

## IV.7 Sulphur dioxide

### IV.7.1 Air pollution by sulphur dioxide in 2019

#### Air pollution by sulphur dioxide in 2019 in relation to the pollution limit value for protection of human health

In 2019, the hourly or the 24-hour pollution limits for sulphur dioxide (SO<sub>2</sub>) were not exceeded at any monitoring station in the Czech Republic, so both pollution limits were met (Tab. XI.18 and XI.19).

The highest 24-hour SO<sub>2</sub> concentrations were measured at the Ostrava-Radvanice ZÚ (70 µg.m<sup>-3</sup>), Český Těšín (65 µg.m<sup>-3</sup>), Sněžník (59 µg.m<sup>-3</sup>), Petrovice at Karviná (49 µg.m<sup>-3</sup>), Kostomlaty pod Milešovkou (46 µg.m<sup>-3</sup>), and Ostrava-Poruba/CHMI (45 µg.m<sup>-3</sup>) stations.

The 25<sup>th</sup> highest SO<sub>2</sub> hourly concentration attained the highest values at the Ostrava-Fifejdy (318 µg.m<sup>-3</sup>), Ostrava-Přívoz (285 µg.m<sup>-3</sup>), Ostrava-Radvanice ZÚ (138 µg.m<sup>-3</sup>), Ostrava-Mariánské Hory (121 µg.m<sup>-3</sup>), and Český Těšín (103 µg.m<sup>-3</sup>) stations.

The 25<sup>th</sup> highest hourly concentration of SO<sub>2</sub> attained the highest values at the Český Těšín (128 µg.m<sup>-3</sup>), Ostrava-Radvanice ZÚ (98 µg.m<sup>-3</sup>), Karviná (70 µg.m<sup>-3</sup>), and Ostrava-Radvanice OZO (69 µg.m<sup>-3</sup>) stations.

The fourth highest 24-hour concentration of SO<sub>2</sub> attained the highest values practically at the same stations, namely Český Těšín (52 µg.m<sup>-3</sup>), Ostrava-Radvanice ZÚ (52 µg.m<sup>-3</sup>), and Petrovice at Karviná (38 µg.m<sup>-3</sup>).

At the Ostrava-Radvanice ZÚ and Ostrava-Radvanice OZO stations, increased concentrations of SO<sub>2</sub> occur mainly in connection with local sources in the vicinity of the station. At the Ostrava-Poruba/CHMI station, the cause of increased hourly concentrations of this substance was also a local effect. In the case of the Český Těšín station, but also other border stations - Petrovice at Karviná, Věřňovice, and Šunychl, SO<sub>2</sub> emissions from local sources at the Czech-Polish border area are involved.

On 99.98% of the area of the Czech Republic, the 24-hour concentrations of SO<sub>2</sub> were under the lower assessment threshold (LAT). The lower assessment threshold was exceeded on only 0.02% of the territory. This applies only to cities of Ostrava and Český Těšín (Fig. IV.7.1). The point symbols at the stations designate 24-hour SO<sub>2</sub> concentration measured at the air quality monitoring stations (Fig. IV.7.2).

