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# INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY

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# The concept

- MANDATE
- About the SEPA in the 2016.
- SEPA ACTIVITIES IN THE AREA OF AIR QUALITY – MONITORING AND ASSESSMENT
- $SO_2$ in Bor- historical overview
- INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY
- $SO_2$ in Europe and Serbia

## Regulation – MANDATE

**National regulations defining the monitoring and assessment of air quality – MANDATE**

- ✓ **Law on Ministries**
  ("Off. Gazette RS" No. 44/14)

**Law on Air Protection**
("Off. Gazette RS" No. 36/09, 10/13)

- ✓ **Regulation for air quality monitoring and air quality requirements**
  ("Off. Gazette RS" No .11/10, 75/10, 63/13)

- ✓ **Regulation on the establishment of zones and agglomerations**
  ("Off. Gazette RS " No. 58/11, 98/12 )

- ✓ **Regulation on the establishment of programs for air quality control in national network ("Off. Gazette RS " No. 58/11)**

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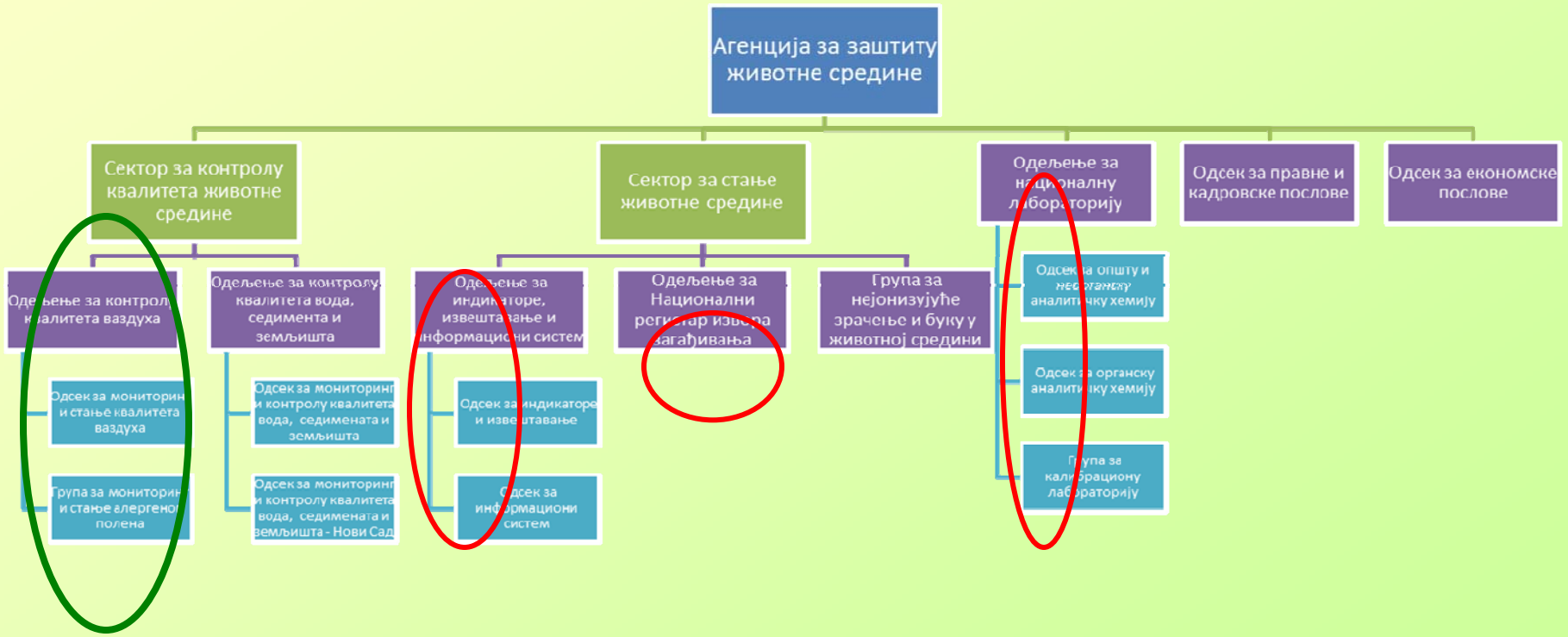
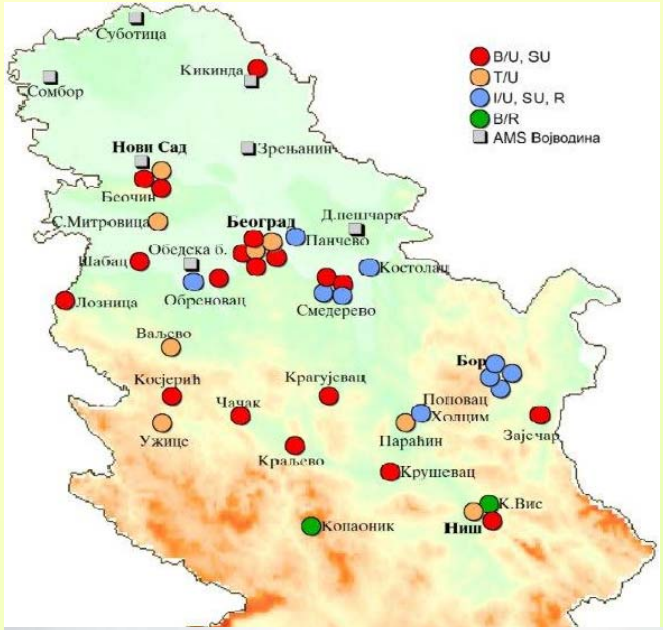
# SEPA 2015.
## Where are all implemented activities related air quality.



