01	22.4	23.2	15.4	11.7	10.1	24.9	17.4
MAZEIKIAI02	27.5	27.7	27.8	26.8	23.9	30.7	27.4
MAZEIKIAI03	20.2	15.6	14.5	15.8	13.1	26.2	16.5
MOLETAI01	13.5	15.3	12.1	12.8	11.4	15.5	13.4
MOLETAI02	9.4	11.3	7.9	7.7	6.7	12.2	9.1
MOLETAI03	6.9	8.7	4.2	3.2	2.8	9.4	5.7
N AKMENE01	12.6	12.7	10.6	9.9	9.3	13.8	11.4
N AKMENE02	7.4	6.9	6.1	5.2	3.3	9.0	6.4

N AKMENE03	10.2	10.3	6.5	5.0	4.8	11.4	8.0
NEMENCINE01	14.2	13.5	12.7	10.2	7.9	16.7	12.6
NEMENCINE02	10.3	9.6	7.8	4.9	3.1	10.7	8.1
NEMENCINE03	12.5	10.3	7.4	4.0	4.0	14.0	9.2
PABRADE01	17.0	17.5	15.6	15.0	11.9	19.7	16.2
PABRADE02	8.5	7.0	5.0	4.0	3.1	9.7	6.1
PABRADE03	8.5	8.1	6.0	4.6	3.8	9.3	6.8
PAKRUOJIS01	13.2	15.9	12.3	11.6	7.2	17.5	13.2
PAKRUOJIS02	9.6	9.9	7.2	5.8	5.5	10.7	8.2
PAKRUOJIS03	11.4	11.9	8.7	7.3	5.9	12.8	9.8
PALANGA01	14.3	18.8	18.1	17.6	12.8	20.3	17.2
PALANGA02	13.4	15.1	12.3	10.3	9.2	15.2	12.8
PALANGA03	9.1	7.8	6.4	5.9	5.5	11.6	7.3
PASVALYS01	16.0	16.3	14.9	19.0	13.6	19.2	16.5
PASVALYS02	11.2	12.6	13.6	8.8	8.2	15.2	11.5
PASVALYS03	11.0	9.3	9.1	6.8	3.8	13.8	9.0
PLUNGE01	24.9	28.8	28.2	25.2	23.8	31.1	26.7
PLUNGE02	10.4	11.9	8.5	4.7	4.4	12.4	8.9
PLUNGE03	14.0	16.3	12.3	9.9	9.5	16.8	13.1
PRIENAI01	14.5	15.7	11.1	8.2	8.0	17.1	12.4
PRIENAI02	10.5	12.6	8.3	5.5	4.9	13.1	9.2
PRIENAI03	9.8	12.3	9.7	7.7	7.1	12.8	9.9
RADVILISKIS01	18.6	24.6	20.0	20.2	15.3	26.5	20.8
RADVILISKIS02	14.0	15.8	11.0	10.1	8.9	17.7	12.5
RADVILISKIS03	15.2	18.9	15.8	14.3	12.3	19.1	16.0
RASEINIAI01	19.3	17.6	15.3	14.0	13.2	24.4	16.5
RASEINIAI02	9.1	12.7	7.7	4.4	4.1	13.3	8.5
RASEINIAI03	9.2	10.9	7.9	5.0	4.3	11.2	8.2
ROKISKIS01	17.4	19.9	17.3	16.5	15.6	20.4	17.8
ROKISKIS02	11.5	10.8	8.7	6.5	6.4	13.3	9.4
ROKISKIS03	14.9	17.3	12.0	10.3	10.1	17.4	13.6
SAKIAI01	11.2	12.5	8.5	7.7	7.5	13.6	10.0
SAKIAI02	9.0	9.9	5.9	4.1	3.8	11.2	7.2
SAKIAI03	9.9	13.0	7.1	5.9	5.2	14.0	8.9
SALCININKAI01	14.0	16.9	16.9	17.6	13.9	19.4	16.3
SALCININKAI02	7.5	8.1	5.1		4.9	8.2	6.9
SALCININKAI03	8.0	8.4	5.9	6.6	5.6	8.5	7.1
SILALE01	11.3	15.5	11.9	7.6	6.4	16.3	11.6
SILALE02	9.7	12.7	7.5	5.4	4.4	14.1	8.8
SILALE03	10.1	9.9	5.3	4.1	3.7	13.2	7.3
SILUTE01	16.6	21.0	20.4	17.8	14.9	21.7	18.9
SILUTE02	14.8	16.6	15.3	11.0	9.3	18.0	14.4
SILUTE03	7.4	10.2	7.4	3.2	2.8	12.1	7.0
SIRVINTOS01	9.2	10.1	7.0	6.3	5.0	10.8	8.1
SIRVINTOS02	10.7	10.8	6.7	6.2	4.6	11.0	8.6
SIRVINTOS03	9.0	9.1	4.7	3.3	2.3	10.4	6.5
SKUODAS01	16.7	21.0	17.8	16.9	15.9	21.6	18.1
SKUODAS02	10.5	11.0	7.4	5.7	5.0	12.3	8.6
SKUODAS03	11.2	12.3	9.5	7.3	6.5	13.5	10.1
SVENCIONELIAI01	11.0	14.0	11.9	10.2	10.0	14.2	11.7
SVENCIONELIAI02	8.0	8.3	5.7	4.5	4.1	9.1	6.7
SVENCIONELIAI03	4.8	4.4	4.0	2.4	1.9	6.1	3.9

SVENCIONYS01	10.0	13.3	13.6	10.0	8.7	15.2	11.7
SVENCIONYS02	7.0	7.8	5.0	3.1	3.0	8.0	5.7
SVENCIONYS03	8.8	7.1	4.9	5.0	4.2	8.8	6.1
TAURAGE01	30.8	36.1	35.2	35.3	30.6	38.7	34.4
TAURAGE02	15.8	17.4	11.6	12.2	10.4	17.5	14.2
TAURAGE03	13.8	15.6	9.5	5.8	4.9	16.2	11.2
TELSIAI01	28.1	27.4	27.8	30.4	25.2	30.4	28.1
TELSIAI02	12.5	13.6	9.8	6.4	5.2	14.6	10.5
TELSIAI03	6.3	6.4	4.5	2.1	1.9	8.2	4.8
TRAKAI01	22.6	27.1	29.7	28.0	19.7	36.3	26.8
TRAKAI02	10.6	9.1	7.1	5.8	5.3	11.0	8.1
TRAKAI03	10.4	8.8	6.3	5.0	3.9	11.9	7.6
UKMERGE01	16.3	18.8	18.0	16.2	14.9	21.0	17.4
UKMERGE02	9.7	11.2	7.8	5.2	4.4	12.0	8.4
UKMERGE03	10.0	12.4	15.9	5.6	5.0	23.1	10.9
UTENA01	25.0	30.1	24.2	27.5	23.4	33.8	26.7
UTENA02	10.5	10.6	7.8	6.6	6.1	11.0	8.9
UTENA03	13.1	14.9	9.6	5.9	5.4	16.0	10.9
VARENA01	13.8	13.7	13.5	6.5	6.3	15.0	11.8
VARENA02	9.9	9.4	8.0	5.4	4.7	10.6	8.2
VARENA03	11.5	13.0	11.1	10.0	8.7	13.3	11.4
VIEVIS01	31.7	34.3	36.0	32.2	24.7	39.6	33.5
VIEVIS02	13.8	16.3	14.1	9.8	7.7	17.9	13.5
VIEVIS03	9.1	8.1	7.4	5.0	4.3	10.1	7.4
VILKAVISKIS01	13.7	18.1	14.0	12.7	12.4	18.7	14.6
VILKAVISKIS02	11.4	13.9	9.1	7.3	6.5	14.7	10.4
VILKAVISKIS03	10.2	14.6	9.3	5.7	5.1	15.1	9.9
VISAGINAS01	11.4	13.3	12.5	8.1	7.3	16.4	11.3
VISAGINAS02	12.7	9.8	7.4	5.6	5.6	13.1	9.3
VISAGINAS03	6.4	4.4	2.7	2.6	2.1	8.6	4.2
ZARASAI01	20.8	11.7	10.8	7.0	6.2	21.1	12.6
ZARASAI02	9.5		8.3	6.5	6.5	11.2	8.1
ZARASAI03	6.9	8.2	6.6	4.2	4.2	8.2	6.8


2010.11.03-2010.12.01
Transport
Residential
Recreation
Commercial
Industry
UAT
LAT
NO2 concentration, µg m-3
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10
20
30
40
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
BIRŽAI
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JURBARKAS
GARLIAVA
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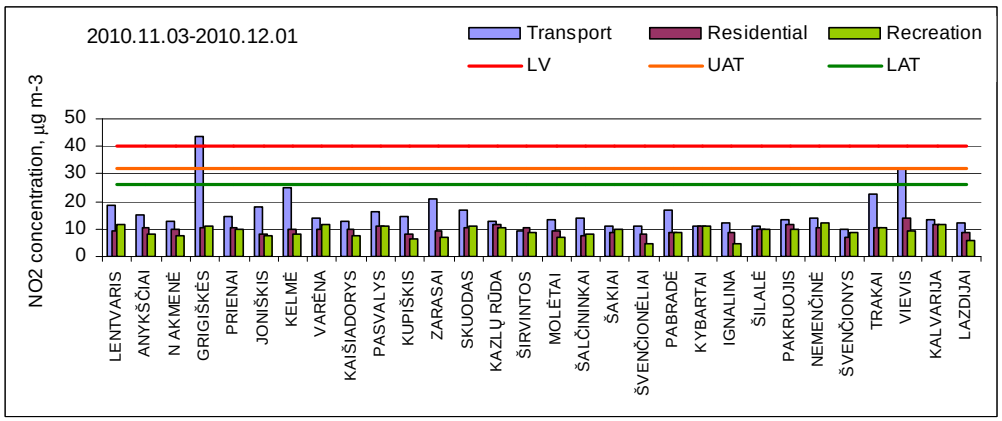
RASEINIAI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Recreation
LV
UAT
LAT
NO2 concentration, µg m-3
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20
30
40
50
LENTVARIS
ANYKŠČIAI
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI
IGNALINA
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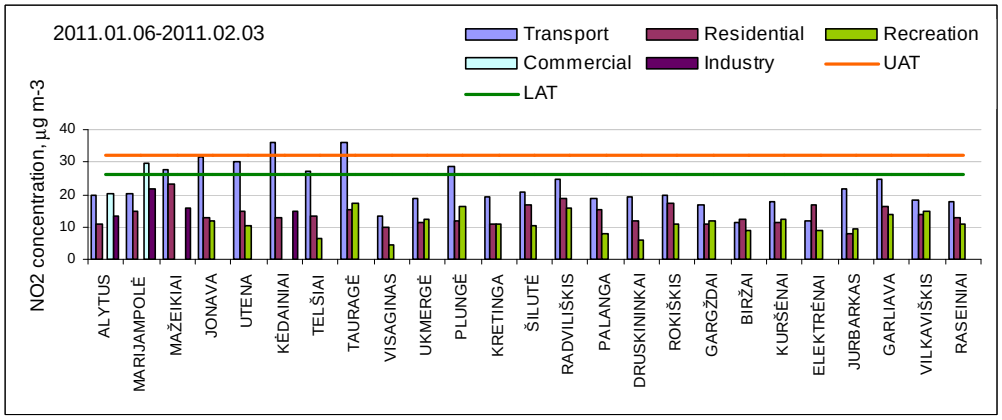
ŠVENČIONYS
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI


2011.01.06-2011.02.03
Transport
Residential
Recreation
Commercial
Industry
UAT
LAT
NO2 concentration, µg m-3
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20
30
40
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
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JURBARKAS
GARLIAVA
VILKAVIŠKIS
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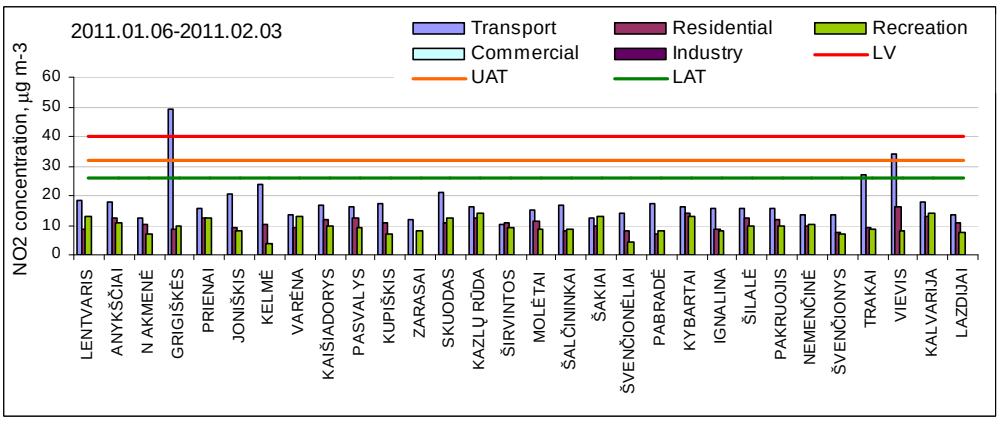
2011.01.06-2011.02.03
Transport
Residential
Recreation
Commercial
Industry
LV
UAT
LAT
NO2 concentration, µg m-3
0
10
20
30
40
50
60
LENTVARIS
ANYKŠČIAI
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI
IGNALINA
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ŠVENČIONYS
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI

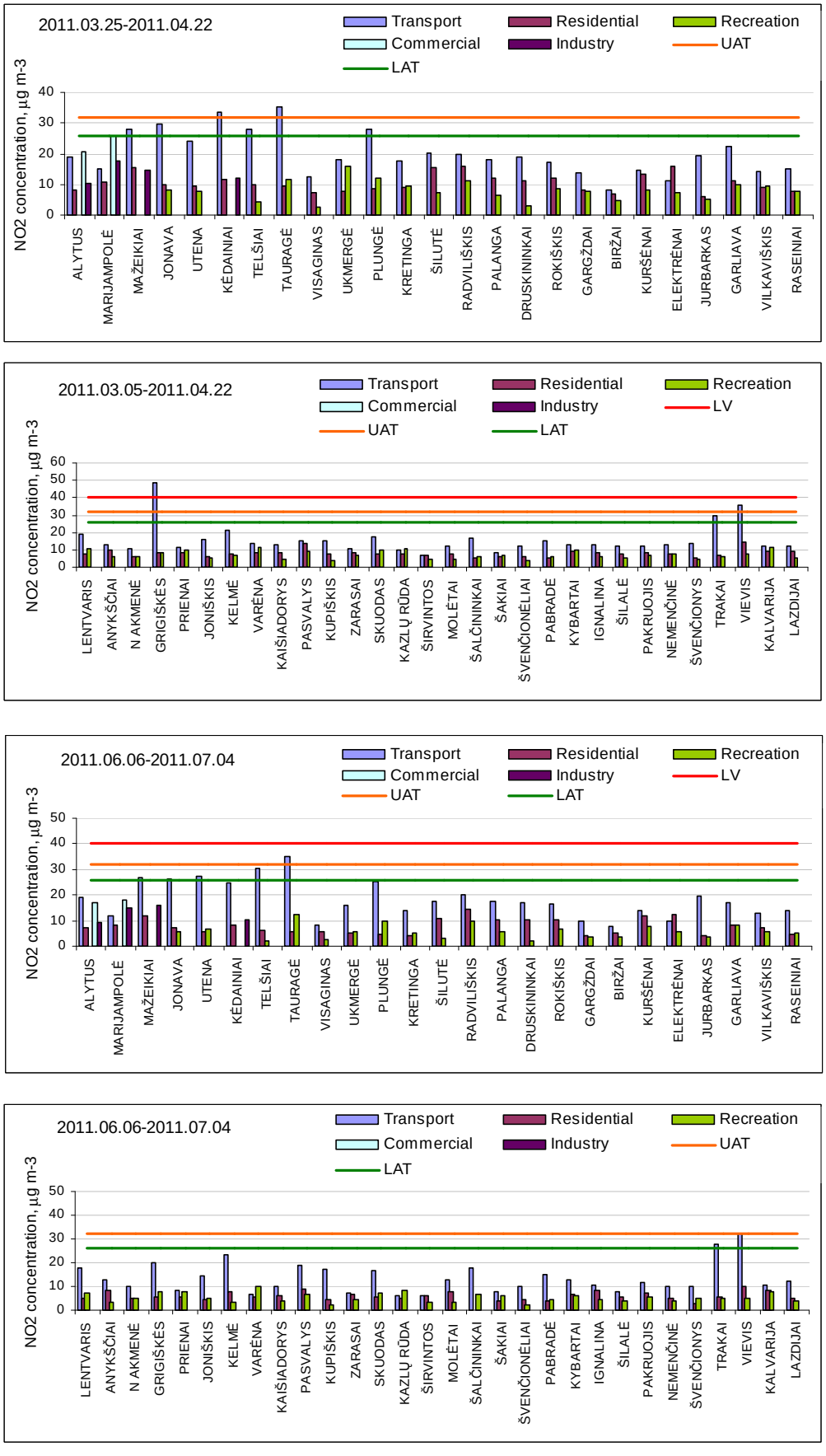


Fig. 38. Seasonal variation of mean nitrogen dioxide concentrations at site-specific areas in towns of zone during the period from 3 November 2010 to 4 July 2011

Benzene

For the entire study period (3 November 2010 to 4 July 2011), the annual mean values for the benzene ranged from 1.3 to 3.4 µg/m^3 depending on the city and they did not exceed the upper assessment threshold value of 3.5 µg/m^3 at all sites in the Zone (Fig. 39). The highest annual mean benzene concentrations were measured at sites near to street with intensive vehicles flow or in a residential area at Tauragė01 (3,1 µg/m^3), Taurage 02 (2.6 µg/m^3), Taurage 03 (3.4 µg/m^3), Telsiai01 (2.7 µg/m^3), Plunge01 (2.5 µg/m^3), Plunge 02 (2.4 µg/m^3) and Garliava01 (3.0 µg/m^3). The annual average benzene concentrations at sites in Klaipeda, Panevezys and Siauliai were in the range from 2.0 µg/m^3 to 3.5 µg/m^3.

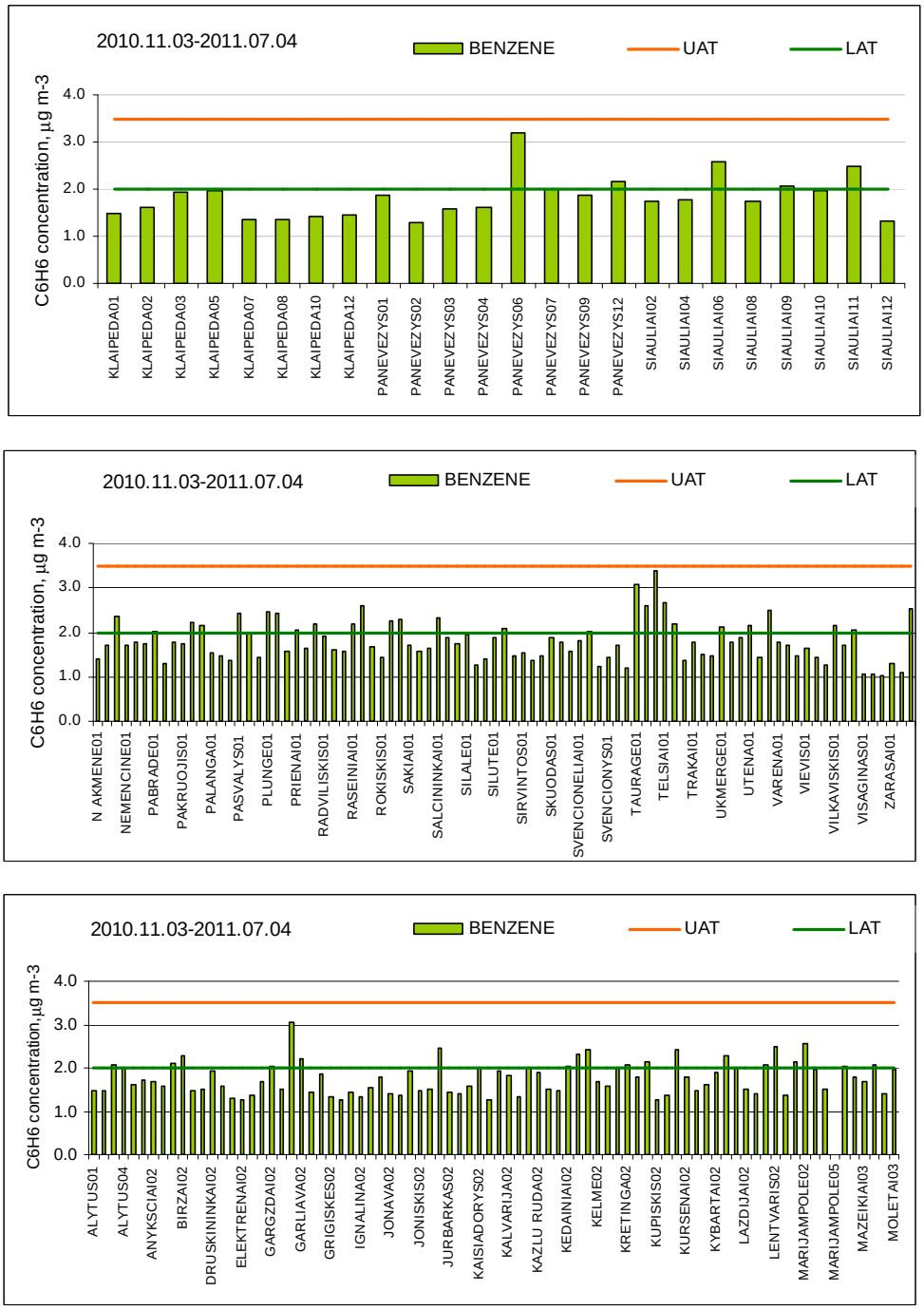


Fig. 39. Annual mean concentrations of benzene in the zone for the study period from 3 November 2010 to 4 July 2011.

Data indicate (Figs. 40, 41) that benzene concentrations during the first study period (3 November – 1 December 2010) were below the lower (2.0 μg/m^3) assessment threshold value and ranged between 1.2 μg/m^3 and 1.8 μg/m^3 at all sites in Klaipeda, while in Panevezys and Siauliai benzene concentrations ranged from 1.4 μg/m^3 to 3.8 μg/m^3 and from 1.3 μg/m^3 to 3.8 μg/m^3, respectively. During autumn, mean concentrations of benzene were in the range of 2.3 –3.8 μg/m^3 in residential area at sites Panevezys06, Panevezys07, Panevezys09, Siauliai06, Siauliai09, Siauliai11, Mazeikiai, Telsiai, Taurage, Plunge, Birzai, Raseiniai, N. Akmene and Skuodas. Benzene concentrations at traffic-exposed sites exceeded the lower (2.0 μg/m^3) assessment threshold value, but did not achieved the upper (3.5 μg/m^3) assessment threshold value in towns Alytus, Marijampole, Utena, Telsiai, Taurage, Plunge, Kursenai, Joniskis, Kelme, Skuodas, Salcininkai and Vievis. In the wintertime (6 January– 3 February 2011), benzene concentrations were evidently higher than that in autumn and were above the lower (2.0 μg/m^3) assessment threshold value almost at all sites in zone. The highest values of benzene were measured at one transport-exposed site in Panevezys12 (3.9 μg/m^3) and at two sites in residential area Panevezys06 (5.5 μg/m^3) and Taurage (6.1 μg/m^3). Generally, during spring study (25 March – 22 April 2011), mean concentration of benzene almost at all sites was below 2.0 μg/m^3 (i.e. the lower assessment threshold value), but it was exceeded at the sites Panevezys06 (2.8 μg/m^3), Siauliai04 (2.1 μg/m^3) and Siauliai06 (2.1 μg/m^3). Mean concentration of benzene for the spring season ranged between the lower (2.0 μg/m^3) and upper (3.5 μg/m^3) assessment threshold values at sites in Taurage, Plunge, Rokiskis, Garliava, Raseiniai, Lentvaris, Kelme and Zarasai. Mean concentrations of benzene during the summer period (6 June – 4 July 2011) were significantly lower (about 50 –80 %) when those measured in winter and did not exceed the lower assessment threshold value of 2.0 μg/m^3 (Figs. 40, 41). The exception was in traffic-exposed area at sites Siauliai10 (2,6 μg/m^3), Lentvaris (2,6 μg/m^3) and Pasvalys (3,1 μg/m^3). On the whole, the highest benzene concentrations were measured at several sites in residential area during winter. Therefore, it can be as the result of incomplete combustion of fuels during the heating season in residential area.

Table 29. Statistics for the benzene atmospheric concentrations in Klaipeda, Panevezys and Siauliai during the period (3 November 2010 – 4 July 2011)

Site code	Address	Benzene concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
KLAIPEDA01	Molo g. 2	1.6	2.3	1.4	0.6	0.5	2.6	1.5
KLAIPEDA02	Liepojos g. P. Lideikio g.	1.5	2.3	1.4	1.2	1.0	2.4	1.6
KLAIPEDA03	Kretingos g. 4	1.2	2.8	2.0	1.4	1.2	2.9	1.9
KLAIPEDA05	Sportininkų g. Stadiono g.	1.6	2.5	1.9	1.8	1.5	2.5	2.0
KLAIPEDA07	Smiltelės g I. Simonaitytės g.	1.4	1.7	1.4	0.9	0.9	1.8	1.4
KLAIPEDA08	Tiltų g. Turgaus g.	1.3	2.0	1.3	0.8	0.7	2.1	1.3
KLAIPEDA10	Taikos pr. 52	1.4	1.8	1.2	1.4	0.5	2.3	1.4
KLAIPEDA12	Statybininkų g. Šilutės pl.	1.4	2.0	1.4	1.0	0.9	2.1	1.4
PANEVEZYS01	Vilniaus g. J. Basanavičiaus g.	1.9	2.9	1.7	1.1	1.0	3.3	1.9
PANEVEZYS02	Dariaus ir Girėno g 15A	1.4	2.0	1.1	0.7	0.7	2.4	1.3
PANEVEZYS03	Elektros g. 4	1.5	2.8	1.4	0.7	0.6	3.1	1.6
PANEVEZYS04	J. Janonio g. prie duonos kepyklos	1.8	2.5	1.3	0.9	0.4	3.3	1.6
PANEVEZYS06	Pušyno g. Bijūnų g. Rožyno mikrorajonas	3.8	5.5	2.8	0.7	0.6	5.6	3.2
PANEVEZYS07	Vytauto g. Aukštaičių g.	2.0	3.5	1.8	0.7	0.6	3.6	2.0
PANEVEZYS09	Paplentės g. Didžioji g. Staniūnuose	2.3	2.9	1.8	0.6	0.4	3.2	1.9

PANEVEZYS12	Pušaloto g. Raginėnų g.	1.8	3.9	2.1	0.8	0.5	4.6	2.2
SIAULIAI02	Aušros al. Tilžės g.	2.0	2.5	1.6	0.9	0.9	2.7	1.7
SIAULIAI04	Žeimių g. Rasos g. Aušros g.	1.7	2.6	2.1	0.7	0.6	2.9	1.8
SIAULIAI06	Miško g. prie Vijolės upės	3.8	4.0	2.1	1.1	0.5	4.3	2.6
SIAULIAI08	Tilžės g. Aukštabalio g.	2.0	2.2	1.5	1.2	0.7	2.5	1.7
SIAULIAI09	K. Donelaičio g. Šilėnų g.	2.6	3.2	1.9	0.7	0.4	3.6	2.1
SIAULIAI10	Pramonės g. Metalistų g.	1.7	2.4	1.5	2.6	1.1	2.6	2.0
SIAULIAI11	Šaukėnų g. Alksnių g.	2.8	4.3	1.9	0.9	0.8	4.4	2.5
SIAULIAI12	Pročiūnų g P. Motiekaičio g.	1.3	2.1	1.3	0.5	0.4	2.3	1.3

Table 30. Statistics for the benzene atmospheric concentrations in towns of zone during the period from 3 November 2010 to 4 July 2011

Site code	Benzene concentration, µg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
ALYTUS01	1.35	2.34	1.01	1.15	2.36	0.54	1.46
ALYTUS02	1.55	2.33	1.01	1.04	2.35	0.44	1.48
ALYTUS03	2.41	2.97	1.59	1.28	3.31	0.77	2.06
ALYTUS04	2.35	3.44	1.43	0.79	3.68	0.52	2.00
ANYKSCIAI01	1.65	2.29	1.50	1.39	2.69	1.27	1.71
ANYKSCIAI02	1.60	2.94	1.45	0.69	3.07	0.67	1.67
ANYKSCIAI03	1.40	2.90	1.41	0.57	3.05	0.51	1.57
BIRZAI01	2.70	3.69	1.71	0.62	4.18	0.48	2.10
BIRZAI02	2.60	3.88	1.98	0.74	3.97	0.70	2.30
BIRZAI03	1.60	2.57	1.19	0.54	2.90	0.46	1.47
DRUSKININKAI01	1.35	2.57	1.42	0.65	2.59	0.46	1.50
DRUSKININKAI02	2.05	2.93	1.49	1.26	3.15	1.00	1.93
DRUSKININKAI03	1.70	2.13	0.90	1.64	2.46	0.80	1.59
ELEKTRENAI01	1.20	1.92	0.99	1.08	2.04	0.49	1.31
ELEKTRENAI02	1.90	1.68	1.23	0.52	1.90	0.42	1.25
ELEKTRENAI03	1.65	1.86	1.07	0.95	2.20	0.61	1.38
GARGZDAI01	1.70	2.56	1.67	0.84	2.70	0.57	1.69
GARGZDAI02	2.05	3.42	1.92	0.75	3.72	0.49	2.04
GARGZDAI03	1.10	2.35	1.55	0.61	2.43	0.61	1.51
GARLIAVA01	3.05	5.04	2.47	1.61	5.19	1.02	3.04
GARLIAVA02	2.50	3.61	1.58	1.10	3.74	1.00	2.20
GARLIAVA03	1.30	2.79	1.23	0.47	2.94	0.42	1.45
GRIGISKES01	1.70	2.31	1.56	1.81	2.67	1.38	1.85
GRIGISKES02	1.35	2.02	1.41	0.56	2.04	0.46	1.33
GRIGISKES03	1.15	2.07	1.23	0.56	2.11	0.44	1.25
IGNALINA01	1.65	1.71	1.65	0.77	2.91	0.50	1.44
IGNALINA02	1.60	1.78	1.09	0.84	2.40	0.75	1.33
IGNALINA03	1.20	2.74	1.22	1.08	2.95	0.68	1.56
JONAVA01	1.65	2.90	1.40	1.15	2.92	0.96	1.78
JONAVA02	1.30	2.42	1.12	0.58	2.47	0.47	1.39
JONAVA03	1.25	2.40	1.22	0.56	2.43	0.38	1.36
JONISKIS01	2.15	3.34	1.71	0.47	3.49	0.40	1.92
JONISKIS02	1.45	2.53	1.29	0.66	2.54	0.37	1.48
JONISKIS03	1.60	1.86	1.15	1.23	2.20	0.70	1.50
JURBARKAS01	2.15	3.57	2.20	1.83	3.75	0.74	2.44
JURBARKAS02	1.15	2.25	1.40	0.93	2.41	0.88	1.43

JURBARKAS03	1.40	2.49	1.27	0.45	2.59	0.40	1.40
KAISIADORYS01	1.55	2.78	1.24	0.76	2.80	0.62	1.58
KAISIADORYS02	2.00	3.22	1.50	1.26	3.26	0.89	1.99
KAISIADORYS03	1.15	1.82	0.96	1.19	1.94	0.51	1.28
KALVARIJA01	2.40	3.04	1.43	0.86	3.29	0.76	1.93
KALVARIJA02	1.85	2.88	1.29	1.25	2.90	0.53	1.82
KALVARIJA03	1.25	1.98	1.02	1.09	2.07	0.90	1.33
KAZLU RUDA01	2.15	3.15	1.56	1.09	3.31	0.59	1.99
KAZLU RUDA02	1.90	3.27	1.50	0.86	3.28	0.49	1.88
KAZLU RUDA03	1.45	2.70	1.31	0.53	2.91	0.48	1.50
KEDAINIAI01	1.45	2.51	1.36	0.56	2.68	0.43	1.47
KEDAINIAI02	1.55	3.20	1.52	1.92	3.59	0.43	2.05
KEDAINIAI03	1.95	4.29	2.11	0.91	5.27	0.79	2.32
KELME01	2.80	3.52	2.41	0.99	4.23	0.84	2.43
KELME02	1.75	2.68	1.75	0.56	2.80	0.44	1.69
KELME03	1.90	2.90	1.26	0.86	2.90	0.78	1.56
KRETINGA01	2.40	3.15	1.91	0.57	3.20	0.47	2.01
KRETINGA02	2.45	3.15	2.02	0.65	3.59	0.14	2.07
KRETINGA03	1.50	3.10	1.53	0.77	3.40	0.62	1.79
KUPISKIS01	2.05	3.50	1.89	1.16	3.69	0.90	2.15
KUPISKIS02	1.15	2.14	1.12	0.65	2.17	0.57	1.27
KUPISKIS03	1.40	2.46	1.16	0.50	2.73	0.40	1.38
KURSENAI01	2.60	4.19	2.20	0.65	4.38	0.61	2.41
KURSENAI02	1.70	2.88	1.83	0.81	2.90	0.71	1.80
KURSENAI03	1.50	2.44	1.27	0.67	2.58	0.51	1.47
KYBARTAI01	1.45	2.56	1.46	0.97	2.62	0.78	1.61
KYBARTAI02	2.15	3.20	1.37	0.91	3.40	0.71	1.91
KYBARTAI03	1.80	4.67	1.76	0.83	4.80	0.48	2.26
LAZDIJAI01	1.90	3.47	1.53	1.05	3.60	0.55	1.99
LAZDIJAI02	1.35	2.82	1.34	0.57	2.90	0.48	1.52
LAZDIJAI03	1.20	2.43	1.08	0.75	2.57	0.56	1.41
LENTVARIS01	1.90	2.65	2.10	2.57	4.13	1.00	2.30
LENTVARIS02	2.35	4.06	2.77	0.82	4.70	0.67	2.50
LENTVARIS03	1.20	2.42	1.27	0.52	2.63	0.51	1.35
MARIJAMPOLE01	2.30	3.77	1.60	0.96	3.80	0.60	2.16
MARIJAMPOLE02	2.30	5.00	1.85	1.09	5.09	0.63	2.56
MARIJAMPOLE03	2.00	3.25	1.58	0.97	3.50	0.71	1.95
MARIJAMPOLE04	1.30	2.80	1.09	0.81	2.80	0.66	1.50
MAZEIKIAI01	2.60	2.66	1.56	1.30	3.50	0.89	2.03
MAZEIKIAI02	2.10	2.63	1.48	1.01	3.14	0.91	1.80
MAZEIKIAI03	2.20	2.65	1.22	0.61	3.20	0.59	1.67
MOLETAI01	1.85	3.53	1.95	1.01	3.69	0.90	2.09
MOLETAI02	1.30	2.30	1.27	0.68	2.30	0.58	1.39
MOLETAI03	1.85	3.70	1.74	0.52	4.25	0.39	1.95
N AKMENE01	1.45	2.17	1.36	0.61	2.19	0.53	1.40
N AKMENE02	1.65	2.72	1.58	0.89	2.85	0.78	1.71
N AKMENE03	2.70	4.27	1.84	0.60	4.41	0.48	2.35
NEMENCINE01	1.75	2.66	1.63	1.31	2.66	0.70	1.72
NEMENCINE02	1.65	2.53	1.55	1.34	2.60	0.49	1.77
NEMENCINE03	1.85	2.72	1.69	0.74	2.95	0.68	1.75
PABRADE01	2.05	2.97	1.62	1.45	3.17	0.74	2.02
PABRADE02	1.55	1.93	1.04	0.61	2.20	0.35	1.28