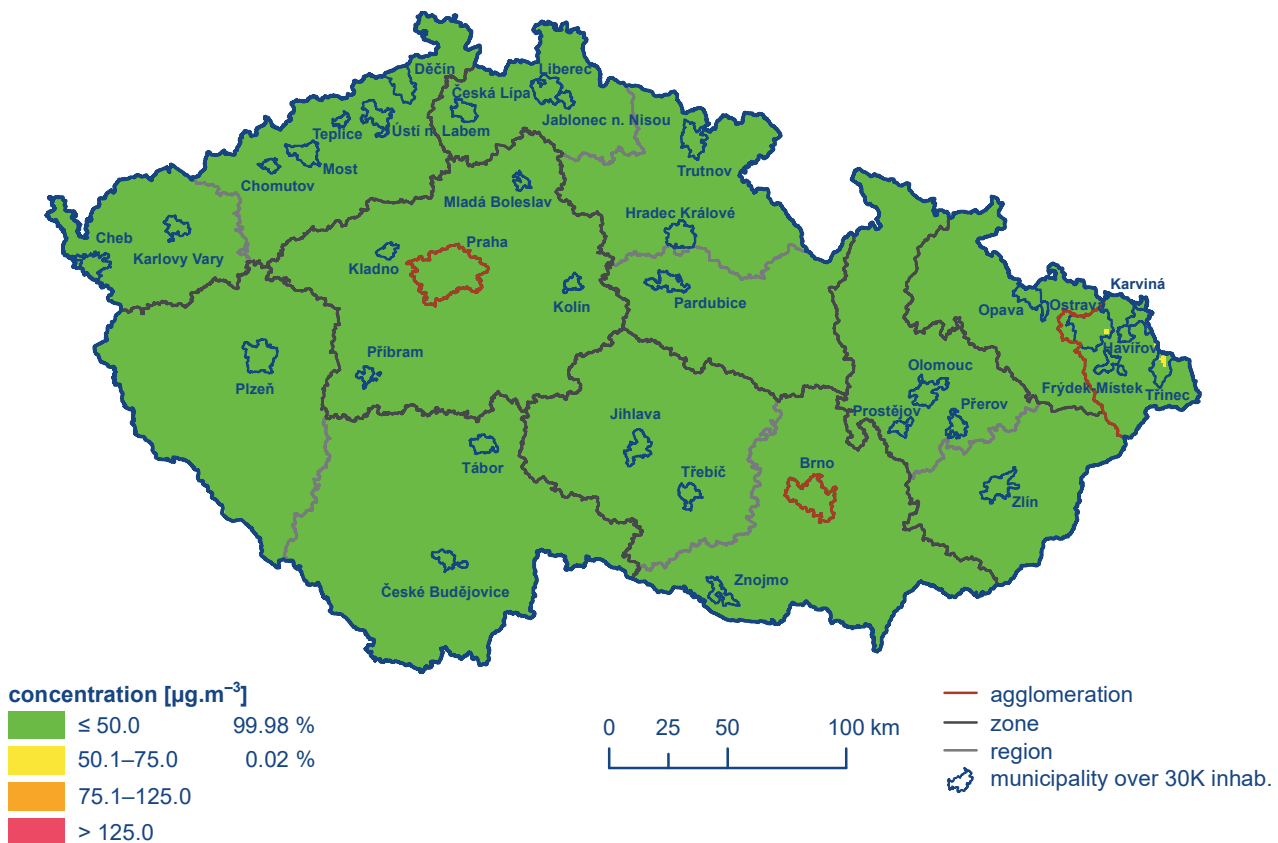
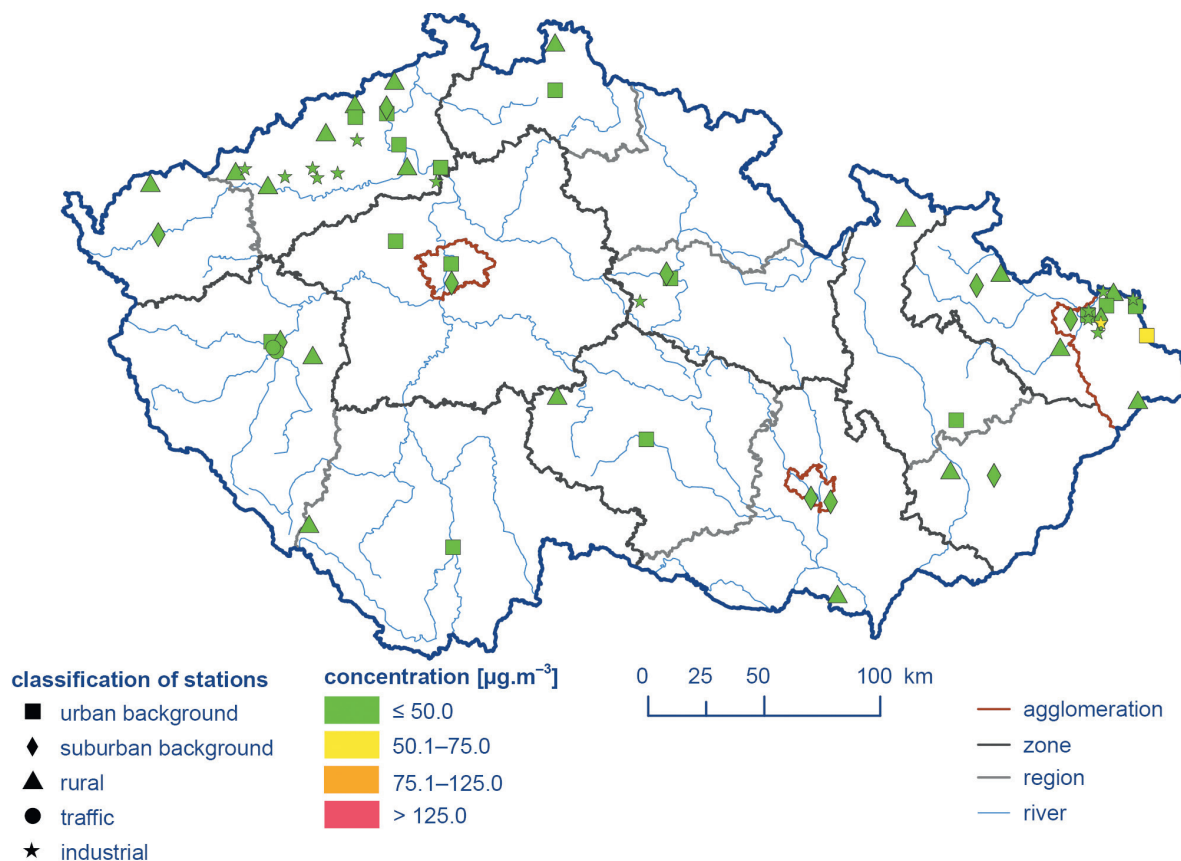


Fig. IV.7.1 Field of 4<sup>th</sup> highest 24-hour SO<sub>2</sub> concentration, 2019



**Fig. IV.7.2 4<sup>th</sup> highest 24-hour  $\text{SO}_2$  concentration at air quality monitoring stations, 2019**

### Air pollution by sulphur dioxide in 2019 in relation to the pollution limit value for protection of ecosystems and vegetation

