AIR POLLUTION IN THE SLOVAK REPUBLIC 2024

ANNEX

AIR QUALITY ASSESSMENT IN ZONE ŽILINA REGION

Emissions and Air Quality Division
SLOVAK HYDROMETEOROLOGICAL INSTITUTE

Bratislava, September 2025
Version 1

1 DESCRIPTION OF TRNAVA REGION TERRITORY IN TERMS OF AIR QUALITY

The Žilina region is located in the Central Western Carpathians the major part of its territory is mountainous, encompassing several basins. The River Váh divides the territory into the northern and southern parts. In the northern part are Vysoké and Západné Tatry (the High and the West Tatras), Skorušinské vrchy, Oravské Beskydy, Oravská Magura., Oravská vrchovina, Chočské vrchy, Malá Fatra, Kysucké Beskydy, Kysucká vrchovina and Javorníky, in the southern part are Nízke Tatry, Veľká Fatra, Lúčanská Fatra and Strážovské vrchy. The highest peak is Kriváň (2 494 m a. s. l.), and the lowest point is at 285 m a. s. l. The area is characterised by deep and closed basins between high mountains, with frequent occurrence of air temperature inversions, especially in the winter. The geomorphological character of the area contributes to poor ventilation and thus, may adversely affect the dispersion of pollutants. According to the Statistical Office of the Slovak Republic, the average population density in the Žilina Region is 101 inhabitants per km² (as assessed as of 31 March 2025).

The **highest population density is in the Žilina Distric**t with 187 inhabitants per km², while the **Turčianske Teplice District has the lowest density** in the region with 40 inhabitants per km². For comparison - the Slovak Republic had an average population density of 111 inhabitants per km² on the given date. In terms of air quality assessment (for SO_2, NO_2, NO_X, PM_{10}, $PM_{2.5}$, benzene, polycyclic aromatic hydrocarbons, and CO in the air), the whole Žilina region is considered one zone.

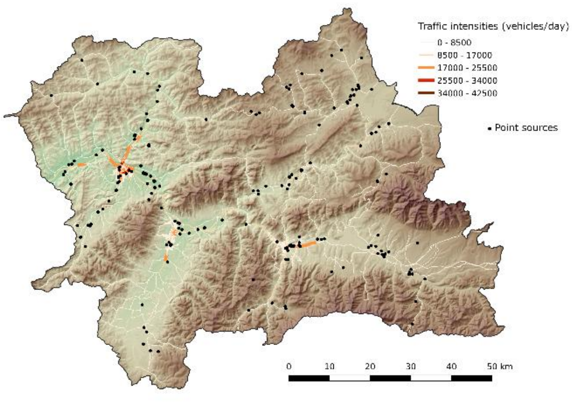
Air pollution sources in zone Žilina region

In the mountainous part of the region, heating of households with solid fuels is a significant source of air pollution. Road transport contributes to air pollution, especially in the busiest road sections around large cities.[1]. Industrial sources of air pollution, such as paper mills, cement plants, lime and ferroalloy production, are among the less dominant contributors to local air pollution with basic pollutants in the Žilina Region zone, while over the years their emissions have decreased due to the modernization of production processes and increasing requirements of environmental legislation. **Tab. 1.1** contains the traffic intensity on major roads in the region according to the national transport census in 2022 and 2023). Map on **Fig. 1.1** shows the more frequent road sections, as processed by the Transport Research Centre (Centrum dopravního výzkumu, CDV) for the year 2024.

***Tab. 1.1** Number of vehicles on the most frequented roads of the Žilina region*

District	Highway/road	Number of vehicles	Trucks	Passenger cars
Žilina	11	43 995	7 739	36 069
	60	41 493	6 427	34 772
	D3	25 837	7 439	18 311
	18	29 649	9 111	20 470
Bytča	D1	28 333	6 765	21 477
Martin	18	25 325	6 321	18 915
	65	23 226	4 420	18 661
	18	18 436	4 553	13 810
Ružomberok	D1	14 737	3 627	11 060
	D1	19 637	4 519	15 046
	18	29 580	5 828	23 665
Liptovský Mikuláš	D1	20 448	4 633	15 746
	59	19 636	3 380	16 156
	18	24 361	2 037	22 184
LM, Tvrdošín	584	21 083	1 969	19 045
Dolný Kubín	č. 59	16 950	2 607	14 289
Námestovo	č. 78	16 134	2 607	14 289
Trstená	R3 southern ring road	6 971	2 002	4 942
Čadca	č. 484	4 608	401	4 175