PABRADE03	1.60	2.39	1.74	1.37	2.58	0.42	1.77
PAKRUOJIS01	1.65	2.81	1.76	0.77	2.94	0.51	1.75
PAKRUOJIS02	2.25	3.86	2.21	0.55	4.01	0.45	2.22
PAKRUOJIS03	2.45	3.37	1.79	0.98	3.45	0.95	2.15
PALANGA01	1.30	2.23	1.36	1.24	2.34	0.64	1.53
PALANGA02	1.70	2.20	1.24	0.68	2.40	0.67	1.46
PALANGA03	1.20	1.62	0.93	1.75	1.90	0.80	1.37
PASVALYS01	1.80	3.26	1.53	3.10	5.59	0.62	2.42
PASVALYS02	1.85	3.44	1.57	1.03	3.71	0.85	1.97
PASVALYS03	1.40	2.22	1.21	0.97	2.69	0.43	1.45
PLUNGE01	2.80	3.79	2.49	0.82	4.20	0.75	2.48
PLUNGE02	3.00	3.79	2.26	0.71	3.98	0.58	2.44
PLUNGE03	1.55	2.42	1.20	1.07	2.72	0.47	1.56
PRIENAI01	2.10	3.19	1.61	1.29	3.31	0.49	2.05
PRIENAI02	1.45	2.64	1.48	1.01	2.65	0.65	1.64
PRIENAI03	2.00	3.95	1.67	1.18	4.38	0.88	2.20
RADVILISKIS01	2.05	2.96	1.68	0.97	3.07	0.61	1.91
RADVILISKIS02	1.85	2.47	1.27	0.80	2.89	0.54	1.60
RADVILISKIS03	1.60	2.39	1.45	0.83	2.45	0.74	1.57
RASEINIAI01	1.80	3.89	2.25	0.83	4.05	0.80	2.19
RASEINIAI02	2.65	4.38	2.63	0.72	4.89	0.68	2.60
RASEINIAI03	1.70	3.03	1.48	0.47	3.04	0.38	1.67
ROKISKIS01	1.35	1.97	1.30	1.12	1.98	1.00	1.43
ROKISKIS02	2.70	3.51	2.09	0.71	3.89	0.58	2.25
ROKISKIS03	2.05	3.76	2.70	0.72	3.89	0.62	2.31
SAKIAI01	1.50	3.05	1.37	0.90	3.12	0.58	1.70
SAKIAI02	1.55	2.81	1.20	0.79	2.89	0.45	1.59
SAKIAI03	1.60	2.81	1.22	0.93	2.91	0.73	1.64
SALCININKAI01	2.40	3.49	2.47	1.06	3.92	0.73	2.34
SALCININKAI02	2.01	2.84	1.52	0.48	2.84	0.48	1.89
SALCININKAI03	1.65	3.23	1.52	0.85	3.23	0.85	1.74
SILALE01	1.71	3.44	1.99	0.68	4.20	0.65	1.95
SILALE02	1.41	1.98	1.16	0.52	2.22	0.40	1.27
SILALE03	1.54	2.42	1.18	0.46	2.55	0.41	1.40
SILUTE01	1.91	2.85	1.68	1.10	3.29	1.05	1.88
SILUTE02	1.92	3.76	1.78	0.87	3.95	0.61	2.09
SILUTE03	1.48	2.51	1.26	0.70	2.81	0.43	1.49
SIRVINTOS01	1.54	2.51	1.34	0.79	2.79	0.56	1.54
SIRVINTOS02	1.45	2.19	1.01	0.87	2.27	0.70	1.38
SIRVINTOS03	1.75	2.50	1.18	0.45	2.61	0.42	1.47
SKUODAS01	2.39	2.64	1.48	1.05	3.10	0.69	1.89
SKUODAS02	2.35	2.55	1.52	0.68	2.80	0.62	1.78
SKUODAS03	1.70	2.27	1.48	0.80	2.37	0.78	1.56
SVENCIONELIAI01	1.60	2.90	1.72	0.91	3.20	0.70	1.81
SVENCIONELIAI02	1.60	2.60	2.35	1.51	2.70	0.60	2.01
SVENCIONELIAI03	1.20	1.90	1.00	0.86	2.20	0.50	1.24
SVENCIONYS01	1.50	1.90	1.55	0.79	2.00	0.60	1.44
SVENCIONYS02	1.10	2.45	2.00	0.96	2.70	0.80	1.70
SVENCIONYS03	0.95	2.05	1.12	0.63	2.10	0.40	1.19
TAURAGE01	3.05	5.05	2.68	1.54	6.26	1.28	3.08
TAURAGE02	2.95	4.71	1.76	1.01	5.60	0.87	2.61
TAURAGE03	3.80	6.11	2.78	0.79	6.82	0.71	3.37

TELSIAI01	3.35	3.45	2.07	0.89	4.40	0.89	2.66
TELSIAI02	3.15	3.34	1.70	0.54	4.20	0.49	2.18
TELSIAI03	1.50	1.85	1.37	0.74	2.20	0.30	1.37
TRAKAI01	1.40	2.67	1.86	0.98	2.79	0.84	1.78
TRAKAI02	1.35	2.15	1.12	1.42	2.40	0.44	1.51
TRAKAI03	1.35	1.86	1.17	1.51	2.58	0.44	1.47
UKMERGE01	2.00	3.67	1.99	0.77	3.88	0.68	2.11
UKMERGE02	1.65	2.95	1.73	0.80	3.13	0.78	1.78
UKMERGE03	1.70	3.30	1.61	0.91	3.33	0.75	1.88
UTENA01	2.25	3.51	1.82	1.11	3.51	1.07	2.17
UTENA02	1.30	2.52	1.26	0.66	2.62	0.53	1.43
UTENA03	2.80	4.18	2.41	0.57	5.13	0.44	2.49
VARENA01	1.80	2.77	1.60	0.94	2.81	0.90	1.78
VARENA02	1.80	2.70	1.27	1.01	2.74	0.57	1.70
VARENA03	1.35	2.68	1.06	0.82	2.90	0.79	1.48
VIEVIS01	2.12	2.46	1.82	0.52	2.50	0.46	1.63
VIEVIS02	1.40	2.13	1.35	0.90	2.28	0.44	1.44
VIEVIS03	1.40	1.92	1.20	0.59	2.12	0.40	1.27
VILKAVISKIS01	1.95	3.67	1.74	1.32	3.77	0.56	2.17
VILKAVISKIS02	1.50	2.96	1.20	1.23	3.01	1.11	1.72
VILKAVISKIS03	2.30	3.55	1.45	0.92	3.58	0.45	2.05
VISAGINAS01	1.06	1.57	0.82	0.84	1.70	0.78	1.07
VISAGINAS02	0.98	1.36	1.09	0.65	1.38	0.65	1.07
VISAGINAS03	0.91	1.39	0.74	1.08	1.79	0.37	1.03
ZARASAI01	1.52	2.02	1.15	0.57	2.09	0.51	1.31
ZARASAI02	1.23		1.25	0.81	1.50	0.57	1.10
ZARASAI03	2.13	3.56	2.75	0.76	3.71	0.76	2.52

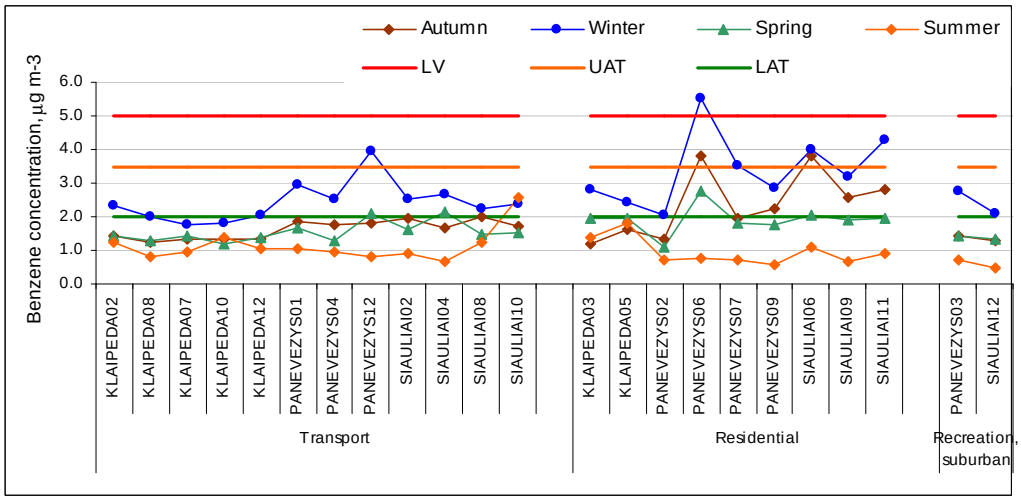
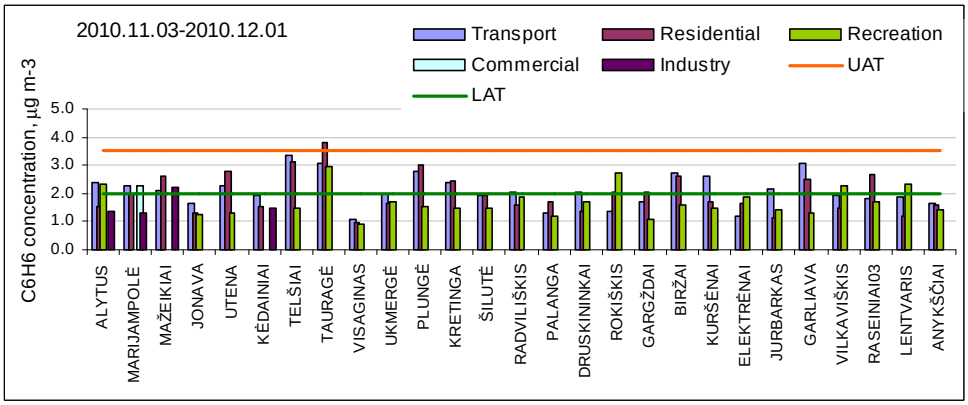
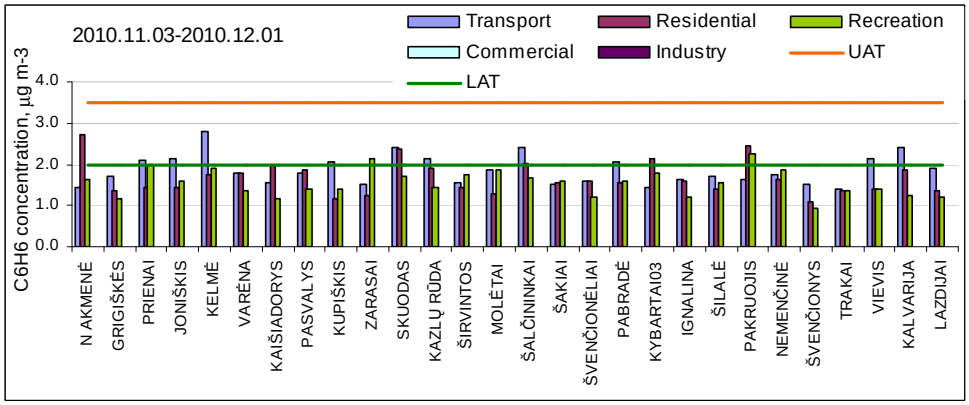
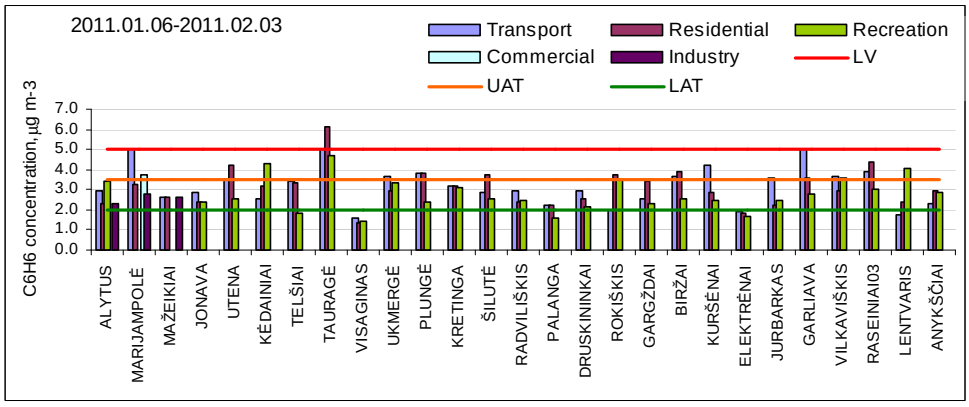
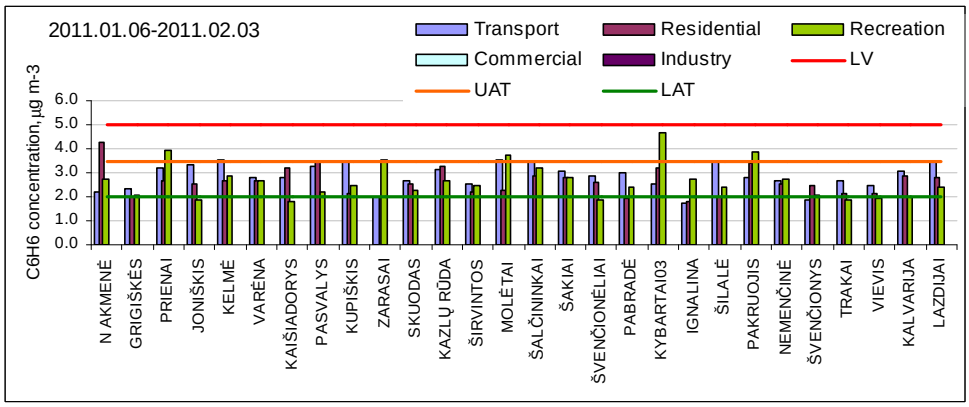


Fig. 40. Seasonal variation of mean benzene concentrations at site-specific areas in Klaipeda, Panevezys and Siauliai during the period from 3 November 2010 to 4 July 2011


2010.11.03-2010.12.01
Transport
Residential
Recreation
Commercial
Industry
UAT
LAT
C6H6 concentration, µg m-3
5.0
4.0
3.0
2.0
1.0
0.0
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
BIRŽAI
KURŠĖNAI
ELEKTRĖNAI
JURBARKAS
GARLIAVA
VILKAVIŠKIS
RASEINIAI03
LENTVARIS
ANYKŠČIAI


2010.11.03-2010.12.01
Transport
Residential
Recreation
Commercial
Industry
UAT
LAT
C6H6 concentration, µg m-3
4.0
3.0
2.0
1.0
0.0
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI03
IGNALINA
ŠILALĖ
PAKRUOJIS
NEMENČINĖ
ŠVENČIONYS
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI


2011.01.06-2011.02.03
Transport
Residential
Recreation
Commercial
Industry
LV
UAT
LAT
C6H6 concentration, µg m-3
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
ALYTUS
MARIJAMPOLĖ
MAŽEIKIAI
JONAVA
UTENA
KĖDAINIAI
TELŠIAI
TAURAGĖ
VISAGINAS
UKMERGĖ
PLUNGĖ
KRETINGA
ŠILUTĖ
RADVILIŠKIS
PALANGA
DRUSKININKAI
ROKIŠKIS
GARGŽDAI
BIRŽAI
KURŠĖNAI
ELEKTRĖNAI
JURBARKAS
GARLIAVA
VILKAVIŠKIS
RASEINIAI03
LENTVARIS
ANYKŠČIAI


2011.01.06-2011.02.03
Transport
Residential
Recreation
Commercial
Industry
LV
UAT
LAT
C6H6 concentration, µg m-3
6.0
5.0
4.0
3.0
2.0
1.0
0.0
N AKMENĖ
GRIGIŠKĖS
PRIENAI
JONIŠKIS
KELMĖ
VARĖNA
KAIŠIADORYS
PASVALYS
KUPIŠKIS
ZARASAI
SKUODAS
KAZLŲ RŪDA
ŠIRVINTOS
MOLĖTAI
ŠALČININKAI
ŠAKIAI
ŠVENČIONĖLIAI
PABRADĖ
KYBARTAI03
IGNALINA
ŠILALĖ
PAKRUOJIS
NEMENČINĖ
ŠVENČIONYS
TRAKAI
VIEVIS
KALVARIJA
LAZDIJAI

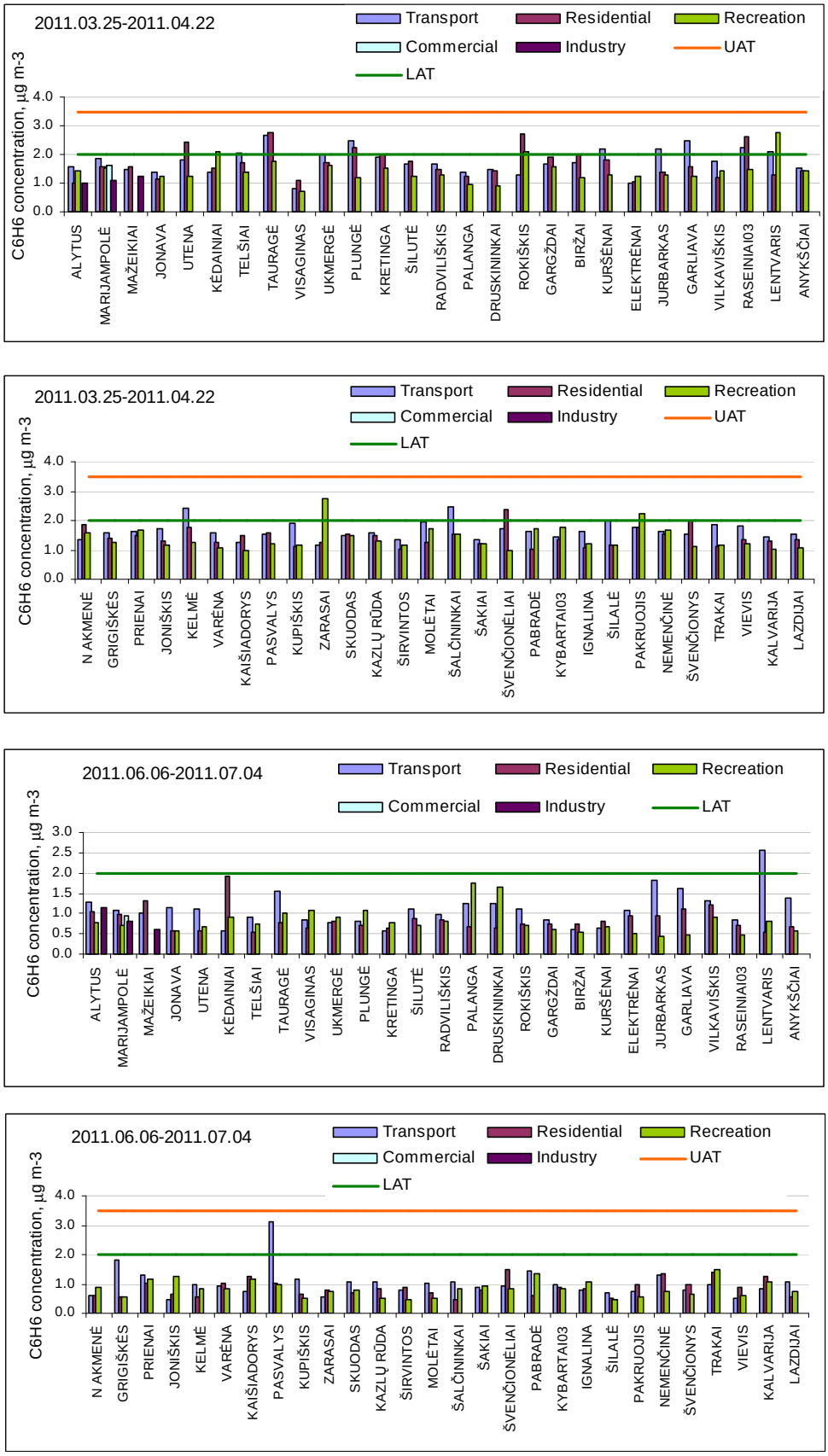


Fig. 41. Seasonal variation of mean benzene concentrations at site-specific areas in towns of Zone during the period from 3 November 2010 to 4 July 2011

Comparison diffusive samplers and continuous measurements of sulfur dioxide and nirogen dioxide concentrations

Study period	Klaipėdos_Silutes pl. OKTS data	Diffusive samplers data	Difference relative, %
	Sulfur dioxide, μg/m^3		
2010.11.03-2010.11.17	1.0	1.7	73
2010.11.17-2010.12.01			
2011.01.06-2011.01.20	2.3	1.7	-25
2011.01.20-2011.02.03	2.9	1.0	-65
2011.03.25-2011.04.08	5.4	1.0	-82
2011.04.08-2011.04.22			
2011.06.06-2011.06.20	5.0	1.3	-74
2011.06.20-2011.07.04	2.3	1.2	-49
Mean 4 seasons	3,2	1.5	-52
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	21.0	23.6	12
2010.11.17-2010.12.01	22.3	25.4	14
2011.01.06-2011.01.20	24.7	24.7	0
2011.01.20-2011.02.03	26.0	29.7	14
2011.03.25-2011.04.08	23.8	27.8	17
2011.04.08-2011.04.22	31.0	33.4	8
2011.06.06-2011.06.20	22.4	26.7	19
2011.06.20-2011.07.04	18.1	24.7	37
Mean 4 seasons	23.7	27.0	14

Study period	Panevezys_Centras OKTS data	Diffusive samplers data	Difference relative, %
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	7.3	13.4	83
2010.11.17-2010.12.01	17.7	19.4	9
2011.01.06-2011.01.20	20.1	18.0	-10
2011.01.20-2011.02.03	16.0	15.6	-3
2011.03.25-2011.04.08	15.3	13.7	-11
2011.04.08-2011.04.22	19.2	16.3	-15
2011.06.06-2011.06.20	8.2	12.3	50
2011.06.20-2011.07.04	7.7	12.7	65
Mean 4 seasons	13.9	15.2	9

Study period	Siauliai OKTS data	Diffusive samplers data	Difference relative, %
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	20.3	27.3	34
2010.11.17-2010.12.01	26.8	26.9	0
2011.01.06-2011.01.20	20.9	29.1	39
2011.01.20-2011.02.03	16.8	25.7	53
2011.03.25-2011.04.08	19.9	25.7	29
2011.04.08-2011.04.22	26.5	29.5	12
2011.06.06-2011.06.20	22.9	32.9	44
2011.06.20-2011.07.04	17.4	25.1	44
Mean 4 seasons	21.4	27.8	30

Study period	Jonava OKTS data	Diffusive samplers data	Difference relative, %
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	7.8	12.8	64
2010.11.17-2010.12.01	7.7	11.2	45
2011.01.06-2011.01.20	8.5	14.1	65
2011.01.20-2011.02.03	9.2	16.0	74
2011.03.25-2011.04.08	10.5	11.7	11
2011.04.08-2011.04.22	12.4	12.5	1

2011.06.06-2011.06.20	8.9	9.5	7
2011.06.20-2011.07.04	6.6	7.3	10
Mean 4 seasons	9.0	11.9	32

Study period	Mazeikiai OKTS data	Diffusive samplers data	Difference relative, %
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	7.9	2.5	-68
2010.11.17-2010.12.01	12.3	4.4	-64
2011.01.06-2011.01.20	7.9	4.2	-47
2011.01.20-2011.02.03	2.6	4.9	85
2011.03.25-2011.04.08	4.1	3.2	-23
2011.04.08-2011.04.22	11.3	2.1	-81
2011.06.06-2011.06.20	5.3	1.3	-76
2011.06.20-2011.07.04	3.2	1.5	-53
Mean 4 seasons	6.8	3.0	-56

Study period	Kedainiai OKTS data	Diffusive samplers data	Difference relative, %
	Nitrogen dioxide, μg/m^3		
2010.11.03-2010.11.17	6.4	3.0	-53
2010.11.17-2010.12.01	8.5	3.4	-60
2011.01.06-2011.01.20	11.9	3.7	-69
2011.01.20-2011.02.03	9.3	2.7	-71
2011.03.25-2011.04.08	6.6	1.4	-79
2011.04.08-2011.04.22	12.1	0.8	-93
2011.06.06-2011.06.20	6.7	1.1	-84
2011.06.20-2011.07.04	4.8	1.3	-73
Mean 4 seasons	8.3	2.2	-74

Conclusions

The mean concentrations of **sulfur dioxide** in zone during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m^3.

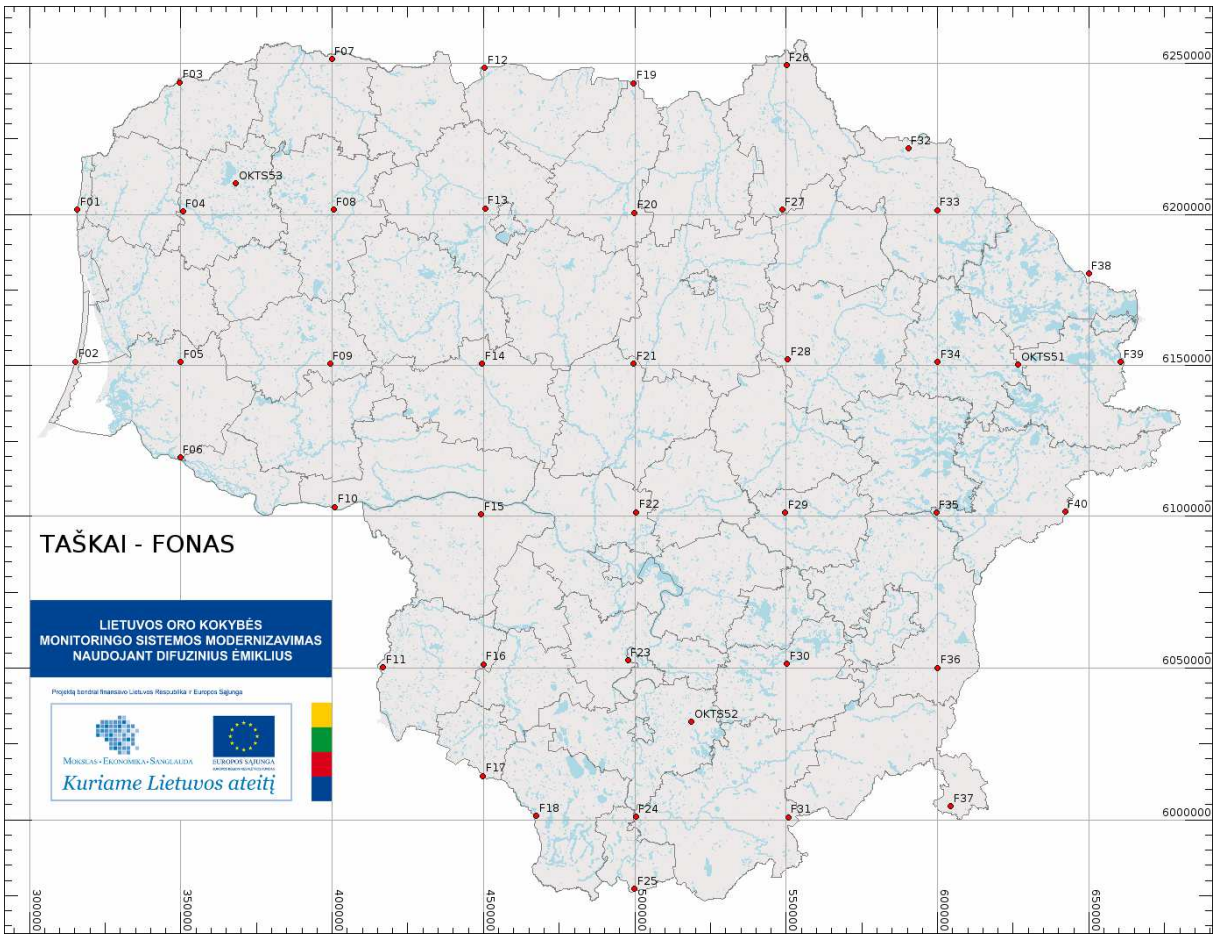
The mean annual concentrations of **nitrogen dioxide** in zone during the study period were in the range from 3.6 μg/m^3 to 59.6 μg/m^3.

1) The mean concentrations of NO_2 exceeded the annual limit value of 40 μg/m^3 at three sites with the intensive traffic flow in Klaipeda04, Klaipeda09, Klaipeda11 and at the site Grigiskes01, located near to highway A1.
2) The mean concentrations of NO_2 exceeded the NO_2 upper assessment threshold value (32 μg/m3) at four sites: Taurage01, Vievis01, Klaipeda12, Siauliai02.
3) The mean concentrations of NO_2 ranged between the lower (26 μg/m3) and upper (32 μg/m3) assessment threshold values at eleven sites: Klaipeda02, Klaipeda07, Klaipeda08, Panevežys01, Mazeikiai02, Kedainiai03, Telsiai01, Jonava01, Trakai01, Utena01, Kedainiai03.

The mean concentrations of **benzene** in the zone during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. Benzene concentrations varied between the lower (2.0 μg/m^3) and upper (3.5 μg/m^3) assessment threshold values of at fifteen sites in the zone: Klaipeda05, Panevezys06, Panevezys07, Panevezys12, Siauliai06, Siauliai09, Siauliai10, Siauliai11, Taurage01, Taurage02, Taurage03, Telsiai01, Plunge01, Plunge02 and Garliava01.

4.4 The assessment of airborne pollutants: nitrogen dioxide, sulfur dioxide and volatile organic compounds distribution of average concentrations in EMEP network

4.4.1 The location of diffusive samplers in EMEP network



42 pav. Location of diffusive samplers in EMEP network.

4.4.2 Coordinates of study places and data capture in EMEP network

Table 31. Data capture (%) in EMEP network (*"-" not measured*).

Site code	Site location		Coordinates (LKS-94)		Data capture, %			
			X	Y	NO_2	SO_2	LOJ	O3
F01	Palanga, pietinė dalis, miške už kopų	Palangos m., Klaipėdos apskr.	315777	6201241	100	100	100	100
F02	Neringa, į ŠV nuo Pervalkos	Neringos m. Klaipėdos apskr.	315342	6151239	100	100	88	100
F03	Narvydžių k., pasienyje prie Latvijos	Skuodo sen., Skuodo r. Sav.	349970	6244930	88	100	100	-
F04	Baltmiškių k., į V nuo Aleksandravo	Šateikių sen., Plungės r. Sav.	349969	6201240	100	100	100	-
F05	Tvaskučių k., į P nuo Švėkšnos	Švėkšnos sav., Šilutės r. Sav.	349969	6151230	100	100	100	100
F06	Karceviškių k.,	Usėnų sen., Šilutės r. Sav.	349970	6118878	100	100	100	100
F07	Buknaičių k.,	Reivyčių sen., Mažeikių r. Sav.	399980	6251251	100	100	100	100
F08	Ruišėnų k.,	Viešvėnų sen., Telšių r. Sav.	399979	6201240	100	100	100	-
F09	Paežerio k.,	Upynos sen., Šilalės r. Sav.	399980	6151230	100	100	100	-
F10	Kalvelių k.,	Viešvilės sen., Jurbarko r. Sav.	399980	6103073	100	100	100	100
F11	Matlaukio k.,	Kybartų sen., Vilkaviškio r. Sav.	415251	6051209	100	100	88	100
F12	Žvelgaičių k., į V nuo kaimo, link Latvijos	Žagarės sen., Joniškio r. Sav.	449984	6248737	100	88	75	-
F13	Kuprių k.,	Šiaulių kaimiškoji sen., Šiaulių r. Sav.	449990	6201240	100	100	88	100
F14	Varkalių k.,	Šiluvos sen., Raseinių r. Sav.	449990	6151230	88	100	100	100
F15	Jotijos k., (vienkiemiai)	Plokščių sen., Šakių r. Sav.	449990	6101220	100	100	100	-
F16	Senkiškių k.,	Gižų sen., Vilkaviškio r. Sav.	449990	6051210	100	100	100	-
F17	Senųjų Alksnėnų k., (vienkiemiai)	Sangrūdos sen., Kalvarijos Sav.	449990	6014298	100	100	100	100
F18	Akmenių k.,	Kučiūnų sen., Lazdijų r. Sav.	466590	6001201	100	100	100	-
F19	Geručių k.,	Žeimelio sen., Pakruojo r. Sav.	500000	6244018	100	100	88	100
F20	Laipuškių k.,	Klovainių sen., Pakruojo r. Sav.	500000	6201240	100	100	75	-
F21	Užupės k.,	Surviliškio sen., Kėdainių r. Sav.	500000	6151230	88	100	100	-
F22	Pakalniškių k., vienkiemis	Lapių sen., Kauno r. Sav.	500000	6101220	88	88	100	88
F23	Naravų k.,	Balbieriškio sen., Prienų r. Sav.	500000	6051210	88	100	88	100
F24	Kudrėnų k.,	Merkinės sen., Varėnos r. Sav.	500000	6001200	100	100	100	-
F25	Švendubrės k., į P nuo kaimo link	Viešiūnų sen., Druskininkų sav.	500000	5976636				100

	Ratnyčios k.				100	100	100	
F26	Nemunėlio Radviliškio gyv., į V nuo gyvenvietės	Nemunėlio Radviliškio sen., Biržų r. Sav.	550010	6251250	100	100	100	-
F27	Palaimos k.,	Vabalninko sen., Biržų r. Sav.	550010	6201240	100	100	100	100
F28	Mickūniškių k., į PR nuo Traupio k.	Traupio sen., Anykščių r. Sav.	550010	6151230	50	75	75	-
F29	Neveronių k.,	Gelvonų sen., Širvintų r. Sav.	549927	6101220	100	100	100	-
F30	Stanislaviškių k.,	Trakų sen., Trakų r. Sav.	550010	6051210	100	100	100	100
F31	Senkonių k.,	Vydenių sen., Varėnos r. Sav.	550010	6001200	100	100	100	100
F32	Onuškio k.,	Juodupės sen., Rokiškio r. Sav.	600016	6223500	100	100	100	-
F33	Palūšnių k., į pietus nuo Rokiškio, prie kelio Kupiškis-Obeliai	Rokiškio r. Sav.	600020	6201240	100	100	100	-
F34	Utenos miesto pietinėje dalyje	Utenos sen., Utenos r. Sav.	600020	6151230	100	100	100	100
F35	Sužionių k.,	Sužionių sen., Vilniaus r. Sav.	600020	6101220	100	100	100	-
F36	Mūrininkų k., prie kelio A3 Minsko kelio	Rukainių sen., Vilniaus r. Sav.	600020	6051210	100	100	100	100
F37	Dieveniškės, į P link Baltarusijos nuo miestelio	Dieveniškių en., Šalčininkų r. Sav.	600020	6003456	100	100	100	-
F38	Kumpuočių k., į ŠV nuo Turmanto	Turmanto sen., Zarasų r. Sav.	650028	6176779	100	100	100	-
F39	Rimšės miestelis. Į R nuo miestelio – link Baltarusijos	Rimšės sen., Ignalinos r. Sav.	660620	6151222	100	100	100	-
F40	Ropiškės k., link sienos su Baltarusija	Strūnaičio sen., Švenčionių r. Sav.	642280	6101218	100	100	100	100

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**

Photographic documentation of the sampling location is presented in **Annex II.**

The protocols of chemical analysis are presented in **Annex III**.

Raw data are presented in **Annex IV**.

4.4.3 Summary results of air monitoring by passive samplers in EMEP network

Table 32. Sulfur dioxide concentrations in in EMEP network for the study period from 3 November 2010 to 4 July 2011

Site code	Address		Coordinates (LKS-94)		SO_2 concentration, µg/m^3							
			X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
F01	Palanga, pietinė dalis, miške už kopų	Palangos m., Klaipėdos apskr.	315797	6201542	*0.15*	1.8	1.2	0.4	0.5	3.2	0.9	0.4
F02	Neringa, į ŠV nuo Pervalkos	Neringos m. Klaipėdos apskr.	315234	6151396	0.3	1.5	1.3	*0.15*	*0.15*	0.8	1.1	0.5
F03	Narvydžių k., pasienyje prie Latvijos	Skuodo sen., Skuodo r. Sav.	349696	6243766	*0.15*	1.8	0.5	2	0.5	0.5	2.0	0.9
F04	Baltmiškių k., į V nuo Aleksandravo	Šateikių sen., Plungės r. Sav.	350653	6201082	*0.15*	1.6	0.9	1.9	2.2	0.8	1.8	0.8
F05	Tvaskučių k., į P nuo Švėkšnos	Švėkšnos sav., Šilutės r. Sav.	350039	6151220	*0.15*	2.8	6.3	1.6	0.6	1.7	6.6	*0.15*
F06	Karceviškių k.,	Usėnų sen., Šilutės r. Sav.	349828	6119708	0.6	1.7	1.2	2	0.7	2.5	1.3	*0.15*
F07	Buknaičių k.,	Reivyčių sen., Mažeikių r. Sav.	399906	6251421	*0.15*	1.7	1	3.5	0.5	*0.15*	2.5	0.3
F08	Ruišėnų k.,	Viešvėnų sen., Telšių r. Sav.	400442	6201521	*0.15*	1.6	0.6	1.6	0.6	*0.15*	1.2	0.5
F09	Paežerio k.,	Upynos sen., Šilalės r. Sav.	399270	6150730	0.4	2.0	0.6	2.4	0.7	0.6	0.8	0.6
F10	Kalvelių k.,	Viešvilės sen., Jurbarko r. Sav.	400905	6103082	*0.15*	1.6	0.7	2.6	0.4	*0.15*	0.8	0.8
F11	Matlaukio k.,	Kybartų sen., Vilkaviškio r. Sav.	416789	6050287	4.3	1.6	1.4	1.7	0.8	0.9	1.0	0.3
F12	Žvelgaičių k., į V nuo kaimo, link Latvijos	Žagarės sen., Joniškio r. Sav.	450360	9248516		1.7	0.3	2.9	0.9	*0.15*	0.8	0.5
F13	Kuprių k.,	Šiaulių kaimiškoji sen., Šiaulių r. Sav.	450502	6201993	*0.15*	1.8	0.7	2	0.8	0.5	0.7	*0.15*
F14	Varkalių k.,	Šiluvos sen., Raseinių r. Sav.	449515	6150737	*0.15*	3.9	0.7	2.3	0.6	2.2	1.1	*0.15*
F15	Jotijos k., (vienkiemiai)	Plokščių sen., Šakių r. Sav.	449298	6100660	4.5	1.9	0.9	2.3	0.6	1.2	"10.6"	*0.15*
F16	Senkiškių k.,	Gižų sen., Vilkaviškio r. Sav.	449981	6051213	2.9	1.3	1.4	1.9	1.1	1.3	1.9	0.3
F17	Senųjų Alksnėnų k., (vienkiemiai)	Sangrūdos sen., Kalvarijos Sav.	449843	6014461	3.2	2.0	0.9	1	*0.15*	0.7	0.3	0.3
F18	Akmenių k.,	Kučiūnų sen., Lazdijų r. Sav.	467502	6001386	2.5	2.0	2.1	3.4	1.1	0.6	1.1	*0.15*
F19	Geručių k.,	Žeimelio sen., Pakruojo r. Sav.	499629	6243384	0.5	1.6	*0.15*	2.1	0.6	*0.15*	1.3	0.3
F20	Laipuškių k.,	Klovainių sen., Pakruojo r. Sav.	499970	6200538	0.3	1.6	0.6	2.6	1.1	*0.15*	1.1	0.7
F21	Užupės k.,	Surviliškio sen., Kėdainių r. Sav.	499592	6150648	0.9	0.4	0.7	1.2	"10.9"	0.8	0.7	*0.15*
F22	Pakalniškių k., vienkiemis	Lapių sen., Kauno r. Sav.	500473	6101285	1.7	1.0	1.2	0.6	0.8	0.9		1.8
F23	Naravų k.,	Balbieriškio sen., Prienų r. Sav.	497767	6052494	1.8	1.1	0.4	0.3	0.5		1.6	0.6
F24	Kudrėnų k.,	Merkinės sen., Varėnos r. Sav.	500366	6000994	4.6	1.2	0.7	1.4	0.9	1.1	1.4	*0.15*
F25	Švendubrės k., į P nuo kaimo link Ratnyčios k.	Viešiūnų sen., Druskininkų sav.	499846	5977219	2.5	1.3	0.9	2.7	1.2	1.1		0.4
F26	Nemunėlio Radviliškio gyv., į V nuo gyvenvietės	Nemunėlio Radviliškio sen., Biržų r. Sav.	550166	6249352	1.3	1.1	1.1	0.9	0.8	*0.15*	0.6	0.4
F27	Palaimos k.,	Vabalninko sen., Biržų r. Sav.	548693	6201603	4.9	0.5	1.1	0.7	0.6	1.5	0.6	"13"
F28	Mickūniškių k., į PR nuo Traupio k.	Traupio sen., Anykščių r. Sav.	550507	6152095			0.1	1.2	0.8	0.7	0.7	*0.15*
F29	Neveronių k.,	Gelvonų sen., Širvintų r. Sav.	549731	6101157	*0.15*	0.9	1.8	0.8	6.1	1.4	0.4	1.8
F30	Stanislaviškių k.,	Trakų sen., Trakų r. Sav.	550310	6051320	0.7	0.6	1.3	0.5	0.7	1	0.6	0.5

F31	Senkonių k.,	Vydenių sen., Varėnos r. Sav.	550631	6000863	2.1	1.4	1	1.4	0.6	1.2	0.5	*0.15*
F32	Onuškio k.,	Juodupės sen., Rokiškio r. Sav.	590353	6221785	0.4	0.9	1.2	0.4	1	0.8	1.2	0.4
F33	Palūšnių k., į pietus nuo Rokiškio, prie kelio Kupiškis-Obeliai	Rokiškio r. Sav.	599915	6201404	0.5	1.0	0.7	0.5	0.8	0.6	1.0	*0.15*
F34	Utenos miesto pietinėje dalyje	Utenos sen., Utenos r. Sav.	600070	6151243	0.9	0.4	0.3	*0.15*	0.8	0.5	1.0	0.4
F35	Sužionių k.,	Sužionių sen., Vilniaus r. Sav.	599651	6101138	*0.15*	0.7	0.5	0.6	2.2	1	*0.15*	*0.15*
F36	Mūrininkų k., prie kelio A3 Minsko kelio	Rukainių sen., Vilniaus r. Sav.	600070	6050055	2.4	0.8	1.2	0.3	*0.15*	*0.15*	0.6	0.7
F37	Dieveniškės, į P link Baltarusijos nuo miestelio	Dieveniškių en., Šalčininkų r. Sav.	604348	6004514	1.8	0.7	1.4	0.5	0.9	0.4	*0.15*	1.4
F38	Kumpuočių k., į ŠV nuo Turmanto	Turmanto sen., Zarasų r. Sav.	649924	6180487	1.4	1.1	1.4	1.9	3.4	1.9	1.7	*0.15*
F39	Rimšės miestelis. Į R nuo miestelio – link Baltarusijos	Rimšės sen., Ignalinos r. Sav.	660583	6151270	1.3	0.9	1.6	0.6	0.6	1.2	0.9	*0.15*
F40	Ropiškės k., link sienos su Baltarusija	Strūnaičio sen., Švenčionių r. Sav.	642138	6101456	1.7	1.4	1.2	1.3	0.3	0.3	2.3	*0.15*

lost or stolen

<0.3 = n.d. half of detection limit = n.d.