In 2019, neither the annual nor winter average concentrations exceeded the pollution limit value at rural locations (Tab. XI.21 and Tab. XI.22). The highest winter average concentrations were recorded at the Krupka ( $10 \mu\text{g}\cdot\text{m}^{-3}$ ), Lom ( $9.7 \mu\text{g}\cdot\text{m}^{-3}$ ), Sněžník ( $7.1 \mu\text{g}\cdot\text{m}^{-3}$ ), and Věřňovice ( $6.2 \mu\text{g}\cdot\text{m}^{-3}$ ) stations. The annual average concentrations attained maximum values at the same stations, Krupka ( $9 \mu\text{g}\cdot\text{m}^{-3}$ ) and Lom ( $7.6 \mu\text{g}\cdot\text{m}^{-3}$ ), and the Brumovice MŠ ( $6.8 \mu\text{g}\cdot\text{m}^{-3}$ ) and Měděnec ( $6 \mu\text{g}\cdot\text{m}^{-3}$ ) stations.

The upper assessment threshold for the annual average  $\text{SO}_2$  concentration was exceeded in 2019 on only small areas in the Moravian–Silesia regions (Fig. IV.7.3). In this region and in the Ústí nad Labem region, the upper assessment threshold of the average concentration of the winter period 2019/2020 was exceeded on a small area (Fig. IV.7.4). In the Moravian-Silesia region, the limit value for the annual and winter average concentration of

$20 \mu\text{g}\cdot\text{m}^{-3}$  was actually exceeded, but only in the cities of Ostrava and Třinec. This exceeded value is based on a model calculation when constructing the map.

All the background stations measuring  $\text{SO}_2$ , taking into account their classification, were used to construct the two maps (Fig. IV.7.3 and Fig. IV.7.4). On the maps, point symbols designate only rural stations because only at these locations the average winter and annual average  $\text{SO}_2$  concentrations are measured in relation to the pollution limit values for protection of ecosystems and vegetation.