***Fig. 1.1** Road traffic intensity in the Žilina region. Source: CDV.*



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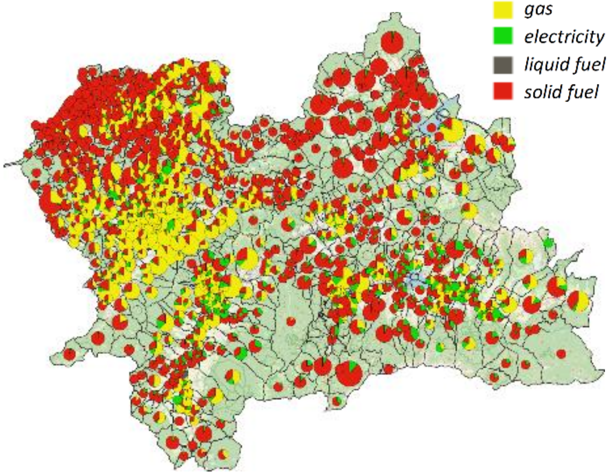
[1] https://www.ssc.sk/sk/cinnosti/rozvoj-cestnej-siete/dopravne-inzinierstvo/celostatne-scitanie-dopravy-v-roku-2022-a-2023.ssc

Fig. 1.2 shows the spatial differences and the share of the type of fuel used for household heating in municipalities (Population and Housing Census (PHC) 2021) of the zone Žilina region. The natural gas is used as heating fuel mostly in the west of the central part; especially in lar-ger cities and municipalities. In the mountainous parts of the region, such as Orava, foothills of Low Tatras mountains range, heating using solid fuel prevails. However, across the whole zone in 2021, gas was predominantly used for heating.

Fig. 1.2 *Share of different types of fuel usedfor heating in the municipalities of the region*[2]



[2] *https://www.scitanie.sk*

2 AIR QUALITY MONITORING STATIONS IN ZONE ŽILINA REGION

The air quality is being monitored at six monitoring stations in the Žilina region, three of them represent an urban background, one station captures the impact of traffic, and two are rural stations. The monitoring station in **Ružomberok-Riadok**, active since the 1980s, characterizes the air quality of an **urban background** with a possible contribution of traffic from a nearby infrequently used road. The stations in the city **of Žilina and Liptovský Mikuláš**, both represent **the urban background** pollution. The **traffic monitoring station is in the city of Martin**. The station in **Oščadnica** represents a monitoring station, aimed **to capture the impact of household heating** using solid fuel. The **rural background station** at **Chopok** (2024 m a. s. l.) is a part of the EMEP and GAW monitoring networks (*https://www.emep.int/*; *https://community.wmo.int/activity-areas/gaw*).

Tab. 2.1 contains information on air quality monitoring stations in the zone Žilina region:

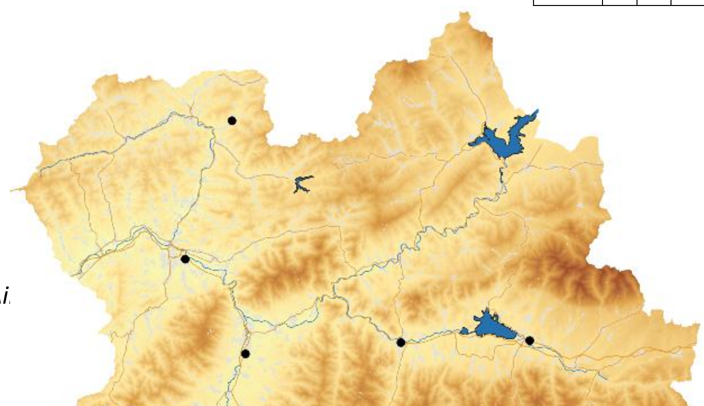
- international EoI code, station characteristics according to the dominant sources of air pollution (traffic, background, industrial), type of monitored area (urban, suburban, rural/regional) and geographical coordinates;
- monitoring programme. Continuous monitoring automatic instruments provide hourly average concentrations of PM_{10}, $PM_{2.5}$, nitrogen oxides, sulphur dioxide, ozone, carbon monoxide, benzene and mercury. The SHMÚ test laboratory analyses heavy metals and polycyclic aromatic hydrocarbons as part of manual monitoring, resulting in 24-hour average concentrations. The exception is the EMEP station Chopok, whose monitoring programme is described in **The Chopok** monitoring station is included in the EMEP monitoring program. The AMS carries out extended monitoring of heavy metals (**Tab. 2.2**) and sampling of atmospheric precipitation (**The basic** parameters of precipitation are analyzed from a 24-hour sample. Heavy metals are analyzed from monthly precipitation due to their low concentration (**Tab. 2.3**). A "bulk" type rain gauge is used to collect precipitation, which captures both wet and dry deposition. Based on the analyses of the samples collected in this way, the wet deposition of the monitored substances is evaluated.

Tab. 2.3). The air quality monitoring program in Chopok in 2024 is presented in **Tab. 2.2**. The main ions are analyzed from 24-hour samples, heavy metals in the air from weekly samples of atmospheric aerosol (sampling interval is 24 hours and 7 days).

- **Tab. 2.2**.

Tab. 2.1 Air quality monitoring programme in the zone Žilina region.