# SEPA ACTIVITIES IN THE AREA OF AIR QUALITY – MONITORING AND ASSESSMENT

## State AAQM network





Република Србија
Министарство пољопривреде и заштите животне средине

ГОДИШЊИ ИЗВЕШТАЈ
О СТАЊУ КВАЛИТЕТА ВАЗДУХА
У РЕПУБЛИЦИ СРБИЈИ 2014. ГОДИНЕ

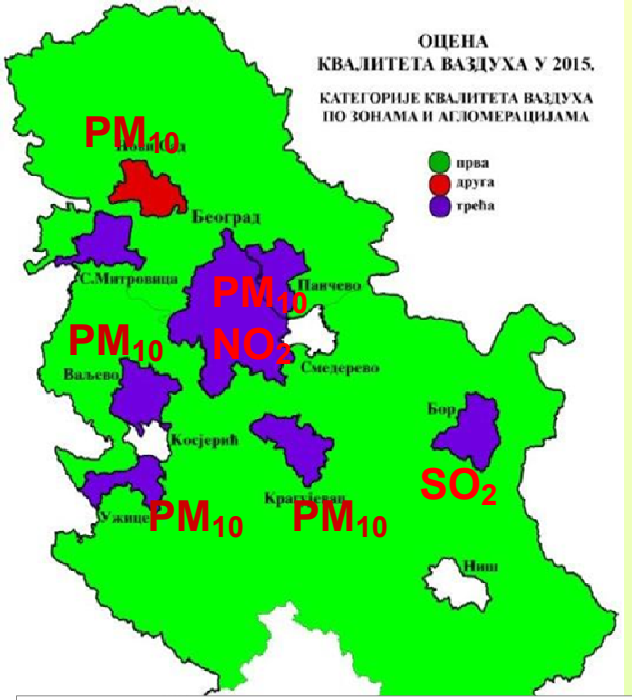
Агенција за заштиту животне средине

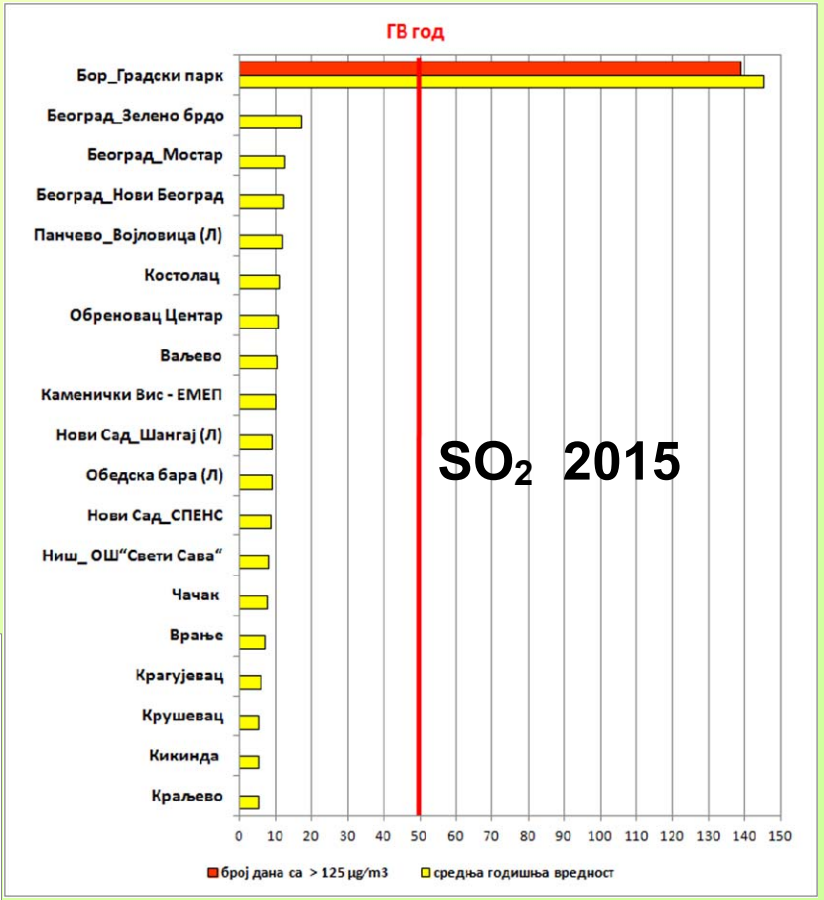
БЕОГРАД, 2015. ГОДИНЕ

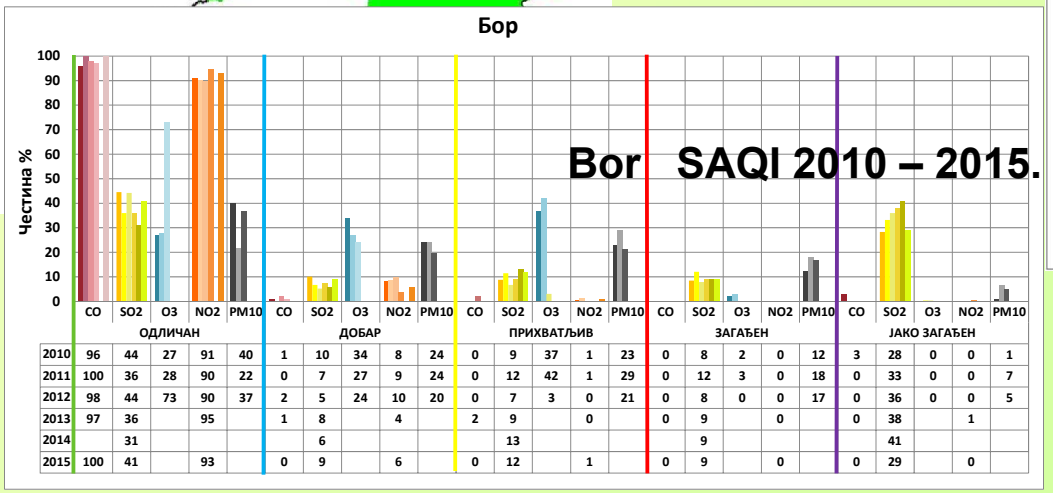
**Annual Report on the state of AQ with the official assessment of AQ in the Republic of Serbia, available on the *www.sepa.gov.rs***

# $SO_2$ in AQ monitoring and assessment

**The earlier conclusion .... ON AIR QUALITY IN SERBIA DOMINANT IMPACT HAVE PM....**
**EXEPT BOR WHERE SO2 ARE DOMINANT**