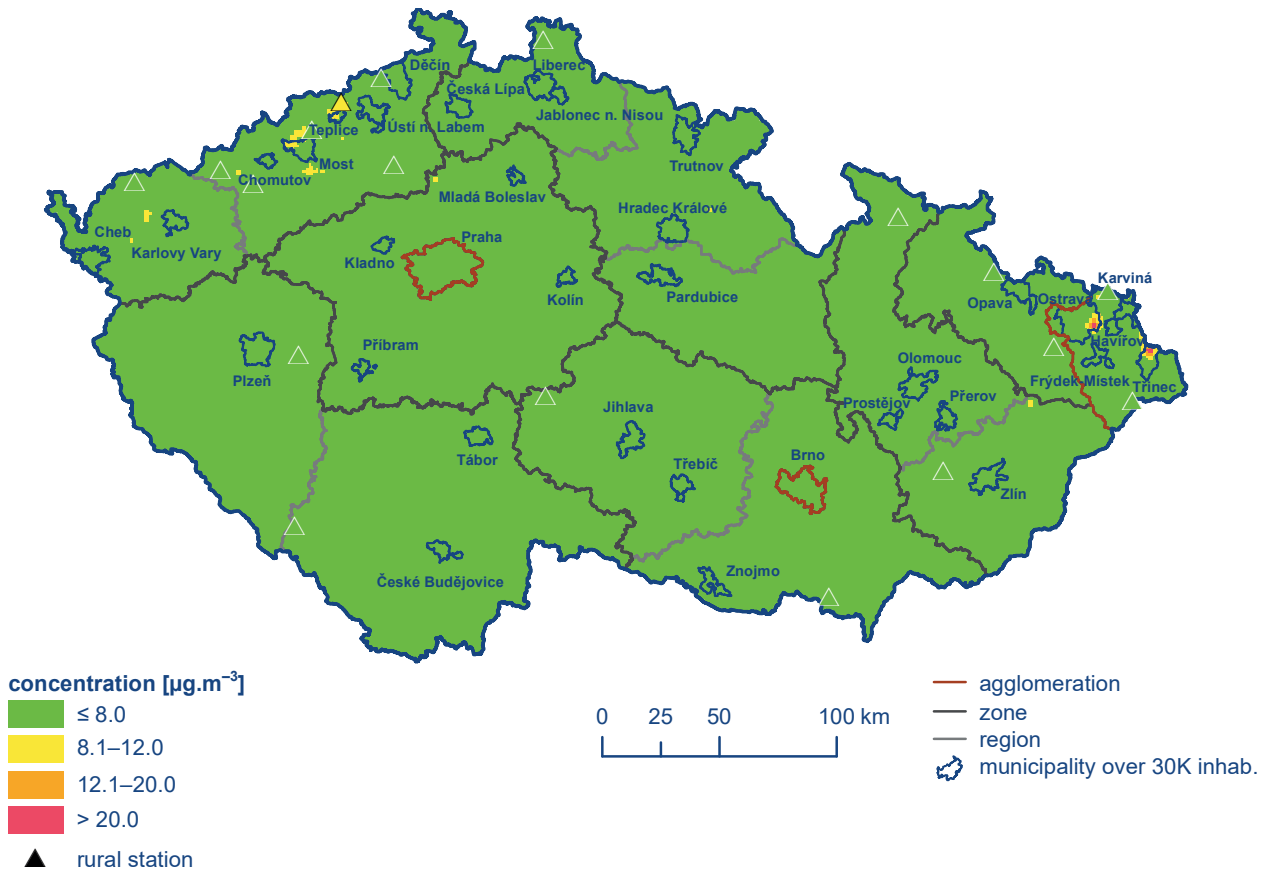


Fig. IV.7.3 Field of annual average  $\text{SO}_2$  concentration, 2019

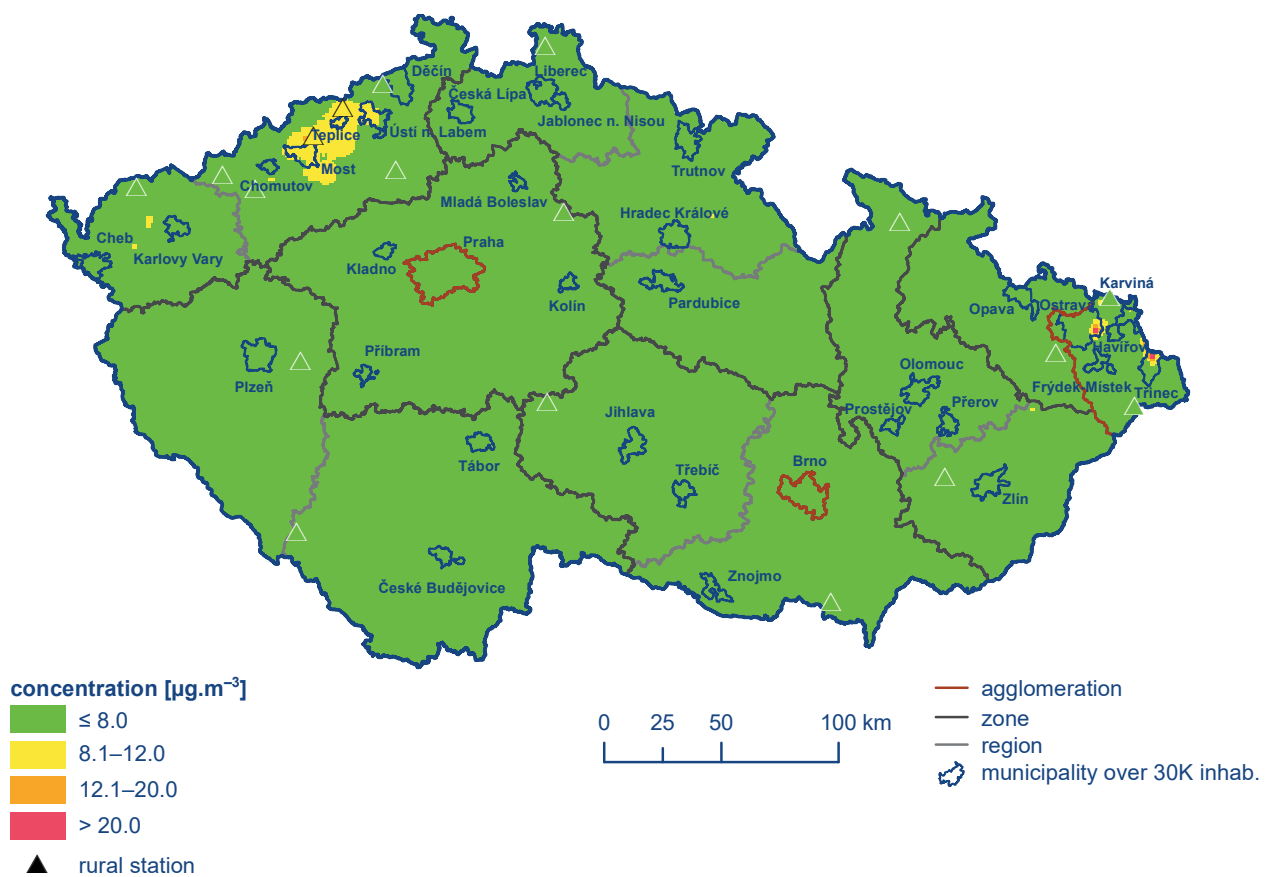


Fig. IV.7.4 Field of annual average  $\text{SO}_2$  concentration in winter of 2019/2020

## IV.7.2 Trends in sulphur dioxide concentrations

A substantial reduction in  $\text{SO}_2$  concentrations occurred after 1998 in connection with coming into effect of Act No. 309/1991 Coll. and ensuring compliance with the prescribed emission limits. Since then, the annual average concentrations of this substance at rural locations have not exceeded the set pollution limit value of  $20 \mu\text{g}\cdot\text{m}^{-3}$ . A further reduction in  $\text{SO}_2$  concentrations occurred throughout the Czech Republic in 2008. Conversely, in 2009 and 2010, a slight increase in  $\text{SO}_2$  pollution was recorded, but from 2011 to 2016 a further declining course was evident. A decreasing trend discontinued in 2017 and there was an increase in  $\text{SO}_2$  concentrations (Fig. IV.7.6 and IV.7.7). Since 2018, the decreasing course of 24-hour concentrations of this substance has continued at most types of stations and overall at all stations, as confirmed in 2019 (Fig. IV.7.7). On the contrary, there was a significant increase in hourly  $\text{SO}_2$  concentrations at industrial and urban stations (Fig. IV.7.6). This increase was affected by concentrations observed at the Ostrava-Fifejdy, Ostrava-Přívov and Ostrava-Mariánské Hory stations arising from remediation work on waste lagoons of the former OSTRAMO company. In 2019, the increase did not already continue and, on the contrary, there was a decrease in hourly  $\text{SO}_2$  concentrations at all types of stations and overall at all stations (Fig. IV.7.6).