"14.4" outlier according Grubbs Test, replaced by mean

Table 33. Nitrogen dioxide concentrations in in EMEP network for the study period from 3 November 2010 to 4 July 2011

Site code	Address		Coordinates (LKS-94)		NO2 concentration, µg/m^3							
			X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
F01	Palanga, pietinė dalis, miške už kopų	Palangos m., Klaipėdos apskr.	315797	6201542	4.4	8.7	6.4	7.1	6.3	5.8	2.9	3.2
F02	Neringa, į ŠV nuo Pervalkos	Neringos m. Klaipėdos apskr.	315234	6151396	3.5	5.5	4.5	5.0	3.3	4.4	1.3	*0.20*
F03	Narvydžių k., pasienyje prie Latvijos	Skuodo sen., Skuodo r. Sav.	349696	6243766	4.7	5.0	6.1	6.0	4.2	2.8		4.8
F04	Baltmiškių k., į V nuo Aleksandravo	Šateikių sen., Plungės r. Sav.	350653	6201082	5.1	6.0	8.2	7.7	3.9	3.6	2.8	1.9
F05	Tvaskučių k., į P nuo Švėkšnos	Švėkšnos sav., Šilutės r. Sav.	350039	6151220	3.4	4.3	6.7	6.4	3.9	3.2	2.1	1.6
F06	Karceviškių k.,	Usėnų sen., Šilutės r. Sav.	349828	6119708	3.5	3.9	5.8	6.6	4.9	3.9	2.4	1.7
F07	Buknaičių k.,	Reivyčių sen., Mažeikių r. Sav.	399906	6251421	3.3	5.6	5.4	5.7	2.8	2.7	2.5	2.2
F08	Ruišėnų k.,	Viešvėnų sen., Telšių r. Sav.	400442	6201521	2.8	3.9	4.1	3.7	2.2	2.0	1.5	1.5
F09	Paežerio k.,	Upynos sen., Šilalės r. Sav.	399270	6150730	3.8	5.3	6.3	7.0	3.5	3.0	2.2	3.7
F10	Kalvelių k.,	Viešvilės sen., Jurbarko r. Sav.	400905	6103082	3.0	4.1	5.4	6.2	4.6	2.3	1.8	2.1
F11	Matlaukio k.,	Kybartų sen., Vilkaviškio r. Sav.	416789	6050287	4.9	5.1	6.6	5.9	3.8	5.0	4.9	4.3
F12	Žvelgaičių k., į V nuo kaimo, link Latvijos	Žagarės sen., Joniškio r. Sav.	450360	9248516		5.0	5.8	5.3	1.9	2.0	2.0	1.6
F13	Kuprių k.,	Šiaulių kaimiškoji sen., Šiaulių r. Sav.	450502	6201993	7.3	8.7	4.8	4.9	3.4	3.6	3.0	2.2
F14	Varkalių k.,	Šiluvos sen., Raseinių r. Sav.	449515	6150737	3.8	4.3	3.2	5.8	2.5	1.9	1.6	2.4
F15	Jotijos k., (vienkiemiai)	Plokščių sen., Šakių r. Sav.	449298	6100660	4.5	5.6	6.6	6.0	3.1	3.6	2.8	2.5
F16	Senkiškių k.,	Gižų sen., Vilkaviškio r. Sav.	449981	6051213	10.2	9.2	12.8	12.7	8.1	8.2	8.1	6.0

F17	Senųjų Alksnėnų k., (vienkiemiai)	Sangrūdos sen., Kalvarijos Sav.	449843	6014461	4.9	5.0	6.7	6.4	3.2	3.2	2.7	2.3
F18	Akmenių k.,	Kučiūnų sen., Lazdijų r. Sav.	467502	6001386	6.9	7.3	7.1	7.6	4.2	3.4	2.7	3.0
F19	Geručių k.,	Žeimelio sen., Pakruojo r. Sav.	499629	6243384	3.4	4.8	4.2	5.3	2.1	3.7	2.4	2.0
F20	Laipuškių k.,	Klovainių sen., Pakruojo r. Sav.	499970	6200538	4.9	5.1	6.3	7.1	3.4	3.1	15.1	2.2
F21	Užupės k.,	Surviliškio sen., Kėdainių r. Sav.	499592	6150648	4.3	5.3	5.9	5.8	3.4	2.8		2.1
F22	Pakalniškių k., vienkiemis	Lapių sen., Kauno r. Sav.	500473	6101285	6.7	7.0	7.4	8.2	4.2	4.2		5.9
F23	Naravų k.,	Balbieriškio sen., Prienų r. Sav.	497767	6052494	3.6	3.6	6.0	7.3	2.3		2.6	2.6
F24	Kudrėnų k.,	Merkinės sen., Varėnos r. Sav.	500366	6000994	4.6	4.3	5.6	5.2	2.0	1.5	1.1	1.7
F25	Švendubrės k., į P nuo kaimo link Ratnyčios k.	Viešiūnų sen., Druskininkų sav.	499846	5977219	4.5	5.1	5.1	4.9	2.0	2.0	1.3	1.3
F26	Nemunėlio Radviliškio gyv., į V nuo gyvenvietės	Nemunėlio Radviliškio sen., Biržų r. Sav.	550166	6249352	4.1	4.5	3.9	5.4	2.0	2.5	1.9	1.5
F27	Palaimos k.,	Vabalninko sen., Biržų r. Sav.	548693	6201603	5.5	4.5	4.8	5.3	2.2	2.1	2.8	2.2
F28	Mickūniškių k., į PR nuo Traupio k.	Traupio sen., Anykščių r. Sav.	550507	6152095				5.6	3.7	2.4		2.4
F29	Neveronių k.,	Gelvonų sen., Širvintų r. Sav.	549731	6101157	4.8	5.5	5.2	5.9	3.2	1.9	2.7	1.6
F30	Stanislaviškių k.,	Trakų sen., Trakų r. Sav.	550310	6051320	5.4	6.3	6.0	6.3	3.6	5.8	3.3	2.3
F31	Senkonių k.,	Vydenių sen., Varėnos r. Sav.	550631	6000863	3.9	4.7	4.9	6.0	2.8	3.1	3.0	3.1
F32	Onuškio k.,	Juodupės sen., Rokiškio r. Sav.	590353	6221785	2.4	4.6	3.3	4.6	2.0	1.3	1.7	0.9
F33	Palūšnių k., į pietus nuo Rokiškio, prie kelio Kupiškis-Obeliai	Rokiškio r. Sav.	599915	6201404	6.7	7.6	6.8	7.9	5.9	6.2	4.5	5.0
F34	Utenos miesto pietinėje dalyje	Utenos sen., Utenos r. Sav.	600070	6151243	8.4	10.0	10.1	12.3	8.4	8.8	6.7	5.2
F35	Sužionių k.,	Sužionių sen., Vilniaus r. Sav.	599651	6101138	3.1	6.0	5.9	5.6	3.3	3.0	2.8	2.0
F36	Mūrininkų k., prie kelio A3 Minsko kelio	Rukainių sen., Vilniaus r. Sav.	600070	6050055	4.9	4.8	4.4	5.5	3.8	3.1	3.1	4.2
F37	Dieveniškės, į P link Baltarusijos nuo miestelio	Dieveniškių en., Šalčininkų r. Sav.	604348	6004514	4.2	5.7	3.9	4.4	2.5	2.0	2.0	3.9
F38	Kumpuočių k., į ŠV nuo Turmanto	Turmanto sen., Zarasų r. Sav.	649924	6180487	2.7	6.3	3.2	3.5	1.7	2.0	1.3	1.4
F39	Rimšės miestelis. Į R nuo miestelio – link Baltarusijos	Rimšės sen., Ignalinos r. Sav.	660583	6151270	3.3	4.5	2.1	3.3	2.0	1.0	1.0	1.3
F40	Ropiškės k., link sienos su Baltarusija	Strūnaičio sen., Švenčionių r. Sav.	642138	6101456	3.0	5.4	3.3	4.7	2.1	1.1	1.9	1.5

	lost or stolen
0.20	half of detection limit = n.d.
"14.4"	outlier according Grubbs Test, replaced by mean

Table 34. Benzene concentrations in in EMEP network for the study period from 3 November 2010 to 4 July 2011

Site code	Address		Coordinates (LKS-94)		Benzene concentration, µg/m^3							
			X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
F01	Palanga, pietinė dalis, miške už kopų	Palangos m., Klaipėdos apskr.	315797	6201542	0.7	1.2	1.6	1.2	1.0	0.7	0.4	0.5
F02	Neringa, į ŠV nuo Pervalkos	Neringos m. Klaipėdos apskr.	315234	6151396	0.5	0.9	1.7	1.1	0.8		0.6	0.4
F03	Narvydžių k., pasienyje prie Latvijos	Skuodo sen., Skuodo r. Sav.	349696	6243766	0.7	1.2	1.4	1.5	0.8	0.7	0.8	0.7
F04	Baltmiškių k., į V nuo Aleksandravo	Šateikių sen., Plungės r. Sav.	350653	6201082	0.8	2.5	1.5	1.4	0.7	1.2	0.3	0.6
F05	Tvaskučių k., į P nuo Švėkšnos	Švėkšnos sav., Šilutės r. Sav.	350039	6151220	0.7	1.1	1.8	1.7	0.8	1.1	0.3	0.7
F06	Karceviškių k.,	Usėnų sen., Šilutės r. Sav.	349828	6119708	0.7	1.0	1.6	1.6	0.8	0.8	0.2	0.9
F07	Buknaičių k.,	Reivyčių sen., Mažeikių r. Sav.	399906	6251421	0.6	1.4	1.4	1.4	0.8	1.1	0.9	0.5
F08	Ruišėnų k.,	Viešvėnų sen., Telšių r. Sav.	400442	6201521	0.6	1.1	1.2	1.2	0.9	0.6	0.5	0.8
F09	Paežerio k.,	Upynos sen., Šilalės r. Sav.	399270	6150730	0.6	1.1	1.8	1.5	0.9	1.0	0.3	1.0
F10	Kalvelių k.,	Viešvilės sen., Jurbarko r. Sav.	400905	6103082	0.9	1.6	2.0	1.8	1.4	1.0	0.3	0.5
F11	Matlaukio k.,	Kybartų sen., Vilkaviškio r. Sav.	416789	6050287	0.9	1.7	2.1	1.8	0.9	1.3	0.2	
F12	Žvelgaičių k., į V nuo kaimo, link Latvijos	Žagarės sen., Joniškio r. Sav.	450360	9248516		1.2	0.4		0.8	0.6	0.3	0.6
F13	Kuprių k.,	Šiaulių kaimiškoji sen., Šiaulių r. Sav.	450502	6201993	0.6	1.3	1.9		1.6	0.7	0.3	0.4
F14	Varkalių k.,	Šiluvos sen., Raseinių r. Sav.	449515	6150737	0.7	1.0	1.6	1.8	1.0	0.8	1.3	0.8
F15	Jotijos k., (vienkiemiai)	Plokščių sen., Šakių r. Sav.	449298	6100660	0.8	1.1	1.9	2.1	0.9	1.4	0.6	0.7
F16	Senkiškių k.,	Gižų sen., Vilkaviškio r. Sav.	449981	6051213	1.0	1.3	2.2	2.2	1.2	0.9	0.5	0.7
F17	Senųjų Alksnėnų k., (vienkiemiai)	Sangrūdos sen., Kalvarijos Sav.	449843	6014461	0.7	1.8	1.8	1.8	0.9	1.6	0.3	0.7
F18	Akmenių k.,	Kučiūnų sen., Lazdijų r. Sav.	467502	6001386	1.1	1.3	2.4	2.1	1.0	0.6	0.4	1.4
F19	Geručių k.,	Žeimelio sen., Pakruojo r. Sav.	499629	6243384	0.3	1.0	1.4		0.6	0.9	0.5	0.8
F20	Laipuškių k.,	Klovainių sen., Pakruojo r. Sav.	499970	6200538		1.2	1.8		0.9	2.4	1.2	0.6
F21	Užupės k.,	Surviliškio sen., Kėdainių r. Sav.	499592	6150648	0.7	1.2	1.8	1.6	0.7	1.2		0.5
F22	Pakalniškių k., vienkiemis	Lapių sen., Kauno r. Sav.	500473	6101285	1.0	1.3	1.9	2.3	1.1	0.7	0.7	1.0
F23	Naravų k.,	Balbieriškio sen., Prienų r. Sav.	497767	6052494	0.7	1.1	1.7	2.0	0.7		0.3	0.7
F24	Kudrėnų k.,	Merkinės sen., Varėnos r. Sav.	500366	6000994	0.8	1.1	2.0	2.1	0.8	0.7	0.3	0.7
F25	Švendubrės k., į P nuo kaimo link Ratnyčios k.	Viešiūnų sen., Druskininkų sav.	499846	5977219	1.6	1.0	2.2	1.7	0.9	0.7	0.5	0.5
F26	Nemunėlio Radviliškio gyv., į V nuo gyvenvietės	Nemunėlio Radviliškio sen., Biržų r. Sav.	550166	6249352	0.9	1.1	2.1	1.8	0.9	0.9	0.8	0.6

F27	Palaimos k.,	Vabalninko sen., Biržų r. Sav.	548693	6201603	0.5	1.1	3.0	1.6	0.8	0.8	0.4	0.5
F28	Mickūniškių k., į PR nuo Traupio k.	Traupio sen., Anykščių r. Sav.	550507	6152095			1.5	1.8	1.4	0.6	0.3	0.6
F29	Neveronių k.,	Gelvonų sen., Širvintų r. Sav.	549731	6101157	1.0	1.3	1.4	1.6	1.0	0.6	0.5	0.9
F30	Stanislaviškių k.,	Trakų sen., Trakų r. Sav.	550310	6051320	0.5	0.8	1.7	1.8	0.8	0.7	0.4	0.8
F31	Senkonių k.,	Vydenių sen., Varėnos r. Sav.	550631	6000863	1.5	1.3	1.8	1.9	0.9	0.9	0.6	1.1
F32	Onuškio k.,	Juodupės sen., Rokiškio r. Sav.	590353	6221785	0.6	1.2	1.9	1.3	0.9	0.6	0.3	1.4
F33	Palūšnių k., į pietus nuo Rokiškio, prie kelio Kupiškis-Obeliai	Rokiškio r. Sav.	599915	6201404	0.8	1.4	1.5	1.5	0.9	0.8	0.4	0.9
F34	Utenos miesto pietinėje dalyje	Utenos sen., Utenos r. Sav.	600070	6151243	1.4	2.4	3.5	3.1	3.1	1.3	1.5	0.7
F35	Sužionių k.,	Sužionių sen., Vilniaus r. Sav.	599651	6101138	0.6	1.4	1.4	1.6	0.8	0.9	0.3	0.4
F36	Mūrininkų k., prie kelio A3 Minsko kelio	Rukainių sen., Vilniaus r. Sav.	600070	6050055	0.9	0.3	2.1	1.9	1.9	0.8	0.4	0.8
F37	Dieveniškės, į P link Baltarusijos nuo miestelio	Dieveniškių en., Šalčininkų r. Sav.	604348	6004514	0.8	1.7	1.6	1.8	1.8	0.8	0.4	0.5
F38	Kumpuočių k., į ŠV nuo Turmanto	Turmanto sen., Zarasų r. Sav.	649924	6180487	0.6	1.3	1.6	1.6	0.9	1.6	0.6	0.7
F39	Rimšės miestelis. Į R nuo miestelio – link Baltarusijos	Rimšės sen., Ignalinos r. Sav.	660583	6151270	0.6	1.1	1.6	1.3	0.7	0.6	0.3	0.6
F40	Ropiškės k., link sienos su Baltarusija	Strūnaičio sen., Švenčionių r. Sav.	642138	6101456	0.7	0.9	1.6	1.6	0.8	0.7	0.4	0.8

lost or stolen

dublicate

Table 35. Ozone concentrations in in EMEP network for the study period from 3 November 2010 to 4 July 2011

Site code	Address		Coordinates (LKS-94)		Ozone concentration, µg/m^3							
			X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
F01	Palanga, pietinė dalis, miške už kopų	Palangos m., Klaipėdos apskr.	315777	6201241	78.1	19.5	76.1	97.3	118.5	115.2	120.8	101.1
F02	Neringa, į ŠV nuo Pervalkos	Neringos m. Klaipėdos apskr.	315342	6151239	24.5	40.2	45.6	86.9	104.5	98.6	107	104.6
F05	Tvaskučių k., į P nuo Švėkšnos	Švėkšnos sav., Šilutės r. Sav.	349969	6151230	72.7	24.5	81.9	92.9	136.4	115.5	96.4	92.1
F06	Karceviškių k.,	Usėnų sen., Šilutės r. Sav.	349970	6118878	60.8	25.6	53.6	97.7	129	156.1	109	87.3
F07	Buknaičių k.,	Reivyčių sen., Mažeikių r. Sav.	399980	6251251	66.6	11.5	94.2	127.1	153.4	139.7	102.6	102.9
F10	Kalvelių k.,	Viešvilės sen., Jurbarko r. Sav.	399980	6103073	42.2	26.7	54.9	77.9	101.2	121.8	103.2	72.3
F11	Matlaukio k.,	Kybartų sen., Vilkaviškio r.	415251	6051209	44.5	"57.9"	111.1	81.5	147.2	141.2	100.7	46.6

		Sav.										
F13	Kuprių k.,	Šiaulių kaimiškoji sen., Šiaulių r. Sav.	449990	6201240	37.0	27.3	99.4	121	160.4	155.6	100.4	91.7
F14	Varkalių k.,	Šiluvos sen., Raseinių r. Sav.	449990	6151230	47.6	12.6	42.1	91.9	155.4	144.4	97.7	93.9
F17	Senųjų Alksnėnų k., (vienkiemiai)	Sangrūdos sen., Kalvarijos Sav.	449990	6014298	29.5	12.9	45.3	76.1	96.9	111.6	83.8	72.5
F18	Akmenių k.,	Kučiūnų sen., Lazdijų r. Sav.	466590	6001201								
F19	Geručių k.,	Žeimelio sen., Pakruojo r. Sav.	500000	6244018	47.5	18.2	90.2	101.7	115.5	145.5	89.8	80
F22	Pakalniškių k., vienkiemis	Lapių sen., Kauno r. Sav.	500000	6101220	72.8	36.5	84.7	106.6	174.8	129.9	57.1	
F23	Naravų k.,	Balbieriškio sen., Prienų r. Sav.	500000	6051210	12.9	9.9	43.7	77.6	"71.9"		72.2	53.5
F25	Švendubrės k., į P nuo kaimo link Ratnyčios k.	Viešiūnų sen., Druskininkų sav.	500000	5976636	30.7	10.3	45.3	77.8	113.7	107.1	80.1	64.6
F27	Palaimos k.,	Vabalninko sen., Biržų r. Sav.	550010	6201240	35.5	22.9	111.4	116.9	144.2	"185.3"	88.4	83.3
F30	Stanislaviškių k.,	Trakų sen., Trakų r. Sav.	550010	6051210	44.4	22.2	60.9	82.4	99.3	105.4	67.7	61.6
F31	Senkonių k.,	Vydenių sen., Varėnos r. Sav.	550010	6001200	58.2	11.0	111.8	"40"	146.9	124.4	"30,5"	85.3
F34	Utenos miesto pietinėje dalyje	Utenos sen., Utenos r. Sav.	600020	6151230	34.5	46.3	72.7	89.2	116.4	140.4	81.1	98.6
F36	Mūrininkų k., prie kelio A3 Minsko kelio	Rukainių sen., Vilniaus r. Sav.	600020	6051210	56.6	32.5	64.5	111.8	122.5	103.3	81.9	109.9
F40	Ropiškės k., link sienos su Baltarusija	Strūnaičio sen., Švenčionių r. Sav.	642280	6101218	37.80	31.80	80.8	106.8	120.9	136.6	103.2	93.5

"40" outlier according Grubbs Test

4.4.4 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide, ozone and benzene concentrations in EMEP network

The atmospheric distribution of pollutants, which are continuously released into the atmosphere from a great diversity of sources that are unequally distributed in time and space, is determined by a variety of physical and chemical processes. The concentration levels of airborne pollutants are largely influenced by the dynamics of meteorological conditions. The concentration levels of airborne pollutants over Lithuania depend on the pollutants emissions both from local sources and from sources in West and South Europe. Transport, energy production and industry are the main sources of air pollution. The diffusive air samplers were used for the estimation of sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and benzene average concentrations distribution in 40 zones' territory sites, using EMEP grid 50 km x 50 km. The sampling sites code and location are presented in Table 31.

Sulfur dioxide

For the entire study period (from 3 November 2010 to 4 July 2011), the annual average concentrations of sufur dioxide ranged between 0.20 and 3.40 μg/m^3 in 40 zones' territory sites (Fig.43 and Table 36). The SO_2 annual averages were below the value of 1.50 μg/m^3 at all sampling sites (except two). These values demonstrate rather small differences and the even regional pollution by SO_2 and its strong connection to the long-range transport of SO_2 on the regional scale. However, concentrations of SO_2 in bi-weekly samples of ambient air were in the range 0.1 – 6.6 μg/m^3 and thereby did not exceed the lower assessment threshold value of 8.0 μg/m^3. The highest concentrations of SO_2 in bi-weekly samples were measured at sites F05 (6.3 μg/m^3), F29 (6.1 μg/m^3), F27 (4.9 μg/m^3) and F15 (4.5 μg/m^3). Supposedly, that the emission of SO_2 from the local sources more or less formed the level of pollution at those sites.

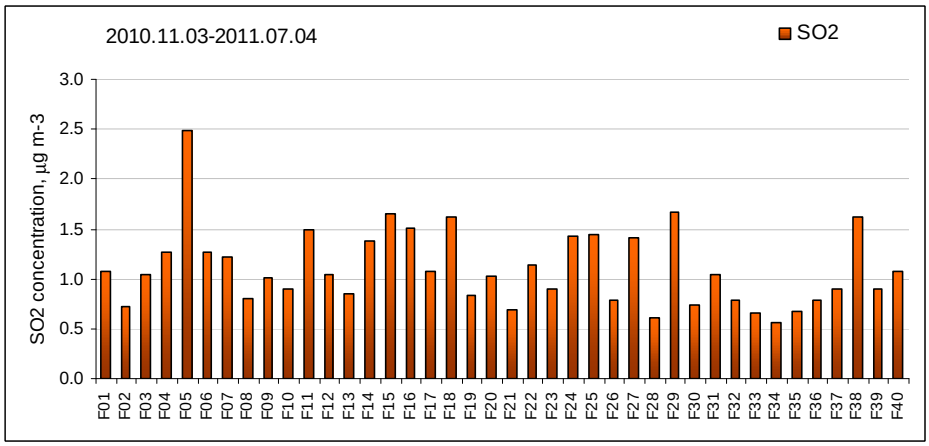


Fig. 43. Annual mean concentrations of sulfur dioxide at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

The seasonal pattern of SO_2 concentrations can be seen from the seasonal means as presented in Fig. 44. The variation of SO_2 concentrations exhibited a seasonal pattern with a maximum in winter and a minimum in summer, though they were not evenly distributed over the year at all sites. The spatial distribution of sulfur dioxide concentrations indicates the tendency to the higher concentrations in west and southwest parts of Lithuania. Data which are based on long-term (20 years) sector analysis of air mass backward trajectories showed

that the main contributors to SO_2 level at background sites in Lithuania are pollutants from the emission sources in Central and South Europe.

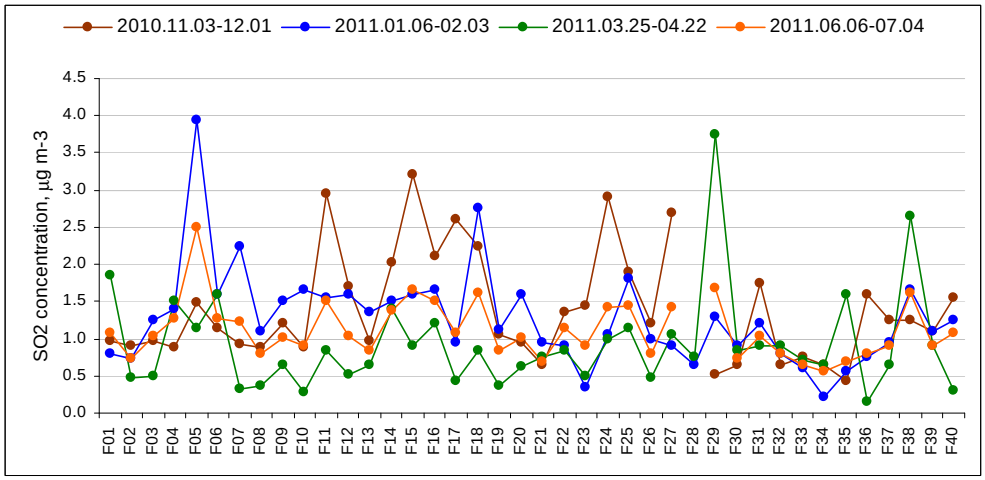


Fig. 44. Seasonal variation of sulfur dioxide concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

Table 36. Statistics for the sulfur dioxide atmospheric concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.
o taškuose statistinės vertės.

Site code	SO_2 concentration, µg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
F01-Palanga	0.98	0.80	1.85	0.65	0.15	3.20	1.07
F02-Neringa	0.90	0.73	0.48	0.80	0.15	1.50	0.73
F03	0.98	1.25	0.50	1.45	0.15	2.00	1.04
F04	0.88	1.40	1.50	1.30	0.15	2.20	1.27
F05	1.48	3.95	1.15	3.38	0.15	6.60	2.49
F06	1.15	1.60	1.60	0.73	0.15	2.50	1.27
F07	0.93	2.25	0.33	1.40	0.15	3.50	1.23
F08	0.88	1.10	0.38	0.85	0.15	1.60	0.80
F09	1.20	1.50	0.65	0.70	0.40	2.40	1.01
F10	0.88	1.65	0.28	0.80	0.15	2.60	0.90
F11	2.95	1.55	0.85	0.65	0.30	4.30	1.50
F12	1.70	1.60	0.53	0.65	0.15	2.90	1.04
F13	0.98	1.35	0.65	0.43	0.15	2.00	0.85
F14	2.03	1.50	1.40	0.63	0.15	3.90	1.39
F15	3.20	1.60	0.90	0.90	0.15	4.50	1.65
F16	2.10	1.65	1.20	1.10	0.30	2.90	1.51
F17	2.60	0.95	0.43	0.30	0.15	3.20	1.07
F18	2.25	2.75	0.85	0.63	0.15	3.40	1.62
F19	1.05	1.13	0.38	0.80	0.15	2.10	0.84
F20	0.95	1.60	0.63	0.90	0.15	2.60	1.02
F21	0.65	0.95	0.75	0.43	0.15	1.20	0.69
F22	1.35	0.90	0.85	1.80	0.60	1.80	1.14
F23	1.45	0.35	0.50	1.10	0.30	1.80	0.90
F24	2.90	1.05	1.00	0.78	0.15	4.60	1.43
F25	1.90	1.80	1.15	0.40	0.40	2.70	1.44
F26	1.20	1.00	0.48	0.50	0.15	1.30	0.79

F27	2.70	0.90	1.05	0.87	0.50	4.90	1.41
F28	-	0.65	0.75	0.43	0.10	1.20	0.61
F29	0.53	1.30	3.75	1.10	0.15	6.10	1.67
F30	0.65	0.90	0.85	0.55	0.50	1.30	0.74
F31	1.75	1.20	0.90	0.33	0.15	2.10	1.04
F32	0.65	0.80	0.90	0.80	0.40	1.20	0.79
F33	0.75	0.60	0.70	0.58	0.15	1.00	0.66
F34	0.65	0.23	0.65	0.70	0.15	1.00	0.56
F35	0.43	0.55	1.60	0.15	0.15	2.20	0.68
F36	1.60	0.75	0.15	0.65	0.15	2.40	0.79
F37	1.25	0.95	0.65	0.78	0.15	1.80	0.91
F38	1.25	1.65	2.65	0.93	0.15	3.40	1.62
F39	1.10	1.10	0.90	0.53	0.15	1.60	0.91
F40	1.55	1.25	0.30	1.23	0.15	2.30	1.08

Nitrogen dioxide

For the entire study period (from 3 November 2010 to 4 July 2011), the annual average concentrations of nitrogen dioxide ranged between 2.3 and 9.4 μg/m^3 in 40 zones' territory sites (Fig.45 and Table 37). As can be seen from Fig. 45, the annual average concentrations of nitrogen dioxide were in the range 3.0 – 5.0 μg/m^3 at the sites in major part of territory and were significantly below the lower assessment threshold limit value of 26.0 μg/m^3 for the annual NO_2 concentration. The highest annual average concentrations of NO_2 were measured at sites F16 (9.4 μg/m^3) and F34 (8.7 μg/m^3), which were close to road with intensive traffic.

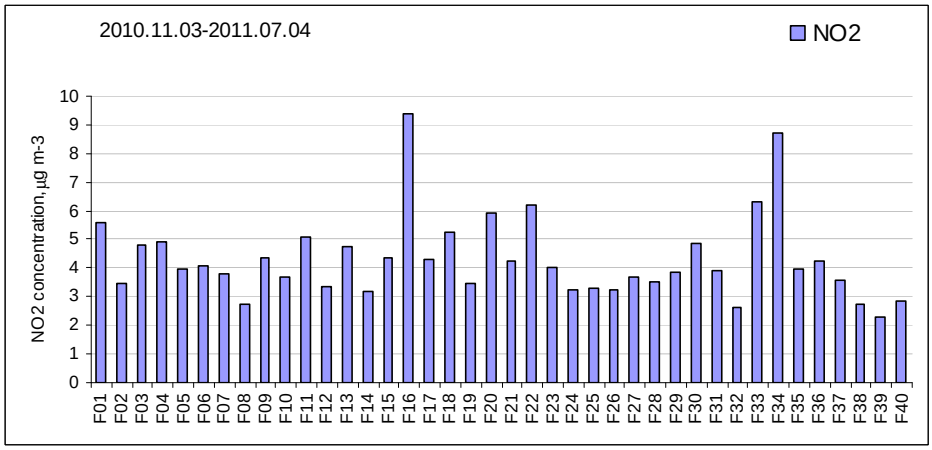


Fig. 45. Annual mean concentrations of nitrogen dioxide at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

In winter, the NO_2 concentrations in bi-weekly samples at sites F16 and F34 were 12.8 μg/m^3 and 11.8 μg/m^3, respectively. The higher elevated concentration level of NO_2 was observed during winter and the lower concentration level – during summer (2.7 – 12.8 μg/m^3 and 0.8 – 8.7 μg/m^3, respectively). The spatial distribution of nitrogen dioxide concentrations indicates the tendency to the higher concentrations in the southwest part of Lithuania.

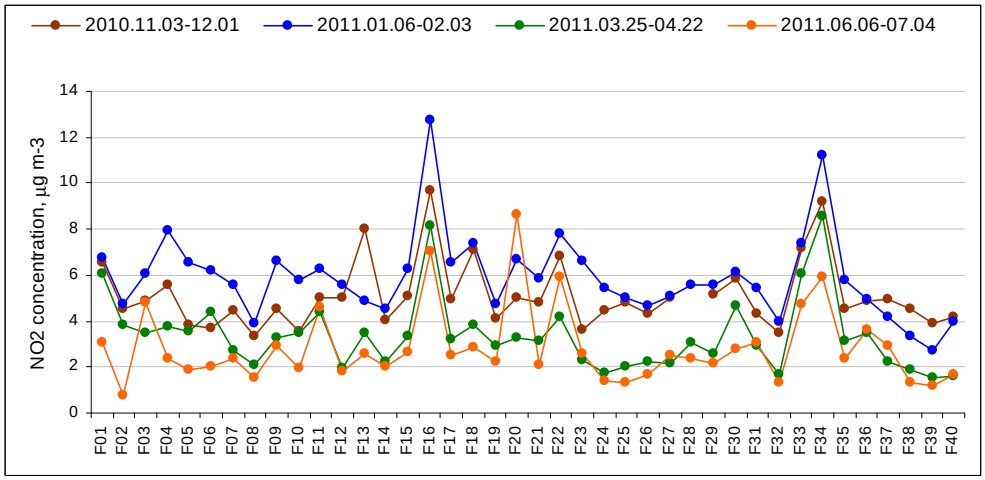


Fig. 46. Seasonal variation of nitrogen dioxide concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

Table 37. Statistics for the nitrogen dioxide atmospheric concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

Site code	NO_2 concentration, µg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
F01-Palanga	6.6	6.8	6.1	3.1	2.9	8.7	5.6
F02-Neringa	4.5	4.8	3.9	0.8	0.2	5.5	3.5
F03	4.9	6.1	3.5	4.8	2.8	6.1	4.8
F04	5.6	8.0	3.8	2.4	1.9	8.2	4.9
F05	3.9	6.6	3.6	1.9	1.6	6.7	4.0
F06	3.7	6.2	4.4	2.1	1.7	6.6	4.1
F07	4.5	5.6	2.8	2.4	2.2	5.7	3.8
F08	3.4	3.9	2.1	1.5	1.5	4.1	2.7
F09	4.6	6.7	3.3	3.0	2.2	7.0	4.4
F10	3.6	5.8	3.5	2.0	1.8	6.2	3.7
F11	5.0	6.3	4.4	4.6	3.8	6.6	5.1
F12	5.0	5.6	2.0	1.8	1.6	5.8	3.4
F13	8.0	4.9	3.5	2.6	2.2	8.7	4.7
F14	4.1	4.5	2.2	2.0	1.6	5.8	3.2
F15	5.1	6.3	3.4	2.7	2.5	6.6	4.3
F16	9.7	12.8	8.2	7.1	6.0	12.8	9.4
F17	5.0	6.6	3.2	2.5	2.3	6.7	4.3
F18	7.1	7.4	3.8	2.9	2.7	7.6	5.3
F19	4.1	4.8	2.9	2.2	2.0	5.3	3.5
F20	5.0	6.7	3.3	8.7	2.2	15.1	5.9
F21	4.8	5.9	3.1	2.1	2.1	5.9	4.2
F22	6.9	7.8	4.2	5.9	4.2	8.2	6.2
F23	3.6	6.7	2.3	2.6	2.3	7.3	4.0
F24	4.5	5.4	1.8	1.4	1.1	5.6	3.3
F25	4.8	5.0	2.0	1.3	1.3	5.1	3.3
F26	4.3	4.7	2.3	1.7	1.5	5.4	3.2
F27	5.0	5.1	2.2	2.5	2.1	5.5	3.7
F28	-	5.6	3.1	2.4	2.4	5.6	3.5
F29	5.2	5.6	2.6	2.2	1.6	5.9	3.9
F30	5.9	6.2	4.7	2.8	2.3	6.3	4.9
F31	4.3	5.5	3.0	3.1	2.8	6.0	3.9

F32	3.5	4.0	1.7	1.3	0.9	4.6	2.6
F33	7.2	7.4	6.1	4.8	4.5	7.9	6.3
F34	9.2	11.2	8.6	6.0	5.2	12.3	8.7
F35	4.6	5.8	3.2	2.4	2.0	6.0	4.0
F36	4.9	5.0	3.5	3.7	3.1	5.5	4.2
F37	5.0	4.2	2.3	3.0	2.0	5.7	3.6
F38	4.5	3.4	1.9	1.4	1.3	6.3	2.8
F39	3.9	2.7	1.5	1.2	1.0	4.5	2.3
F40	4.2	4.0	1.6	1.7	1.1	5.4	2.9

Benzene

For the entire study period (from 3 November 2010 to 4 July 2011), the annual average concentrations of benzene ranged between 0.70 and 2.10 μg/m^3 in 40 zones' territory sites (Fig.47 and Table 38). As can be seen from Fig. 47, the annual averages of benzene were below the lower assessment threshold limit value of 2.0 μg/m^3 at all sampling sites with the exception of site F34. This sampling site is in the south part of town Utena and at short distance to road. Benzene concentrations ranged from 0.2 μg/m^3 to 3.5 μg/m^3 in be-weekly samples and the highest concentration was again measured at the sampling site F34.