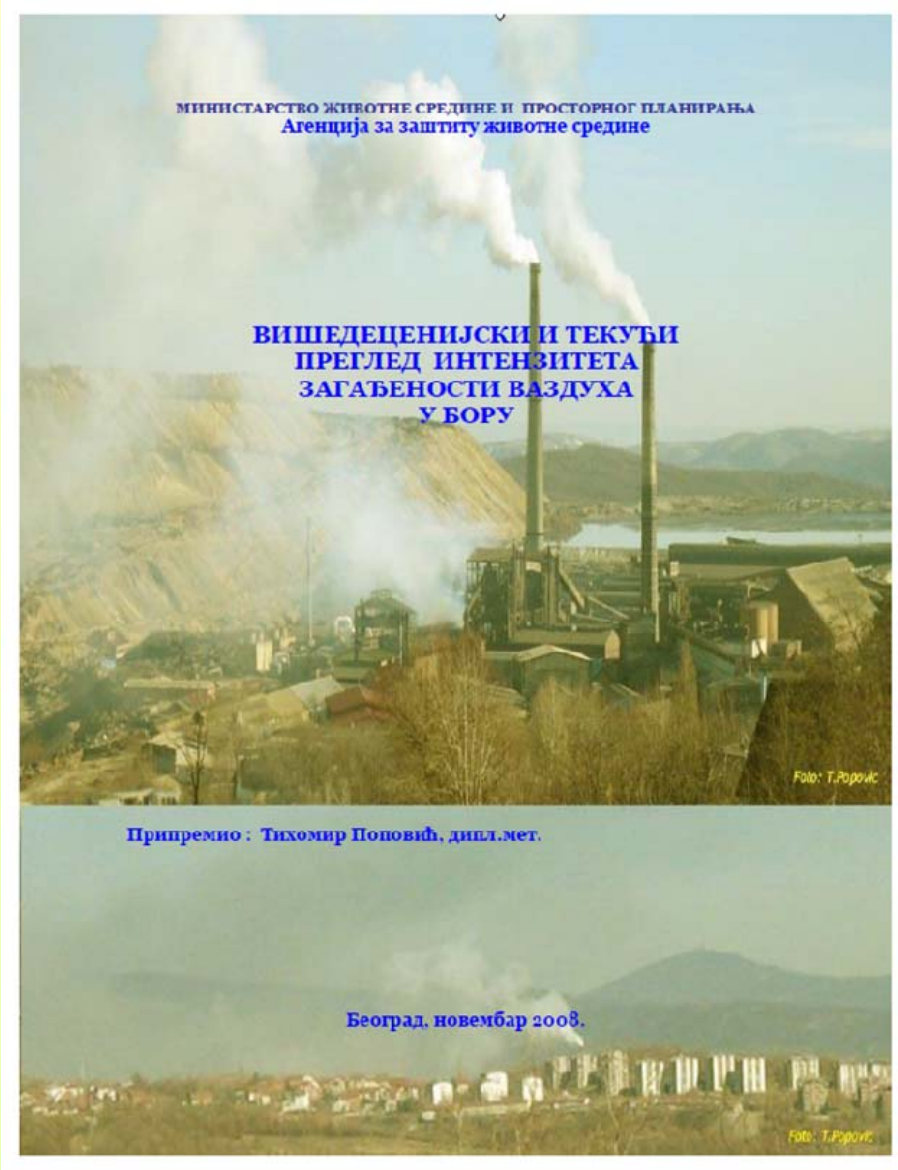


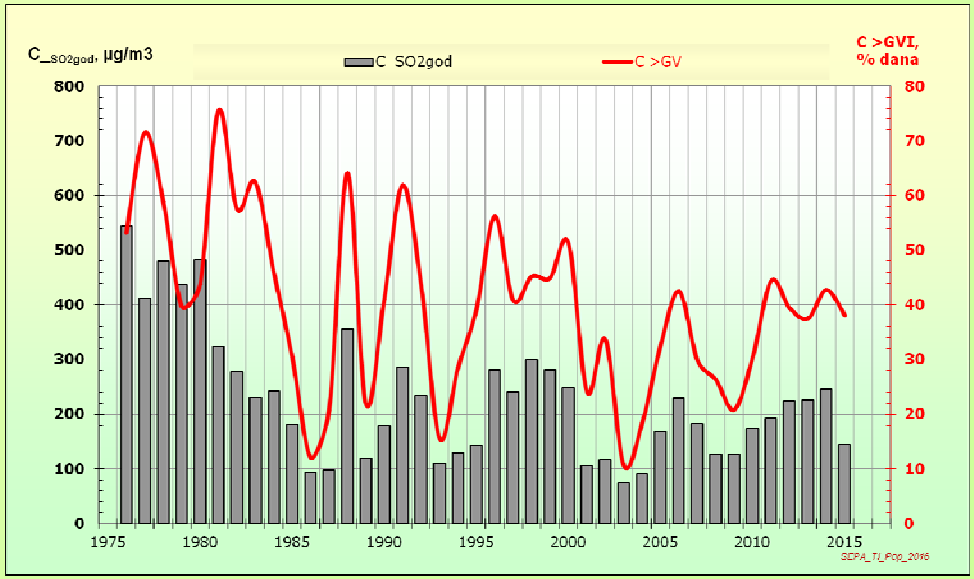

| | ОДЛИЧАН | | | | | ДОБАР | | | | | ПРИХВАТЉИВ | | | | | ЗАГАЂЕН | | | | | ЈАКО ЗАГАЂЕН | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO | SO2 | O3 | NO2 | PM10 | CO | SO2 | O3 | NO2 | PM10 | CO | SO2 | O3 | NO2 | PM10 | CO | SO2 | O3 | NO2 | PM10 | CO | SO2 | O3 | NO2 | PM10 |
| 2010 | 96 | 44 | 27 | 91 | 40 | 1 | 10 | 34 | 8 | 24 | 0 | 9 | 37 | 1 | 23 | 0 | 8 | 2 | 0 | 12 | 3 | 28 | 0 | 0 | 1 |
| 2011 | 100 | 36 | 28 | 90 | 22 | 0 | 7 | 27 | 9 | 24 | 0 | 12 | 42 | 1 | 29 | 0 | 12 | 3 | 0 | 18 | 0 | 33 | 0 | 0 | 7 |
| 2012 | 98 | 44 | 73 | 90 | 37 | 2 | 5 | 24 | 10 | 20 | 0 | 7 | 3 | 0 | 21 | 0 | 8 | 0 | 0 | 17 | 0 | 36 | 0 | 0 | 5 |
| 2013 | 97 | 36 | | 95 | | 1 | 8 | | 4 | | 2 | 9 | | 0 | | 0 | 9 | | 0 | | 0 | 38 | | 1 | |
| 2014 | | 31 | | | | | 6 | | | | | 13 | | | | | 9 | | | | | 41 | | | |
| 2015 | 100 | 41 | | 93 | | 0 | 9 | | 6 | | 0 | 12 | | 1 | | 0 | 9 | | 0 | | 0 | 29 | | 0 | |