The annual and winter averages show a slight decrease in  $\text{SO}_2$  concentrations in 2019 and 2019/2020. This decrease is apparent in all rural localities as well as in the category of regional localities. The 10-year annual and winter average (2009–2018) has a balanced course, the winter average is at a slightly higher level (Fig. IV.7.8).

The overall decreasing course in  $\text{SO}_2$  concentrations follows a reduction in emissions, sulphur removal in coal-fired power plants and a change in the fuel types in use (see the emission trends in Chap. II). The varying meteorological and dispersion conditions in particular years also had an impact on the year-on-year variations in the concentrations of this substance.

Since 2008, a decreasing course has been apparent in the 4<sup>th</sup> highest 24-hour and 25<sup>th</sup> highest hourly  $\text{SO}_2$  concentrations at a majority of selected stations (Fig. IV.7.5). This decreasing course is even more apparent in the 2011–2016 period. The decline discontinued in 2017 and it again resumed in most locations in 2018. Significant increase in concentrations of this substance in 2018 concerned only three Ostrava area stations of Fifejdy, Přívov and Mariánské Hory, as a result of the impact of remediation of the OSTRAMO lagoons, as previously mentioned in the text. In 2019, the decrease in  $\text{SO}_2$  concentrations continued at most stations.

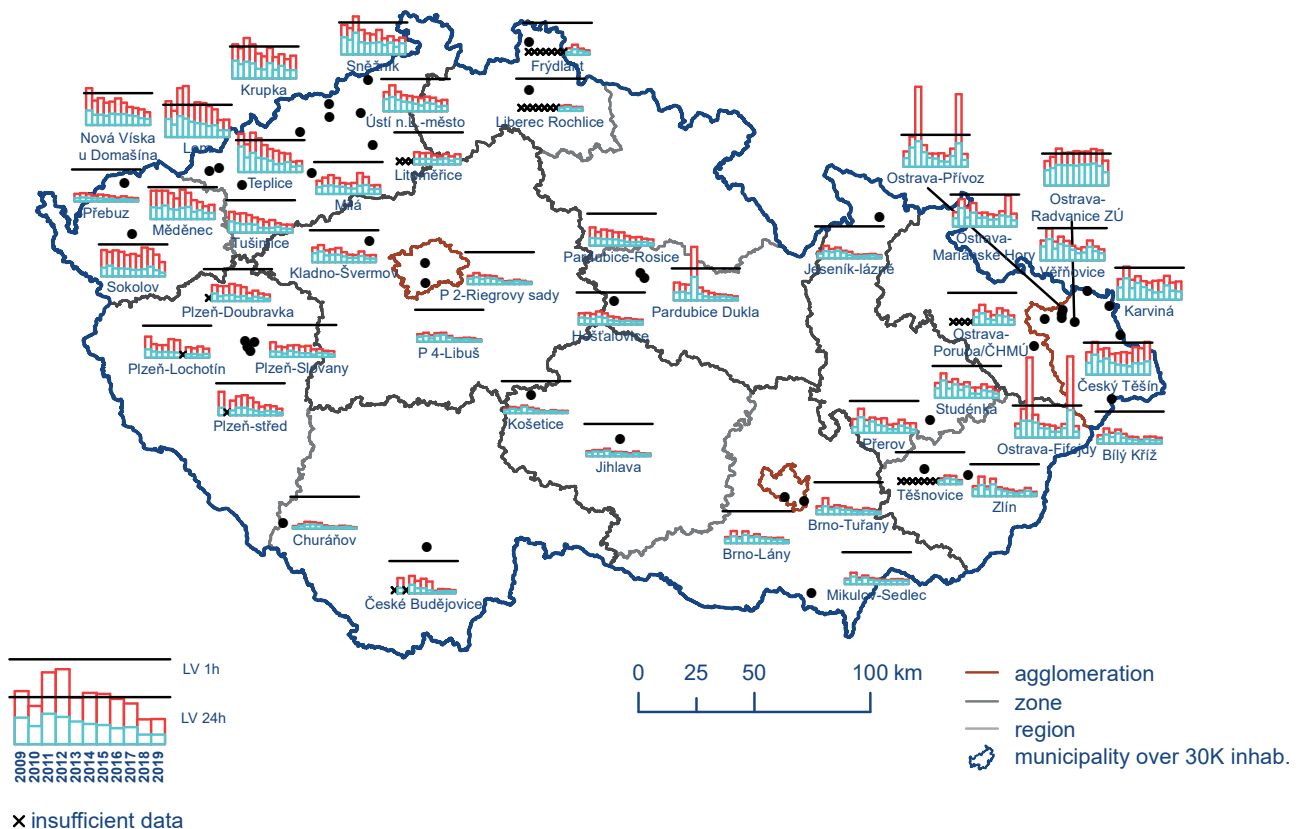


Fig. IV.7.5 4<sup>th</sup> highest 24-hour and 25<sup>th</sup> highest hourly  $\text{SO}_2$  concentrations at selected stations, 2009–2019