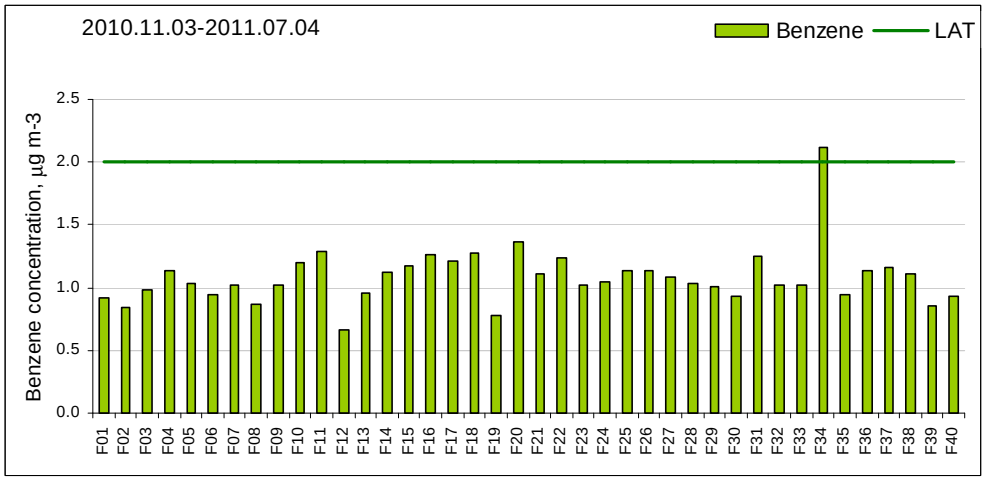


Fig. 47. Annual mean concentrations of benzene at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

The time series of benzene are characterized by a strong seasonal variation (Fig. 48). The higher benzene concentrations were observed during winter and the lower concentration – during summer and ranged, respectively, from 1.2 to 3.3 μg/m^3 and from 0.2 to 1.1 μg/m^3.

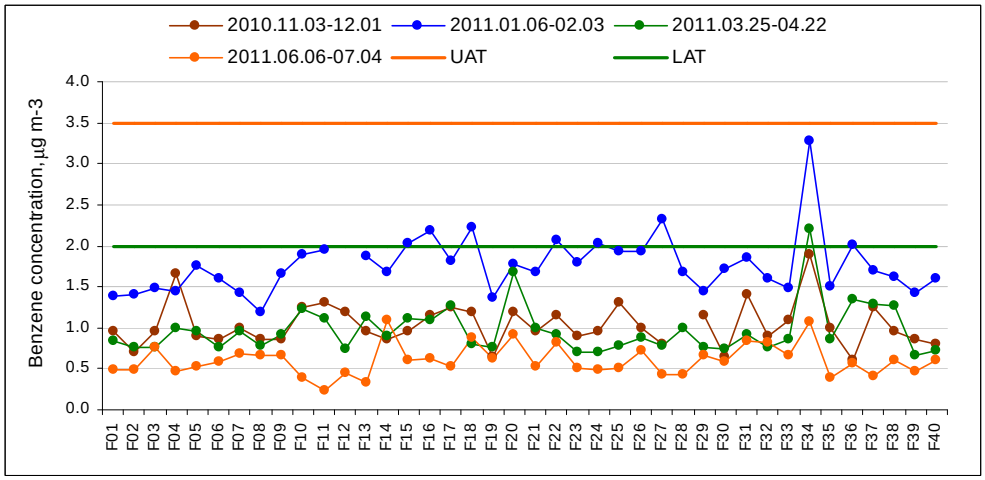


Fig. 48. Seasonal variation of benzene concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

The data indicate, that winter concentrations level of benzene was on average 3 times higher than in summer. The spatial variation of benzene annual concentrations demonstrate rather small differences and it suggests that air pollution level over the territory of Lithuania are more or less similar, although the benzene level at site F34 was slightly higher than that in other sites.

Table 38. Statistics for the benzene atmospheric concentrations at 40 sites accordingly EMEP grid (50 km x 50 km) for the study period from 3 November 2010 to 4 July 2011.

Site code	Benzene concentration, µg/m^3						
	Autumn	Winter	Spring	Summer	min	max	Mean
F01-Palanga	0.95	1.38	0.83	0.48	0.44	1.61	0.91
F02-Neringa	0.70	1.41	0.76	0.48	0.41	1.70	0.85
F03	0.95	1.48	0.76	0.76	0.69	1.55	0.99
F04	1.65	1.44	0.99	0.47	0.30	2.50	1.14
F05	0.90	1.75	0.96	0.53	0.33	1.76	1.04
F06	0.85	1.59	0.77	0.58	0.24	1.61	0.95
F07	1.00	1.42	0.96	0.68	0.46	1.43	1.02
F08	0.85	1.20	0.78	0.65	0.50	1.22	0.87
F09	0.85	1.65	0.92	0.67	0.34	1.82	1.02
F10	1.25	1.90	1.22	0.40	0.31	1.96	1.19
F11	1.30	1.96	1.12	0.24	0.24	2.11	1.28
F12	1.20	0.38	0.74	0.45	0.30	1.20	0.66
F13	0.95	1.87	1.14	0.32	0.29	1.87	0.96
F14	0.85	1.67	0.89	1.09	0.70	1.78	1.13
F15	0.95	2.03	1.11	0.61	0.56	2.12	1.18
F16	1.15	2.18	1.09	0.63	0.51	2.20	1.26
F17	1.25	1.81	1.27	0.54	0.32	1.84	1.22
F18	1.20	2.23	0.80	0.89	0.36	2.39	1.28
F19	0.65	1.37	0.76	0.62	0.30	1.37	0.78
F20	1.20	1.77	1.68	0.92	0.64	2.44	1.36
F21	0.95	1.68	0.99	0.53	0.53	1.77	1.11
F22	1.15	2.07	0.92	0.83	0.66	2.29	1.24
F23	0.90	1.80	0.71	0.50	0.32	1.95	1.02
F24	0.95	2.02	0.70	0.48	0.26	2.07	1.04
F25	1.30	1.94	0.79	0.51	0.51	2.16	1.13

F26	1.00	1.92	0.87	0.73	0.61	2.09	1.13
F27	0.80	2.32	0.79	0.43	0.36	3.00	1.08
F28	-	1.67	1.00	0.43	0.31	1.80	1.04
F29	1.15	1.45	0.77	0.67	0.47	1.56	1.01
F30	0.65	1.72	0.74	0.59	0.41	1.80	0.93
F31	1.40	1.86	0.91	0.84	0.63	1.94	1.25
F32	0.90	1.59	0.76	0.81	0.27	1.90	1.02
F33	1.10	1.48	0.87	0.66	0.38	1.49	1.03
F34	1.90	3.28	2.20	1.07	0.69	3.51	2.11
F35	1.00	1.50	0.85	0.40	0.35	1.57	0.94
F36	0.60	2.01	1.34	0.57	0.30	2.15	1.13
F37	1.25	1.70	1.29	0.41	0.36	1.77	1.16
F38	0.95	1.63	1.26	0.61	0.55	1.64	1.11
F39	0.85	1.43	0.66	0.47	0.31	1.61	0.85
F40	0.80	1.60	0.73	0.60	0.43	1.62	0.93

Ozone

Although not independent of each other, ozone (O_3) concentration may be viewed as the sum of a global/hemispheric, background concentration and regionally/locally produced ozone. Most of the ozone is believed to originate from the troposphere itself, but a significant fraction is also advected from the stratosphere. Ozone anthropogenic air pollution result from a complex process involving chemical reactions between nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) and oxygen (O_2), in the presence of sunlight. The formation of ozone occurs mainly in seasons of greater sunlight and very stable atmospheric conditions near the surface, as these meteorological conditions allow for a low dispersion of pollutants, thus increasing the probability of reaction among themselves. At the mid-latitudes the ozone concentration seasonal variation show the early spring increase while the highest concentration level is typical for summer period.

EU Limit Value for ozone

Ozone target values established in the EU directive and approved by the order of Ministry of Environment are the following: the target value for 2010 is that the maximum daily 8-hour mean concentration should not exceed 120 μg m^{-3} on more than 25 days per calendar year averaged over 3 years. Latest directive sets primary long-term objectives, target values, an alert threshold (240 μg m^{-3}) and information threshold (180 μg m^{-3}) to avoid, prevent and reduce the harmful effects of ozone on the human health and the environment.

Ozone concentration variation in Lithuanian territory was carried out in 20 sites. The mean ozone concentration values measured via passive sampling were obtained. Generalizing the results it may be concluded that the ozone mean concentration was found to be 83.2 ± 39.2 μg m^{-3} in the territory of Lithuania (Table 39).

Quality control

To produce controlled ozone atmospheres a MCZ 15 calibration system (MCZ Umwelttechnik, Germany) was used. Ozone generation using ultraviolet light has been used, characterized by an especially high level of reproducibility and high stability of the span gas setting. The analytical principle is based on absorption of UV light by the ozone molecule and subsequent use of photometry to measure reduction of the quanta of light reaching the detector at 254 nm. The actual concentration was measured by a Monitor Labs UV Monitor Model 8810, which was calibrated at Swiss Federal Office of Metrology and Accreditation (number of calibration certificate 233-0196). As conversion factor of 1.86 from ppb to μg m^{-3} was applied.

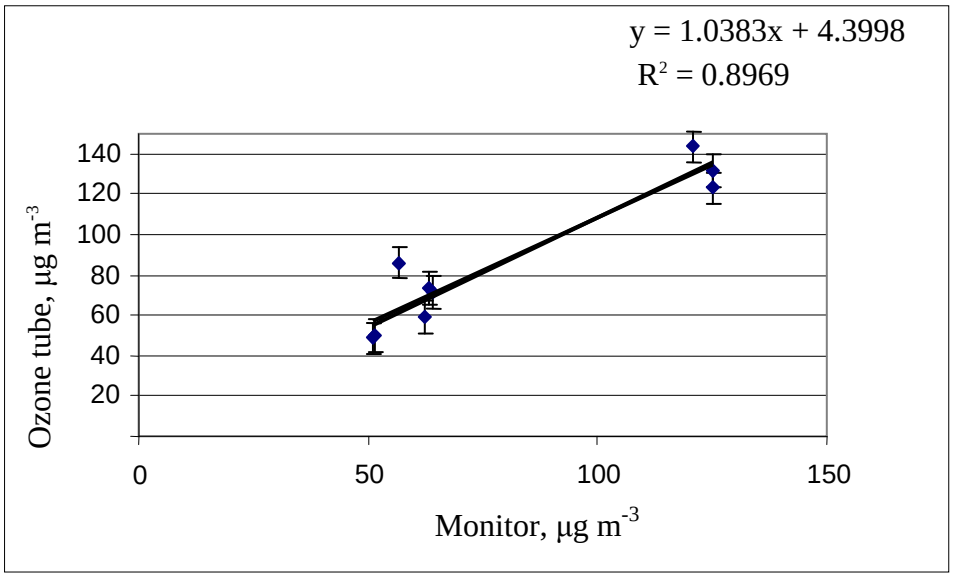


Fig. 49. Ozone calibration results

The Swiss calibration factor of 0.0255 was applied. From these findings, there is no need to change the Swiss factor.

Results

Data on mean concentration varied in fairly wide range, i.e. during the first stage the mean O_3 concentration was relatively lowest throughout the study period (35.9 ± 18.8 µg m^{-3}), while in spring (2011, March 25 - April 22) the highest concentration values (128.4 ± 23.8 µg m^{-3}) was found. The highest O_3 concentrations throughout the study period was observed in F07 (99.8 µg m^{-3}), F13 (99.1 µg m^{-3}) and F27 (98.5 µg m^{-3}) and the lowest - F23 (48.8 µg m^{-3}) and f17 (66.0 µg m^{-3}) exhibition area (Table 39). The analysis of mean ozone concentration in separate seasons of the year was characterized by seasonal variation, but it should be noted that during the spring months the ozone levels were considerably higher than in summer.

Table 39. Mean ozone concentration during the exposure periods

Period	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Mean O_3 concentration**
Mean O_3 concentration, µg m^{-3}	35,9	49,3	83,3	109,8	128,4	109,0	86,4	81,7	**83,2**

The reported data suggest that the mean ozone concentration variation in the ambient air (during the first and second periods) was significant (from 11.4 to 54.7 µg m^{-3}). The highest mean ozone concentration (78.1 ± 17.5 µg m^{-3}) was obtained in Palanga, (Klaipeda County) while the lowest mean O_3 concentration (11.4 ± 17.5 µ g m-3) - in District Municipality of Prienai (Balbieriskis) (Fig. 50).

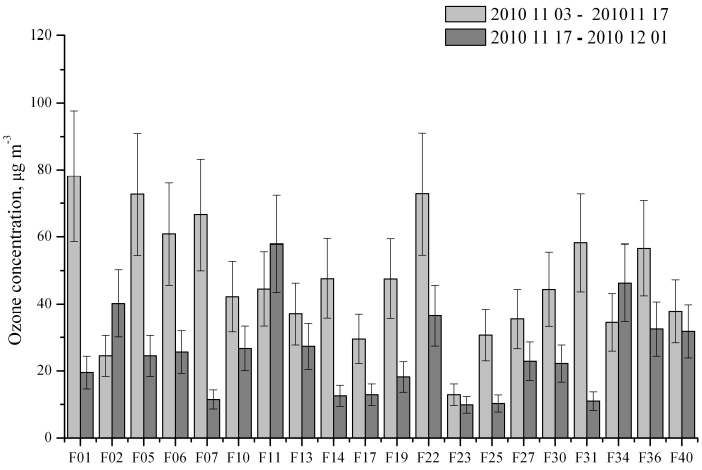


Fig. 50 Mean ozone concentration during the exposure period November 3 – December 1, 2010

It should be noted that a low mean concentration of ozone was obtained there by passive sampling approaches at both time periods. The spatial distribution of mean ozone concentration showed that the higher values were found in the western part of Lithuania.

During the second period of the study, the mean ozone concentration varied from 60.7 ± 17.3 μg m^{-3} (eldership of Balbieriškis) to 114.2 ± 17.3 μg m^{-3} (Vabalninko sen., Palaimos k.) (Fig. 51). It is obvious that the mean ozone concentration during the cold time of year is quite high; the measurements at eleven sites showed mean concentration values > 80 μg m^{-3}. In addition, the spatial distribution of ozone maximum concentration was obtained throughout the whole territory of Lithuania.

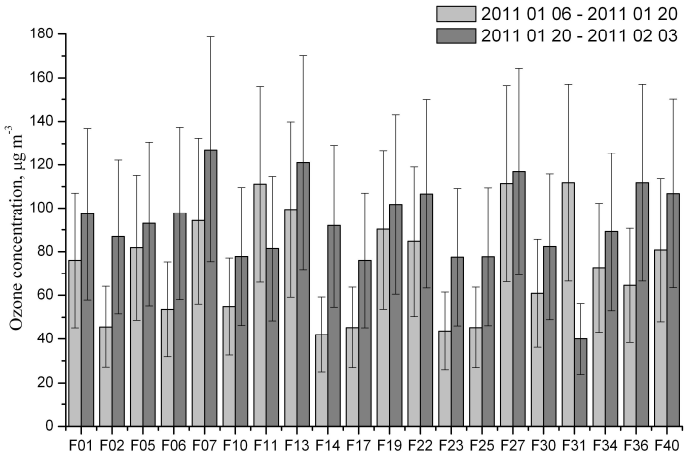


Fig. 51 Mean ozone concentration during the exposure period January 6 – February 3, 2011

Bearing in mind that the lowest winter temperatures in most districts was found to be -15 ...- 20 ° C and -21 in the north ...- 23 °, a significant difference between the concentrations of ozone exposure in different locations during the experiment could be caused by meteorological factors, although the relationship between these variables did not reveal a strong correlation.

Analysis of ozone level measured at background stations (Zemaitija, Aukstaitija and Dzukija) and by passive samplers coincides only 55% of data and therefore without correction factor can be regarded as informative and reliable. The largest discrepancy has been exhibited in F07, F13, F22, F27, F36 and F40 places. It can be concluded that the air quality assessment based on a passive sampling is not effective during the winter.

As can be seen during the third phase of the study period the highest ozone concentration (185.0 ± 25.7 μg m^{-3}) in eldership of Vabalninkas was observed, while the lowest (71.9 ± 22.2 μg m^{-3}) in eldership of Balbieriskis, however, the statistical analysis showed that these values was detected as the outliers. During this period of study extremely high mean ozone concentration was found 128.4 ± 23.8 μg m^{-3}. In background areas in the Northern Hemisphere, high ozone levels usually occur during the spring and warm, sunny summer months (from April through September), though the passive sampling approach revealed extremely high O_3 concentration in spring. It is worth noting that only episodes of photochemical ozone level reach 120 to 170 μg m^{-3}, typically ozone concentrations range from 60 to 90 μg m^{-3}. As seen from Fig. 52 the target values were not exceeded, but the long term objectives of max 8 hours on 120 μg m^{-3} at ~ 60% of the exposure sites were exceeded. There were no exceedances of information and alert threshold in Lithuanian territory.

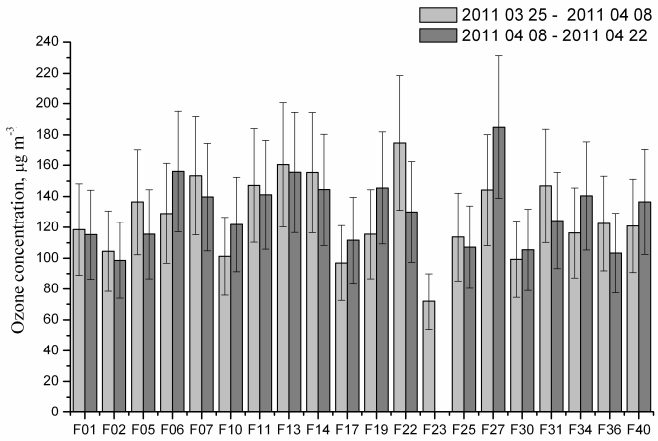


Fig. 52. Mean ozone concentration during the exposure period March 25 – April 22, 2011

Taking into account the ground-level ozone research under the EMEP program (Girgždienė, 2010) the occurrence of ozone concentrations > 120 μg m^{-3} during 2005 - 2010 period was reported in less than 1% of the time (for example, in 2010 - the two cases), as well as at monitoring site ozone background levels of data uncertainty and the maximum value, which is presented in conjunction with the technical characteristics of passive sampling devices, it can be argued that the measurement results are not sufficiently informative, and can not be used for ambient air quality assessment. Taking into account the uncertainty of the measured value and significant deviation from the mean character, it is assumed that the population information threshold (180 μg m^{-3}) has not been exceeded.

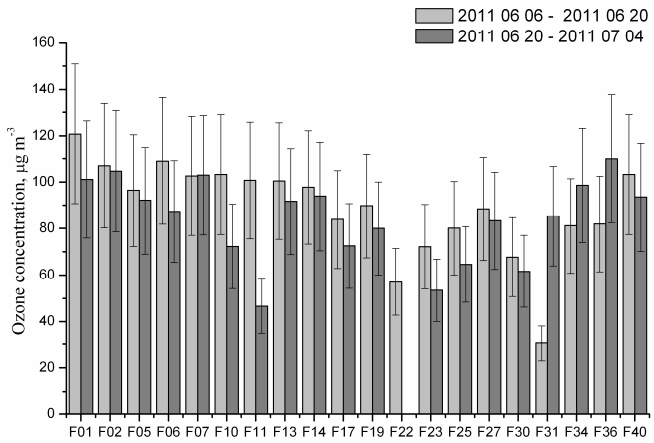


Fig. 53 Mean ozone concentration during the exposure period
June 6 – July 4, 2011

One of the factors influencing this result could be higher wind speed (3.4 m s^{-1}) than during other study periods, leading to ozone absorption rate increasing (Tang and Lau, 2000). A comparison between passive sampling data and data estimated at the automatic air quality background research stations revealed that ozone level from 6% (eldership of Sangruda) up to 50% in eldership of Vabalninkas (outlier) is lower than the O_3 concentrations indicated by measuring approach. As mentioned above for ground-level ozone in middle latitudes the maximum concentration occurs in summer period due to photochemical events undo solar ultraviolet radiation. However, during fourth study period, the mean ozone concentration varied in the range from 30.5 (outlier) (F31) to 120.8 μg m^{-3} (F01) and the mean concentration was found to be 86.4 ± 19.3 μg m^{-3} (Fig.53). It was found that mean ozone concentration (120.8 μg m^{-3}) in Palanga site exceeds the target value of long-term objectives of the protection of human health.

Comparison of passive and continuous measurements of ozone concentration level. **Calibration factor**.

In order to evaluate the coincidence between measured ozone concentrations by different methods the comparative analysis of the data was carried out.

Since ozone is a reactive gas and can not be absorbed, the measurement methods mainly are based on the oxidation reactions, where the measured reaction by-products and is calculated on the concentration of ozone in the air. The diffusive sampler is based on the diffusion of ozone along a tube to an absorbing medium. The chemisorption of ozone takes place by reaction with 1,2-di(4-pyridyl)-ethylene (DPE); the ozonide formed undergoes cleavage and yields an aldehyde. The amount of aldehyde is finally determined spectrophotometrically by the MBTH method at 442 nm. Ongoing chemical reactions have not been thoroughly explored, making it impossible to accurately determine the sampling rate in ml/min. To solve this problem the verification of the test material - a complex combination of aldehyde absorption color intensity was directly compared with measured data values expressed in μg m^{-3} per hour. Calibration factor was described in 1988 Switzerland (Monn and Hangartner, 1990). Different studies showed that the calibration factor depends on the exposure location (city, rural area, different countries and climates).

It was observed that data tend to distort the values of ozone concentration time-series, but the experimental dispersion of results remain unchanged. The results of relative ratio tests provide evidence that its value ranges from 0.5 to 0.7, which shows that there is a systematic

error, which origin is unknown. Such errors can be eliminated in the introduction of certain amendments.

The individual calibration factors for each monitoring site (automatic stations) were calculated. During this study the values of ratio was evaluated and divided into clusters. As shown in Table 40 the data formed two clusters: Cluster 1 with calibration factor <0.03 and 2nd Cluster with calibration factor ≥ 0.03. Table 40 summarizes calibration statistics.

Table 40. Statistics of calibration.

	The coefficient of the regression line slope	Calibration factor	Correction value
Kaunas, Petrašiūnai	35,4	0,02825	0,73
Kaunas, Noreikiškės	36,7	0,02725	0,65
Klaipėda, Šilutės pl.	38,2	0,02618	0,60
Šiauliai	34,2	0,2924	0,73
Vilnius, Lazdynai	27,9	0,03583	-0,13
Vilnius, Žirmūnai	27,3	0,03660	0,29
Aukštaitijos IMS	28,8	0,03472	0,52
Žemaitijos IMS	31,3	0,03191	0,73
Dzūkijos IMS	23,0	0,0434	0,42

In order to establish a relationship between 14 day mean values and 8-hour peak values, the data set of hourly ozone values of all Lithuanian automatic monitoring stations from 1.9. 2010 and 31.8.2011 were analysed (Fig. 54).

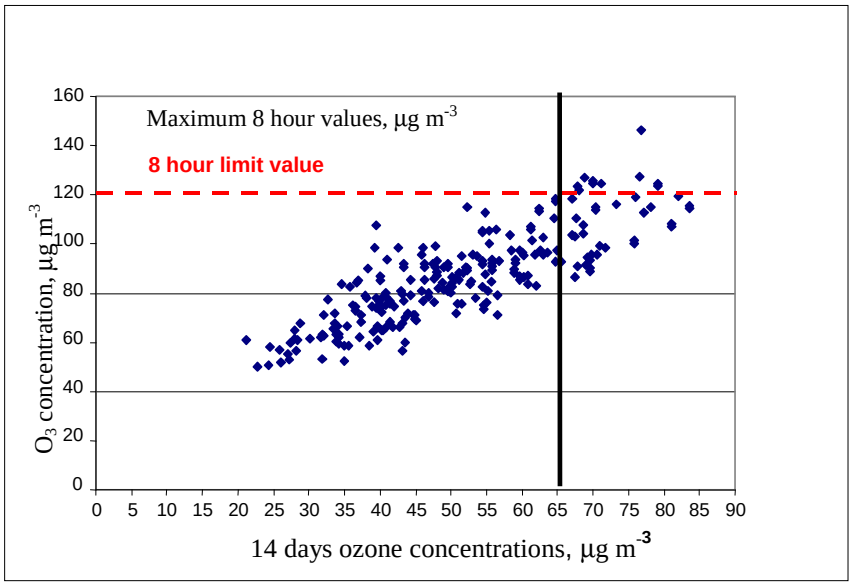


Fig. 54. Plot of 14 day means versus maximum 8 hour values for all ozone air monitoring stations in Lithuania

The scatter chart (Fig. 54) shows a clear evidence that there is a chance that the 8-hour moving average peak value > 120 µg m^{-3} occurs when passive samplers show values at > 65 µg m^{-3} in Lithuania. Other consideration was made in plotting 14 day mean values and daily exceedances. Unfortunately, only a few data pairs was available in the period of 1.9.10 till 31.8.11. But it allows estimating the days of exceedances, if a data set over one year is available

Since during I and II study periods the passive samplers were not exhibited the ozone concentration was compared with the ozone values observed in nearest background stations (Dzukija, Aukstaitija and Zemaitija). Taking into account the maximum uncertainty limit of

passive measurement method the coincidence was found to be 50 and 25 %, respectively. Eastern Europe and Lithuania are the regions where increased ozone levels are mainly affected by polluted air masses from the south and west, although the assessment of the spatial mean ozone concentrations measured by passive sampling technique revealed that the distribution in the territory of Lithuania did not meet the expected results of the decrease toward northern Europe.

Conclusions

1. The mean concentrations of sulfur dioxide in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 20.0 $\mu g/m^3$ and were below the lower assessment threshold value of 8.0 $\mu g/m^3$.
2. The spatial distribution of sulfur dioxide concentrations indicates the tendency to be the higher concentrations in west and southwest parts of Lithuania.
3. The mean concentrations of nitrogen dioxide in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 40.0 $\mu g/m^3$.
4. The spatial distribution of nitrogen dioxide concentrations indicates the tendency to be the higher concentrations in west part of Lithuania.
5. The mean concentrations of benzene in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 5.0 $\mu g/m^3$ aiming to protect public health.
6. The spatial distribution of benzene concentrations indicates the similar level of this pollutant over the Lithuanian territory.
7. A comparative statistical analysis showed that the systematic error has the greatest influence on ozone concentration values measured by passive sampling devices. Calibration, when feasible, is the most reliable way to reduce systematic errors and make the passive sampling approaches useful in Lithuanian region.

4.5 Investigation of sulfur dioxide, nitrogen dioxide and benzene concentrations in the area of "Lithuanian Power Plant"

4.5.1 Coordinates of study places and data capture in the area of "Lithuanian Power Plant"

Table 41. Data capture (%) in the area of "Lithuanian Power Plant" ("-" *not measured*).".

Site code	Adresas		Coordinates (LKS-94)		Data capture, %		
			X	Y	NO_2	SO_2	LOJ
Elektrine01	Naujuju Kietaviškiu vil.	3 km in upwind direction	539135	6068395	100	100	50
Elektrine02	away from highway A1	3 km in down wind direction	542500	6073130	100	100	100
Elektrine03	Gabriliavos vil.	5 km in down wind direction	542372	6075092	100	2	100
Elektrine33	Zebertoniu vil	5 km in down wind direction	546011	6073279	100	100	100
Elektrine04	Karsaku vil.	10 km in down wind direction	540676	6080796	88	88	88
Elektrine44	Dainaveles vil.	10 km in down wind direction	545324	6080115	100	100	100
Elektrine444	Jurzdikos vil	10 km in down wind direction	551579	6071239	100	100	100

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**

Photographic documentation of the sampling location is presented in **Annex II.**

The protocols of chemical analysis are presented in **Annex III**.

Raw data are presented in **Annex IV**.

4.5.2 Summary results of air monitoring by passive samplers for the study period from 3 November 2010 to 4 July 2011.

Table 42. Sulfur dioxide concentrations in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	Coordinates (LKS-94)		SO2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
Elektrine01	Naujuju Kietaviskiu vil.	539313	6068571	0.6	0.6	1.2	0.3	0.4	0.8	0.8	0.7
Elektrine02	Away from highway A1	542176	6073264	1.0	0.5	1.4	1.1	*0.15*	1.1	0.3	*0.15*
Elektrine03	Gabriliavos vil.	542372	6075092	1.1	0.8	1.3	0.5	0.9	1.1	*0.15*	0.3
Elektrine33	Zebertoniu vil	546011	6073279	0.6	1.2	2.1	*0.15*	1.5	1.3	0.4	0.7
Elektrine04	Karsaku vil.	539949	6081267		0.7	1.1	3.4	0.4	0.9	*0.15*	*0.15*
Elektrine44	Dainaveles vil.	545324	6080115	1.1	0.6	1.1	0.6	0.3	1.8	1.7	0.7
Elektrine444	Jurzdikos vil	544183	6083071	1.7	0.7	1.2	0.5	*0.15*	3	0.6	0.9

lost or stolen

<0.3 = n.d. half of detection limit = n.d.

Table 43. Nitrogen dioxide concentrations in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	Coordinates (LKS-94)		NO2 concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
Elektrine01	Naujuju Kietaviskiu vil.	539313	6068571	6.4	6.0	6.5	6.9	3.8	3.7	3.2	2.5
Elektrine02	Away from highway A1	542176	6073264	12.7	9.9	13.6	11.7	9.4	8.7	8.4	5.3
Elektrine03	Gabriliavos vil.	542372	6075092	7.3	7.0	8.0	7.6	4.7	6.0	5.2	2.9
Elektrine33	Zebertoniu vil	546011	6073279	8.7	8.5	9.9	8.0	6.7	8.8	7.2	4.8
Elektrine04	Karsaku vil.	539949	6081267		5.6	7.0	7.3	4.1	3.6	3.7	2.6
Elektrine44	Dainaveles vil.	545324	6080115	5.6	5.4	6.9	6.3	3.7	3.1	3.8	2.5
Elektrine444	Jurzdikos vil	544183	6083071	8.4	12.0	10.6	10.9	7.3	10.7	8.1	5.7

lost or stolen

Table 44. Benzene concentrations in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	Coordinates (LKS-94)		Benzene concentration, µg/m^3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
Elektrine01	Naujuju Kietaviskiu vil.	539313	6068571	stolen	1.60	1.7				0.4	0.7
Elektrine02	Away from highway A1	542176	6073264	0.90	1.10	1.6	1.8	1.0	0.8	0.4	0.6
Elektrine03	Gabriliavos vil.	542372	6075092	0.7	1.3	1.8	1.7	1.1	0.8	0.4	0.8
Elektrine33	Zebertoniu vil	546011	6073279	0.90	1.60	2.4	2.0	1.3	0.9	0.8	0.5
Elektrine04	Karsaku vil.	539949	6081267		1.30	1.6	1.8	1.1	0.3	0.3	0.4
Elektrine44	Dainaveles vil.	545324	6080115	0.90	1.40	1.5	1.8	1.1	1.1	0.5	1.4
Elektrine444	Jurzdikos vil	544183	6083071	1.90	1.40	1.8	1.8	1.3	1.4	0.4	1.5

4.5.3 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide and benzene concentrations in the region of "Lithuanian Power Plant"

In the region of "Lithuanian Power Plant", seven sites were chosen for the location of diffusive samplers in order to assess the distribution of average concentrations of sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and benzene (C6H6) levels around the company "Lithuanian Power Plant". The diffusive samplers were exposed at the different distances from the plant: 1) 3 km in upwind direction - Elektrine01, 2) 3 km in down wind direction - Elektrine02, 3) 5 km in down wind direction- Elektrine03, 4) 5 km in down wind direction- Elektrine33, 5) 10 km in down wind direction - Elektrine04, 6) 10 km in down wind direction- Elektrine44 and 7) 10 km in down wind direction- Elektrine444

Sulfur dioxide

Sulfur dioxide is derived from the combustion of sulfur-containing fossil fuels and is a major air pollutant in many parts of the world. At present, the predominant sources include the use of sulfur-containing fossil fuels for domestic heating as well stationary power plants. The use of tall chimneys at power plants has led to wider dispersion and dilution of sulfur dioxide.

Data presented in Table 44 show that concentrations of sulfur dioxide at all sampling sites in the region of "Lithuanian Power Plant" covered a relatively narrow range (from <0.3 $\mu g/m^3$ to 3.4 $\mu g/m^3$) and, it can be seen, that concentrations of SO_2 were significantly below the annual limit value of 20.0 $\mu g/m^3$ as well the lower assessment threshold value of 8.0 $\mu g/m^3$ during the study period from 3 November 2010 to 4 July 2011. The highest sulfur dioxide concentrations in the vicinity of power plant were measured in winter and varied between 0.8 and 2.3 $\mu g/m^3$, while in the summertime, SO_2 concentrations were in the range of <0.3 – 1.7 $\mu g/m^3$. The seasonal variation at site Elektrine01 was significantly smaller than that at sites Elektrine02, Elektrine03, Elektrine33 and particularly at Elektrine04. It shows that "Lithuanian Power Plant" is the source for the emission of SO_2, yet unsignificant at present. Low concentrations were measured upwind at site Elektrine01 and downwind at sites Elektrine44 and Elektrine444. It is very possible, that the highest concentration of SO_2 in winter at sampling site Elektrine04, located 10 km downwind from source (power plant), was due to the emmision from a local source. Fig. 56 shows spatial nearly even distribution of SO_2 concentrations in the region of "Lithuanian Power Plant".

