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## Source-receptor tables for 2016

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The source-receptor tables in this appendix are calculated for the meteorological and chemical conditions of 2016. The EMEP MSC-W model version rv4.17 has been used for the 2016 source-receptor model runs. The emissions used are the latest reported emissions for 2016 as shown in EMEP Status Report 1/2018 (2018).

It can be noted that there also have been many changes in chemistry, deposition, and vertical resolution in the current rv4.17 setup compared to the rv4.9 source-receptor matrix calculations performed in EMEP Report 1/2016. For example, the increased NO<sub>2</sub> deposition rates discussed in EMEP Report 1/2017 (Chapter 8) can lead to increased local-scale deposition in some region, and the calculations of POD<sub>1</sub> for forests have changed. For more details see Simpson et al. (2018).

The tables are calculated for the new EMEP domain, which covers the geographic area between 30°N-82°N latitude and 30°W-90°E longitude, and are based on model runs driven by ECMWF-IFS meteorology in 0.3° × 0.2° longitude-latitude projection.

The source-receptor (SR) relationships give the change in air concentrations or depositions resulting from a change in emissions from each emitter country.

For each country, reductions in five different pollutants have been calculated separately, with an emission reduction of 15% for SO<sub>x</sub>, NO<sub>x</sub>, NH<sub>3</sub>, NMVOC or PPM, respectively. Here reduction in PPM means that PPM<sub>fine</sub> and PPM<sub>coarse</sub> are reduced together in one simulation. For year 2016, reductions in volcanic emissions are done for passive SO<sub>2</sub> degassing of Italian volcanoes (Etna, Stromboli and Vulcano). The boundary conditions for all gaseous and aerosol species were given as 5-year monthly average concentrations, derived from EMEP MSC-W global runs, kept invariable over the calculation period.

The deposition tables show the contribution from one country to another. They have been calculated adding the differences obtained by a 15% reduction for all emissions in one country multiplied by a factor of 100/15, in order to arrive at total estimates.

For the concentrations and indicator tables, the differences obtained by the 15% emission reduction of the relevant pollutants are given directly. Thus, the tables should be interpreted as estimates of this reduction scenario from the chemical conditions in 2016.

The SR tables in the following aim to respond to two fundamental questions about trans-boundary air pollution:

1. Where do the pollutants emitted by a country or region end up?
2. Where do the pollutants in a given country or region come from?

Each column answers the first question. The numbers within a column give the change in the value of each pollutant (or indicator) for each receiver country caused by the emissions in the country given at the top of the column.

Each row answers the second question. The numbers given in each row show which emitter countries were responsible for the change in pollutants in the country given at the beginning of each row.

Note that more information on aerosol components and SR tables in electronic format are available from the EMEP website [www.emep.int](http://www.emep.int).

The following SR tables are included:

### Acidification and eutrophication

- Deposition of OXS (oxidised sulphur). The contribution from  $\text{SO}_x$ ,  $\text{NO}_x$ ,  $\text{NH}_3$ , PPM and VOC emissions have been summed up and scaled to a 100% reduction. Units: 100 Mg of S.
- Deposition of OXN (oxidised nitrogen). The contribution from  $\text{SO}_x$ ,  $\text{NO}_x$ ,  $\text{NH}_3$ , PPM and VOC emissions have been summed up and scaled to a 100% reduction. Units: 100 Mg of N.
- Deposition of RDN (reduced nitrogen). The contribution from  $\text{SO}_x$ ,  $\text{NO}_x$ ,  $\text{NH}_3$ , PPM and VOC emissions have been summed up and scaled to a 100% reduction. Units: 100 Mg of N.

### Ground Level Ozone

- $\text{AOT40}_f^{\text{uc}}$ . Effect of a 15% reduction in  $\text{NO}_x$  emissions. Units: ppb.h
- $\text{AOT40}_f^{\text{uc}}$ . Effect of a 15% reduction in VOC emissions. Units: ppb.h
- SOMO35. Effect of a 15% reduction in  $\text{NO}_x$  emissions. Units: ppb.d
- SOMO35. Effect of a 15% reduction in VOC emissions. Units: ppb.d

### Particulate Matter

- $\text{PM}_{2.5}$ . Effect of a 15% reduction in PPM emissions. Units:  $\text{ng/m}^3$
- $\text{PM}_{2.5}$ . Effect of a 15% reduction in  $\text{SO}_x$  emissions. Units:  $\text{ng/m}^3$
- $\text{PM}_{2.5}$ . Effect of a 15% reduction in  $\text{NO}_x$  emissions. Units:  $\text{ng/m}^3$
- $\text{PM}_{2.5}$ . Effect of a 15% reduction in  $\text{NH}_3$  emissions. Units:  $\text{ng/m}^3$
- $\text{PM}_{2.5}$ . Effect of a 15% reduction in VOC emissions. Units:  $\text{ng/m}^3$
- $\text{PM}_{2.5}$ . Effect of a 15% reduction in all emissions. The contribution from a 15% reduction in PPM,  $\text{SO}_x$ ,  $\text{NO}_x$ ,  $\text{NH}_3$  and VOC emissions have been summed up. Units:  $\text{ng/m}^3$

### Fine Elemental Carbon

- Fine EC. Effect of a 15% reduction in PPM emissions. Units:  $0.1 \text{ ng/m}^3$

### Coarse Elemental Carbon

- Coarse EC. Effect of a 15% reduction in PPM emissions. Units:  $0.1 \text{ ng/m}^3$

The country/region codes used in the source-receptor tables can be found in Table 1:

Code	Country/Region	Code	Country/Region
AL	Albania	IS	Iceland
AM	Armenia	IT	Italy
AST	Remaining Asian areas	KG	Kyrgyzstan
AT	Austria	KZ	Kazakhstan
ATL	Remaining N.-E. Atlantic Ocean	LI	Liechtenstein
AZ	Azerbaijan	LT	Lithuania
BA	Bosnia and Herzegovina	LU	Luxembourg
BAS	Baltic Sea	LV	Latvia
BLS	Black Sea	MC	Monaco
BE	Belgium	MD	Republic of Moldova
BG	Bulgaria	ME	Montenegro
BIC	Boundary and Initial Conditions	MED	Mediterranean Sea
BY	Belarus	MK	The FYR of Macedonia
CH	Switzerland	MT	Malta
CY	Cyprus	NL	Netherlands
CZ	Czech Republic	NO	Norway
DE	Germany	NOA	North Africa
DK	Denmark	NOS	North Sea
EE	Estonia	PL	Poland
EXC	EMEP land areas	PT	Portugal
ES	Spain	RO	Romania
EU	European Union (EU28)	RS	Serbia
FI	Finland	RU	Russian Federation
FR	France	SE	Sweden
GB	United Kingdom	SI	Slovenia
GE	Georgia	SK	Slovakia
GL	Greenland	TJ	Tajikistan
GR	Greece	TM	Turkmenistan
HR	Croatia	TR	Turkey
HU	Hungary	UA	Ukraine
IE	Ireland	UZ	Uzbekistan

Table 1: Country/region codes used throughout this report.

## References

EMEP Status Report 1/2018: Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components, EMEP MSC-W & CCC & CEIP, Norwegian Meteorological Institute (EMEP/MSC-W), Oslo, Norway, 2018.

Simpson, D., Bergström, R., , Gauss, M., Tsyro, S., Wind, P., and Valdebenito, Á.: Updates to the EMEP MSC-W model, 2017-2018, in: Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components. EMEP Status Report 1/2018, The Norwegian Meteorological Institute, Oslo, Norway, 2018.