# $SO_2$ in AQ monitoring and assessment




**The state of air quality in Bor is a subject of SEPA interest since the establishment.**

**Data of Institute RiM and SEPA AAQM allow historical overview.**



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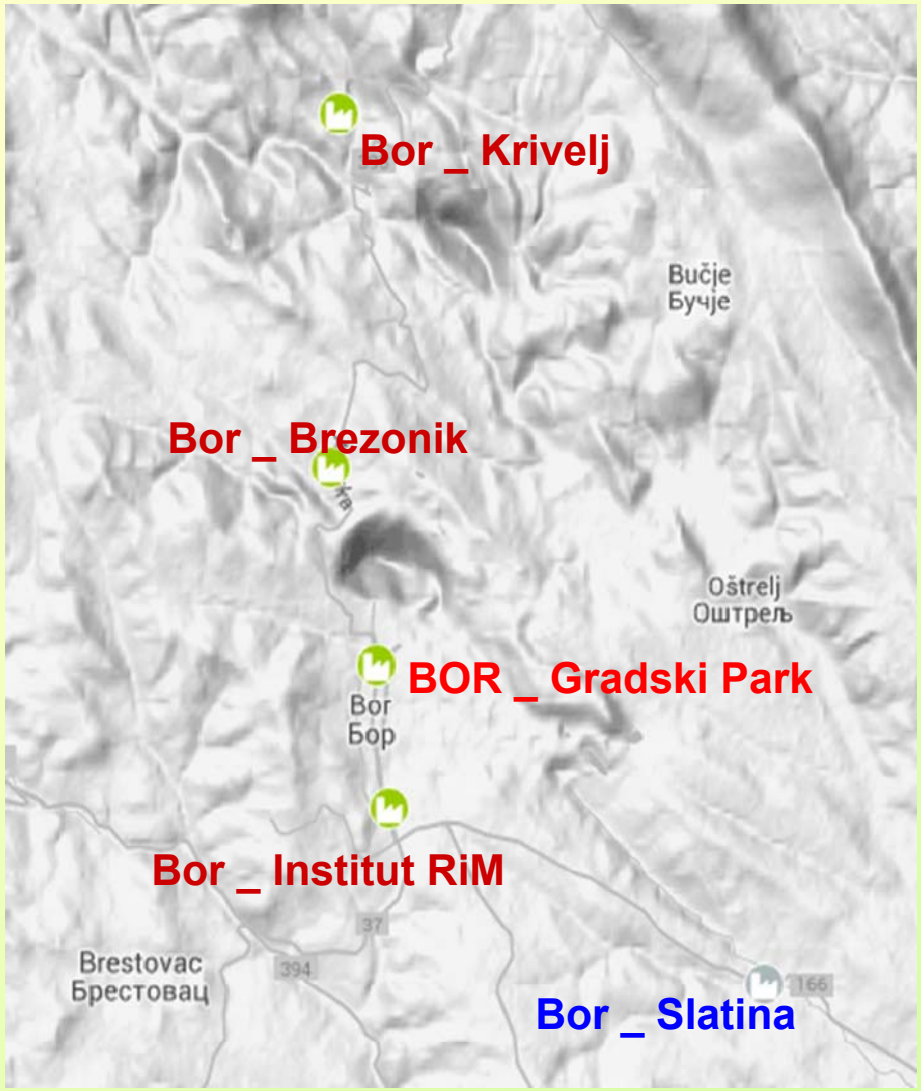
## AAQMS in Bor area




A special addition to the national data management system adapted to the operational team in TIR-Bor

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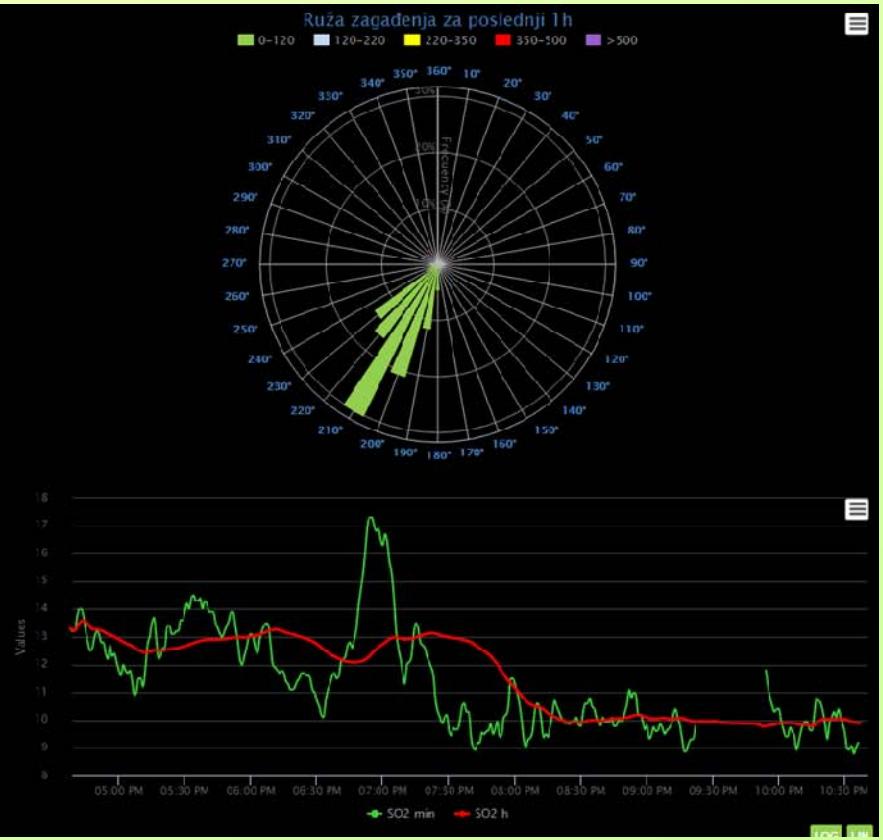
## A special addition to the national data management system adapted to the operational team in TIR-Bor

Excel

| VREME | SO2 | SO2 1h | t | t 1h | V | V 1h | dd | dd 1h |
|---|---|---|---|---|---|---|---|---|
| 03.06.16. 22:37 | | 9.89 | | 17.38 | | 2.4 | | 211.35 |
| 03.06.16. 22:36 | 9.2 | 9.89 | 17.6 | 17.38 | 2.71 | 2.39 | 234 | 211.23 |
| 03.06.16. 22:35 | 9 | 9.91 | 17.6 | 17.37 | 3.02 | 2.38 | 230 | 210.76 |
| 03.06.16. 22:34 | 8.79 | 9.93 | 17.6 | 17.36 | 2.26 | 2.38 | 218 | 210.26 |
| 03.06.16. 22:33 | 9.08 | 9.96 | 17.5 | 17.36 | 2.99 | 2.37 | 231 | 210.08 |
| 03.06.16. 22:32 | 8.93 | 9.98 | 17.3 | 17.35 | 3.18 | 2.36 | 226 | 209.77 |
| 03.06.16. 22:31 | 8.97 | 10.01 | 17 | 17.35 | 2.43 | 2.35 | 225 | 209.43 |
| 03.06.16. 22:30 | 9.53 | 10.04 | 17.4 | 17.34 | 2.33 | 2.35 | 209 | 209.04 |
| 03.06.16. 22:29 | 9.84 | 10.05 | 17.4 | 17.34 | 2.17 | 2.35 | 222 | 208.99 |
| 03.06.16. 22:28 | 10.1 | 10.06 | 17.4 | 17.33 | 2.61 | 2.35 | 218 | 208.53 |
| 03.06.16. 22:27 | 10.4 | 10.06 | 17.3 | 17.33 | 2.58 | 2.35 | 215 | 208.28 |
| 03.06.16. 22:26 | 10.1 | 10.05 | 17.3 | 17.33 | 2.47 | 2.35 | 218 | 207.95 |
| 03.06.16. 22:25 | 10.3 | 10.04 | 17.2 | 17.32 | 2.07 | 2.35 | 235 | 207.55 |
| 03.06.16. 22:24 | 10.1 | 10.04 | 17.2 | 17.32 | 2.94 | 2.35 | 228 | 207.02 |
| 03.06.16. 22:23 | 9.91 | 10.03 | 17.2 | 17.32 | 2.14 | 2.34 | 212 | 206.48 |
| 03.06.16. 22:22 | 9.31 | 10.04 | 17.2 | 17.32 | 1.33 | 2.34 | 213 | 206.22 |
| 03.06.16. 22:21 | 9.83 | 10.05 | 17.3 | 17.33 | 1.84 | 2.35 | 207 | 206 |
| 03.06.16. 22:20 | 10.3 | 10.04 | 17.3 | 17.33 | 2.18 | 2.36 | 209 | 205.92 |
| 03.06.16. 22:19 | 10.6 | 10 | 17.3 | 17.33 | 1.8 | 2.36 | 208 | 205.86 |
| 03.06.16. 22:18 | 10.7 | 9.95 | 17.3 | 17.33 | 1.64 | 2.36 | 199 | 205.82 |
| 03.06.16. 22:17 | 10.8 | 9.89 | 17.3 | 17.33 | 1.93 | 2.37 | 204 | 205.78 |