Table 44. Statistics for the sulfur dioxide atmospheric concentrations in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	Location	SO_2 concentration, $\mu g/m^3$						
			Autumn	Winter	Spring	Summer	min	max	Mean
Elektrine01	Naujuju Kietaviškiu vil.	3 km in upwind direction	0.6	0.8	0.6	0.8	0.3	1.2	0.7
Elektrine02	Away from highway A1	3 km in down wind direction	11.3	12.7	9.1	6.9	5.3	13.6	10.0
Elektrine03	Gabriliavos vil.	5 km in down wind direction	7.2	7.8	5.4	4.1	2.9	8.0	6.1
Elektrine33	Zebertoniu vil	5 km in down wind direction	8.6	9.0	7.8	6.0	4.8	9.9	7.8

Elektrine04	Karsaku vil.	10 km in down wind direction	5.6	7.2	3.9	3.2	2.6	7.3	4.8
Elektrine44	Dainaveles vil.	10 km in down wind direction	5.5	6.6	3.4	3.2	2.5	6.9	4.7
Elektrine444	Jurzdikos vil	10 km in down wind direction	10.2	10.8	9.0	6.9	5.7	12.0	9.2

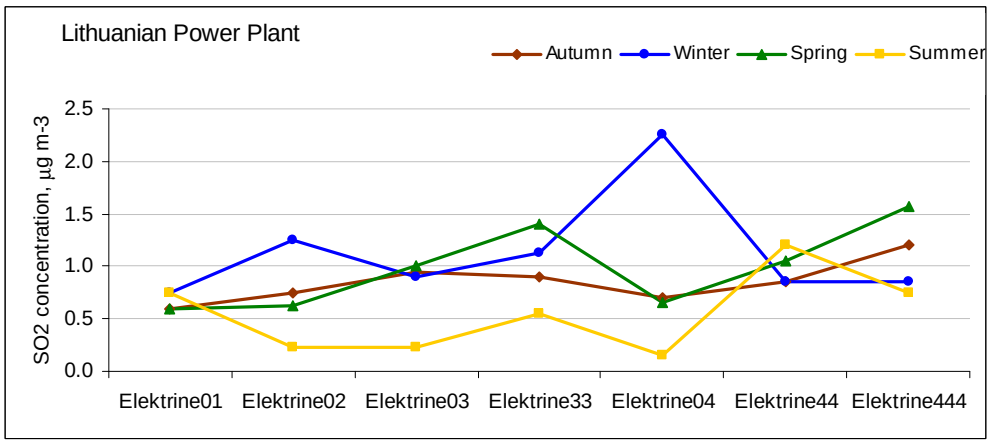


Fig. 56. Spatial distribution of seasonal mean concentrations of sulfur dioxide in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Nitrogen dioxide

Data in Table 45 show that concentrations of nitrogen dioxide at all sampling sites in the region of "Lithuanian Power Plant" were significantly below the lower assessment threshold value of 26.0 µg/m^3 and ranged from 2.5 µg/m^3 to 13.6 µg/m^3 during the study period from 3 November 2010 to 4 July 2011. The variation of NO_2 mean concentrations exhibited a seasonal pattern with a maximum in winter and a minimum in summer at all sampling sites. The data show that nitrogen dioxide concentration winter is on average 2 times higher than in summer. The lower NO_2 concentration in summer may be partly due to the destruction of NO_2 by a photochemical reaction with OH radicals because solar radiation is generally the strongest. Fig. 57 shows the spatial distribution of annual mean concentrations of nitrogen dioxide in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011. The maximum values of nitrogen dioxide concentration were measured at the sampling site Elektrine02 with annual mean of 10.0 µg/m^3 and the minimum at Elektrine01 with annual mean of 4.9 µg/m^3. The second lower annual concentration of nitrogen dioxide was found at the sampling site Elektrine44 with annual mean of 4.7 µg/m^3

Table 45. Spatial distribution of seasonal mean concentrations of nitrogen dioxide in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	NO_2 concentration, µg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Elektrine01	3 km in upwind direction	6.2	6.7	3.8	2.9	2.5	6.9	4.9
	3 km in down wind	11.3	12.7	9.1	6.9	5.3	13.6	10.0

Elektrine02	direction							
Elektrine03	5 km in down wind direction	7.2	7.8	5.4	4.1	2.9	8.0	6.1
Elektrine33	5 km in down wind direction	8.6	9.0	7.8	6.0	4.8	9.9	7.8
Elektrine04	10 km in down wind direction	5.6	7.2	3.9	3.2	2.6	7.3	4.8
Elektrine44	10 km in down wind direction	5.5	6.6	3.4	3.2	2.5	6.9	4.7
Elektrine444	10 km in down wind direction	10.2	10.8	9.0	6.9	5.7	12.0	9.2

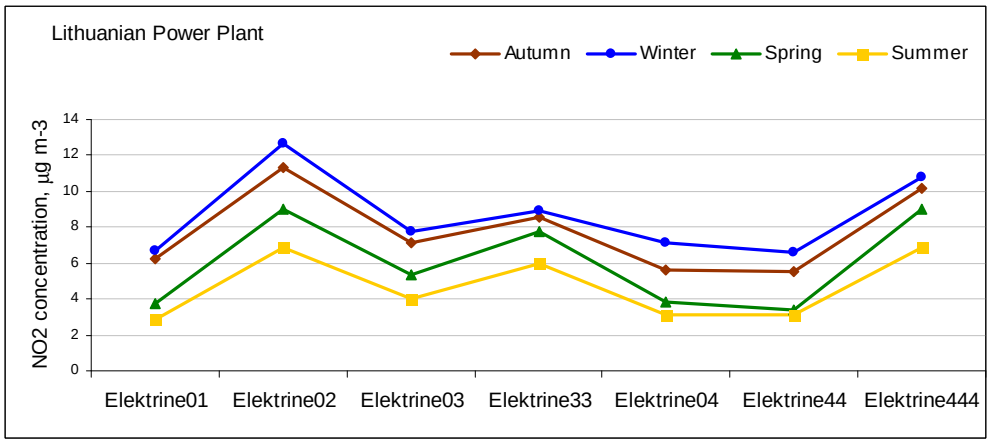


Fig. 57. Spatial distribution of seasonal mean concentrations of nitrogen dioxide in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Benzene

Data in Table 46 show that concentrations of benzene at all sampling sites in the region of "Lithuanian Power Plant" were below the limit value of 5.0 µg/m^3 and ranged from 0.4 µg/m^3 to 2.2 µg/m^3 during the study period from 3 November 2010 to 4 July 2011. Variation of NO_2 mean concentrations revealed the seasonal pattern with the maximum values in winter and minimum values in summer at all sampling sites. The highest value (2.2 µg/m^3) of benzene was measured at the sampling site Elektrinė33 located 5 km downwind from power plant in winter. Fig. 58 shows spatial even distribution of benzene concentrations in the region of "Lithuanian Power Plant". Annual mean concentrations of benzene at sampling sites in area of the power plant were in the range of 1.0 – 1.4 µg/m^3.

Table 46. Statistics for the benzene atmospheric concentrations in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Site code	Address	Benzene concentration, µg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Elektrine01	3 km in upwind direction	1.6	1.7		0.6	0.4	1.7	1.1
Elektrine02	3 km in down wind direction	1.0	1.7	0.9	0.5	0.4	1.8	1.0
Elektrine03	5 km in down wind direction	1.0	1.7	1.0	0.6	0.4	1.8	1.1
	5 km in down wind	1.3	2.2	1.1	0.6	0.5	2.4	1.3

Elektrine33	direction							
Elektrine04	10 km in down wind direction	1.3	1.7	0.7	0.4	0.3	1.8	1.0
Elektrine44	10 km in down wind direction	1.2	1.6	1.1	0.9	0.5	1.8	1.2
Elektrine444	10 km in down wind direction	1.7	1.8	1.4	0.9	0.4	1.9	1.4

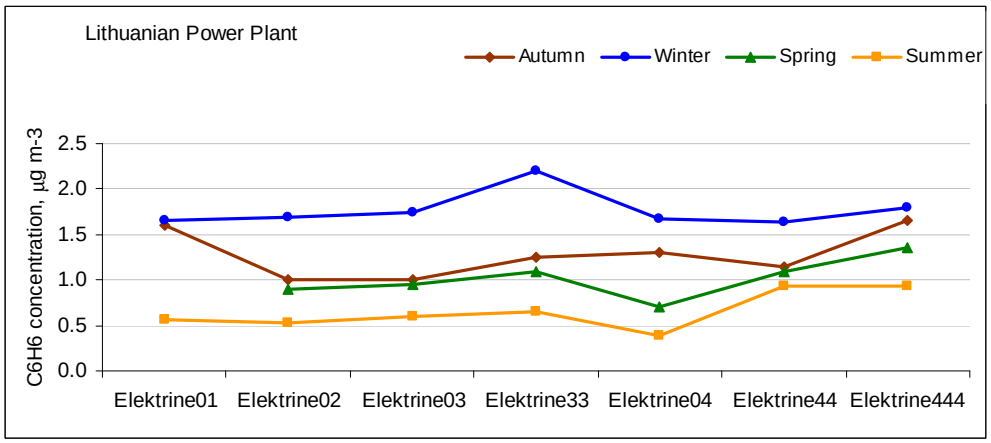


Fig. 58. Spatial distribution of seasonal mean concentrations of benzene in the region of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011.

Conclusions

1. The mean concentrations of sulfur dioxide, nitrogen dioxide and benzene around the "Lithuanian Power Plant" during the study period relatively were low and did not exceed the annual limit values aiming to protect public health.

4.6 An evaluation of the ammonia atmospheric concentrations in an area of swine farms

4.6.1 Coordinates of study places and data capture in an area of swine farms

Table 47. Data capture (%) in an area of 4 swine farms (*"-" not measured*).

Site code	Address	Coordinates (LKS-94)		Data capture, %
		X	Y	NH_3
Stock Company (SC) „Birzu bekonas" Leitiskiai vil., Birzai district		544902	6250863	
Bekonas01	50 m in upwind direction	544797	6250880	100
Bekonas02	50 m in down wind direction	544982	6250843	100
Bekonas03	100 m in down wind direction	545025	6250898	100
Bekonas04	200 m in down wind direction	545080	6250992	100
SC „Saerimner" Rupinsku swine complex Rupinsku-Malvinavo vil., Ignalina district		638858	6148144	
Rupinskai01	50 m in upwind direction	638734	6148069	100
Rupinskai02	50 m in down wind direction	638940	6148230	100
Rupinskai03	100 m in down wind direction	638975	6148231	100
Rupinskai04	200 m in down wind direction	639010	6148232	100
Agricultural Association „Vycia" Patamulselis vil., Roku sen., Kaunas district		498497	6075346	
Vycia01	50 m in upwind direction	498532	6075275	100
Vycia02	50 m in down wind direction	498648	6075377	100
Vycia03	100 m in down wind direction	498544	6075179	100
Vycia04	200 m in down wind direction	498743	6075596	100
SC „Saerimner" division 06, Juseviciai vil., Kalvarija sen.		451872	6029099	
Juseviciai01	50 m in upwind direction	453398	6028710	100
Juseviciai02	50 m in down wind direction	453779	6028811	100
Juseviciai03	100 m in down wind direction	453799	6028826	100
Juseviciai04	200 m in down wind direction	453814	6028860	100
SC "Sistem" swine complex, Ciukiskiai vil., Josvainiu sen., Kedainiai district				
Ciukiskiu km 01	50 m in upwind direction	488892	6126772	100
Ciukiskiu km 02	territory of swine farm	489486	6127107	100
Ciukiskiu km 03	territory of swine farm	489672	6127125	100
Ciukiskiu km 04	territory of swine farm	489849	6127106	100

All documentation of placement, shipping of diffusive samplers are presented in **Annex I.**

Photographic documentation of the sampling location is presented in **Annex II.**

The protocols of chemical analysis are presented in **Annex III**.

Raw data are presented in **Annex IV**.

4.6.2 Summary results of air monitoring by passive samplers for the study period from 3 November 2010 to 4 July 2011.

Table 48. Ammonia concentrations in an area of 4 swine farms for the study period from 3 November 2010 to 4 July 2011(“–“ *not measured*).

Site code	Address	Coordinates (LKS-94)		NH3 concentration, µg/m3							
		X	Y	2010.11.03-2010.11.17	2010.11.17-2010.12.01	2011.01.06-2011.01.20	2011.01.20-2011.02.03	2011.03.25-2011.04.08	2011.04.08-2011.04.22	2011.06.06-2011.06.20	2011.06.20-2011.07.04
	Stock Company (SC) „Birzu bekonas“ Leitiskiai vil., Birzai district.	544902	6250863								
Bekonas01	50 m in upwind direction	544797	6250880	9.3	29.2	22.6	3.2	14.9	14.8	23.6	27.8
Bekonas02	50 m in down wind direction	544982	6250843	11.4	12.3	12.8	24.0	15.5	29.5	23.7	27.7
Bekonas03	100 m in down wind direction	545025	6250898	13.5	10.1	14.7	31.3	33.6	49.4	36	42.6
Bekonas04	200 m in down wind direction	545080	6250992	26.1	7.2	41.5	31.4	20.1	17.1	35.1	33.5
	SC „Saerimner“ Rupinsku swine complex Rupinsku-Malvinavo vil., Ignalina district	638858	6148144								
Rupinskai01	50 m in upwind direction	638734	6148069	21.0	27.0	6.1	6.3	10.7	13.7	34	40.5
Rupinskai02	50 m in down wind direction	638940	6148230	62.0	45.7	69.8	53.5	54.6	53.4	56.2	62.5
Rupinskai03	100 m in down wind direction	638975	6148231	46.1	31.5	63.8	49.7	32.0	31.0	36.1	38.8
Rupinskai04	200 m in down wind direction	639010	6148232	11.9	18.1	34.7	27.4	16.5	18.4	15	18
	Agricultural Association „Vycia“ Patamulselis vil., Roku sen., Kaunas district	498497	6075346								
Vycia01	50 m in upwind direction	498532	6075275	6.0	3.4	0.3	1.1	–	–	–	–
Vycia02	50 m in down wind direction	498648	6075377	4.1	4.3	2.1	2.3	–	–	–	–
Vycia03	100 m in down wind direction	498544	6075179	3.2	1.2	0.1	1.4	–	–	–	–
Vycia04	200 m in down wind direction	498743	6075596	2.8	4.7	1.8	2.0	–	–	–	–
	SC „Saerimner“ division 06, Juseviciai vil., Kalvarija sen.	451872	6029099								
Juseviciai01	50 m in upwind direction	453398	6028710	15.2	25	6.1	7.7	4.0	9.9	10.3	41.5
Juseviciai02	50 m in down wind direction	453779	6028811	26.7	15.4	42.7	33.0	42.1	34.2	56.8	41.25
Juseviciai03	100 m in down wind direction	453799	6028826	21.3	21.1	14.6	29.9	30.0	25.8	43.3	36.1
Juseviciai04	200 m in down wind direction	453814	6028860	24.3	19.6	11.9	27.8	27.0	25.4	24.8	28.2

	SC "Sistem" swine complex, Ciukiskiai vil., Josvainiu sen., Kedainiai district										
Ciukiskiu km 01	50 m in upwind direction	488892	6126772	–	–	–	–	6.6	19	124.8	31.7
Ciukiskiu km 02	Territory of swine farm	489486	6127107	–	–	–	–	52.9	91.9	125.2	99.4
Ciukiskiu km 03	Territory of swine farm	489672	6127125	–	–	–	–	78.0	131.5	125.2	100.3
Ciukiskiu km 04	Territory of swine farm	489849	6127106	–	–	–	–	0.2	96.8	36.8	102.6

4.6.3 The seasonal variation of atmospheric sulfur dioxide, nitrogen dioxide and benzene concentrations in an area of 4 swine farms

Ammonia (NH_3) is a highly reactive gas that is mostly emitted into the atmosphere from agricultural sources (excreta from domestic animals and fertilizers) at or near ground level. Oceans, biomass burning and crops are also important NH_3 emission sources. It is well estimated that about 60% of the global NH_3 emission is from anthropogenic sources.

The concentrations and spatial distributions for NH_3 were measured seasonally over one year around 5 swine farms: Stock Company (SC) „Birzu bekonas“ (Leitiskiai vil., Birzai district.), SC „Saerimner“ Rupinsku swine complex (Rupinsku-Malvinavo vil., Ignalina district), Agricultural Association „Vycia“ (Patamulselis vil., Roku sen., Kaunas district), SC „Saerimner“ division 06, Juseviciai vil., Kalvarija sen.) and SC "Sistem" swine complex (Ciukiskiai vil., Josvainiu sen., Kedainiai district). Measurements of ammonia atmospheric concentrations were conducted using the diffusive samplers from 3 November 2010 to 4 July 2011. The samplers were set up at four sites at the different distances from the swine farms: 1) 50 m in upwind direction, 2) 50 m in down wind direction, 3) 100 m in down wind direction, 4) 200 m in down wind direction. The concentrations and spatial distributions for NH_3 were measured seasonally over two be-weekly periods.

There are no set air quality guidelines for ammonia atmospheric concentrations. Therefore the measured NH_3 concentrations during this study were compared with daily limit value of 40.0 $\mu g/m^3$, which is adopted by the minister of environmental protection and public health on 30 October 2000, order No. 471/582 (2000 No.100-3185, 2007 No. 67-2627).

4.6.3.1 Stock Company „Birzu bekonas“

The measured NH_3 concentrations around the Stock Company „Birzu bekonas“ were averaged over the autumn, winter, spring and summer periods (Table 49). Data indicate that seasonally mean NH_3 concentrations did not exceed air quality limit value of 40.0 $\mu g/m^3$ at all four measurement sites. However, NH_3 be-weekly concentrations were 41.5 $\mu g/m^3$ in winter during the third phase of sampling and 49.4 $\mu g/m^3$ – in spring during the six phase of sampling at site 200 m in down wind direction. In summer, NH_3 concentration of 42.6 $\mu g/m^3$ was observed in be-weekly sample during the eight phase of sampling at site 100 m in down wind direction from swine farm.

Table 49. Statistics for the ammonia atmospheric concentrations around Stock Company „Birzu bekonas“ during the study period (3 November 2010 – 4 July 2011)

Site code	Location	NH_3 concentration, $\mu g/m^3$						
		Autumn	Winter	Spring	Summer	min	max	Mean
Bekonas01	50 m in upwind direction	**19.3**	**12.9**	**14.9**	**25.7**	**3.2**	**29.2**	**18.2**
Bekonas 02	50 m in down wind direction	**11.9**	**18.4**	**22.5**	**25.7**	**11.4**	**29.5**	**19.6**
Bekonas 03	100 m in down wind direction	**11.8**	**23.0**	**41.5**	**39.3**	**10.1**	**49.4**	**28.9**
Bekonas 04	200 m in down wind direction	**16.7**	**36.5**	**18.6**	**34.3**	**7.2**	**41.5**	**26.5**

4.6.3.2 Stock Company „Saerimner“ Rupinsku swine complex

Data indicate that seasonally averaged NH_3 atmospheric concentrations around SC „Saerimner“ Rupinsku swine complex exceed air quality limit value of 40.0 $\mu g/m^3$ at measurement site 50 m downwind from the swine complex and were 53.9 $\mu g/m^3$, 61.7 $\mu g/m^3$, 54.0 $\mu g/m^3$ and 59.4 $\mu g/m^3$ in autumn, winter, spring and summer, respectively (Table 50).

The significant increase in NH_3 atmospheric concentrations were recorded in the warm period of the year. Data show that ammonia concentrations showed a tendency to gradual decrease at sites downwind from the swine complex and it value at site 200 m downwind from the swine complex was at the same level as at site 50 m in upwind direction to the swine complex.

Table 50. Statistics for the ammonia atmospheric concentrations around SC „Saerimner“ Rupinsku swine complex during the study period (3 November 2010 – 4 July 2011)

Site code	Location	NH_3 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Rupinskai01	50 m in upwind direction	24.0	6.2	12.2	37.3	6.1	40.5	19.9
Rupinskai02	50 m in down wind direction	53.9	61.7	54.0	59.4	45.7	69.8	57.2
Rupinskai03	100 m in down wind direction	38.8	56.8	31.5	37.5	31.0	63.8	41.1
Rupinskai04	200 m in down wind direction	15.0	31.1	17.5	16.5	11.9	34.7	20.0

4.6.3.3 Agricultural Association „Vycia“

The ammonia atmospheric concentrations were in the range 0.1 – 6.0 μg/m^3 (Table 51) around the swine complex of Agricultural Association „Vycia“. Averaged NH_3 atmospheric concentrations ranged from 1.5 to 3.2 μg/m^3 for the second sampling period in winter. Therefore, it was assessed to discontinue the study around this swine complex because the measured level of ammonia concentrations were not typical for intensively managed swine production. It was decided to continue the study of ammonia atmospheric concentrations around the swine complex "Sistem".

Table 51. Statistics for the ammonia atmospheric concentrations around Agricultural Association „Vycia“ swine complex during the study period (3 November 2010 – 3 February 2011)

Site code	Location	NH_3 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Vycia01	50 m in upwind direction	4.7	0.7	-	-	0.3	6.0	2.7
Vycia 02	50 m in down wind direction	4.2	2.2	-	-	2.1	4.3	3.2
Vycia 03	100 m in down wind direction	2.2	0.8	-	-	0.1	3.2	1.5
Vycia 33	200 m in down wind direction	3.8	1.9	-	-	1.8	4.7	2.8

4.6.3.4 Stock Company „Saerimner“ division 06

The annual ammonia atmospheric concentration did not reached the limit value of 40.0 μg/m^3 around the swine complex of SC „Saerimner“ division 06 (Table 52). However, be-weekly concentrations of NH_3 exceeded the limit value for NH_3 at site at site 50 m in downwind direction from the swine complex in spring and summer and were 42.7 μg/m^3, 42.1 μg/m^3, 56.6 μg/m^3 and 41,3 μg/m^3, respectively, during the third, fifth, seventh and eight phase of sampling. In summer, be-weekly concentrations of NH_3 were 36.1 μg/m^3 and 43.3 μg/m^3 at the site 100 m in downwind direction from the swine complex. Spatial distribution of NH_3 atmospheric concentration indicates that NH_3 concentrations, which were measured at sites in downwind direction from the swine complex, were 1.6–2.4 times higher than those at site in upwind direction to the swine complex.

Table 52. Statistics for the ammonia atmospheric concentrations around SC „Saerimner“ division 06 swine complex during the study period (3 November 2010 – 4 July 2011)

Site code	Location	NH_3 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Juseviciai01	50 m in upwind direction	20.1	6.9	7.0	25.9	4.0	41.5	15.0
Juseviciai02	50 m in down wind direction	21.1	37.9	38.2	49.0	15.4	56.8	36.5
Juseviciai03	100 m in down wind direction	21.2	22.3	27.9	39.7	14.6	43.3	27.8
Juseviciai04	200 m in down wind direction	22.0	19.9	26.2	26.5	11.9	28.2	23.6

4.6.3.5 SC "Sistem" swine complex

The results indicate, that during two seasons (25 March – 4 July 2011), atmospheric mean concentration of ammonia varied between 48.5 and 112.8 μg/m^3 at sampling sites in downwind direction from this swine complex (Table 53). Increased concentrations were recorded in summer downwind from the source region. Spatial distribution of NH_3 atmospheric concentration indicates that NH_3 atmospheric concentrations measured at sites in downwind direction from the swine complex were 1.3–2.4 times higher than those at site in upwind direction to the swine complex.

Table 53. Statistics for the ammonia atmospheric concentrations around SC "Sistem" swine complex during the study period (25 March – 4 July 2011)

Site code	Location	NH_3 concentration, μg/m^3						
		Autumn	Winter	Spring	Summer	min	max	Mean
Ciukiskiu km 01	50 m in upwind direction	-	-	12.8	78.3	6.6	124.8	45.5
Ciukiskiu km 02	Territory of swine farm	-	-	72.4	112.3	52.9	125.2	92.4
Ciukiskiu km 03	Territory of swine farm	-	-	104.8	112.8	78.0	131.5	108.8
Ciukiskiu km 04	Territory of swine farm	-	-	48.5	69.7	0.2	102.6	59.1

Conclusions

1. The mean annual concentrations of ammonia around the swine Stock Company „Birzu bekonas“ during the study period did not exceed the limit value of 40.0 μg/m^3. However, the exceedances of the limit value occurred in the be-weekly samples.
2. The mean concentrations of ammonia around the swine Stock Company „Saerimner“ Rupinsku exceeded the limit value of 40.0 μg/m^3 at site 50 m in downwind direction from farm during the autumn, winter, spring and summer and, respectively, were 53.9 μg/m^3, 61.7 μg/m^3, 54.0 μg/m^3 and 59.4 μg/m^3.
3. The mean annual concentrations of ammonia around the swine SC „Saerimner“ division 06 during the study period did not reached the limit value. However, the exceedances of the limit value occurred in be-weekly samples at site 50 m in downwind direction from the swine complex in spring and summer and were 42.7 μg/m^3, 42.1 μg/m^3, 56.6 μg/m^3 and 41.3 μg/m^3, respectively, during the third, fifth, seventh and eight measurement periods.
4. The atmospheric concentrations of ammonia around the SC "Sistem" swine complex in be-weekly samples exceeded the limit value 2 – 3 times during study period (25 March – 4 July 2011). The concentrations of NH_3 in ambient air at sites in downwind direction from the swine complex were 1.3–2.4 times higher than those at site in upwind direction to the swine complex.

4.7 Annual mean concentrations of atmospheric pollutants and maps of annual concentrations distribution of these pollutants.

4.7.1 Annual mean concentrations of pollutants in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011.

Table 54. Annual mean concentrations of pollutants (μg/m^3) in Vilnius agglomeration for the study period from 3 November 2010 to 4 July 2011 (*"-" not measured*)..

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3))		
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene
VILNIUS01	583758	6063283	2010.11.03–2011.07.04	-	20.2	1.5
VILNIUS02	584763	6064354	2010.11.03–2011.07.04	-	22.3	-
VILNIUS03	588156	6066315	2010.11.03–2011.07.04	1.10	10.2	-
VILNIUS04	583365	6068074	2010.11.03–2011.07.04	-	11.7	1.9
VILNIUS05	583080	6065084	2010.11.03–2011.07.04	-	37.7	-
VILNIUS06	581970	6068079	2010.11.03–2011.07.04	1.08	16.0	-
VILNIUS07	580681	6066187	2010.11.03–2011.07.04	-	19.1	1.5
VILNIUS08	579739	6066697	2010.11.03–2011.07.04	-	31.0	-
VILNIUS09	582959	6060975	2010.11.03–2011.07.04	1.79	34.4	1.8
VILNIUS10	582796	6060109	2010.11.03–2011.07.04	-	42.1	-
VILNIUS11	581960	6059972	2010.11.03–2011.07.04	0.96	45.6	1.9
VILNIUS12	582010	6059221	2010.11.03–2011.07.04	1.27	22.6	-
VILNIUS13	582415	6058371	2010.11.03–2011.07.04	-	52.7	2.1
VILNIUS14	584931	6060496	2010.11.03–2011.07.04	-	16.0	-
VILNIUS15	591991	6062292	2010.11.03–2011.07.04	1.60	12.9	1.7
VILNIUS16	583063	6061719	2010.11.03–2011.07.04	-	25.5	-
VILNIUS17	582512	6062879	2010.11.03–2011.07.04	0.69	29.3	-
VILNIUS18	581427	6063545	2010.11.03–2011.07.04	-	55.6	2.3
VILNIUS19	580579	6063083	2010.11.03–2011.07.04	1.41	30.4	-
VILNIUS20	581758	6061964	2010.11.03–2011.07.04	-	54.5	2.3
VILNIUS21	580262	6060396	2010.11.03–2011.07.04	0.77	22.6	-
VILNIUS22	579704	6061515	2010.11.03–2011.07.04	1.07	13.3	-
VILNIUS23	577147	6060074	2010.11.03–2011.07.04	-	26.7	1.4
VILNIUS24	577530	6060653	2010.11.03–2011.07.04	1.11	17.5	-
VILNIUS25	577926	6062234	2010.11.03–2011.07.04	-	20.4	-
VILNIUS26	575873	6064366	2010.11.03–2011.07.04	-	13.1	1.8
VILNIUS27	578885	6063708	2010.11.03–2011.07.04	0.76	40.0	-
VILNIUS28	578896	6065447	2010.11.03–2011.07.04	-	16.6	1.6
VILNIUS29	577304	6068799	2010.11.03–2011.07.04	1.34	9.1	-
VILNIUS30	580925	6064834	2010.11.03–2011.07.04	-	29.3	1.7
VILNIUS31	578744	6060775	2010.11.03–2011.07.04	1.04	43.3	-
VILNIUS32	578744	6060775	2010.11.03–2011.07.04	-	20.3	1.6
VILNIUS33	574710	6058627	2010.11.03–2011.07.04	1.08	30.1	-
VILNIUS34	583365	6068074	2010.11.03–2011.07.04	-	10.3	-
VILNIUS35	577762	6049785	2010.11.03–2011.07.04	-	11.2	1.5

4.7.2 Annual mean concentrations of pollutants in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011.

Table 55. Annual mean concentrations of pollutants (μg/m^3) in Kaunas agglomeration for the study period from 3 November 2010 to 4 July 2011 (*"-" not measured*)..

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3)		
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene
KAUNAS01	492623	6088847	2010.11.03–2011.07.04	1.81	30.7	-
KAUNAS02	492615	6090103	2010.11.03–2011.07.04	-	26.6	2.5
KAUNAS03	496331	6088790	2010.11.03–2011.07.04	0.96	46.8	-
KAUNAS04	502034	6089967	2010.11.03–2011.07.04	-	11.2	2.1
KAUNAS05	488393	6088343	2010.11.03–2011.07.04	0.93	16.3	-
KAUNAS06	490165	6087262	2010.11.03–2011.07.04	-	28.5	1.5
KAUNAS07	491938	6088081	2010.11.03–2011.07.04	0.77	18.6	-
KAUNAS08	494000	6088000	2010.11.03–2011.07.04	-	21.4	-
KAUNAS09	495956	6087875	2010.11.03–2011.07.04	-	18.3	1.7
KAUNAS10	498130	6088176	2010.11.03–2011.07.04	0.88	28.4	-
KAUNAS11	500160	6088074	2010.11.03–2011.07.04	-	19.5	1.5
KAUNAS12	503927	6087804	2010.11.03–2011.07.04	-	31.5	-
KAUNAS13	487939	6086031	2010.11.03–2011.07.04	0.79	8.7	-
KAUNAS14	489996	6085770	2010.11.03–2011.07.04	-	15.4	1.7
KAUNAS15	492014	6085948	2010.11.03–2011.07.04	-	25.8	2.6
KAUNAS16	493964	6085815	2010.11.03–2011.07.04	0.83	25.0	-
KAUNAS17	495997	6086351	2010.11.03–2011.07.04	-	22.0	-
KAUNAS18	498051	6085969	2010.11.03–2011.07.04	-	16.8	1.6
KAUNAS19	500051	6086253	2010.11.03–2011.07.04	0.94	15.4	-
KAUNAS20	502155	6085972	2010.11.03–2011.07.04	-	19.1	1.9
KAUNAS21	492937	6086262	2010.11.03–2011.07.04	-	24.0	-
KAUNAS22	491351	6084691	2010.11.03–2011.07.04	1.14	14.8	-
KAUNAS23	491986	6084074	2010.11.03–2011.07.04	-	12.8	1.7
KAUNAS24	494479	6084259	2010.11.03–2011.07.04	-	26.9	1.9
KAUNAS25	495467	6083510	2010.11.03–2011.07.04	1.26	41.1	-
KAUNAS26	497805	6085005	2010.11.03–2011.07.04	-	24.3	1.9
KAUNAS27	500078	6084015	2010.11.03–2011.07.04	0.85	26.4	2.3
KAUNAS28	491995	6081984	2010.11.03–2011.07.04	-	14.9	-
KAUNAS29	493827	6082050	2010.11.03–2011.07.04	0.91	15.2	-
KAUNAS30	496006	6081911	2010.11.03–2011.07.04	-	27.2	-
KAUNAS31	497951	6082027	2010.11.03–2011.07.04	0.99	11.9	1.8
KAUNAS32	499916	6081980	2010.11.03–2011.07.04	0.97	19.9	-
KAUNAS33	496325	6079938	2010.11.03–2011.07.04	-	15.4	1.7
KAUNAS34	498391	6080481	2010.11.03–2011.07.04	-	11.7	-
KAUNAS35	501601	6079204	2010.11.03–2011.07.04	0.79	12.0	-

4.7.3 Annual mean concentrations of pollutants in Zone for the study period from 3 November 2010 to 4 July 2011.

Table 56. Annual mean concentrations of pollutants (μg/m^3) in zone for the study period from 3 November 2010 to 4 July 2011 (*"-" not measured*).

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3)		
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene
KLAIPEDA01	317356	6181537	2010.11.03–2011.07.04	0.91	-	1.47
KLAIPEDA02	319434	6181140	2010.11.03–2011.07.04	1.01	30.8	1.61
KLAIPEDA03	319756	6180136	2010.11.03–2011.07.04	0.93	24.1	1.94
KLAIPEDA04	322484	6176444	2010.11.03–2011.07.04		44.6	-
KLAIPEDA05	318437	6180451	2010.11.03–2011.07.04	1.29	20.2	1.95
KLAIPEDA06	320418	6179292	2010.11.03–2011.07.04	-	24.8	-
KLAIPEDA07	323146	6174130	2010.11.03–2011.07.04	-	26.8	1.36
KLAIPEDA08	320004	6178668	2010.11.03–2011.07.04	0.89	30.1	1.34
KLAIPEDA09	319612	6179416	2010.11.03–2011.07.04	1.24	44.6	-
KLAIPEDA10	320946	6176889	2010.11.03–2011.07.04	-	24.4	1.42
KLAIPEDA11	320937	6175175	2010.11.03–2011.07.04	1.39	50.5	-
KLAIPEDA12	323159	6175127	2010.11.03–2011.07.04	0.79	34.7	1.45
PANEVEZYS01	522977	6176841	2010.11.03–2011.07.04	1.49	27.3	1.88
PANEVEZYS02	520298	6177592	2010.11.03–2011.07.04	-	12.0	1.30
PANEVEZYS03	522818	6177223	2010.11.03–2011.07.04	-	16.9	1.59
PANEVEZYS04	520468	6178607	2010.11.03–2011.07.04	-	19.0	1.63
PANEVEZYS05	520411	6179265	2010.11.03–2011.07.04	1.19	13.8	
PANEVEZYS06	522728	617900	2010.11.03–2011.07.04	0.90	12.8	3.20
PANEVEZYS07	523598	6176706	2010.11.03–2011.07.04	-	13.9	2.01
PANEVEZYS08	520088	6175197	2010.11.03–2011.07.04	0.70	9.9	-
PANEVEZYS09	525040	6175873	2010.11.03–2011.07.04	0.81	-	1.86
PANEVEZYS10	525743	6177700	2010.11.03–2011.07.04	1.28	9.7	-
PANEVEZYS11	524838	6179646	2010.11.03–2011.07.04	0.81	10.8	-
PANEVEZYS12	521653	6178724	2010.11.03–2011.07.04	1.29	19.5	2.16
SIAULIAI01	458612	6199957	2010.11.03–2011.07.04	2.12	9.1	-
SIAULIAI02	457379	6200069	2010.11.03–2011.07.04	-	33.9	1.75
SIAULIAI03	455927	6200651	2010.11.03–2011.07.04	-	13.5	-
SIAULIAI04	459807	6202377	2010.11.03–2011.07.04	0.69	19.2	1.78
SIAULIAI05	458435	6202358	2010.11.03–2011.07.04	1.81	20.9	-
SIAULIAI06	456048	6202293	2010.11.03–2011.07.04	0.86	11.1	2.59
SIAULIAI07	453918	6198085	2010.11.03–2011.07.04	1.01	23.8	-
SIAULIAI08	455323	6193355	2010.11.03–2011.07.04		31.9	1.73
SIAULIAI09	456720	6198676	2010.11.03–2011.07.04	1.04		2.08
SIAULIAI10	457398	6197424	2010.11.03–2011.07.04	2.00	26.0	1.96
SIAULIAI11	458564	6197330	2010.11.03–2011.07.04	0.80	12.0	2.48
SIAULIAI12	460338	6197599	2010.11.03–2011.07.04	1.57	7.9	1.31
ALYTUS01	501105	6031759	2010.11.03–2011.07.04	1.53	11.7	1.46
ALYTUS02	500959	6028806	2010.11.03–2011.07.04	1.20	9.4	1.48
ALYTUS03	502507	6028699	2010.11.03–2011.07.04	1.32	19.7	2.06
ALYTUS04	502481	6027689	2010.11.03–2011.07.04	1.21	20.3	2.00
ALYTUS05	500741	6030624	2010.11.03–2011.07.04	-	19.5	1.60
ANYKSCIAI01	569750	6155073	2010.11.03–2011.07.04	0.85	14.7	1.71
ANYKSCIAI02	570383	6154900	2010.11.03–2011.07.04	2.35	10.3	1.67
ANYKSCIAI03	570224	6155363	2010.11.03–2011.07.04	2.09	7.1	1.57
BIRZAI01	55760	6230044	2010.11.03–2011.07.04	0.84	9.7	2.10
BIRZAI02	547187	6229695	2010.11.03–2011.07.04	0.96	8.6	2.30
BIRZAI03	546908	6230479	2010.11.03–2011.07.04	1.40	6.5	1.47
DRUSKININKAI01	498072	5986666	2010.11.03–2011.07.04	1.68	11.1	1.50
DRUSKININKAI02	499530	5985856	2010.11.03–2011.07.04	1.19	18.4	1.93
DRUSKININKAI03	497901	5987822	2010.11.03–2011.07.04	1.38	4.2	1.59
ELEKTRENAI01	543513	6072650	2010.11.03–2011.07.04	0.74	11.2	1.31
ELEKTRENAI02	542208	6071913	2010.11.03–2011.07.04	0.89	7.6	1.25
ELEKTRENAI03	543165	6072363	2010.11.03–2011.07.04	0.93	14.8	1.38
GARGZDAI01	336544	6178116	2010.11.03–2011.07.04	0.83	13.9	1.69
GARGZDAI02	336199	6176738	2010.11.03–2011.07.04	0.88	8.0	2.04
GARGZDAI03	337262	6178840	2010.11.03–2011.07.04	1.11	8.3	1.51
GARLIAVA01	491907	6075767	2010.11.03–2011.07.04	1.03	21.1	3.04
GARLIAVA02	491902	6077928	2010.11.03–2011.07.04	0.75	12.5	2.20
GARLIAVA03	493517	6076708	2010.11.03–2011.07.04	1.03	10.5	1.45
GRIGISKES01	570551	6060175	2010.11.03–2011.07.04	1.03	40.3	1.85
GRIGISKES02	570768	6059352	2010.11.03–2011.07.04	0.86	8.2	1.33
GRIGISKES03	569660	6061180	2010.11.03–2011.07.04	1.03	9.2	1.25
IGNALINA01	637268	6135970	2010.11.03–2011.07.04	0.88	12.7	1.44
IGNALINA02	637639	6135044	2010.11.03–2011.07.04	0.89	8.5	1.33