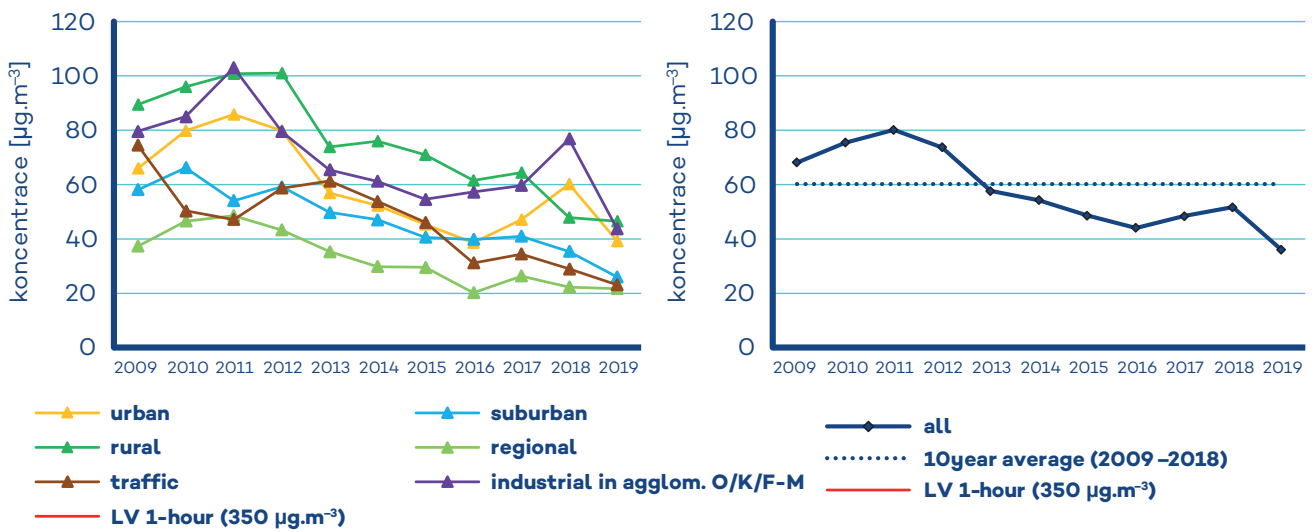


Fig. IV.7.6 Annual characteristics of SO<sub>2</sub> (25<sup>th</sup> highest 1-hour concentration) at particular types of stations in the Czech Republic, 2009–2019

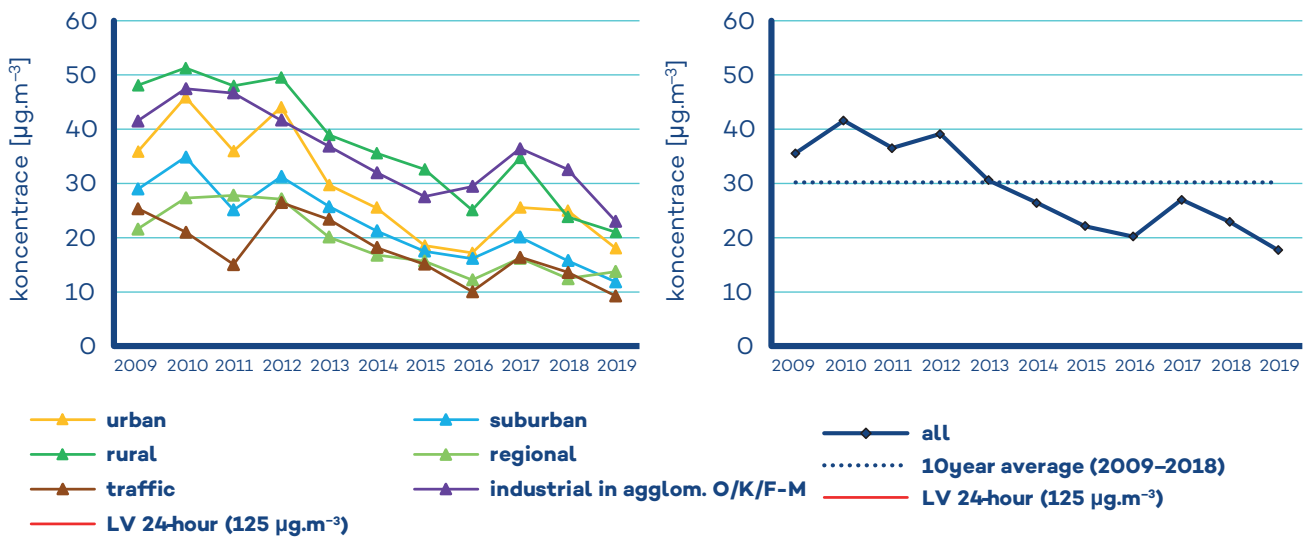


Fig. IV.7.7 Annual characteristics of SO<sub>2</sub> (4<sup>th</sup> highest 24-hour concentration) at particular types of stations in the Czech Republic, 2009–2019