Showing 1 to 360 of 360 entries



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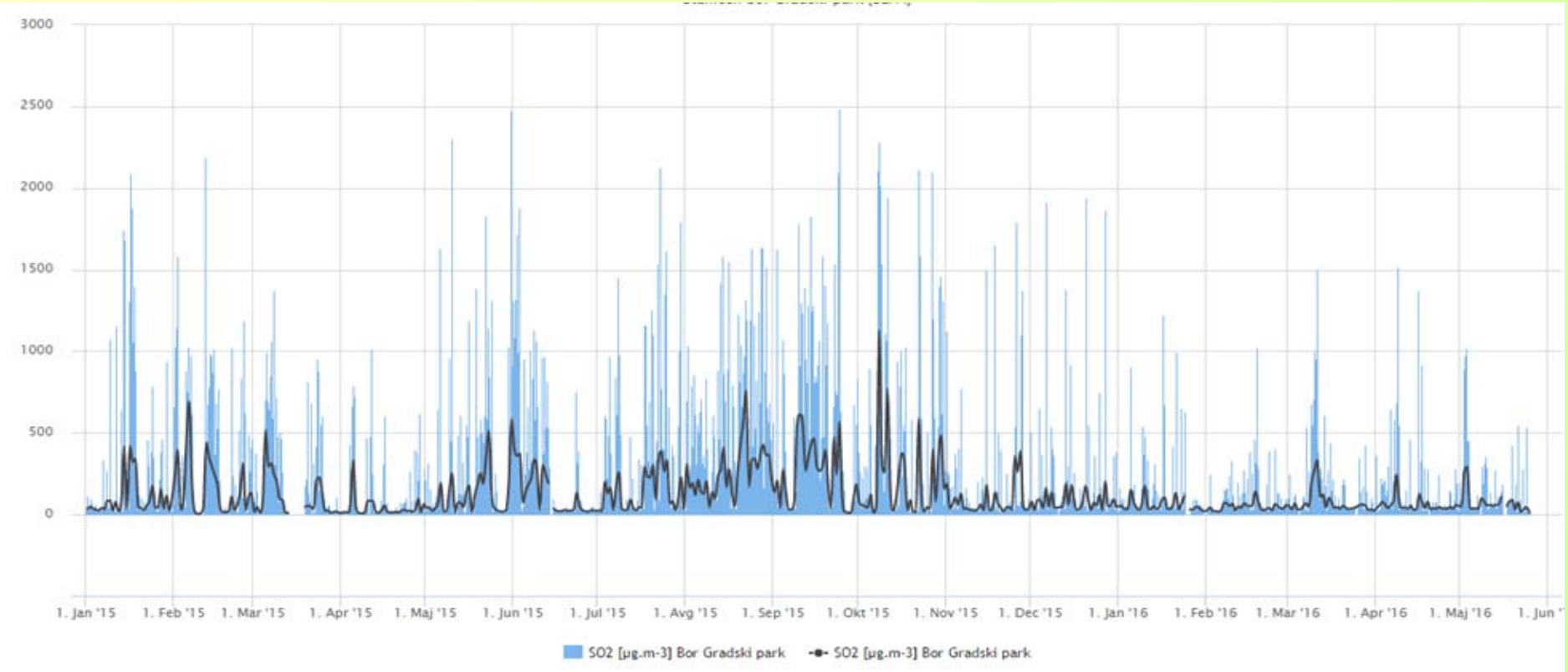
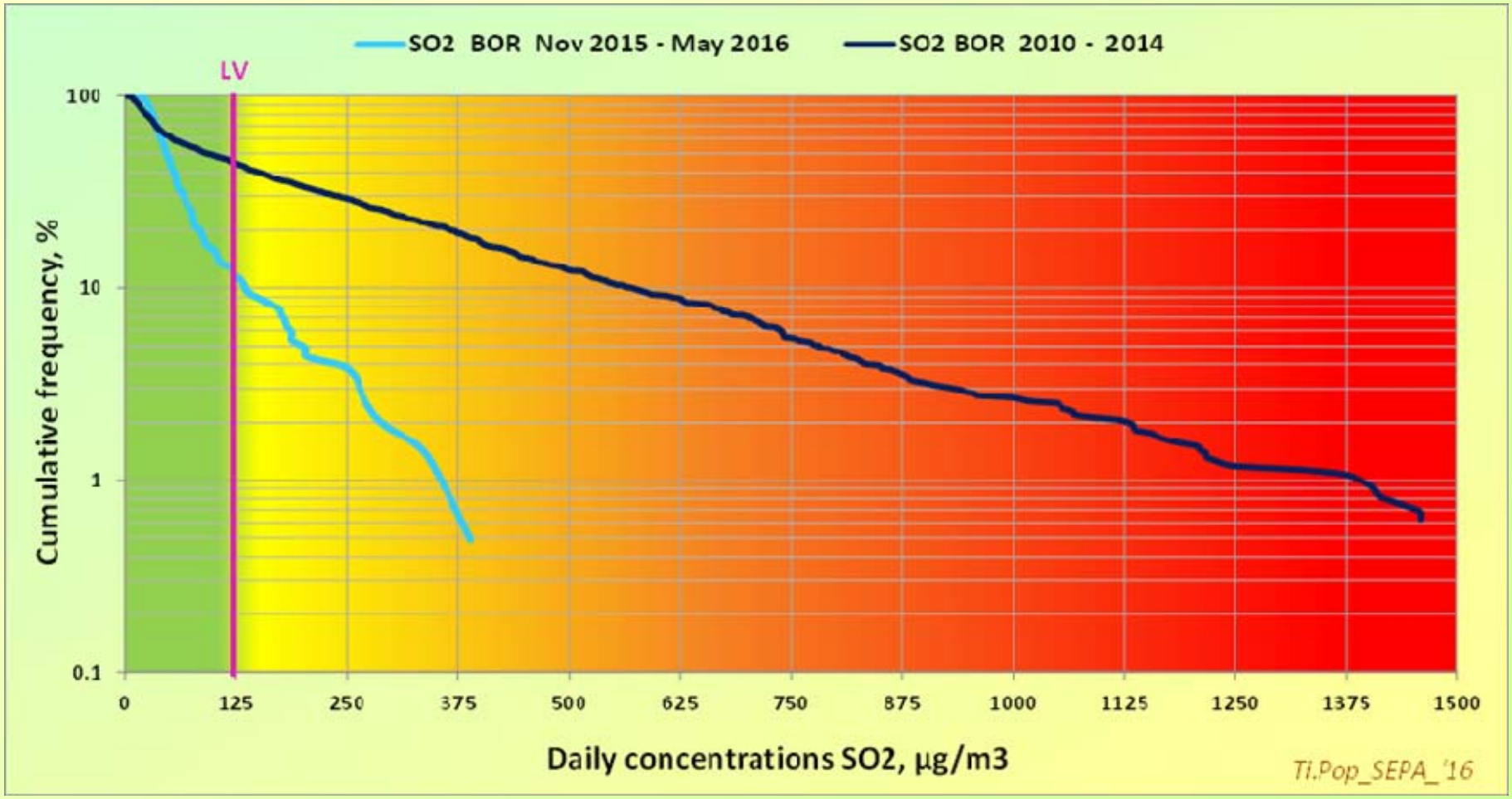