IGNALINA03	638065	6136145	2010.11.03–2011.07.04	0.84	5.7	1.56
JONAVA01	517864	6104172	2010.11.03–2011.07.04	0.98	28.3	1.78
JONAVA02	520066	6104559	2010.11.03–2011.07.04	0.73	10.3	1.39
JONAVA03	517111	6104606	2010.11.03–2011.07.04	1.71	9.4	1.36
JONISKIS01	476252	6234371	2010.11.03–2011.07.04	0.68	17.1	1.92
JONISKIS02	476336	6232886	2010.11.03–2011.07.04	0.70	6.9	1.48
JONISKIS03	475194	6234842	2010.11.03–2011.07.04	0.71	6.4	1.50
JURBARKAS01	421550	6105388	2010.11.03–2011.07.04	0.59	19.9	2.44
JURBARKAS02	420104	6104683	2010.11.03–2011.07.04	1.25	6.4	1.43
JURBARKAS03	420464	6105578	2010.11.03–2011.07.04	0.84	6.6	1.40
KAISIADORYS01	529295	6080725	2010.11.03–2011.07.04	0.91	13.1	1.58
KAISIADORYS02	529928	6081486	2010.11.03–2011.07.04	0.96	8.9	1.99
KAISIADORYS03	527506	6080785	2010.11.03–2011.07.04	1.00	6.6	1.28
KALVARIJA01	449850	6031119	2010.11.03–2011.07.04	1.90	13.5	1.93
KALVARIJA02	449284	6031771	2010.11.03–2011.07.04	1.31	10.6	1.82
KALVARIJA03	448659	6031042	2010.11.03–2011.07.04	1.24	11.2	1.33
KAZLU RUDA01	467619	6068546	2010.11.03–2011.07.04	1.16	11.2	1.99
KAZLU RUDA02	466796	6068741	2010.11.03–2011.07.04	1.23	9.3	1.88
KAZLU RUDA03	467613	6067755	2010.11.03–2011.07.04	1.49	10.9	1.50
KEDAINIAI01	498731	6127025	2010.11.03–2011.07.04	0.91	12.4	1.47
KEDAINIAI02	499694	6128749	2010.11.03–2011.07.04	0.87	11.3	2.05
KEDAINIAI03	498358	6128078	2010.11.03–2011.07.04	0.93	31.7	2.32
KELME01	432882	6166778	2010.11.03–2011.07.04	-	23.3	2.43
KELME02	433687	6165589	2010.11.03–2011.07.04	0.86	8.9	1.69
KELME03	433150	6167648	2010.11.03–2011.07.04	0.73	5.5	1.56
KRETINGA01	327453	6198340	2010.11.03–2011.07.04	1.11	17.1	2.01
KRETINGA02	326918	6197661	2010.11.03–2011.07.04	2.11	8.5	2.07
KRETINGA03	328177	6199537	2010.11.03–2011.07.04	1.20	8.8	1.79
KUPISKIS01	561136	6189987	2010.11.03–2011.07.04	2.07	16.1	2.15
KUPISKIS02	562418	6188987	2010.11.03–2011.07.04	0.80	7.7	1.27
KUPISKIS03	560962	6190603	2010.11.03–2011.07.04	1.57	4.8	1.38
KURSENAI01	433829	6208758	2010.11.03–2011.07.04	1.24	16.2	2.41
KURSENAI02	434399	6206864	2010.11.03–2011.07.04	0.67	12.8	1.80
KURSENAI03	433353	6207866	2010.11.03–2011.07.04	0.68	10.3	1.47
KYBARTAI01	421185	6056084	2010.11.03–2011.07.04	1.54	13.3	1.61
KYBARTAI02	419802	6057354	2010.11.03–2011.07.04	1.70	10.3	1.91
KYBARTAI03	420321	6056179	2010.11.03–2011.07.04	2.58	10.0	2.26
LAZDIJAI01	468376	6011044	2010.11.03–2011.07.04	1.73	12.2	1.99
LAZDIJAI02	469108	6010510	2010.11.03–2011.07.04	1.52	8.0	1.52
LAZDIJAI03	467888	6008769	2010.11.03–2011.07.04	1.21	5.5	1.41
LENTVARIS01	567994	6056942	2010.11.03–2011.07.04	1.23	18.4	2.08
LENTVARIS02	567357	6056391	2010.11.03–2011.07.04	1.56	10.6	2.50
LENTVARIS03	567006	6058501	2010.11.03–2011.07.04	0.79	7.6	1.35
MARIJAMPOLE01	458278	6046875	2010.11.03–2011.07.04	-	24.2	2.16
MARIJAMPOLE02	459492	6047161	2010.11.03–2011.07.04	1.80	15.7	2.56
MARIJAMPOLE03	458048	6045276	2010.11.03–2011.07.04	1.96	11.9	1.95
MARIJAMPOLE04	460094	6049221	2010.11.03–2011.07.04	1.39	17.3	1.50
MARIJAMPOLE05	458424	6049301	2010.11.03–2011.07.04	2.42	-	-
MAZEIKIAI01	397648	6243360	2010.11.03–2011.07.04	0.69	17.4	2.03
MAZEIKIAI02	397138	6242374	2010.11.03–2011.07.04	1.58	27.4	1.80
MAZEIKIAI03	395905	6243888	2010.11.03–2011.07.04	1.09	16.5	1.67
MOLETAI01	590287	6122720	2010.11.03–2011.07.04	0.87	13.4	2.09
MOLETAI02	589813	6121936	2010.11.03–2011.07.04	1.09	9.1	1.39
MOLETAI03	591063	6122567	2010.11.03–2011.07.04	0.60	5.7	1.95
N AKMENE01	430823	6243672	2010.11.03–2011.07.04	1.61	11.4	1.40
N AKMENE02	431849	6243134	2010.11.03–2011.07.04	0.79	6.4	1.71
N AKMENE03	430365	6243947	2010.11.03–2011.07.04	0.62	8.0	2.35
NEMENCINE01	594112	6079969	2010.11.03–2011.07.04	0.70	12.6	1.72
NEMENCINE02	594522	6079708	2010.11.03–2011.07.04	1.29	8.1	1.77
NEMENCINE03	593881	6080176	2010.11.03–2011.07.04	1.83	9.2	1.75
PABRADE01	613273	6095443	2010.11.03–2011.07.04	1.21	16.2	2.02
PABRADE02	612180	6095543	2010.11.03–2011.07.04	1.57	6.1	1.28
PABRADE03	613183	6094800	2010.11.03–2011.07.04	0.67	6.8	1.77
PAKRUOJIS01	491076	6205127	2010.11.03–2011.07.04	0.69	13.2	1.75
PAKRUOJIS02	490425	6204644	2010.11.03–2011.07.04	1.74	8.2	2.22
PAKRUOJIS03	490659	6205559	2010.11.03–2011.07.04	1.01	9.8	2.15
PALANGA01	316940	6201970	2010.11.03–2011.07.04	0.91	17.2	1.53
PALANGA02	317902	6202273	2010.11.03–2011.07.04	1.05	12.8	1.46
PALANGA03	316128	6202122	2010.11.03–2011.07.04	0.68	7.3	1.37
PASVALYS01	525116	6213980	2010.11.03–2011.07.04	1.65	16.5	2.42
PASVALYS02	525906	6214670	2010.11.03–2011.07.04	0.56	11.5	1.97
PASVALYS03	524218	6214718	2010.11.03–2011.07.04	0.85	9.0	1.45
PLUNGE01	365373	6199726	2010.11.03–2011.07.04	1.07	26.7	2.48
PLUNGE02	365775	6198557	2010.11.03–2011.07.04	1.08	8.9	2.44
PLUNGE03	365228	6200559	2010.11.03–2011.07.04	1.34	13.1	1.56
PRIENAI01	496445	6055839	2010.11.03–2011.07.04	0.84	12.4	2.05
PRIENAI02	496923	6056783	2010.11.03–2011.07.04	1.24	9.2	1.64
PRIENAI03	496593	6054813	2010.11.03–2011.07.04	1.11	9.9	2.20

RADVILISKIS01	471591	6186580	2010.11.03–2011.07.04	1.05	20.8	1.91
RADVILISKIS02	470380	6187426	2010.11.03–2011.07.04	0.79	12.5	1.60
RADVILISKIS03	470973	6185949	2010.11.03–2011.07.04	1.10	16.0	1.57
RASEINIAI01	443808	6138665	2010.11.03–2011.07.04	0.91	16.5	2.19
RASEINIAI02	445048	6137865	2010.11.03–2011.07.04	0.88	8.5	2.60
RASEINIAI03	444609	6139532	2010.11.03–2011.07.04	0.79	8.2	1.67
ROKISKIS01	599289	6202848	2010.11.03–2011.07.04	1.01	17.8	1.43
ROKISKIS02	598633	6203755	2010.11.03–2011.07.04	0.84	9.4	2.25
ROKISKIS03	599219	6204530	2010.11.03–2011.07.04	1.34	13.6	2.31
SAKIAI01	438310	6091371	2010.11.03–2011.07.04	1.31	10.0	1.70
SAKIAI02	438440	6090614	2010.11.03–2011.07.04	1.21	7.2	1.59
SAKIAI03	438787	6091553	2010.11.03–2011.07.04	1.32	8.9	1.64
SALCININKAI01	590076	6019702	2010.11.03–2011.07.04	0.97	16.3	2.34
SALCININKAI02	590885	6020330	2010.11.03–2011.07.04	1.06	6.9	1.89
SALCININKAI03	590850	6019410	2010.11.03–2011.07.04	1.14	7.1	1.74
SILALE01	385094	6152233	2010.11.03–2011.07.04	0.79	11.6	1.95
SILALE02	385610	6151648	2010.11.03–2011.07.04	0.84	8.8	1.27
SILALE03	384588	6151845	2010.11.03–2011.07.04	1.09	7.3	1.40
SILUTE01	339294	6137016	2010.11.03–2011.07.04	0.76	18.9	1.88
SILUTE02	340054	6137714	2010.11.03–2011.07.04	0.79	14.4	2.09
SILUTE03	340797	6136362	2010.11.03–2011.07.04	1.26	7.0	1.49
SIRVINTOS01	561915	6100023	2010.11.03–2011.07.04	0.79	8.1	1.54
SIRVINTOS02	560582	6101375	2010.11.03–2011.07.04	1.83	8.6	1.38
SIRVINTOS03	561286	6100805	2010.11.03–2011.07.04	0.75	6.5	1.47
SKUODAS01	347054	6240123	2010.11.03–2011.07.04	1.36	18.1	1.89
SKUODAS02	346964	6240461	2010.11.03–2011.07.04	1.33	8.6	1.78
SKUODAS03	347681	6240032	2010.11.03–2011.07.04	0.86	10.1	1.56
SVENCIONELIAI01	627258	6116083	2010.11.03–2011.07.04	0.77	11.7	1.81
SVENCIONELIAI02	628095	6117835	2010.11.03–2011.07.04	0.78	6.7	2.01
SVENCIONELIAI03	626857	6114407	2010.11.03–2011.07.04	1.13	3.9	1.24
SVENCIONYS01	637700	6113686	2010.11.03–2011.07.04	0.92	11.7	1.44
SVENCIONYS02	637814	6112290	2010.11.03–2011.07.04	0.82	5.7	1.70
SVENCIONYS03	638463	6112618	2010.11.03–2011.07.04	1.01	6.1	1.19
TAURAGE01	391422	6125855	2010.11.03–2011.07.04	0.99	34.4	3.08
TAURAGE02	391009	6124468	2010.11.03–2011.07.04	2.12	14.2	2.61
TAURAGE03	391404	6126893	2010.11.03–2011.07.04	0.93	11.2	3.37
TELSIAI01	390822	6206865	2010.11.03–2011.07.04	1.24	28.1	2.66
TELSIAI02	391253	6207678	2010.11.03–2011.07.04	1.23	10.5	2.18
TELSIAI03	390399	6205322	2010.11.03–2011.07.04	0.83	4.8	1.37
TRAKAI01	560350	6055510	2010.11.03–2011.07.04	0.81	26.8	1.78
TRAKAI02	560464	6056382	2010.11.03–2011.07.04	0.83	8.1	1.51
TRAKAI03	559692	6057525	2010.11.03–2011.07.04	0.76	7.6	1.47
UKMERGE01	548658	6124135	2010.11.03–2011.07.04	0.69	17.4	2.11
UKMERGE02	547745	6124320	2010.11.03–2011.07.04	0.95	8.4	1.78
UKMERGE03	549809	6123631	2010.11.03–2011.07.04	1.40	10.9	1.88
UTENA01	601284	6152751	2010.11.03–2011.07.04	0.69	26.7	2.17
UTENA02	601222	6153609	2010.11.03–2011.07.04	0.68	8.9	1.43
UTENA03	601211	6152092	2010.11.03–2011.07.04	1.59	10.9	2.49
VARENA01	537113	6008500	2010.11.03–2011.07.04	1.24	11.8	1.78
VARENA02	537547	6009036	2010.11.03–2011.07.04	1.09	8.2	1.70
VARENA03	538496	6009306	2010.11.03–2011.07.04	0.83	11.4	1.48
VIEVIS01	552637	6070998	2010.11.03–2011.07.04	0.78	33.5	1.63
VIEVIS02	552096	6071491	2010.11.03–2011.07.04	0.79	13.5	1.44
VIEVIS03	553120	6070240	2010.11.03–2011.07.04	0.77	7.4	1.27
VILKAVISKIS01	438061	6057325	2010.11.03–2011.07.04	2.31	14.6	2.17
VILKAVISKIS02	437860	6058369	2010.11.03–2011.07.04	1.64	10.4	1.72
VILKAVISKIS03	438396	6056739	2010.11.03–2011.07.04	1.32	9.9	2.05
VISAGINAS01	657720	6048875	2010.11.03–2011.07.04	0.89	11.3	1.07
VISAGINAS02	654198	6164025	2010.11.03–2011.07.04	1.18	9.3	1.07
VISAGINAS03	652531	6165080	2010.11.03–2011.07.04	1.38	4.2	1.03
ZARASAI01	641050	6179639	2010.11.03–2011.07.04	0.65	12.6	1.31
ZARASAI02	642143	6180479	2010.11.03–2011.07.04	0.73	8.1	1.10
ZARASAI03	641058	6180594	2010.11.03–2011.07.04	0.94	6.8	2.52

4.7.4 Annual mean concentrations of pollutants in EMEP network for the study period from 3 November 2010 to 4 July 2011.

Table 57. Annual mean concentrations of pollutants (μg/m^3) in EMEP network for the study period from 3 November 2010 to 4 July 2011 ("-" *not measured*).

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3)			
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene	Ozone
F01	315797	6201542	2010.11.03–2011.07.04	1.07	5.60	0.91	90.82
F02	315234	6151396	2010.11.03–2011.07.04	0.73	3.46	0.85	76.49
F03	349696	6243766	2010.11.03–2011.07.04	1.04	4.80	0.99	-
F04	350653	6201082	2010.11.03–2011.07.04	1.27	4.90	1.14	-
F05	350039	6151220	2010.11.03–2011.07.04	2.49	3.95	1.04	89.05
F06	349828	6119708	2010.11.03–2011.07.04	1.27	4.09	0.95	89.89
F07	399906	6251421	2010.11.03–2011.07.04	1.23	3.78	1.02	99.75
F08	400442	6201521	2010.11.03–2011.07.04	0.80	2.71	0.87	-
F09	399270	6150730	2010.11.03–2011.07.04	1.01	4.35	1.02	-
F10	400905	6103082	2010.11.03–2011.07.04	0.90	3.69	1.19	75.02
F11	416789	6050287	2010.11.03–2011.07.04	1.50	5.06	1.28	96.12
F12	450360	9248516	2010.11.03–2011.07.04	1.04	3.37	0.66	-
F13	450502	6201993	2010.11.03–2011.07.04	0.85	4.74	0.96	99.10
F14	449515	6150737	2010.11.03–2011.07.04	1.39	3.19	1.13	85.70
F15	449298	6100660	2010.11.03–2011.07.04	1.65	4.34	1.18	-
F16	449981	6051213	2010.11.03–2011.07.04	1.51	9.41	1.26	-
F17	449843	6014461	2010.11.03–2011.07.04	1.07	4.30	1.22	66.07
F18	467502	6001386	2010.11.03–2011.07.04	1.62	5.28	1.28	-
F19	499629	6243384	2010.11.03–2011.07.04	0.84	3.49	0.78	86.05
F20	499970	6200538	2010.11.03–2011.07.04	1.02	5.90	1.36	-
F21	499592	6150648	2010.11.03–2011.07.04	0.69	4.23	1.11	-
F22	500473	6101285	2010.11.03–2011.07.04	1.14	6.23	1.24	94.63
F23	497767	6052494	2010.11.03–2011.07.04	0.90	4.00	1.02	44.97
F24	500366	6000994	2010.11.03–2011.07.04	1.43	3.25	1.04	-
F25	499846	5977219	2010.11.03–2011.07.04	1.44	3.28	1.13	66.20
F26	550166	6249352	2010.11.03–2011.07.04	0.79	3.23	1.13	-
F27	548693	6201603	2010.11.03–2011.07.04	1.41	3.68	1.08	86.09
F28	550507	6152095	2010.11.03–2011.07.04	0.61	3.53	1.04	-
F29	549731	6101157	2010.11.03–2011.07.04	1.67	3.85	1.01	-
F30	550310	6051320	2010.11.03–2011.07.04	0.74	4.88	0.93	67.99
F31	550631	6000863	2010.11.03–2011.07.04	1.04	3.94	1.25	89.61
F32	590353	6221785	2010.11.03–2011.07.04	0.79	2.60	1.02	-
F33	599915	6201404	2010.11.03–2011.07.04	0.66	6.33	1.03	-
F34	600070	6151243	2010.11.03–2011.07.04	0.56	8.74	2.11	84.89
F35	599651	6101138	2010.11.03–2011.07.04	0.68	3.96	0.94	-
F36	600070	6050055	2010.11.03–2011.07.04	0.79	4.23	1.13	85.38
F37	604348	6004514	2010.11.03–2011.07.04	0.91	3.58	1.16	-
F38	649924	6180487	2010.11.03–2011.07.04	1.62	2.76	1.11	-
F39	660583	6151270	2010.11.03–2011.07.04	0.91	2.31	0.85	-
F40	642138	6101456	2010.11.03–2011.07.04	1.08	2.88	0.93	88.92

4.7.5 Annual mean concentrations of pollutants in the area of "Lithuanian Power Plant" for the study period from 3 November 2010 to 4 July 2011

Table 58. Annual mean concentrations of pollutants (μg/m^3) in the area of "Lithuanian Power Plant"for the study period from 3 November 2010 to 4 July 2011 ("-" *not measured*).

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3)		
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene
Elektrine01	539313	6068571	2010.11.03–2011.07.04	0.68	4.88	1.10
Elektrine02	542176	6073264	2010.11.03–2011.07.04	0.71	9.96	1.03
Elektrine03	542372	6075092	2010.11.03–2011.07.04	0.77	6.09	1.07
Elektrine33	546011	6073279	2010.11.03–2011.07.04	0.99	7.83	1.30
Elektrine04	539949	6081267	2010.11.03–2011.07.04	0.97	4.84	0.97
Elektrine44	545324	6080115	2010.11.03–2011.07.04	0.99	4.66	1.21
Elektrine444	544183	6083071	2010.11.03–2011.07.04	1.09	9.21	1.43

4.7.6 Annual mean concentrations of ammonia in an area of swine farms for the study period from 3 November 2010 to 4 July

Table 59. Annual mean concentrations of ammonia in an area of swine farms for the study period from 3 November 2010 to 4 July

Site code	Coordinates (LKS-94)		Study period	Ammonia concentrations, μg/m^3
	X	Y		
Stock Company „Birzu bekonas“				
Bekonas01	544797	6250880	2010.11.03–2011.07.04	18.2
Bekonas02	544982	6250843	2010.11.03–2011.07.04	19.6
Bekonas03	545025	6250898	2010.11.03–2011.07.04	28.9
Bekonas04	545080	6250992	2010.11.03–2011.07.04	26.5
Stock Company „Saerimner“ Rupinsku swine complex				
Rupinskai01	638734	6148069	2010.11.03–2011.07.04	19.9
Rupinskai02	638940	6148230	2010.11.03–2011.07.04	57.2
Rupinskai03	638975	6148231	2010.11.03–2011.07.04	41.1
Rupinskai04	639010	6148232	2010.11.03–2011.07.04	20.0
Agricultural Association „Vycia“				
Vycia01	498532	6075275	2010.11.03–2011.02.03	2.7
Vycia02	498648	6075377	2010.11.03–2011.02.03	3.2
Vycia03	498544	6075179	2010.11.03–2011.02.03	1.5
Vycia04	498743	6075596	2010.11.03–2011.02.03	2.8
Stock Company „Saerimner“ division 06				
Juseviciai01	453398	6028710	2010.11.03–2011.07.04	15.0
Juseviciai02	453779	6028811	2010.11.03–2011.07.04	36.5
Juseviciai03	453799	6028826	2010.11.03–2011.07.04	27.8
Juseviciai04	453814	6028860	2010.11.03–2011.07.04	23.6
SC "Sistem" swine complex				
Ciukiskiu km 01	488892	6126772	2011.03.25–2011.07.04	45.5
Ciukiskiu km 02	489486	6127107	2011.03.25–2011.07.04	92.4
Ciukiskiu km 03	489672	6127125	2011.03.25–2011.07.04	108.8
Ciukiskiu km 04	489849	6127106	2011.03.25–2011.07.04	59.1

4.7.7 Annual mean concentrations of pollutants near OKT stations for the study period from 3 November 2010 to 4 July 2011

Table 60. Annual mean concentrations of pollutants (μg/m^3) near OKT stations for the study period from 3 November 2010 to 4 July 2011

Site code	Coordinates (LKS-94)		Study period	Annual mean concentrations of pollutants (μg/m^3)		
	X	Y		Sulfur diokside	Nitrogen diokside	Benzene
OKTS51	626668	6150427	2010.11.03–2011.07.04	0.69	2.10	1.30
OKTS52	518668	6032288	2010.11.03–2011.07.04	1.51	2.18	0.93
OKTS53	368224	6210265	2010.11.03–2011.07.04	0.74	3.01	0.81
OKTS02	578075	6061735	2010.11.03–2011.07.04	2.01	14.14	1.08
OKTS03	583078	6065086	2010.11.03–2011.07.04	0.71	40.86	1.89
OKTS12	522965	6176770	2010.11.03–2011.07.04	2.01	15.18	1.81
OKTS22	456774	6200607	2010.11.03–2011.07.04	1.13	27.78	1.74
OKTS33-	322661	6176421	2010.11.03–2011.07.04	1.53	27.00	1.13
OKTS41	499116	6084335	2010.11.03–2011.07.04	0.95	20.74	2.09
OKTS42	518192	6104083	2010.11.03–2011.07.04	0.71	11.89	1.28
OKTS45	489475	6083056	2010.11.03–2011.07.04	1.19	11.15	1.36

4.7.8 Maps of annual mean concentrations distribution of sulfur dioxide, nitrogen dioxide, benzene and ozone

Vilnius agglomeration

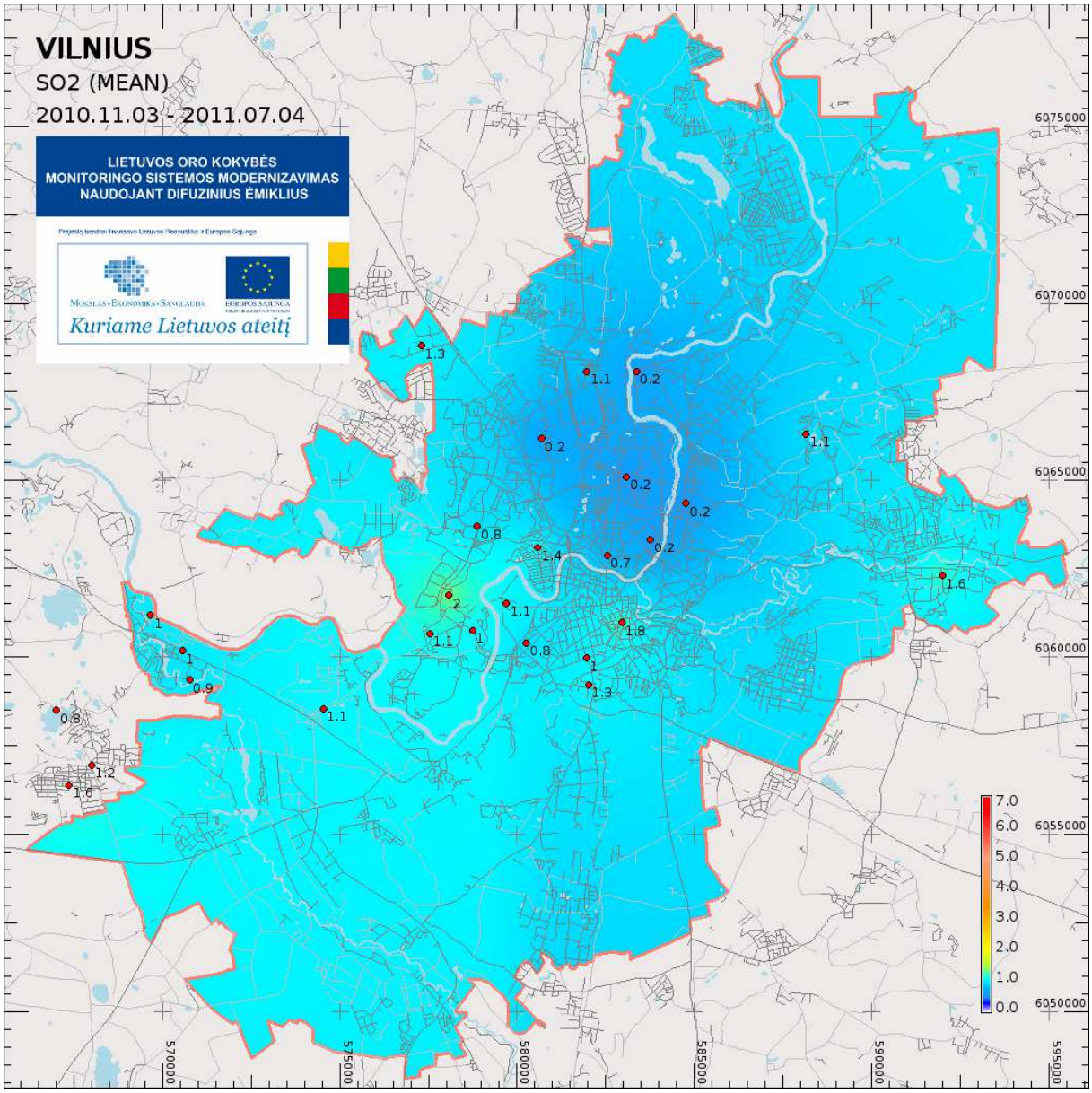


Fig. 58. Annual mean concentrations of sulfur dioxide in Vilnius agglomeration for the period from 3 November 2010 to 4 July 2011

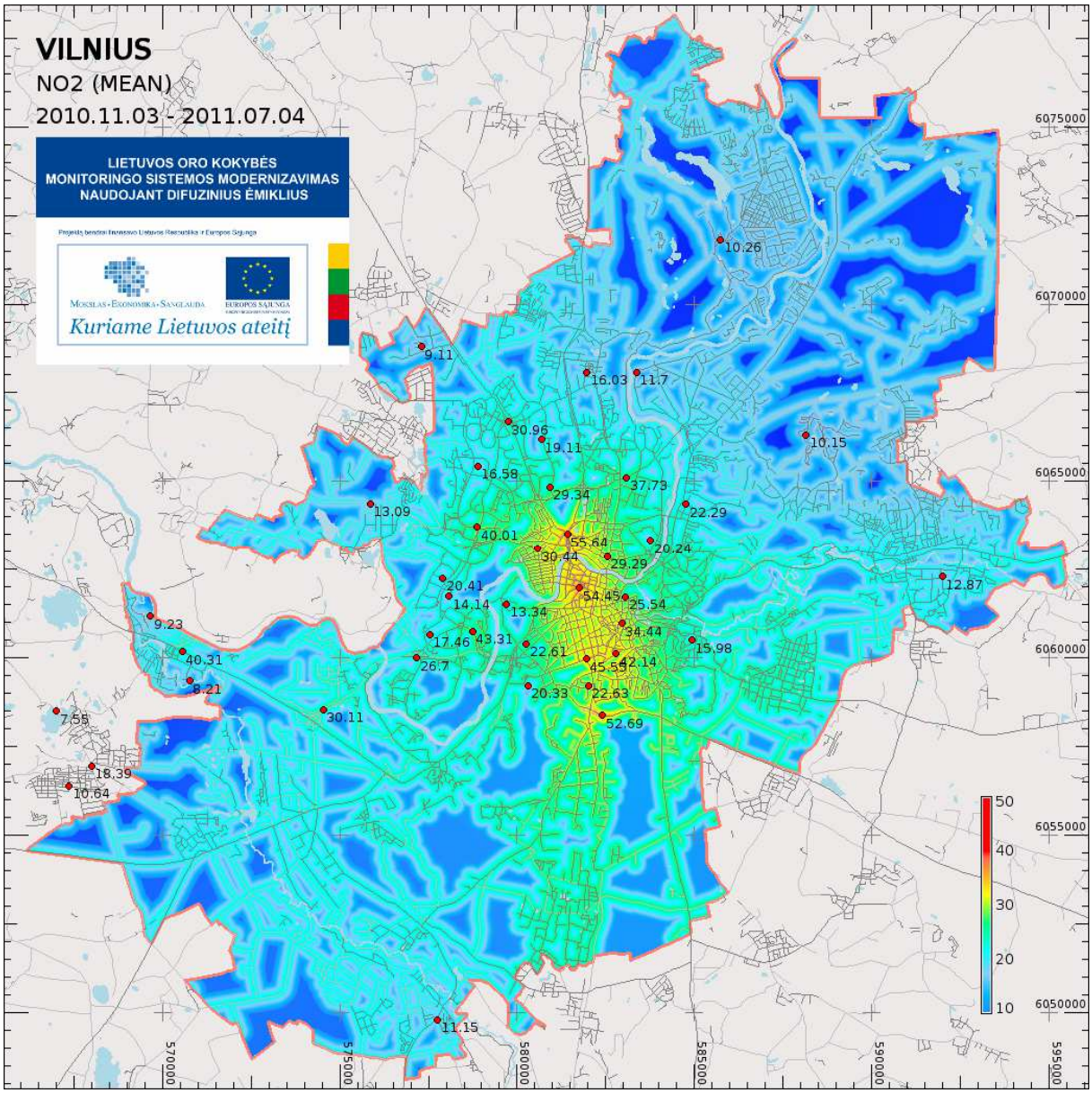


Fig. 59. Annual mean concentrations of nitrogen dioxide in Vilnius agglomeration for the period from 3 November 2010 to 4 July 2011.

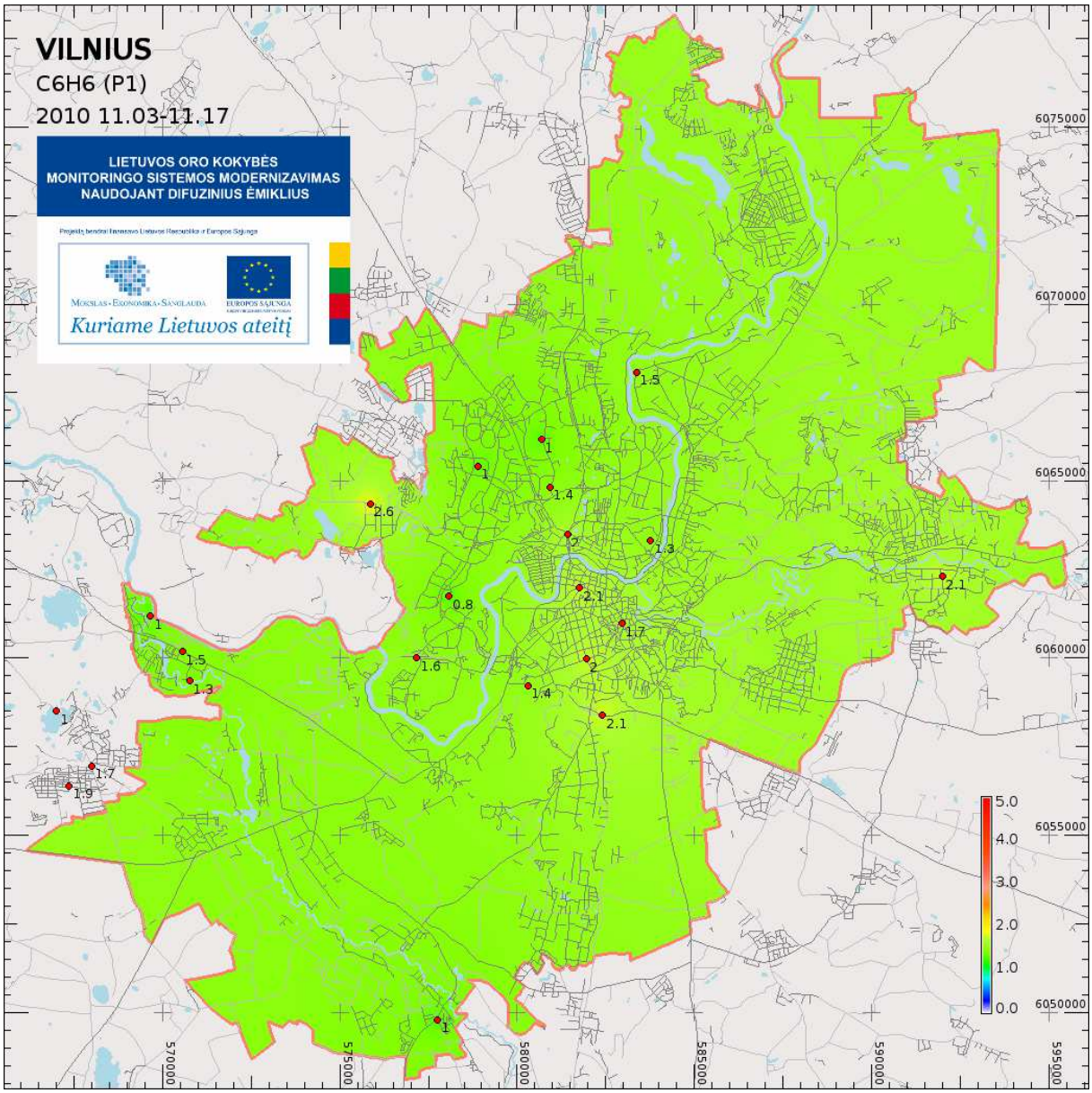


Fig. 60. Annual mean concentrations of benzene in Vilnius agglomeration for the period from 3 November 2010 to 4 July 2011.

Kaunas agglomeration

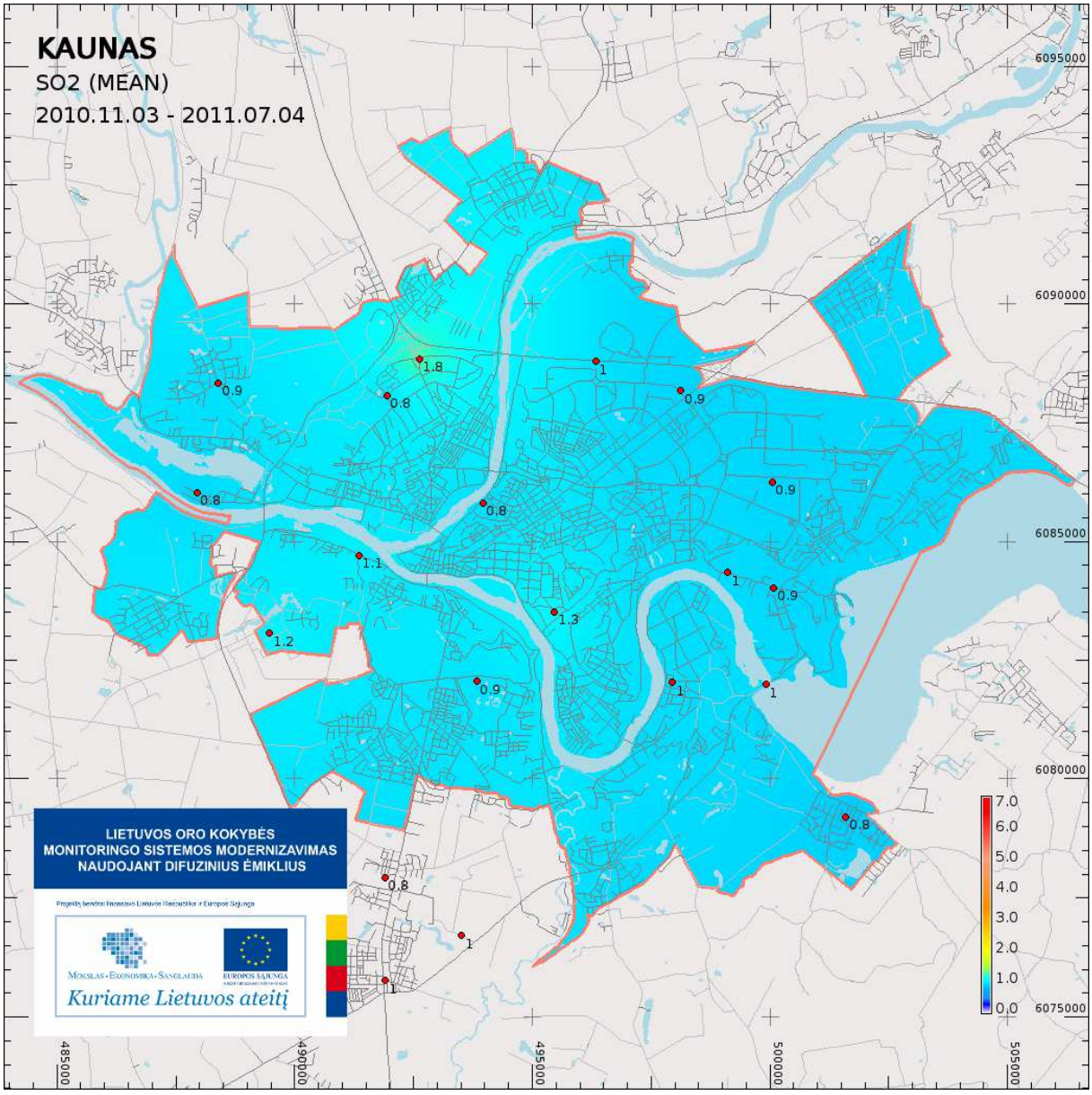


Fig. 61. Annual mean concentration of sulfur dioxide in Kaunas agglomeration for the period from 3 November 2010 to 4 July 2011.