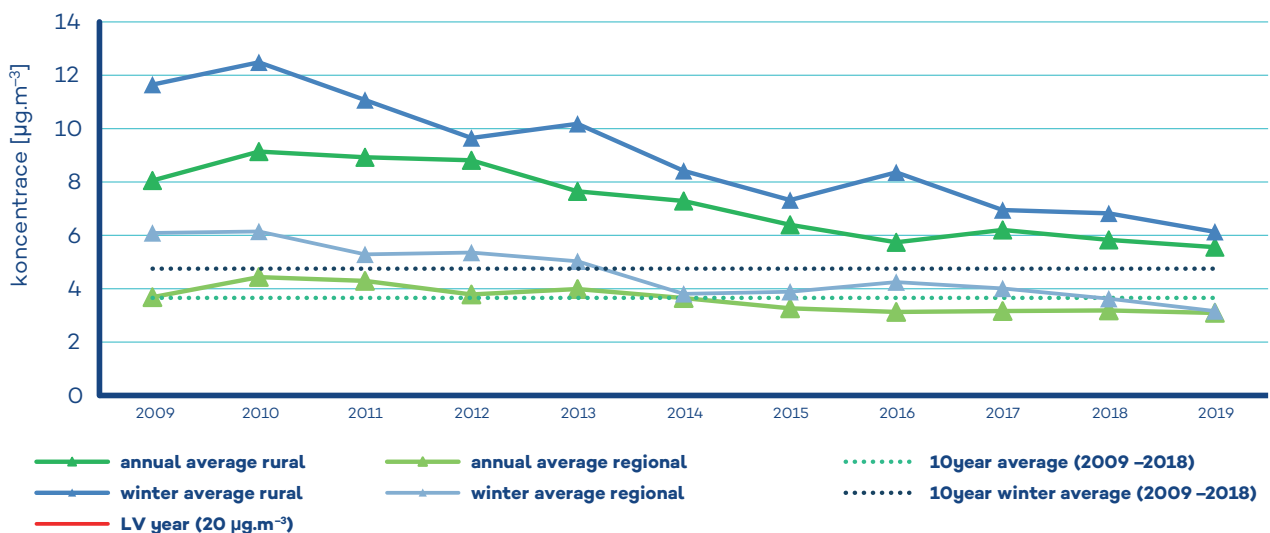


Fig. IV.7.8 Annual characteristics of SO<sub>2</sub> at particular types of stations in the Czech Republic, 2009–2019

### IV.7.3 Sulphur dioxide emissions

Sulphur dioxide emissions originate mainly from the combustion of solid fossil fuels containing sulphur. In 2018, at a national scale, 54.9% of SO<sub>2</sub> emissions originated from sector 1A1a – Public electricity and heat production and 21.7% from sector 1A4bi – Residential: Stationary (Fig. IV.7.9). A reduction in SO<sub>2</sub> emissions in the 2009–2018 period took place after 2012 as a result of preparation of sources for stricter emissions limits (Fig. IV.7.10). In view of the predominant effect of the sector of public electricity and heat production, SO<sub>2</sub> emissions appear mostly in the Ústí, Moravian-Silesia and Central Bohemia regions in which the larger energy production facilities are located (Fig. IV.7.11).