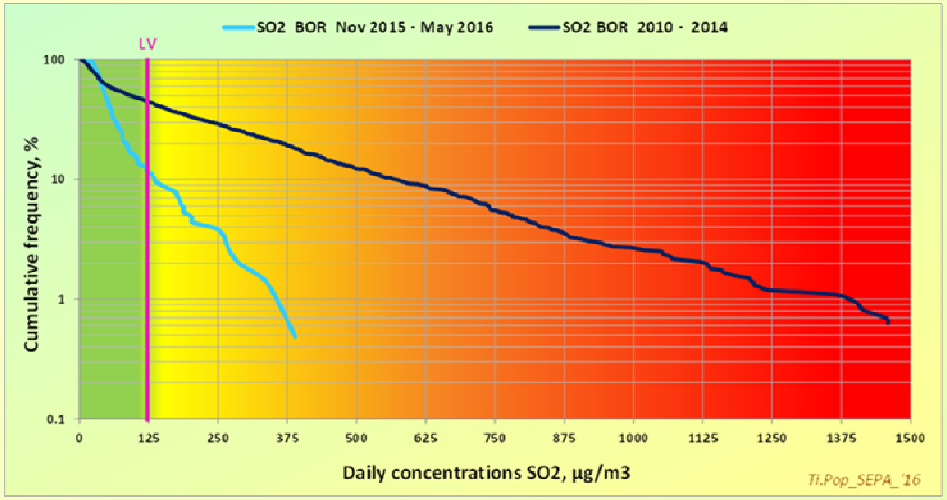

***Hourly and daily concentrations $SO_2$ at AAQMS BOR_Gradski Park in period 1 Jan 2015 - 24 May 2016***

# INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY




***Empirical cumulative distribution of daily $SO_2$ concentrations at the site BOR_Gradski Park in period 2010-2014. and period of working only new smelter, Nov 2015 – May 2016***

# INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY




***Empirical probability, in %, of certan or higher daily concentrations of SO2 in location Bor_Gradski Park in period 2010-2014 and period of working only new smelter, Nov 2015 – May 2016***

| Daily SO2, µg/m3 | BOR XI 2015 - V 2016 | BOR 2010 - 2014 |
|---|---|---|
| 125 (1 x LV) | 11.5 | 44.5 |
| 250 (2 x LV) | 3.9 | 29.2 |
| 375 (3 x LV) | 0.5 | 19.2 |
| 1250 (10 x LV) | - | 1.2 |

- **In the period of working the new smelter is 4 times less chance of occurrence daily LV**
- **The double exceeding LV can be expected 7 times less than before the start of working only a new smelter.**
- **In the case of a triple exceeding LV reduction of the probability of occurrence is even higher and is even 38 times.**
- **Ten times exceeding LV were recorded in the previous period. In terms of working only new smelter such cases should not be expect more.**

# INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY

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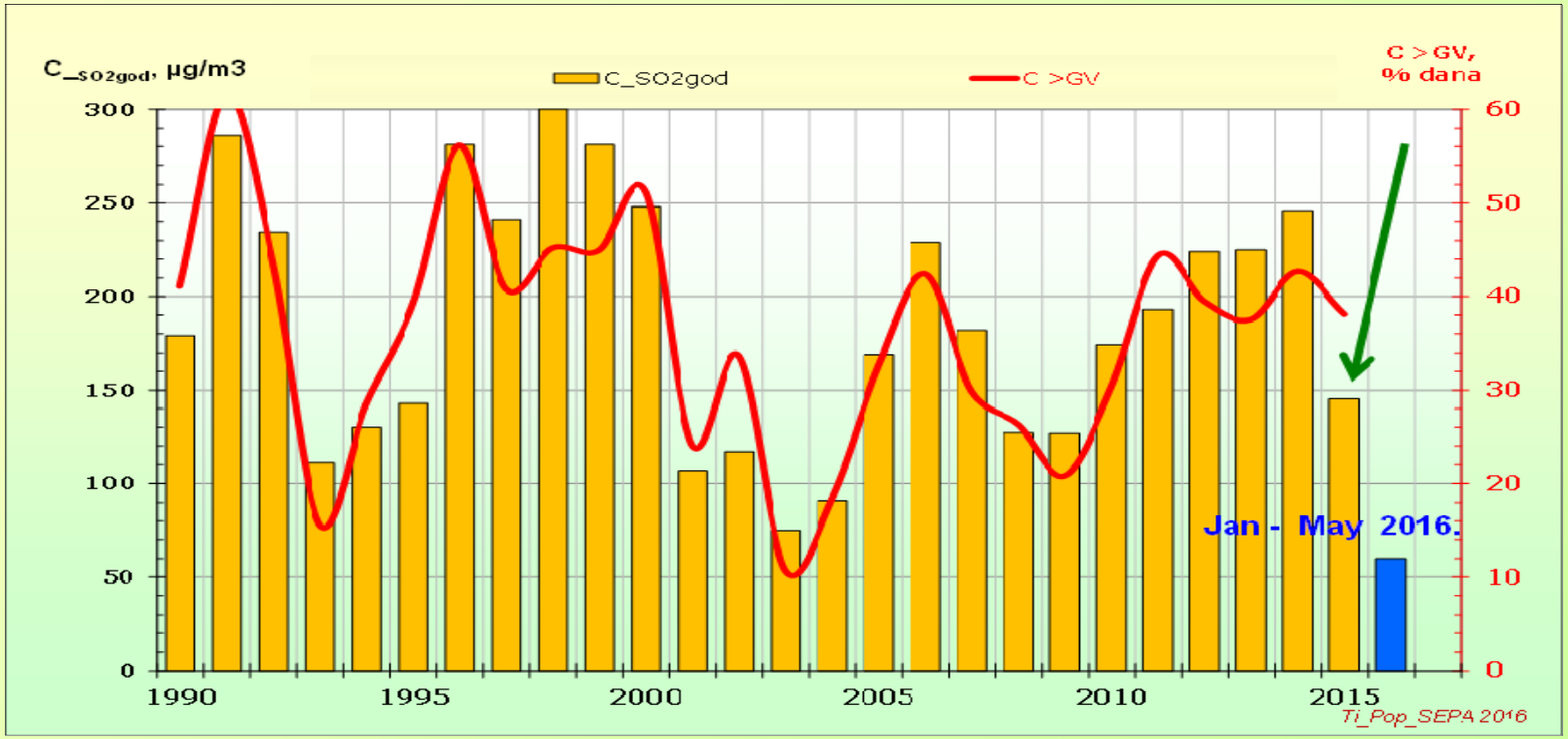
**Although only the new smelter worked since the beginning of November 2015, the annual concentration of SO2 in the AAQMS Bor_Gradski Park is significantly lower than in previous years; 2014 it was 246 µg/m3 and in 2015 it was 145 µg/m3.**