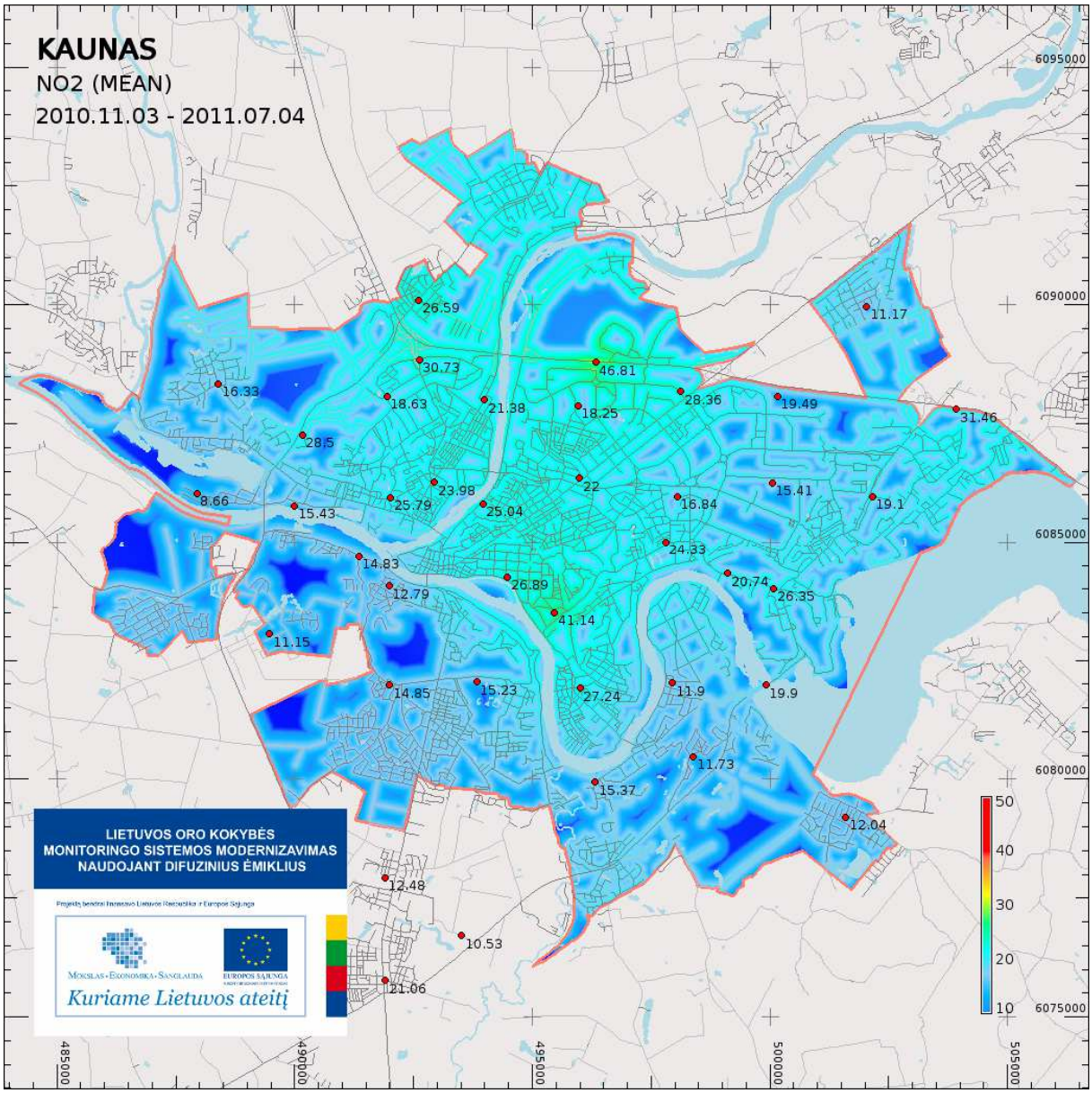


Fig. 62. Annual mean concentration of nitrogen dioxide in Kaunas agglomeration for the period from 3 November 2010 to 4 July 2011.

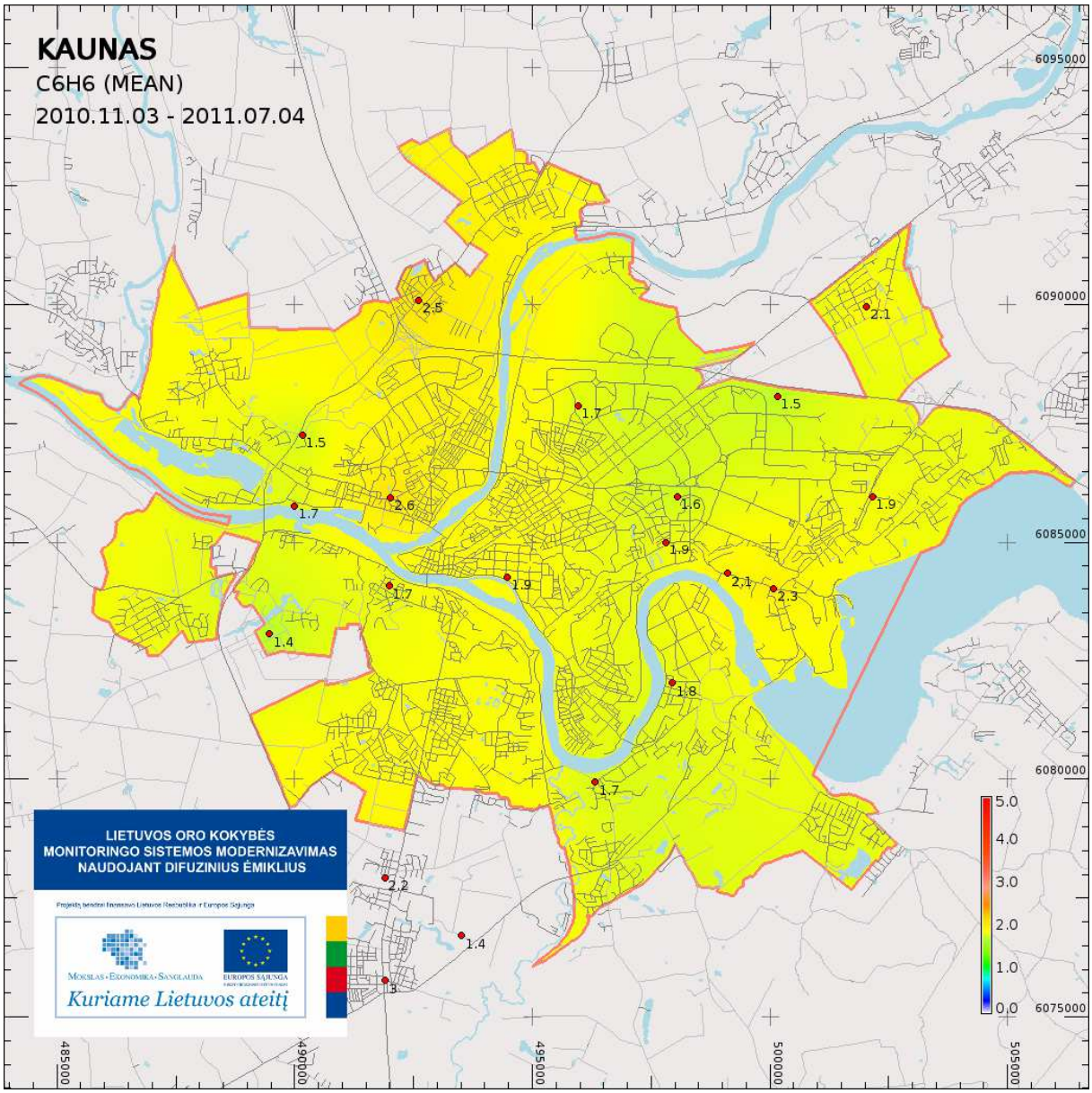


Fig. 63. Annual mean concentrations of benzene in Kaunas agglomeration for the period from 3 November 2010 to 4 July 2011.

The maps of annual mean concentrations of sulfur dioxide, nitrogen dioxide, benzene and ozone at 40 sites accordingly EMEP grid (50 km x 50 km) for the period from 3 November 2010 to 4 July 2011.

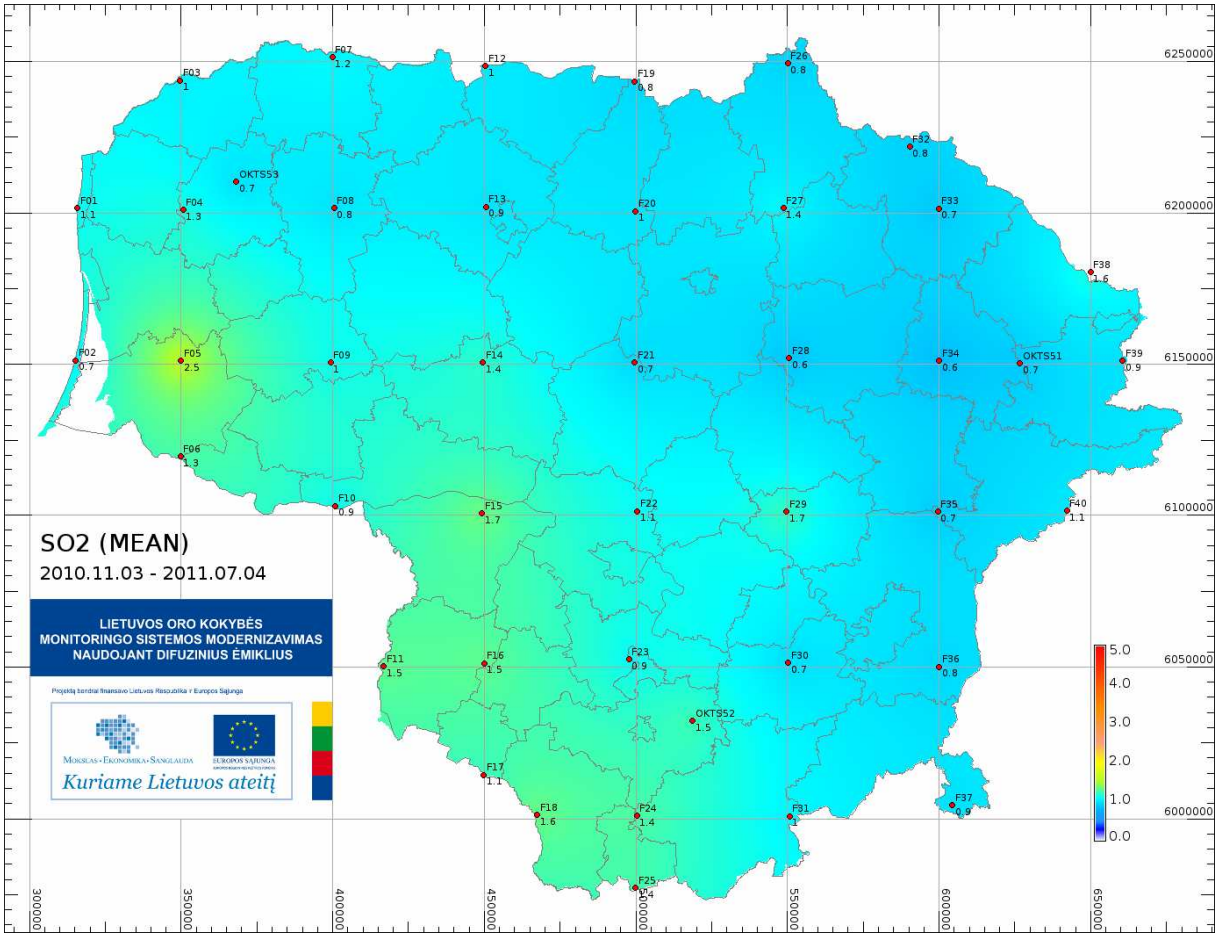


Fig. 64. Annual mean concentrations of sulfur dioxide at 40 sites accordingly EMEP grid (50 km x 50 km) for the period from 3 November 2010 to 4 July 2011.

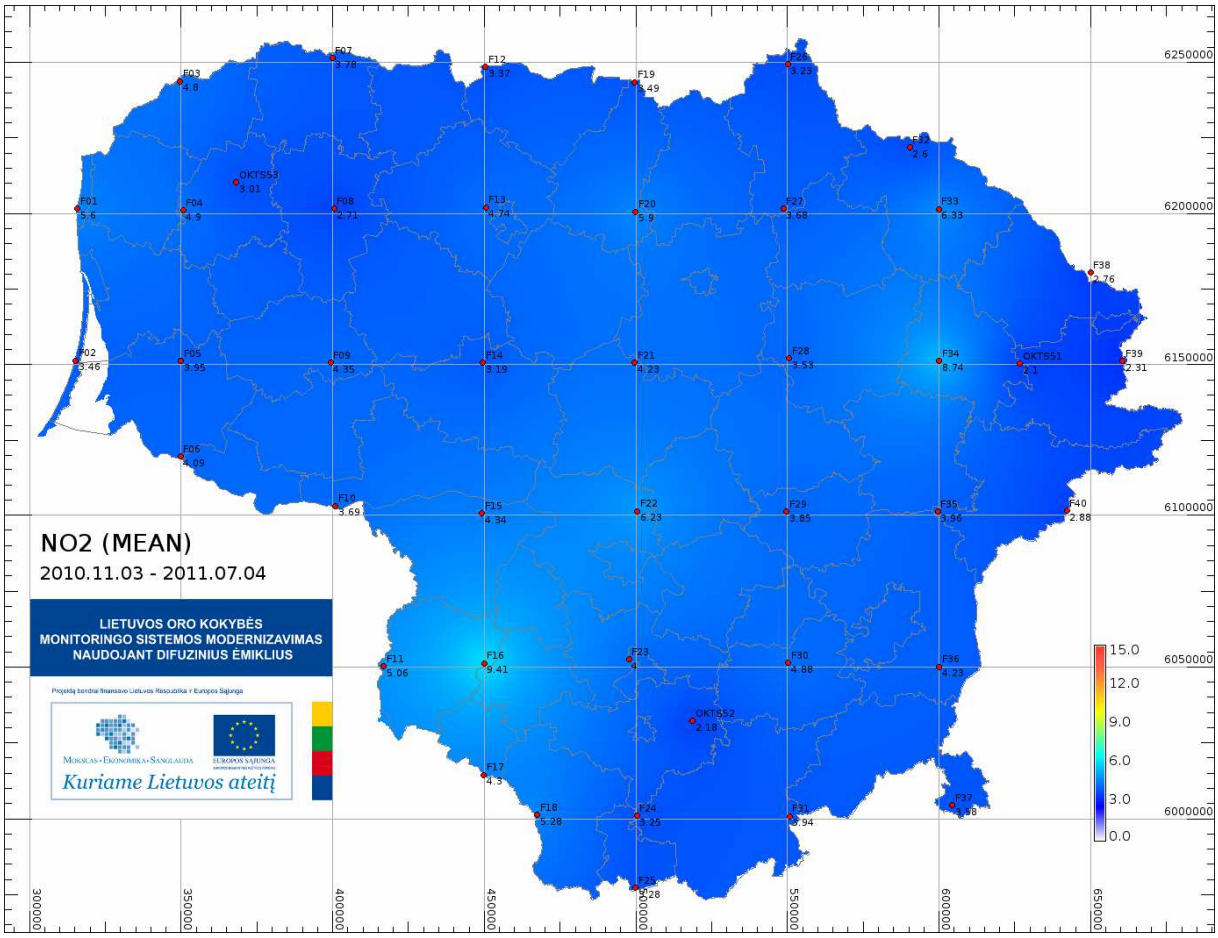


Fig. 65. Annual mean concentrations of nitrogen dioxide at 40 sites accordingly EMEP grid (50 km x 50 km) for the period from 3 November 2010 to 4 July 2011

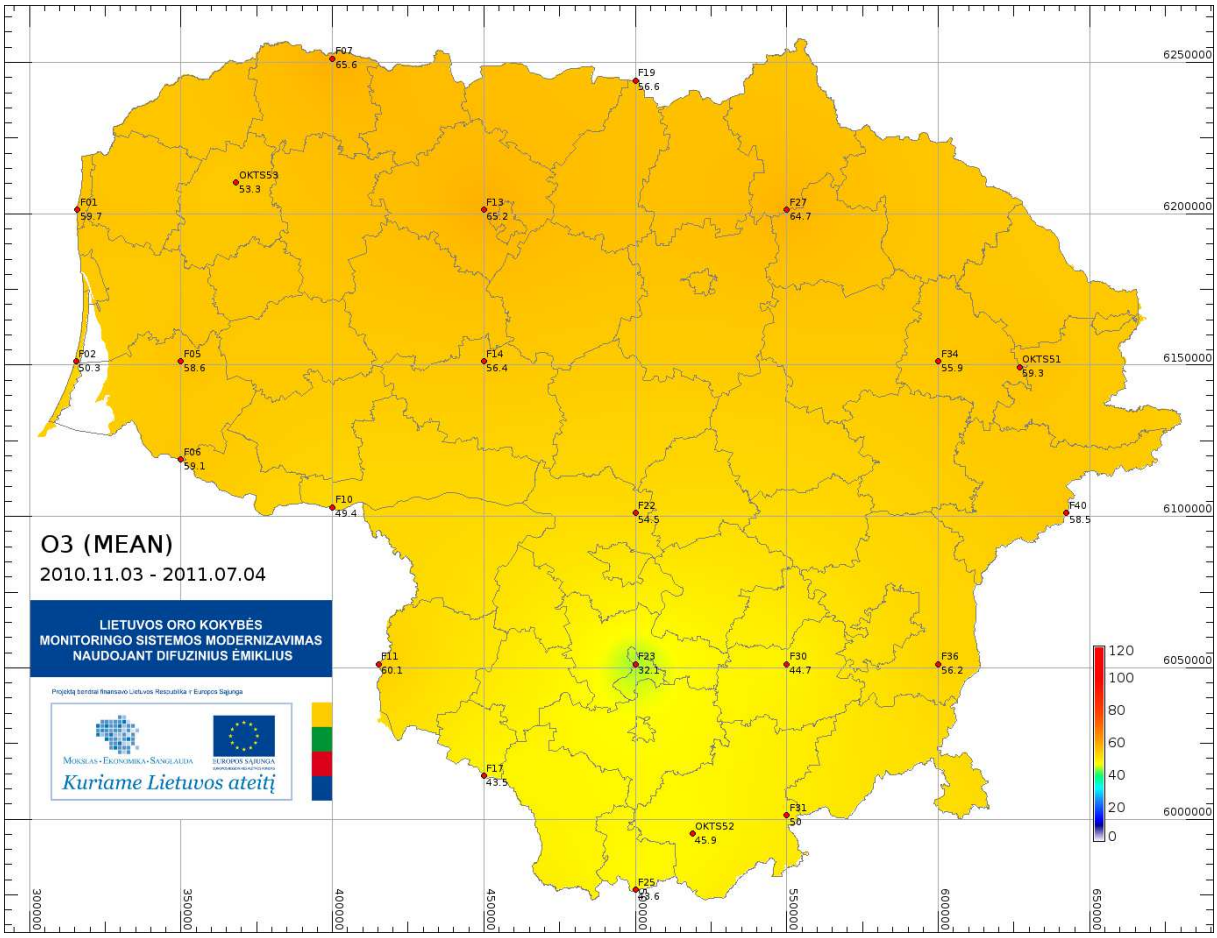


Fig. 66. Annual mean concentrations of ozone at 40 sites accordingly EMEP grid (50 km x 50 km) for the period from 3 November 2010 to 4 July 2011

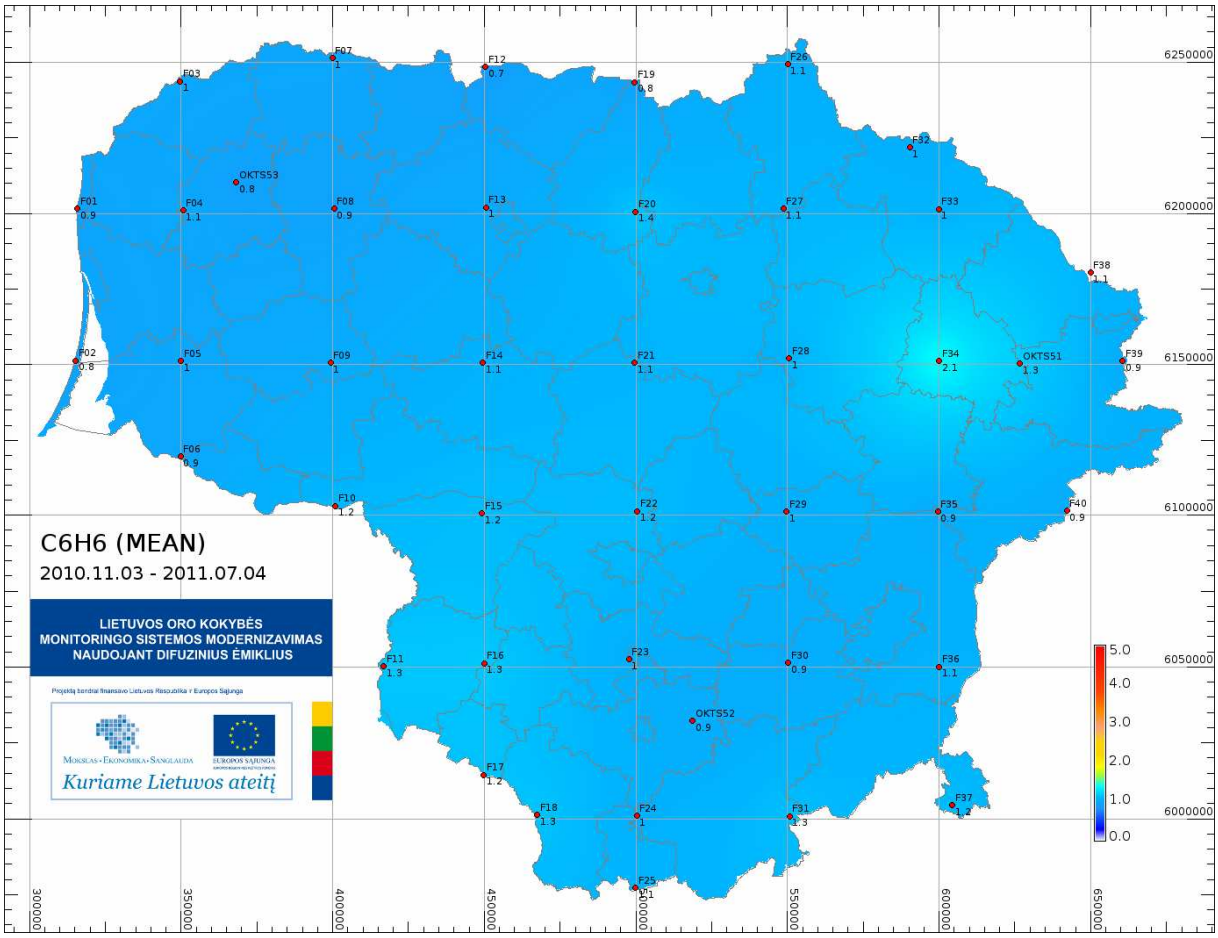


Fig. 67. Annual mean concentrations of benzene at 40 sites accordingly EMEP grid (50 km x 50 km) for the period from 3 November 2010 to 4 July 2011

The maps of annual mean concentrations of sulfur dioxide, nitrogen dioxide and benzene at 58 cities for the study period from 3 November 2010 to 4 July 2011.

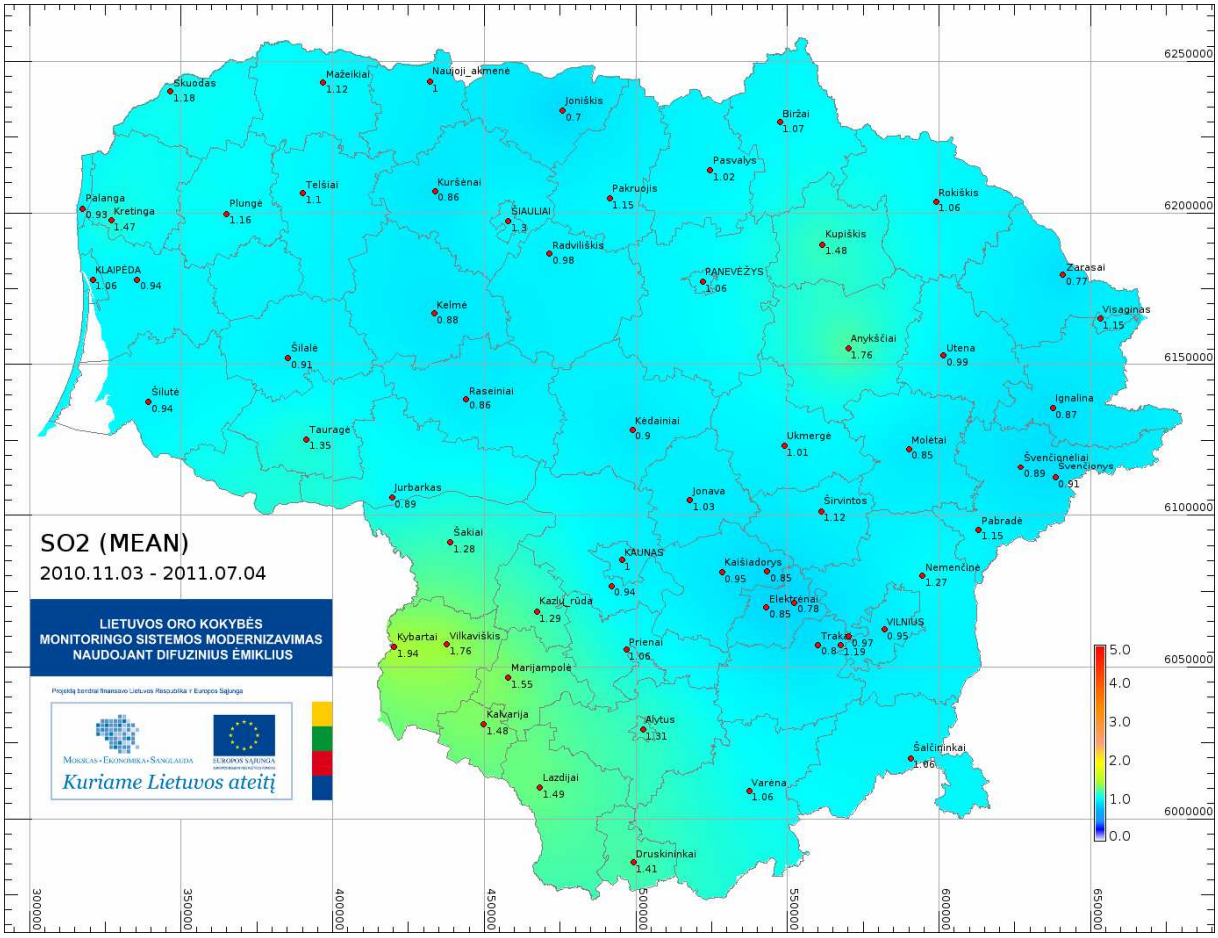


Fig. 68. Annual mean concentrations of sulfur dioxide in the zone (58 cities) for the period from 3 November 2010 to 4 July 2011.

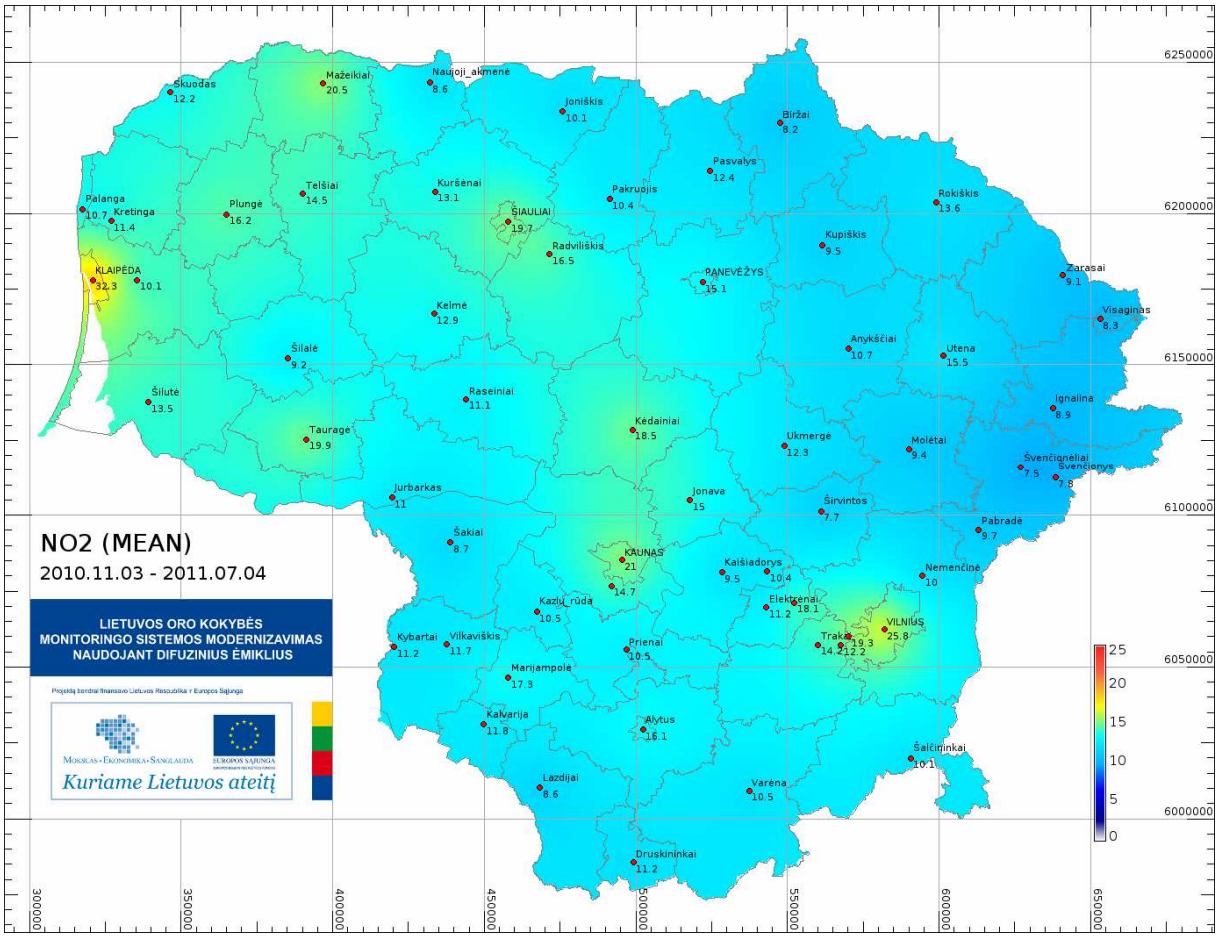


Fig. 69. Annual mean concentrations of nitrogen dioxide in the zone (58 cities) for the period from 3 November 2010 to 4 July 2011.

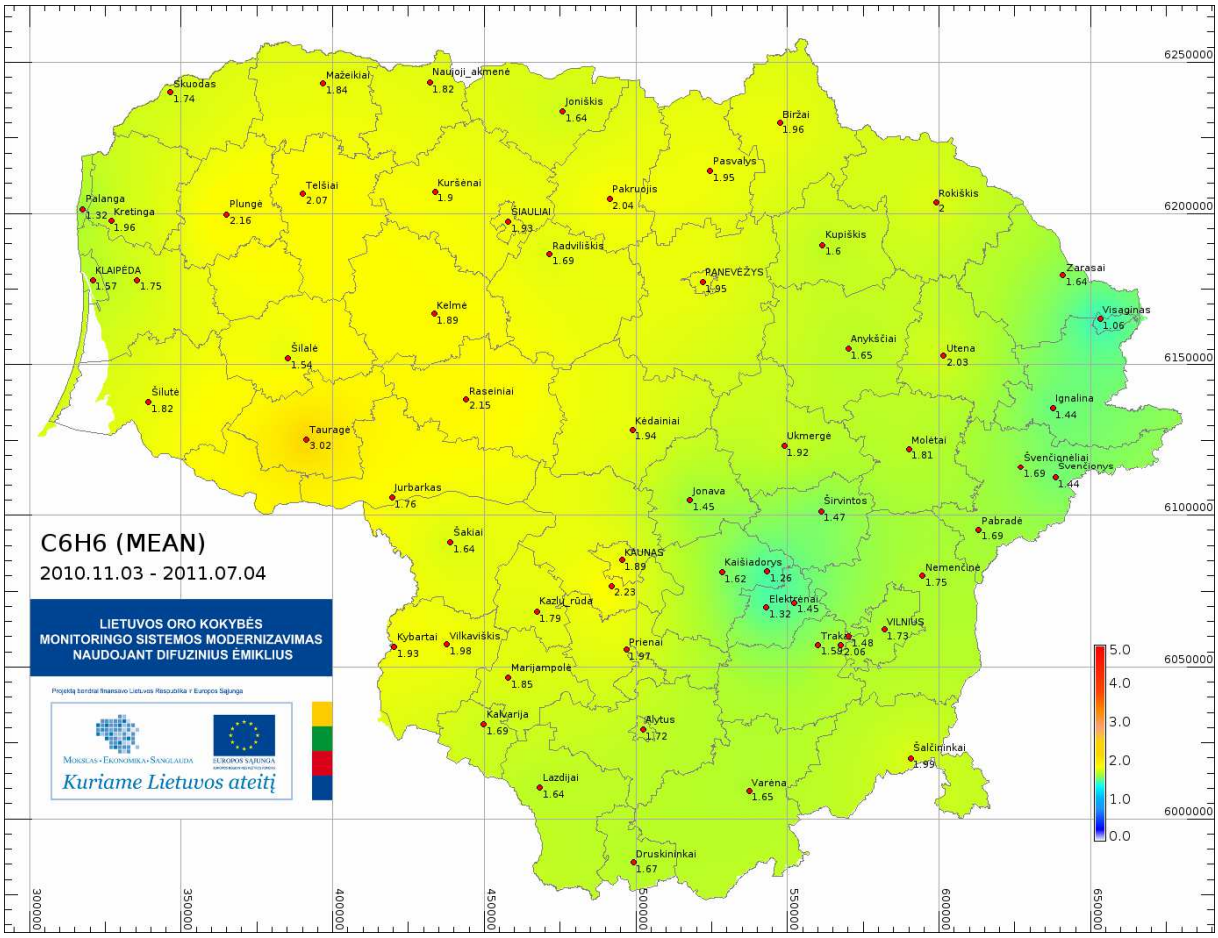


Fig. 70. Annual mean concentrations of benzene in the zone (58 cities) for the period from 3 November 2010 to 4 July 2011.

The maps of annual mean concentrations of sulfur dioxide, nitrogen dioxide, benzene and ozone in the region of "Lithuanian Power Plant" for the period from 3 November 2010 to 4 July 2011.

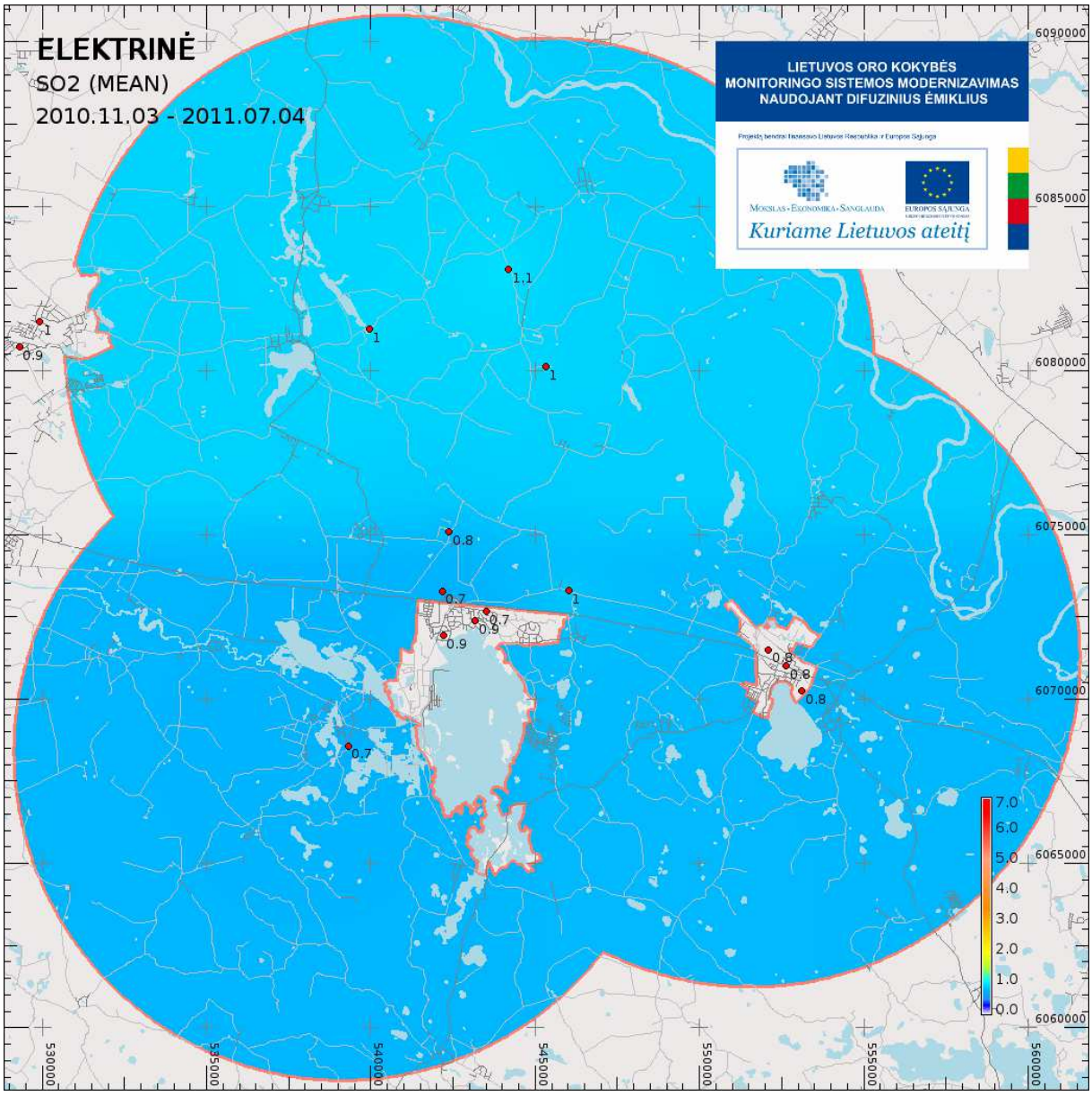


Fig. 71. Annual mean concentrations of sulfur dioxide in the region of "Lithuanian Power Plant" for the period from 3 November 2010 to 4 July 2011.