Zone Žilina region								Monitoring programme									
								Continuously								Manually	
District	EoI code	Station	Type of area	Type of latitude	Geographical longitude	Geographical latitude	altituude [m]	PM_{10}	$PM_{2.5}$	NO, NO_2	SO_2	O_3	CO	Benzene	Hg	As, Cd, Ni, Pb	BaP
Liptovský Mikuláš	SK0002R	Chopok, EMEP	R	B	19°35'21"	48°56'37"	1990									*	
Liptovský Mikuláš	SK0067A	Liptovský Mikuláš, Školská	U	B	19°37'10"	49°05'02"	578										
Čadca	SK0071A	Oščadnica	S	B	18°53'01"	49°26'07"	465										
Martin	SK0039A	Martin, Jesenského	U	T	18°55'17"	49°03'35"	383										
Ružomberok	SK0008A	Ružomberok, Riadok	U	B	19°18'09"	49°04'45"	475										
Žilina	SK0020A	Žilina, Obežná	U	B	18°46'17"	49°12'41"	356										
							Total	5	5	6	3	4	3	2	0	2	3



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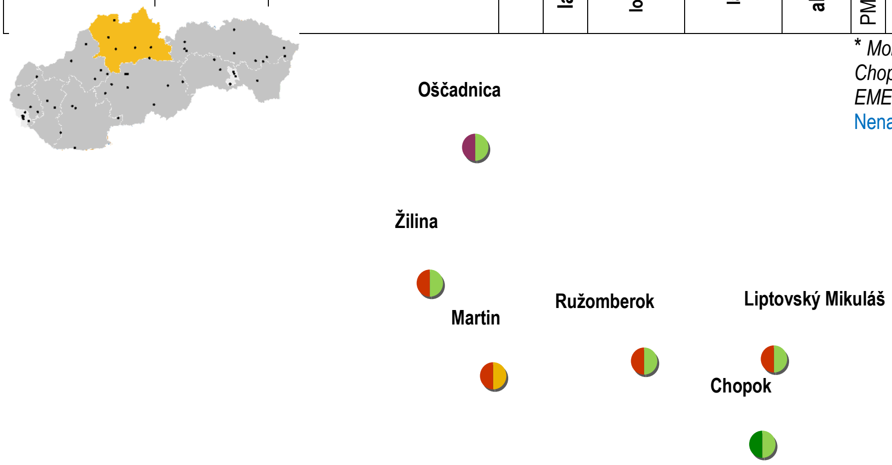
Zone Žilina region									Monitoring programme									
									Continuously								Manually	
District	EoI code	Station	Type of		Geographical		altuitude [m]											
			area	latitude	longitude	latitude			PM_{10}	$PM_{2,5}$	NO, NO_2	SO_2	O_3	CO	Benzene	Hg	As, Cd, Ni, Pb	BaP



* *Monitoring of heavy metals at the station Chopok is carried out according to the EMEP monitoring programme (Chyba! Nenašiel sa žiaden zdroj odkazov.)*

Type of area:
U – urban
S – suburban
R – rural (regional)

Type of station:
B – background
T –traffic
I – industrial

The Chopok monitoring station is included in the EMEP monitoring program. The AMS carries out extended monitoring of heavy metals (**Tab. 2.2**) and sampling of atmospheric precipitation (**The basic** parameters of precipitation are analyzed from a 24-hour sample. Heavy metals are analyzed from monthly precipitation due to their low concentration (**Tab. 2.3**). A "bulk" type rain gauge is used to collect precipitation, which captures both wet and dry deposition. Based on the analyses of the samples collected in this way, the wet deposition of the monitored substances is evaluated.

Tab. 2.3). The air quality monitoring program in Chopok in 2024 is presented in **Tab. 2.2**. The main ions are analyzed from 24-hour samples, heavy metals in the air from weekly samples of atmospheric aerosol (sampling interval is 24 hours and 7 days).

Tab. 2.2 Monitoring program at the EMEP station Chopok

	SO_2	NO_2	SO_4^{2-}	NO_3^-	$HNO_{3(g)}$	Cl-	TSP*	Pb	As	Cd	Ni	Cr	Cu	Zn
Chopok	x	x	x	x	x	x	x	x	x	x	x	x	x	x

* *TSP – total suspended particulates in air*

The basic parameters of precipitation are analyzed from a 24-hour sample. Heavy metals are analyzed from monthly precipitation due to their low concentration (**Tab. 2.3**). A "bulk" type rain gauge is used to collect precipitation, which captures both wet and dry deposition. Based on the analyses of the samples collected in this way, the wet deposition of the monitored substances is evaluated.

Tab. 2.3 Precipitation monitoring programme at EMEP station Chopok

	pH	conductivity	SO_4^{2-}	NO_3^-	Cl^-	NH_4^+	Alkaline ións K^+, Na^+, Ca^{2+}, Mg^{2+}	Pb	As	Cd	Ni	Cr	Cu	Zn
Chopok	x	x	x	x	x	x	x	x	x	x	x	x	x	x

3 ASSESSMENT OF AIR QUALITY IN ZONE TRNAVA REGION

This chapter contains an assessment of air quality in the zone Trnava Region based on monitoring, supplemented by mathematical modelling results for PM_{10}, $PM_{2.5}$ and benzo(a)pyrene for the year 2024.