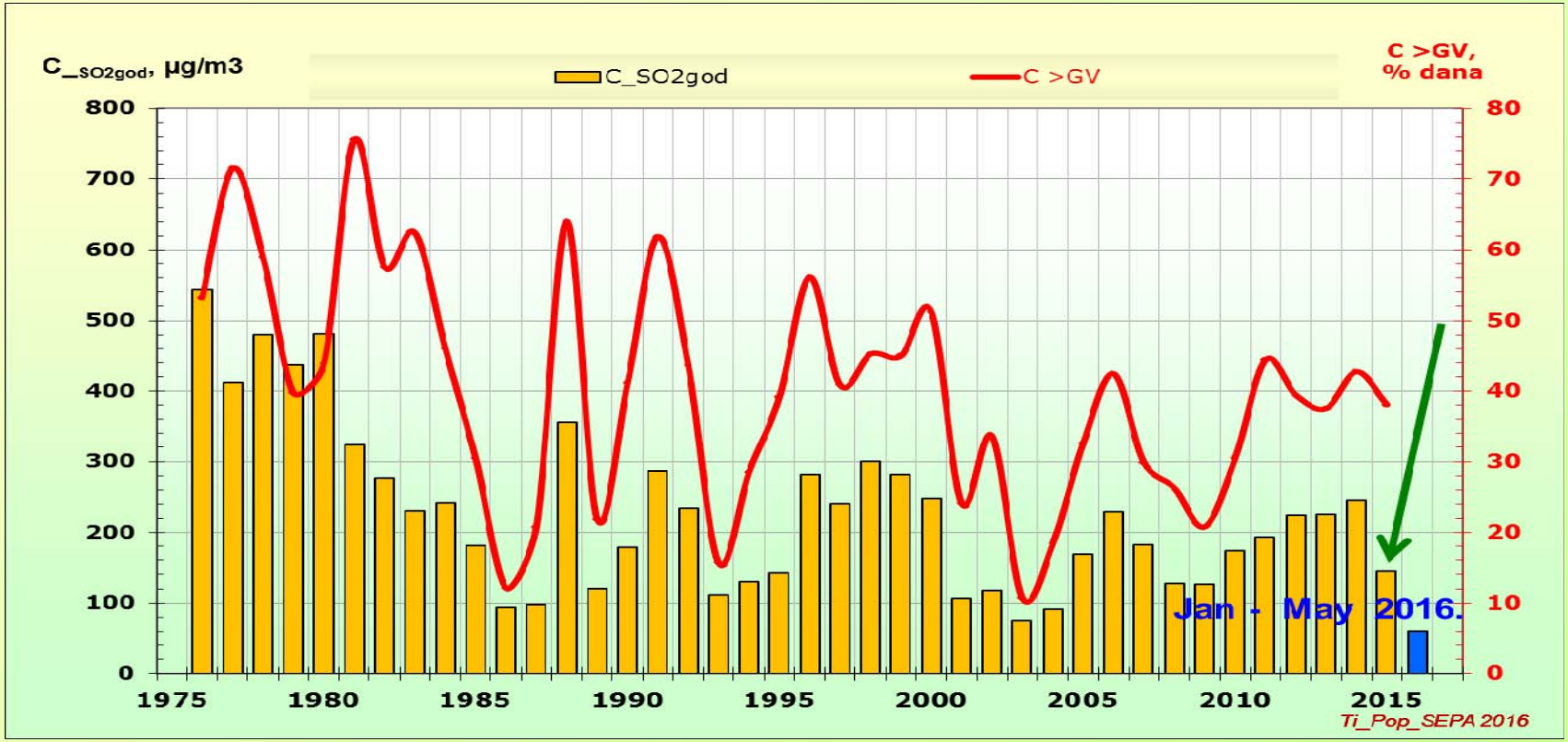
**In the period Jan–May 2016. SO2 concentrations have dropped to 60 µg/m3.**




***Annual concentration of SO2 at the site BOR_Gradski Park and percentage of days during the year excceding daily LV in the period 1990-2015.***

# INITIAL IMPACT OF NEW BOR COPPER SMELTER ON AIR QUALITY

**. ... In relation to a set of data since 1976 changes seem convincing**




***Annual concentration of SO2 at the site BOR_Gradski Park and percentage of days during the year excceding daily LV in the period 1976-2015.***

# CONCLUSION

**The initial impact of new copper smelter in Bor on air quality in the city is very encouraging.**

**Assessment of the state of air quality in Bor was performed compared to the standard and compared to the average state before activating only a new smelter which is represented in several years period 2010 – 2014.**

**During the period of operation of only a new smelter, Nov 2015 - May 2016, there were the exceedances of limit values of daily concentrations of SO2, which indicates the need to continue actions to improve air quality in Bor.**

**However, an analysis of data from the period when it was only a new smelter, Nov 2015 - May 2016, and the period 2010 – 2014, indicates a decrease in the frequency and intensity of daily exceedances of LV for SO2 in Bor; 4 TIMES is rarer exceeding LV (125 µg/m3), 7 TIMES is rarer exceeding double values of LV (250 µg/m3) and for a 38 times rarer occurrence exceeding 3 x LV (375 µg/m3).**