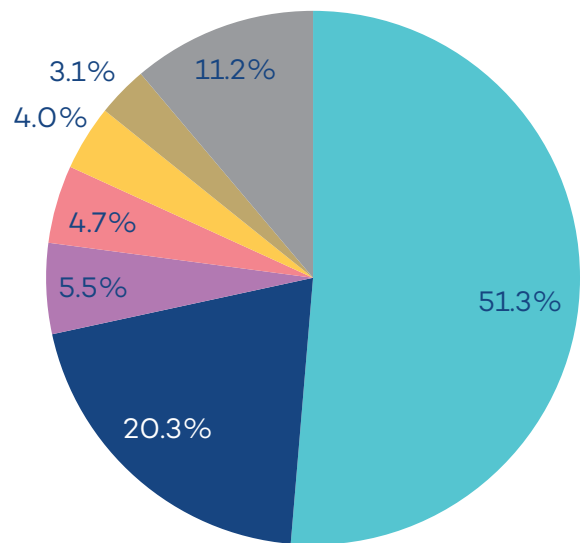


Fig. IV.7.9 Share of NFR sectors in total SO<sub>2</sub> emissions, 2018

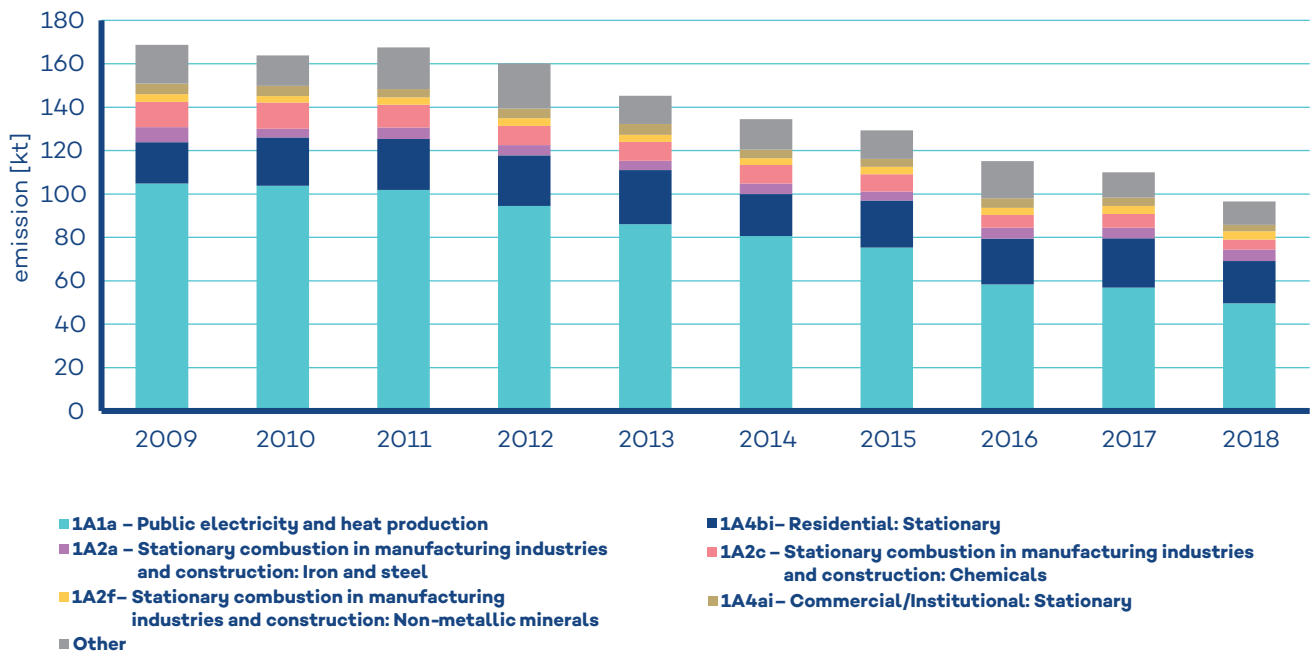
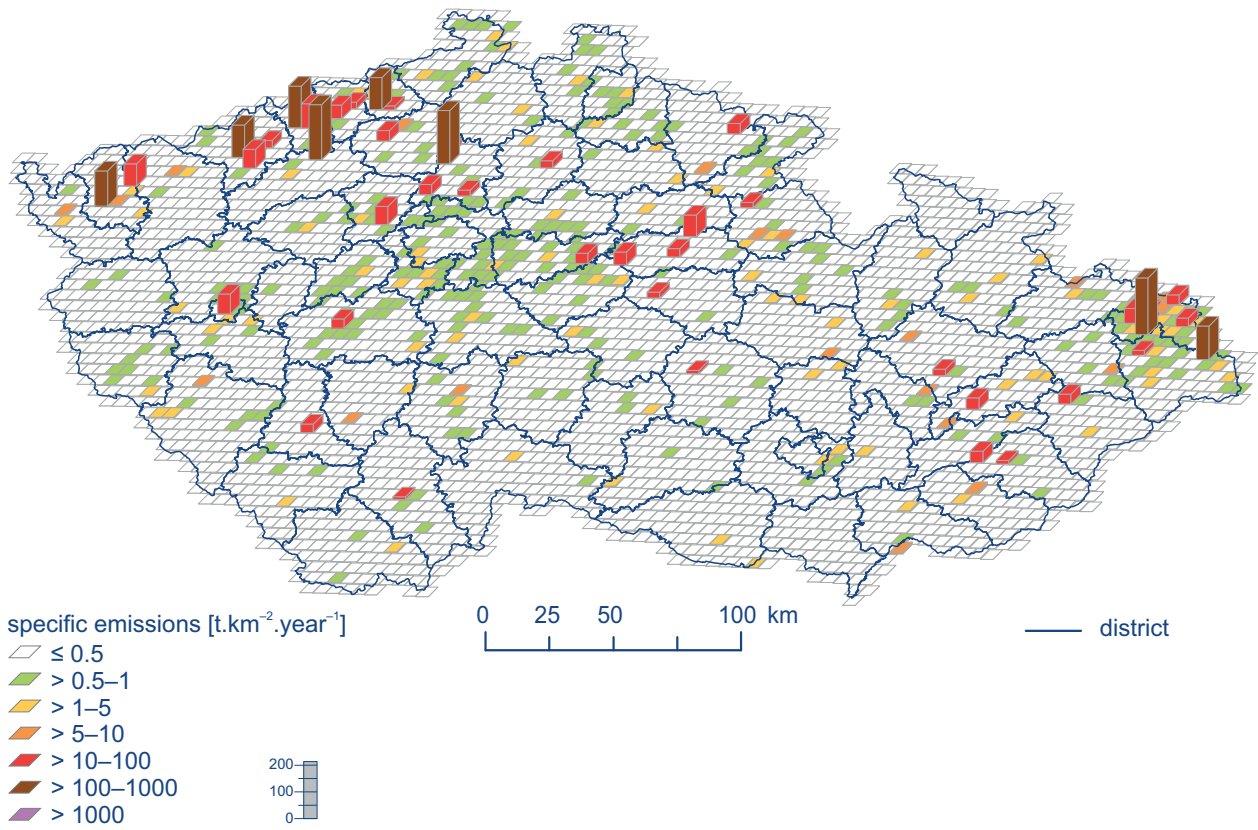


Fig. IV.7.10 Total SO<sub>2</sub> emissions, 2009–2018



**Fig. IV.7.11 Sulphur dioxide emission densities in 5 x 5 km spatial resolution squares, 2018**