Tab. 3.1 *Assessment of air pollution according to limit values for protection of human health and smog warning system for PM_{10} in the zone Žilina region – 2024.*

	Type	Protection of human health									IT[2)]	AT[2)]
		SO_2		NO_2		PM_{10}		$PM_{2,5}$	CO	Benzén	PM_{10}	PM_{10}
Pollutant	Area / station	1 h	24 h	1 h	1 rok	24 h	1 rok	1 rok	8 h[1)]	1 rok	12 h	12 h
Averaging period		number of exceedances	number of exceedances	number of exceedances	average	number of exceedances	average	average	average	average	Duration of exceedance [h]	Duration of exceedance [h]
Parameter		350	125	200	40	50	40	20	10 000	5	100	150
Limit value [µg·m⁻³]		24	3	18		35						
Chopok, EMEP	RB			0	1							
Liptovský Mikuláš, Školská	UB	0	0	0	11	9	19	13			44	9
Martin, Jesenského	UT			0	16	16	22	15	1 486	0.3	21	9
Oščadnica	SB	0	0	0	6	12	20	16			46	0
Ružomberok, Riadok	UB	0	0	0	15	16	21	15	1 916	0.3	37	7
Žilina, Obežná	UB			0	17	17	21	15	1 424		29	4

≥ 90 % of valid measurements   [1)] *eight-hour maximum concentration*

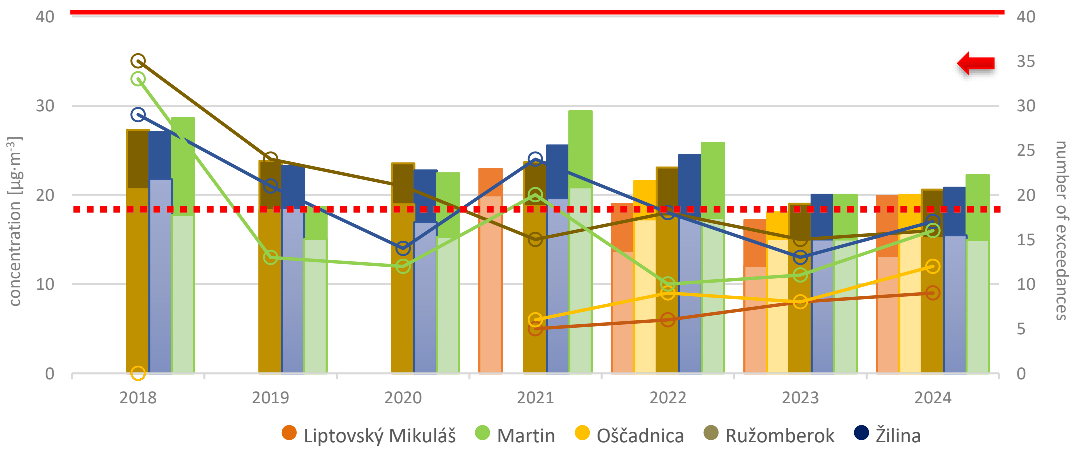
[2)] *IT, AT – duration of exceedance (in hours) of the information threshold (IT) and alert threshold (AT) for PM_{10}*

In accordance with the Decree of the Ministry of Environment of the Slovak Republic No. 250/2023 Coll. on air quality, the required proportion of valid values was observed at the monitoring stations.

3.1 PM_{10} and $PM_{2,5}$

Fig. 3.1 shows the average annual concentrations of PM_{10}, $PM_{2.5}$ and the number of days with average daily PM_{10} concentrations above 50 µg·m^{-3} according to the results of measurements at monitoring stations in the Žilina region in 2018 – 2024.

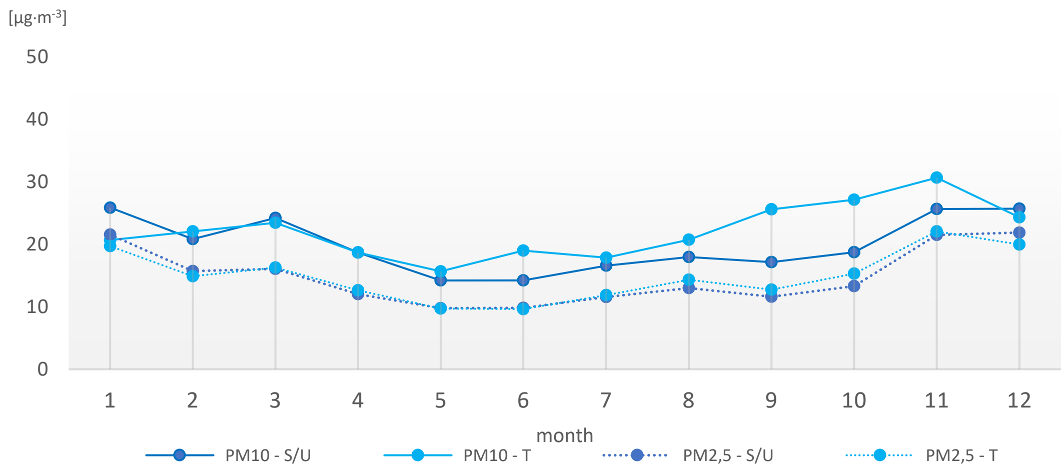
Fig. 3.1 *Average annual concentrations of PM_{10}, $PM_{2.5}$ and the number of exceedances of the daily limit value for PM_{10}*



PM_{10} *dark column color,* ***$PM_{2,5}$*** *– light column color;* ***number of exceedances*** *– solid broken lines*
Horizontal lines show limit values (LH), red solid PM10 (average annual concentration: 40 µg·m^{-3}); red striped $PM_{2.5}$ (average annual concentration: 20 µg·m^{-3}); red solid arrow – LH number of exceedances (average daily PM_{10} concentration 50 µg·m^{-3} max. number of exceedances 35/calendar year).

