Source-receptor tables for 2018

The source-receptor tables in this appendix are calculated for the meteorological and chemical conditions of 2018, using the EMEP MSC-W model version rv4.35. The tables are calculated for the EMEP domain covering 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(cy40r1) meteorology in $0.3° \times 0.2°$ 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.

Some additional emphasis this year has been put on the emission of condensable organics, and most of the tables in this appendix are based on model calculations using the *EMEP-wRef2C* dataset. However, for tables related to primary particulate matter, additional tables are provided that are based on the *EMEP* emission dataset as provided by CEIP. Details about these emission datasets are given in Chapters 3 and 6, but for a quick overview, the national emission data for 2018 can be found in Appendix A, together with the expert estimates for 2018 for PPM. The expert estimates including condensable organics in GNFR sector C (EMEPwRef2C) are described in Chapter 5. The setup of the model for the source receptor model runs are described in Chapter 6.

For each country, reductions in five different pollutants have been calculated separately, with an emission reduction of 15% for SO_x, NO_x, NH_3, NMVOC or PPM, respectively. Here, a reduction in PPM means that $PPM_{2.5}$ and PPM_{coarse} are reduced together in one simulation. For year 2018, reductions in volcanic emissions are done for passive SO_2 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 2018.

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.

A list of abbreviations of countries and regions is given in Table 1.1.

More information on aerosol components and SR tables in electronic format are available from the EMEP website `www.emep.int`.

Acidification and eutrophication

- Deposition of OXS (oxidised sulphur). The contribution from SO_x, NO_x, 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 SO_x, NO_x, 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 SO_x, NO_x, NH_3, PPM and VOC emissions have been summed up and scaled to a 100% reduction. Units: 100 Mg of N.

Ground Level Ozone

- $AOT40_f^{uc}$. Effect of a 15% reduction in NO_x emissions. Units: ppb.h
- $AOT40_f^{uc}$. Effect of a 15% reduction in VOC emissions. Units: ppb.h
- SOMO35. Effect of a 15% reduction in NO_x emissions. Units: ppb.d
- SOMO35. Effect of a 15% reduction in VOC emissions. Units: ppb.d

For ozone, we do not include the contributions from areas that are outside the EMEP domain. Until last year these had been included in the tables as BIC (Boundary and Initial Conditions) and were calculated by reducing NOx and NMVOC at the model boundary. However, the most important contributor to ozone from areas outside the EMEP domain is ozone itself, transported hemispherically accross the model boundary. Including the BIC contribution that is due (only) to NOx and NMVOC only would be misleading.

Particulate Matter

- $PM_{2.5}$. Effect of a 15% reduction in PPM emissions. Units: ng/m^3
- $PM_{2.5}$. Effect of a 15% reduction in SO_x emissions. Units: ng/m^3
- $PM_{2.5}$. Effect of a 15% reduction in NO_x emissions. Units: ng/m^3
- $PM_{2.5}$. Effect of a 15% reduction in NH_3 emissions. Units: ng/m^3
- $PM_{2.5}$. Effect of a 15% reduction in VOC emissions. Units: ng/m^3
- $PM_{2.5}$. Effect of a 15% reduction in all emissions. The contribution from a 15% reduction in PPM, SO_x, NO_x, NH_3 and VOC emissions have been summed up. Units: ng/m^3

Fine Elemental Carbon

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

Coarse Elemental Carbon

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

Source-receptor calculations with the 15% perturbation method used the EMEPwRef2C emission data set. Additional source-receptor calculations for PM, using the official EMEP emissions for PPM, were done only with the new *Local Fraction* method. For details about this method see Section 11.2. Since the *Local Fraction* method tracks all emissions, results have been scaled by a factor of 0.15 to give comparable results for concentrations and indicator tables. Unless stated otherwise in the captions of the tables, the results are given for the model calculations using EMEPwRef2C emissions.

For EC emissions, two different emission data sets have been used: 1) Official EMEP gridded EC emissions and 2) EC derived from the EMEPwRef2C emission data, using a set of PM-split files consistent with the TNO *Ref2* data set. For details see Chapter 7.