**Reliability of these estimates can be increased by analyzing a longer period of work only a new smelter. The authors will that fact bear in mind in the coming period when such analysis can be repeated.**

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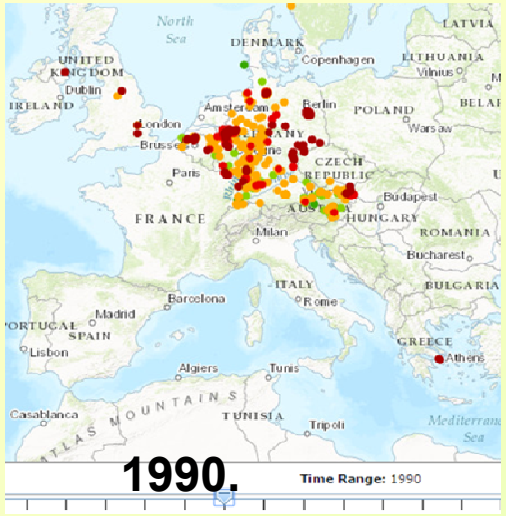
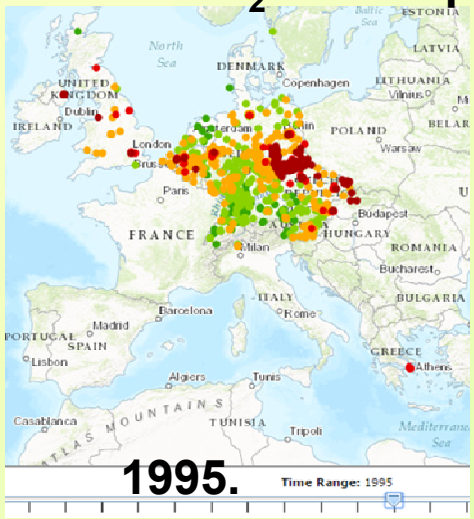
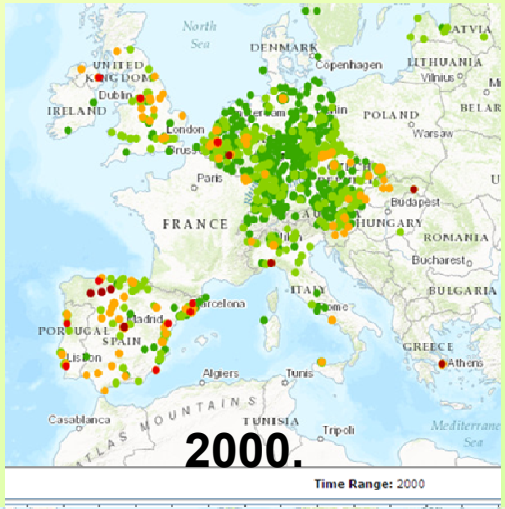
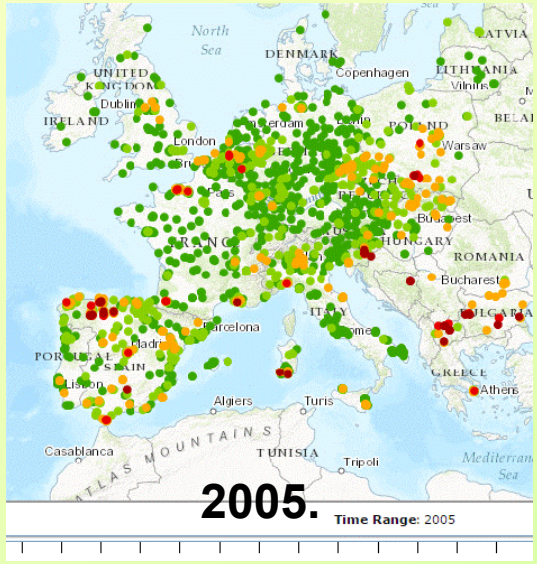
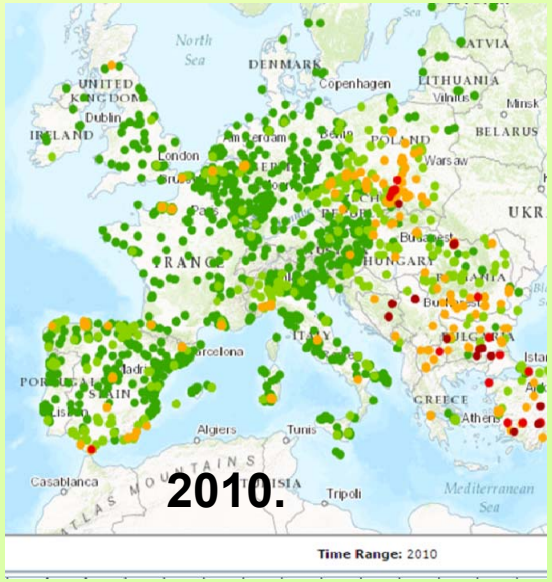
## Annual mean concentrations of $SO_2$ in Europe

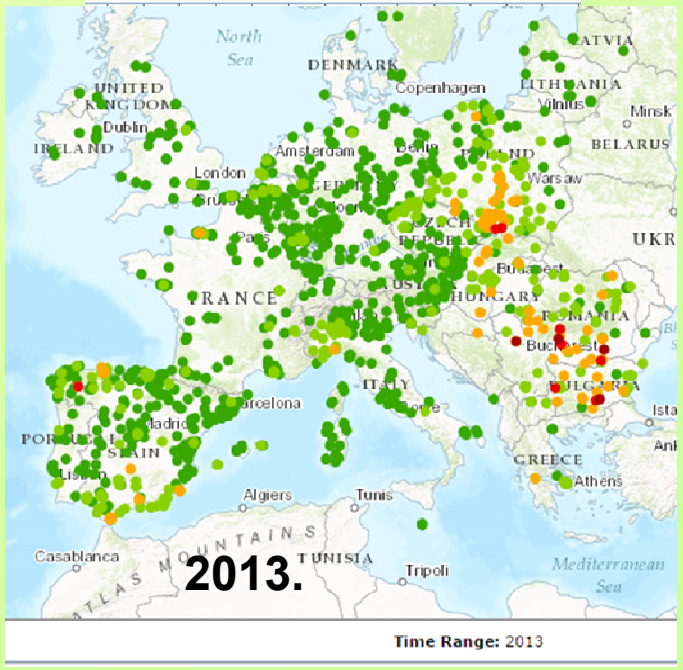


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5.Agencija za zaštitu životne sredine 2016**, IZVEŠTAJ O STANJU KVALITETA VAZDUHA U REPUBLICI SRBIJI** 2010, 2011, 2012, 2013, 2014 and 2015 (in preparation), http://www.sepa.gov.rs/download/VAZDUH2014.pdf


# THANK YOU
# for your attention !