The limit value for the average annual concentration of PM_{10} (40 µg·m^{-3}) and $PM_{2.5}$ (20 µg·m^{-3}) in the Žilina Region zone was not exceeded, as was the number of exceedances (35) of the average daily limit concentration of PM10 (50 µg·m^{-3}) at no station (**Fig. 3.1**). The highest average annual concentration of PM10 (22 µg·m^{-3}) was recorded at the monitoring station in Martin. The number of daily exceedances was highest at the station in Žilina. Increased emissions of PM_{10} and $PM_{2.5}$ from local heating occur mainly in the coldest months of the year, when there is more intensive combustion of solid fuels. In 2024, the highest monthly concentrations occurred mainly in January, March, November and December. A significant difference in PM_{10} concentrations at the traffic AMS and background sites can be observed in autumn (**Fig. 3.2)**. In winter, monthly average $PM_{2.5}$ concentrations at background stations were higher than at the traffic AMS. Average annual $PM_{2.5}$ concentrations were very similar at all stations except Liptovský Mikuláš (13 µg·m^{-3}).

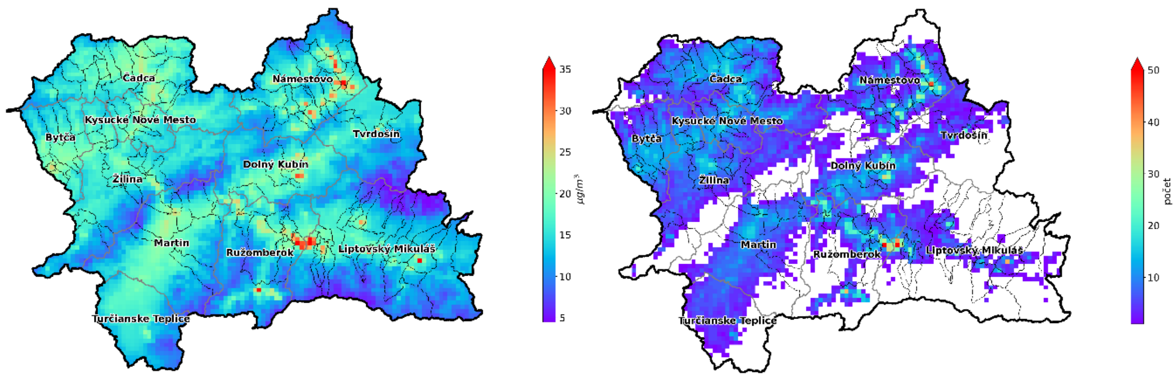
Fig. 3.2 *Average monthly concentrations of PM_{10} and $PM_{2.5}$ in the Žilina region by station type.*



***T PM10** a **T PM2.5** – average monthly concentration of PM_{10} and $PM_{2,5}$ at traffic station Martin; **U/S PM10** a **U/S B PM2.5** – average of monthlz cocentrations of PM_{10} and $PM_{2,5}$ at urban/suburban background stations: Liptovský Mikuláš, Oščadnica, Ružomberok a Žilina.*

Fig. 3.3 shows the results of the modelling of PM_{10} concentrations for 2024, calculated using the RIO model, which was subsequently adjusted using the IDW regression method. The model sees the highest annual average PM_{10} concentrations, as well as the highest number of daily limit exceedances in the municipalities around Ružomberok and Námestovo. The modelling mainly identifies the Orava region as a problematic location, which was also confirmed by indicative monitoring in the municipality of Breza in Orava in 2022. This region is not yet covered by a permanent monitoring station, but its establishment is planned.

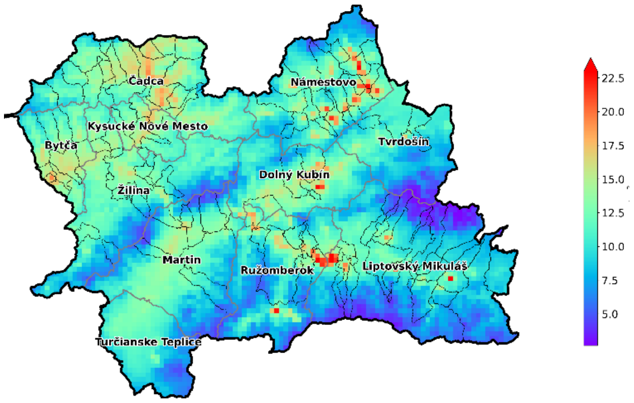
Fig. 3.3 *Average annual PM_{10} concentration (left) and number of PM_{10} daily limit value exceedances (right) in 2024.*



The map in **Fig. 3.4** is the output of the RIO model in combination with IDW-R. Mathematical modelling shows several problem locations in Orava, Kysucie, and around Ružomberok.