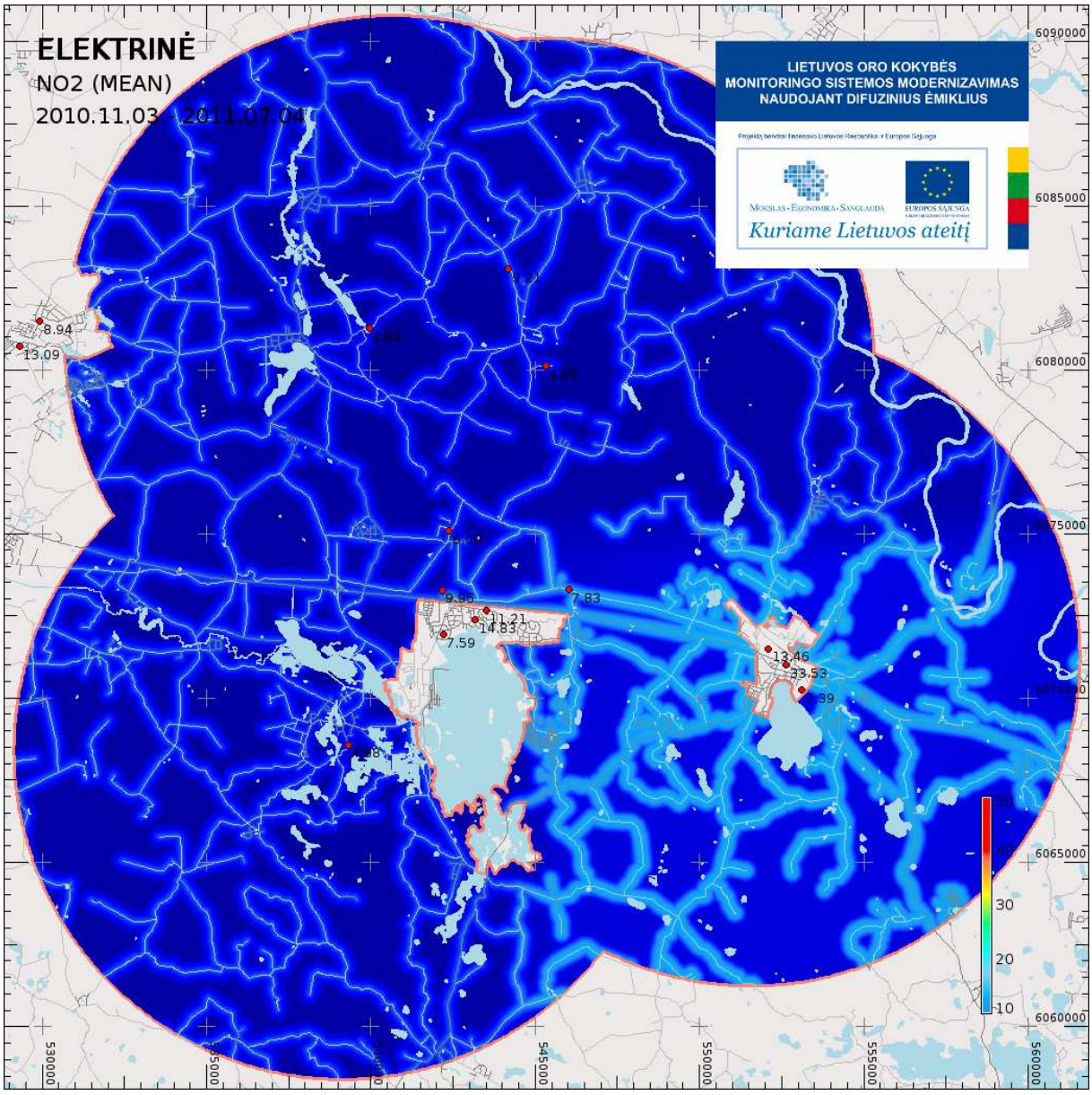


Fig. 72. Annual mean concentrations of nitrogen dioxide in the region of "Lithuanian Power Plant" for the period from 3 November 2010 to 4 July 2011.

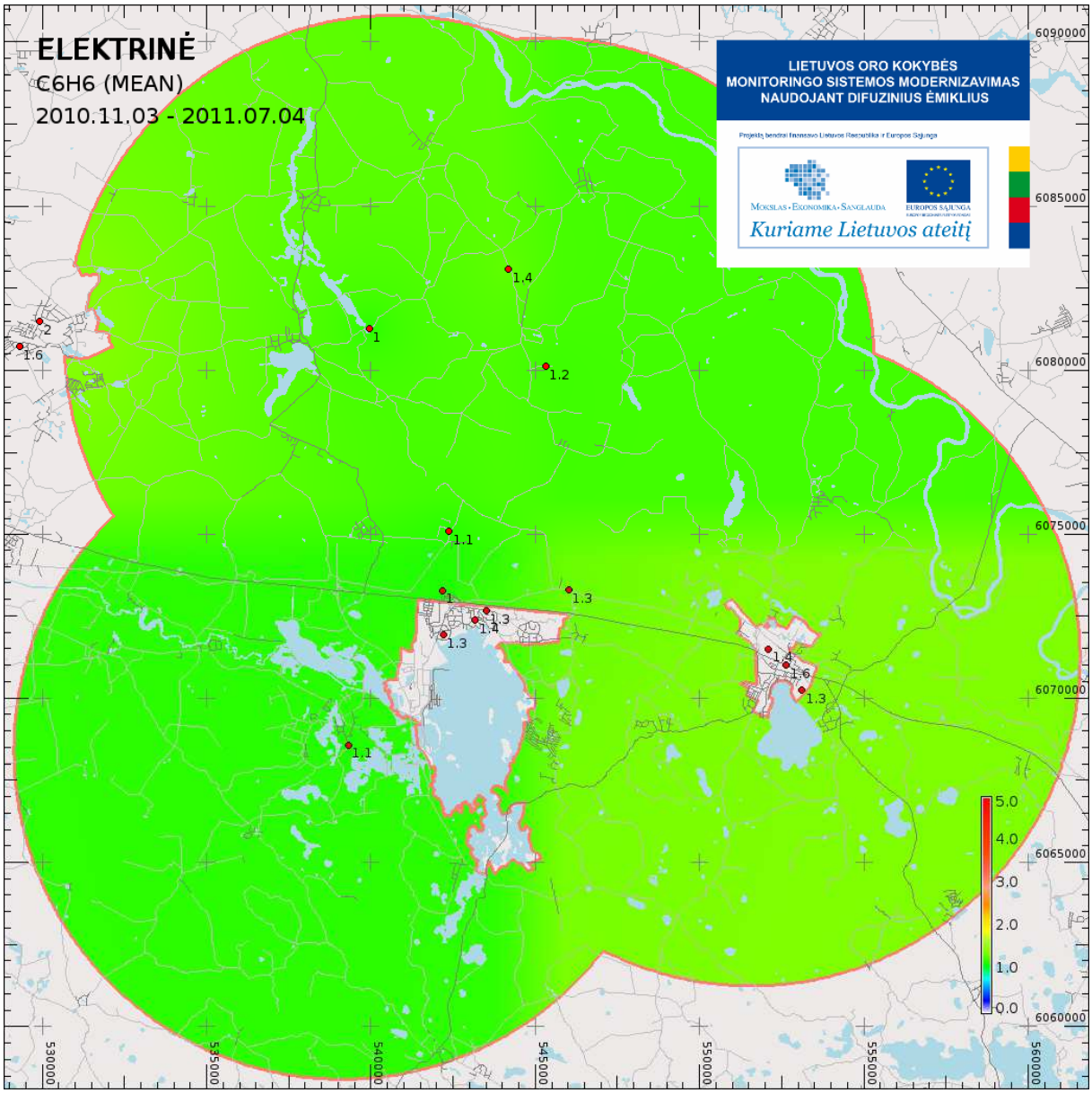


Fig. 73. Annual mean concentrations of benzene in the region of "Lithuanian Power Plant" for the period from 3 November 2010 to 4 July 2011.

The maps of annual mean concentrations of ammonia in an area of swine farms for the study period from 3 November 2010 to 4 July

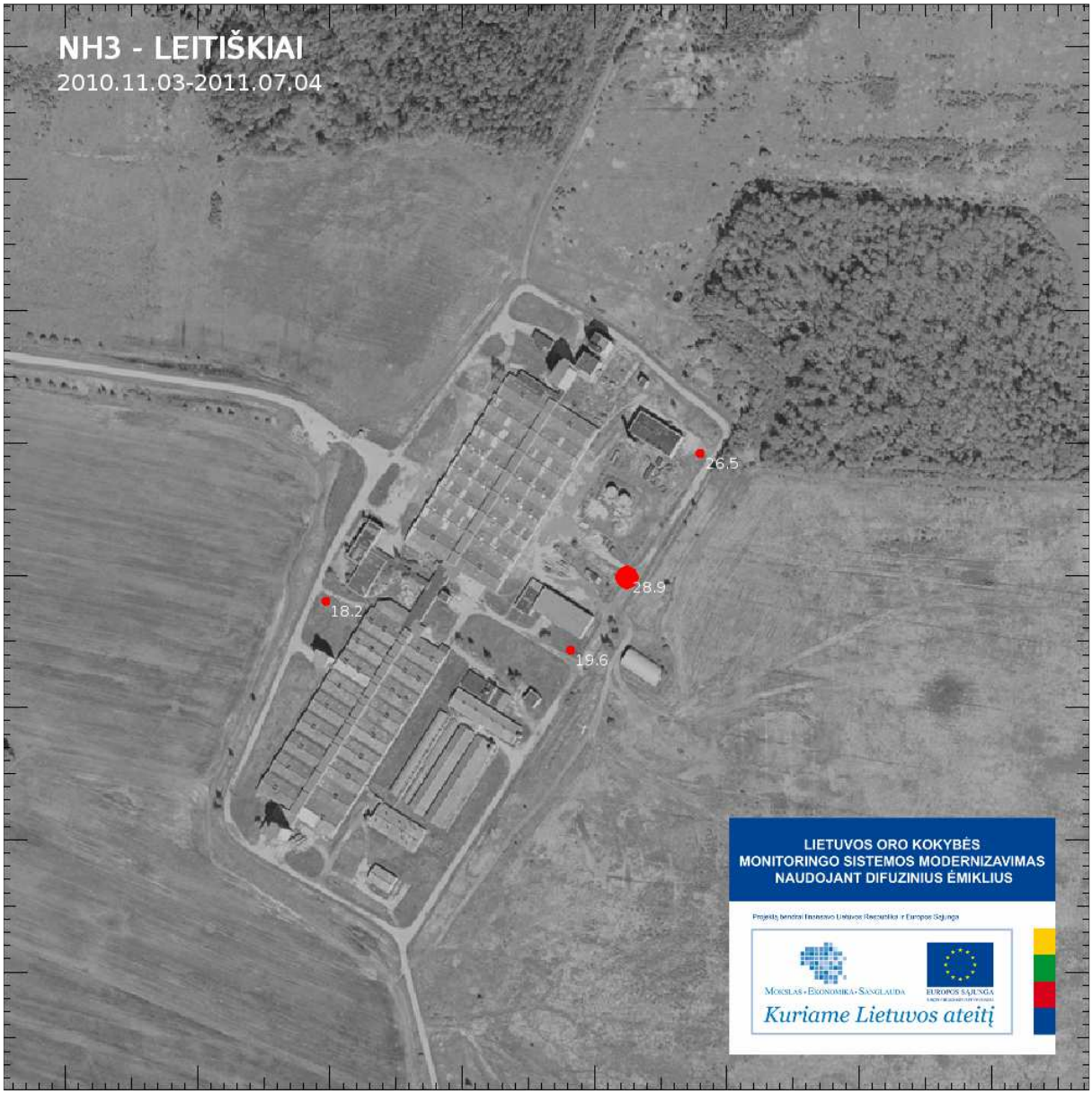


Fig.74. Annual mean concentrations of ammonia around the Stock Company „Birzu bekonas“ for the study period from 3 November 2010 to 4 July

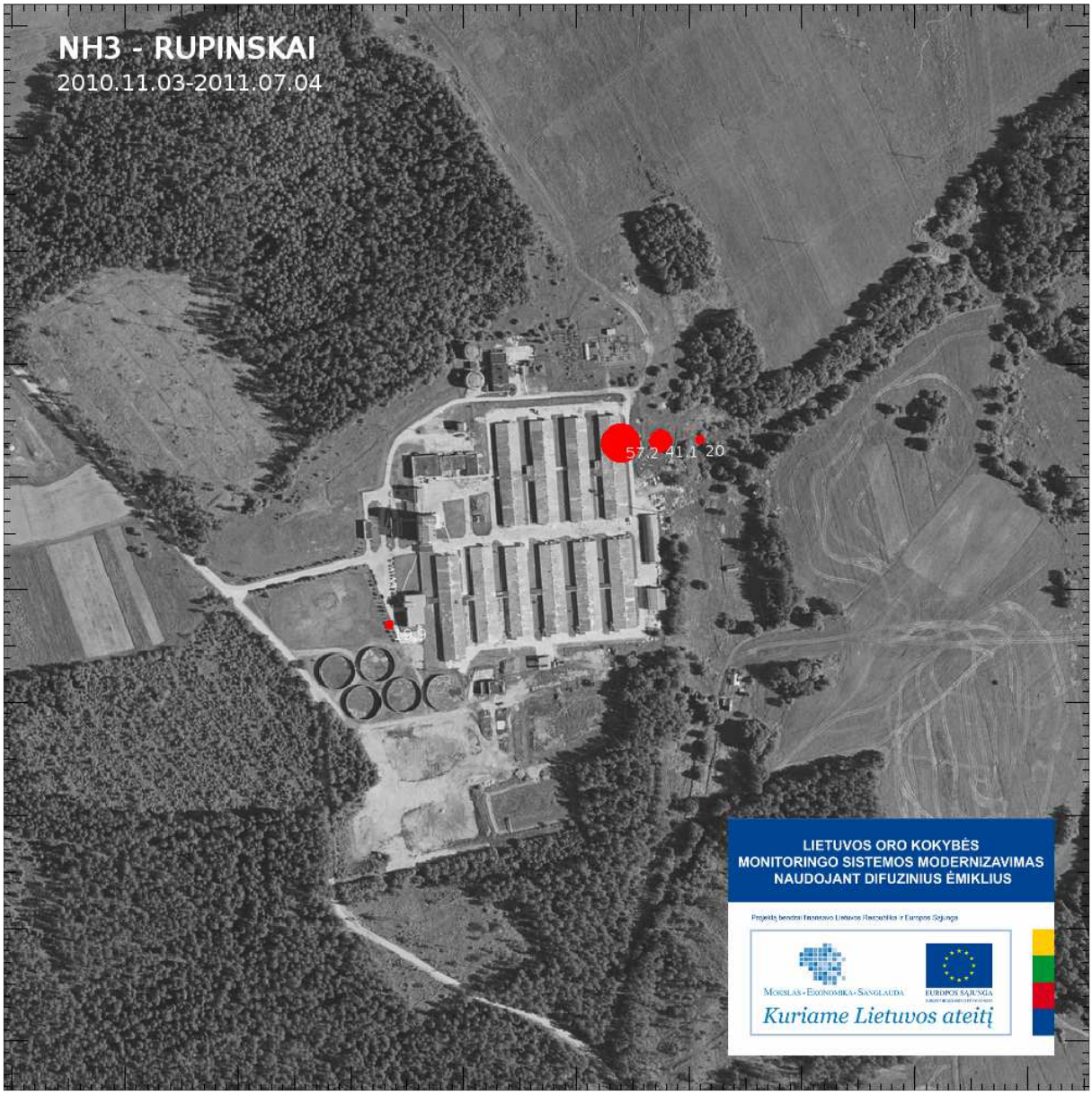


Fig.75. Annual mean concentrations of ammonia around SC „Saerimner“ Rupinsku swine complex for the study period from 3 November 2010 to 4 July

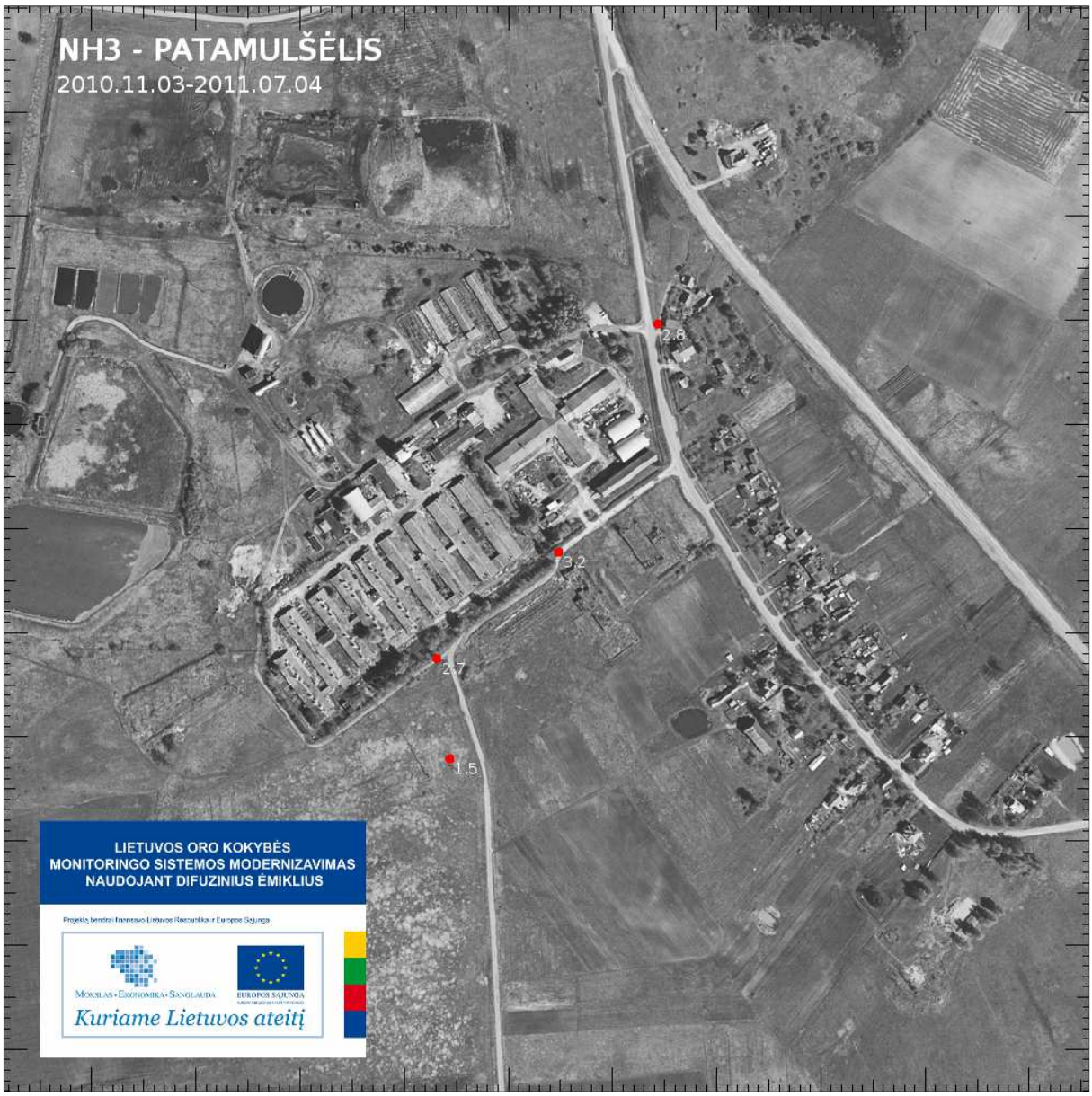


Fig.76. Annual mean concentrations of ammonia around Agricultural Association „Vycia“ swine complex for the study period from 3 November 2010 to 4 July

Fig.77. Annual mean concentrations of ammonia around the swine complex of SC „Saerimner“ division 06 for the study period from 3 November 2010 to 4 July

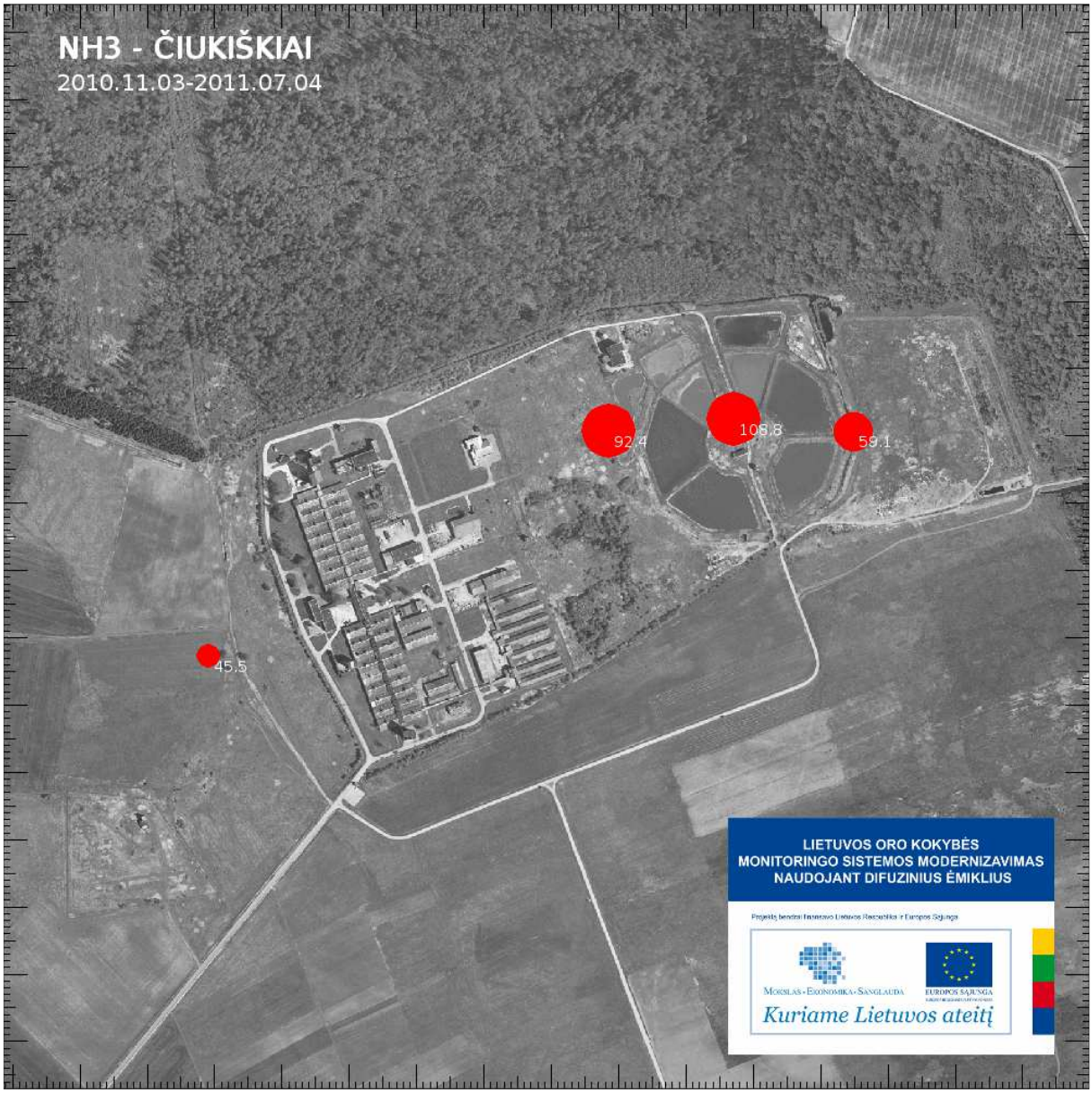


Fig.78. Annual mean concentrations of ammonia around SC "Sistem" swine complex for the study period from 3 November 2010 to 4 July

4.8 The assessment of the air quality monitoring stations network and Lithuanian territory partitions into zone and agglomerations compliance to the EU directives requirements.

Agglomerations and zones for future sulfur dioxide, nitrogen dioxide and benzene measurements

On the basis of the results of the campaign of diffusive samplers it is recommended to leave the placement and the number of zones and agglomerations as they are.

Table 61. Agglomerations and zones for future sulfur dioxide, nitrogen dioxide and benzene measurements

Agglomerations/zones		Area, km^2	Population, thousand	Pollutants		
				Sulfur dioxide	Nitrogen dioxide	Benzene
Vilnius agglomeration	Territory of Vilnius city	401	543,07	+	+	+
Kaunas agglomeration	Territory of Kaunas city	157	336,81	+	+	+
Zone	The rest part of Lithuania	64742	2174,1	+	+	+

"+" – assessment should be maintained

Recommendation for future pollutant assessment in the automatic monitoring stations

On the basis of the results of the campaign diffusive samplers and according to the directive 2008/50/EC recommendation pollutants for their future assessment are presented in Table 62. According to directive 2008/50/EC the assessment of air quality should be maintained in areas of good air quality as well. It means that the air quality assessment in future should be extended.

Table 62. Recommendation for future pollutant assessment in the automatic monitoring stations

Pollutants, µg/ m^3	**VILNIUS**		**KAUNAS**		**KLAIPEDA**	**PANEVEZYS**	**SIAULIAI**	**JONAVA**	**Aukstaitijos_ IMS**	**Dzukijos_IMS**	**Zemaitijos_IMS**
	Lazdynai OKTS02	**Zirmūnai OKTS03**	**Petrasiunai OKTS41**	**Noreikiskes OKTS45**	**Silutės plentas OKTS33**	**Centras OKTS12**	**OKTS22**	**OKTS42**	**OKTS51**	**OKTS52**	**OKTS53**
Sulfur dioxide	+	–	+	+	+	+	+	–	–	–	–
Nitrogen dioxide	+	+	+	+	+	+	+	+	+	+	+
Benzene	–	+	+	+	+	+	+	+	–	–	–

"+" – are recommended for measuring

"–" – no continuous monitoring nesessary

Recommendation for the placement and number of the automatic monitoring stations

The results campaign of the diffusive samplers show that the Lithuanian ambient air monitoring network consisting of 14 automatic monitoring stations located in urbanized territories and 3 background stations at the rural sites allows assessment of ambient air quality according to directive 2008/50/EC requirements. The number and placement of automated air monitoring stations for continuous measurement are sufficient for the atmospheric air quality assessment**.**

CONCLUSIONS AND RECOMMENDATIONS

VILNIUS AGGLOMERATION

The mean concentrations of **sulfur dioxide** in Vilnius agglomeration during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m^3.

It is recommended to extend continuous measurements of sulfur dioxide concentration at automatic urban air monitoring stations. The number of automated urban air monitoring stations is sufficient for the atmospheric air quality assessment.

The mean concentration of **nitrogen dioxide** in Vilnius agglomeration during the study period varied within 9.1 and 55.6 μg/m^3.

1. The mean concentrations of NO_2 **exceeded the annual limit value** of 40 μg/m^3 at seven sites exposed to intensive traffic flow: Laisvės pr. – Justiniskiu str. (VILNIUS27), Laisvės pr. – Architektų str. (VILNIUS31), Svitrigailos – Paneriu crossing (VILNIUS11), Zirniu str. (VILNIUS13), Pamenkalnio – V. Kudirkos (VILNIUS20), Ukmerges – G. Vilko crossing (VILNIUS18), near the terminals of railway and bus (VILNIUS10).
2. The mean concentrations of NO_2 **exceeded the NO_2 upper assessment threshold value** (32 μg/m^3) at two sites: Vokieciu str. (the most visited part) (VILNIUS09) and Kareiviu str. (VILNIUS05).
3. The mean concentrations of NO_2 **ranged between the lower (26 μg/m^3) and upper (32 μg/m^3) assessment threshold values** at six sites: Oslo-Erfurto str. (VILNIUS23), Lvovo str. (Snipiskes) (VILNIUS17), Gelvonu str. (Seskine) (VILNIUS30), Gariunu str. (VILNIUS33), Kestucio-Seliu str. (VILNIUS19) and Ukmerges-P. Zadeikos str. (VILNIUS08).

It is recommended to extend continuous measurements of nitrogen dioxide concentration at automatic urban air monitoring stations. The number of automatic air monitoring stations is sufficient for the atmospheric air quality assessment and should be maintained. It is recommended to assess the NO_2 concentrations using diffusive air samplers periodically, at least every five years, at sites with intensive traffic flow.

The mean concentrations of **benzene** in Vilnius agglomeration during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. However, benzene concentrations exceeded the upper assessment threshold value of 2.0 μg/m^3 at sites: Zirniu str. (VILNIUS137), crossing of Ukmerges – G. Vilko (VILNIUS18) and Pamenkalnio – V. Kudirkos (VILNIUS20).

The number of automatic air monitoring stations is sufficient for continuous measurement of benzene concentrations in Vilnius agglomeration for the atmospheric air quality assessment. However, it is recommended periodically, at least every five years, to assess benzene concentrations using diffusive air samplers.

KAUNAS AGGLOMERATION

The mean concentrations of **sulfur dioxide** in Kaunas agglomeration during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m3.

It is recommended to extend continuous measurements of sulfur dioxide concentration at automatic urban air monitoring stations. A number of automatic urban air monitoring stations is sufficient for the atmospheric air quality assessment.

The mean concentration of **nitrogen dioxide** in Kaunas agglomeration during the study period ranged between 8.7 μg/m^3 and 45.6 μg/m^3.

1. The mean concentrations of NO_2 **exceeded the annual limit** value of 40 μg/m^3 at two sites exposed to intensive traffic flow: crossing of Vytauto ave.-M.K. Ciurlionio (KAUNAS25) and near A1 road in the area Kleboniskis forest - parking lot (KAUNAS03).
2. The mean concentrations of NO_2 **ranged between the lower (26 μg/m^3) and upper (32 μg/m^3) assessment threshold values** at eight sites: R. Kalantos - M. Gimbutienes str. (KAUNAS27), Vandziogalos - Vytenu str. (KAUNAS02), S.Daukanto str. (KAUNAS24), Skuodo - Juozapaviciaus - Siulu str. (Sanciai) (KAUNAS30), Siaures ave. - Savanoriu ave. (KAUNAS10), Silainių road-Vakarinis detour (KAUNAS06), IX Forto -Kursiu str. (KAUNAS01), near road A1 and Ateities (KAUNAS12).

It is recommended to extend continuous measurements of nitrogen dioxide concentration at automatic urban air monitoring stations. A number of automated urban air monitoring stations is sufficient for the atmospheric air quality assessment and should be maintained. However, it is recommended to assess the NO_2 concentrations using diffusive air samplers periodically, at least every five years, at sites with intensive traffic flow.

The mean concentrations of **benzene** in Kaunas agglomeration during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. Benzene concentrations exceeded the upper assessment threshold value of 2.0 μg/m^3 at four sites near crossings: Liepu str. (Ramuciai) (KAUNAS04), R. Kalantos-M. Gimbutienes (KAUNAS27), Vandziogalos - Vytenu (KAUNAS02), Kedainiu - Tilzes (Vilijampole) (KAUNAS15).

A number of automatic urban air monitoring stations for continuous measurement of benzene concentrations in Kaunas agglomeration is sufficient for the atmospheric air quality assessment. However, it is recommended periodically, at least every five years, to assess benzene concentrations using diffusive air samplers at sites with intensive traffic flow.

ZONE (the rest part of Lithuania)

The mean concentrations of **sulfur dioxide** in zone during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m3.

A number of automatic urban air monitoring stations is sufficient for the atmospheric air quality assessment.

The mean annual concentrations of **nitrogen dioxide** in zone during the study period were in the range from 3.6 μg/m^3 to 59.6 μg/m^3.

1. The mean concentrations of NO_2 **exceeded the annual limit value** of 40 μg/m^3 at three sites with the intensive traffic flow in Klaipeda04, Klaipeda09, Klaipeda11 and at the site Grigiskes01, located near to highway A1.
2. The mean concentrations of NO_2 **exceeded the NO_2 upper assessment threshold value** (32 μg/m^3) at four sites: Taurage01, Vievis01, Klaipeda12, Siauliai02.
3. The mean concentrations of NO_2 ranged between the lower (26 μg/m^3) and upper (32 μg/m^3) assessment threshold values at eleven sites: Klaipeda02, Klaipeda07, Klaipeda08, Panevežys01, Mazeikiai02, Kedainiai03, Telsiai01, Jonava01, Trakai01, Utena01, Kedainiai03.

A number of automatic air monitoring stations for continuous measurement of nitrogen dioxide concentrations in the zone is sufficient for the atmospheric air quality assessment. However, it is recommended periodically, at least every five years, to assess nitrogen dioxide concentrations using diffusive air samplers at sites with intensive traffic flow and to apply the models for the spatial distribution of NO_2 atmospheric concentrations in the zone.

The mean concentrations of **benzene** in the zone during the study period did not exceed the annual limit value of 5.0 μg/m^3 for the human health. Benzene concentrations varied between the lower (2.0 μg/m^3) and upper (3.5 μg/m^3) assessment threshold values of at fifteen sites in the zone: Klaipeda05, Panevezys06, Panevezys07, Panevezys12, Siauliai06, Siauliai09, Siauliai10, Siauliai11, Taurage01, Taurage02, Taurage03, Telsiai01, Plunge01, Plunge02 and Garliava01.

It is recommended periodically, at least every five years, to assess benzene concentrations using diffusive air samplers. A number of air monitoring sites for continuous measurement of benzene concentrations in the zone is sufficient for the atmospheric air quality assessment.

EMEP network

1. The mean concentrations of sulfur dioxide in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 20.0 μg/m^3 and were below the lower assessment threshold value of 8.0 μg/m^3.
2. The spatial distribution of sulfur dioxide concentrations indicates the tendency to be the higher concentrations in west and southwest parts of Lithuania.
3. The mean concentrations of nitrogen dioxide in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 40.0 μg/m^3.
4. The spatial distribution of nitrogen dioxide concentrations indicates the tendency to be the higher concentrations in west part of Lithuania.
5. The mean concentrations of benzene in 40 zones' territory sites, using EMEP grid 50 km x 50 km, during the study period did not exceed the annual limit value of 5.0 μg/m^3 aiming to protect public health.
6. The spatial distribution of benzene concentrations indicates the similar level of this pollutant over the Lithuanian territory.
7. A comparative statistical analysis showed that the systematic error has the greatest influence on ozone concentration values measured by passive sampling devices. Calibration, when feasible, is the most reliable way to reduce systematic errors and make the passive sampling approaches useful in Lithuanian region.

It is recommended to apply the models for the spatial distribution of atmospheric pollutants concentrations in the EMEP network.

“LITHUANIAN POWER PLANT”

The mean concentrations of sulfur dioxide, nitrogen dioxide and benzene around the "Lithuanian Power Plant" during the study period relatively were low and did not exceed the annual limit values aiming to protect public health.

It is recommended periodically, at least every five years, to assess SO_2 concentrations around power plant using diffusive air samplers.

AN AREA OF SWINE FARMS

1. The mean annual concentrations of ammonia around the swine Stock Company „Birzu bekonas“ during the study period did not exceed the limit value of 40.0 μg/m^3. However, the exceedances of the limit value occurred in the be-weekly samples.
2. The mean concentrations of ammonia around the swine Stock Company „Saerimner“ Rupinsku exceeded the limit value of 40.0 μg/m^3 at site 50 m in downwind direction from farm during the autumn, winter, spring and summer and, respectively, were 53.9 μg/m^3, 61.7 μg/m^3, 54.0 μg/m^3 and 59.4 μg/m^3.
3. The mean annual concentrations of ammonia around the swine SC „Saerimner“ division 06 during the study period did not reached the limit value. However, the exceedances of the limit value occurred in be-weekly samples at site 50 m in downwind direction from the swine complex in spring and summer and were 42.7 μg/m^3, 42.1 μg/m^3, 56.6 μg/m^3 and 41.3 μg/m^3, respectively, during the third, fifth, seventh and eight measurement periods.
4. The atmospheric concentrations of ammonia around the SC "Sistem" swine complex in be-weekly samples exceeded the limit value 2 – 3 times during study period (25 March – 4 July 2011). The concentrations of NH_3 in ambient air at sites in downwind direction from the swine complex were 1.3–2.4 times higher than those at site in upwind direction to the swine complex.

It is recommended to control NH_3 concentrations around the swine complexes continuously.

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I ANNEX. Documentation of placement, shipping of diffusive samplers

II ANNEX. (CD) Photographic documentation of the sampling location".

III ANNEX. The protocols of chemical analysis

IV ANNEX. (CD) Raw data.

V ANNEX. (CD) Maps