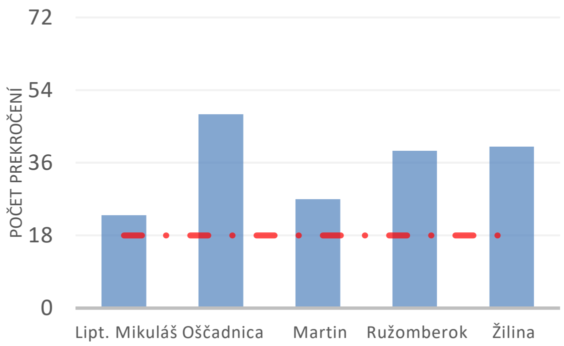
The European Union, as part of the European Green Deal, has developed a Zero Pollution Action Plan, which sets out a vision for 2050. Its aim is to reduce air pollution to levels that are no longer considered harmful to health and natural ecosystems. The action plan includes new EU limit and target values for many pollutants.

Fig. 3.4 Annual Average $PM_{2,5}$ concentration in 2024. Output of model RIO/IDW-R.



The biggest challenge for Slovakia will be to meet the new limit values for $PM_{2.5}$. The $PM_{2.5}$ plan introduces a daily limit value of 25 µg.m^{-3}, which must not be exceeded more than 18 times per year (this is to be achieved by 1. 1. 2030). **Fig. 3.5** illustrates how many exceedances of the new EU daily limit for PM2.5 we would reach in 2024. In the Žilina region zone, no monitoring station would meet the new EU limit value, at most stations the number of exceedances would be more than 2 times. Likewise, at all stations the average annual concentration was higher than the WHO recommendation (5 µg.m^{-3}), which was not met in any month of the year, i.e. not even in summer, when $PM_{2.5}$ concentrations are lowest.

*Fig. 3.5 Number of days with average daily $PM_{2.5}$ concentration > 25 µg.m^{-3} in 2024 – evaluation with respect to the newly introduced EU limit *.*

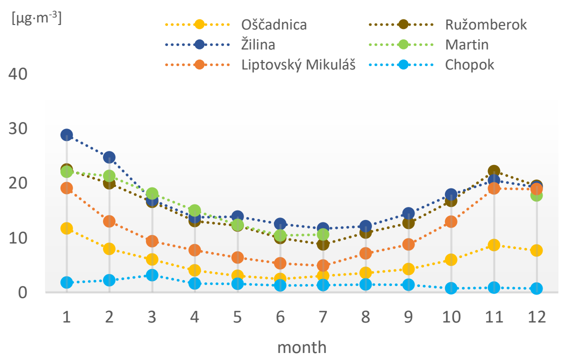


** Under the new EU limit, which will come into force on 1 January 2030, the average daily concentration of $PM_{2.5}$ must not exceed 25 µg.m^{-3} more than 18 times a year.*

3.2 Nitrogen dioxide

Nitrogen dioxide is monitored at six stations in the zone, the average monthly values for individual stations are shown in **Fig. 3.6.**

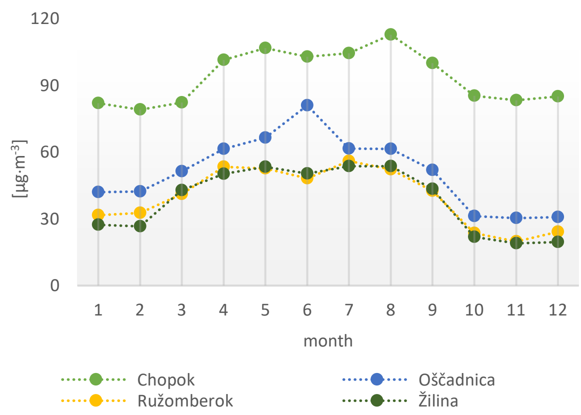
Fig. 3.6 Average monthly NO_2 concentrations.2024.



Despite the fact that the main source of NO_2 emissions is road transport, the highest concentrations, just like last year, were recorded at the urban background station Žilina, Obežná (18 µg·m^{-3}) and Ružomberok, Riadok (17 µg·m^{-3}). At the traffic station in Martin it was 16 µg·m^{-3}. The highest monthly concentrations were measured in the coldest months of February and November with the occurrence of deteriorated dispersion conditions. The limit value for the average annual concentration of NO_2 (40 µg·m^{-3}) was not exceeded at any station in the zone in 2024.Monthly concentrations at the traffic station in Martin are close to the values measured at the urban background station in Ružomberok and Žilina. In 2024, in the Žilina region zone, two stations met the WHO recommendations (10 µg·m^{-3}) for the average annual concentration of NO_2: Chopok (2 µg·m^{-3}) and Oščadnica (6 µg·m^{-3}).

3.3 Ozone

Fig. 3.7 Average monthly O_3 concentration - 2024.



Ozone monitoring is carried out in this zone at four monitoring stations – Chopok, Žilina, Ružomberok and Oščadnica. The highest ozone concentrations are measured at the Chopok station, and some of the lowest within the National Air Quality Monitoring Network are measured at the stations in Ružomberok and Žilina. This is due to the characteristics of the stations. Chopok is a high-mountain station, where the transport of ozone from higher layers of the atmosphere is significant. The target value for O_3 was exceeded. At urban stations near roads, ozone titration via NO is evident.

The highest concentrations of ground-level ozone usually occur in warm months with high sunlight intensity. O_3 concentrations rise with sunrise, peak around noon, and gradually decrease in the evening to a minimum that occurs in the early morning. Large differences in ground-level ozone concentrations are also recorded in warm and cold seasons. **In 2024, we did not record any exceedance of the information or warning threshold for ground-level ozone at any station.**

3.4 Benzo(a)pyrene

Benzo(a)pyrene (BaP) is monitored in the Žilina Region at three monitoring stations – in Žilina, Ružomberok and Oščadnica. The target value for benzo(a)pyrene (1 ng.m^{-3}) was exceeded by all three AMS (**Tab. 3.2**). In Žilina, this pollutant has been monitored since 2018, in Ružomberok since 2020 – in 2021 – 2023 the target value was exceeded roughly twice.

Tab. 3.2 *Average annual concentrations of benzo(a)pyrene in 2018 – 2024.*

Target value [ng·m^{-3}]	2018 1,0	2019 1,0	2020 1,0	2021 1,0	2022 1,0	2023 1,0	2024 1,0
Žilina, Obežná	6,0	2,0	1,9	1,9	1,9	1,2	1,3
Ružomberok, Riadok			4,5	2,3	2,2	2,0	1,5
Oščadnica						1,9	2,1
Martin, Jesenského							*1,0

≥ 90 % of valid measurements
The exceedance of the target value is marked in red if the station had sufficient (≥90 %) valid measurements in the given year.
** In Martin measurements began during 2024*

Fig. 3.8 *Concentrations of benzo(a)pyrene in 2024*

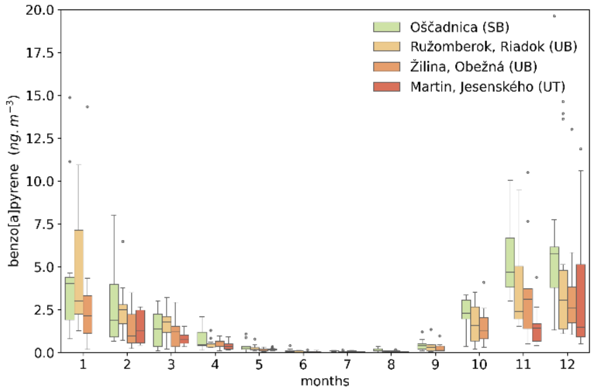
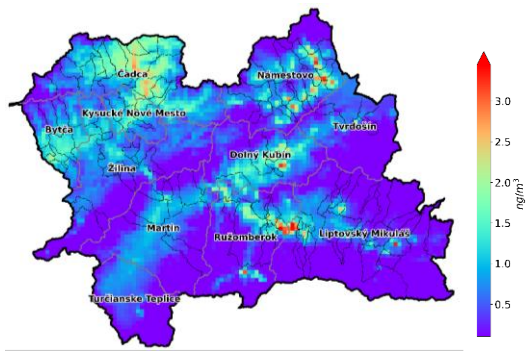


Fig. 3.9 *Average annual concentration of BaP RIO/IDW- R model output, (2024).*



The most significant source of benzo(a)pyrene is heating of households with solid fuel, especially insufficiently dried wood, or unsuitable fuel (various types of waste). Transport can mainly affect the concentrations at the stations in the zone. **Fig. 3.8** shows concentrations at the monitoring stations in Žilina, Oščadnica, Ružomberok and Martin. The highest concentrations of benzo(a)pyrene were measured, as with other pollutants, in cold February with a maximum of more than 10 ng.m^{-3} and in December, when we recorded a maximum of 20 ng.m^{-3} in Oščadnica.

The station in Oščadnica (installed in 2022) confirms, as well as the outputs from mathematical modeling (**Fig. 3.9**), that Kysuce is also an area where BaP is a problem. It is a location with higher heating demands in the winter and the occurrence of deteriorated dispersion conditions.

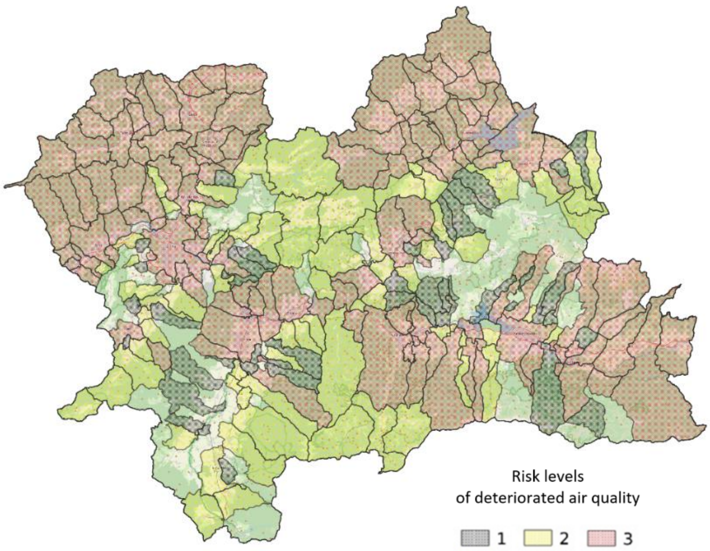
3.5 Chemical composition of precipitation

At the rural background station Chopok, precipitation quality is monitored on a daily basis. The qualitative composition of basic ions, pH parameters and conductivity are monitored. The annual average **pH** value **was 5.15**. Wet deposition of **SO_4^{2-}** was at the level of **0.24 g S/m^2/year** and **NO^{3-}** was **0.2 g N/m^2/year**. **Wet deposition of lead** was at the level of **11 g/ha/year**. Detailed monitoring results are presented in Chapter 3 in the Regional Monitoring section of the report *Air Quality in the Slovak Republic 2024.*

3.6 Risk municipalities

Fig. 3.10 presents the municipalities at risk of deteriorated air quality as determined by the Integrated Assessment Method[3]. Level 3 corresponds to the highest probability of air pollution risk. The methodo-logy includes the level of household heating with solid fuels, the impact of worsened dispersion conditions from both short-term and long-term perspectives, results from the chemical transport model CMAQ, the interpolation model RIO, and high-resolution modelling results using the CALPUFF model in selected domains with an assumed deteriorated air quality.

Fig. 3.10 Risk municipalities in zone Žilina region (2024).



Municipalities in which the limit value for PM, NO_2, or the target value for BaP was exceeded based on high spatial resolution modelling were automatically assigned a risk level 3, similar to municipalities where the limit or target value exceedance was detected through measurement. The list of municipalities and their risk levels can be found on the SHMÚ website [4].

Zones and agglomerations that include at least one municipality with a risk level 3 are obligated to develop an Air Quality Plan. In this regard, municipalities with a risk level 3 correspond to *air quality management areas*. However, measures to reduce emissions must be imple-mented in all municipalities within this designated zone with a risk level 2 or 3, ideally also in municipalities with a risk level 1.

The assessment using the Integrated Assessment Method aims to identify areas where action to improve air quality needs to be targeted. Given the distribu-tion of air pollution sources and consi-dering the microclimatic characteristics of the region, it is likely that pollution levels vary at different locations within the risk area. The high-resolution model-ling provides information on the spatial distribution of air pollution, publicly avail-able at the SHMÚ website [5].

3.7 Summary

According to the monitoring results, **no exceedances of the limit values for SO_2, NO_2, CO, benzene, PM_{10} and $PM_{2.5}$** were measured in the Žilina Region zone in 2024. According to the monitoring, **the target value for** the average annual concentration of **BaP was exceeded at the stations in Ružomberok, Žilina and Oščadnica**. The target value for O_3 was exceeded at the rural background monitoring station Chopok, where transmission from higher layers of the atmosphere plays a role.

Long-term trends in PM (**Fig. 3.1**) and NO_2 in the zone are decreasing. Since 2018, the number of exceedances of the daily limit for PM_{10} at all stations has decreased significantly.

Based on the outputs from the RIO, IDW-R model, we can conclude that in the Žilina Region zone there is a risk of higher concentrations of $PM_{2.5}$ and BaP in several municipalities in Orava, Kysucie, around Ružomberok, Martin, and also in some municipalities in the Liptovský Mikuláš district.

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[3] *Štefánik, D., Krajčovičová, J.: Metóda integrovaného posúdenia obcí vzhľadom na riziko nepriaznivej kvality ovzdušia, Slovenský hydrometeorologický ústav, 2023, dostupné na https://www.shmu.sk/sk/?page=996*

[4] *https://www.shmu.sk/sk/?page=2873*

[5] *https://www.shmu.sk/sk/?page=2699*

If we were to assess the compliance with the requirements resulting from the new Air Quality Directive 2024/2881, which sets stricter limit values (will enter into force on 1 January 2030), the biggest problem in the Žilina Region zone would be not to exceed the new limit values for PM2.5. All stations in the region currently do not meet several of the stricter requirements of the new Air Quality Directive. Despite the fact that the pollution level in the region is showing a decreasing trend, additional measures will need to be taken to help reduce pollution to the required level in order to meet the requirements of the new directive.

If we were to assess air quality according to WHO recommendations[6], no station would meet the values of the established concentrations for pollutants. The ambition of the Zero Pollution Action Plan[7] is to achieve air quality according to these recommendations by 2050.

In the Žilina region zone, the biggest problem in terms of air quality is the high concentrations of BaP.

[6] *WHO GLOBAL AIR QUALITY GUIDELINES, 2021. Recommendations on classical air pollutants, str. 4. https://apps.who.int/iris/bitstream/handle/10665/345334/9789240034433-eng.pdf*

[7] *https://www.consilium.europa.eu/en/press/press-releases/2024/02/20/air-quality-council-and-parliament-strike-deal-to-strengthen-standards-in-the-eu/*