Source-receptor tables for 2019

The source-receptor tables in this appendix are calculated for the meteorological and chemical conditions of 2019, using the EMEP MSC-W model version rv4.42. 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(cy46r1) 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.

The tables in this appendix are based on model calculations using the EMEPwREF2.1C dataset.

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 2019, 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 2019.

The SR tables in the following aim to respond to two fundamental questions about transboundary 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.

Code	Country/Region/Source
AL	Albania
AM	Armenia
AST	Asian areas
AT	Austria
ATL	N.-E. Atlantic Ocean
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BAS	Baltic Sea
BE	Belgium
BG	Bulgaria
BIC	Boundary/Initial Conditions
BLS	Black Sea
BY	Belarus
CH	Switzerland
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
DMS	Dimethyl sulfate (marine)
EE	Estonia
ES	Spain
EU	European Union (EU28)
EXC	EMEP land areas
FI	Finland
FR	France
GB	United Kingdom
GE	Georgia
GL	Greenland
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland

Code	Country/Region/Source
IS	Iceland
IT	Italy
KG	Kyrgyzstan
KZ	Kazakhstan
LI	Liechtenstein
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Moldova
ME	Montenegro
MED	Mediterranean Sea
MK	North Macedonia
MT	Malta
NL	Netherlands
NO	Norway
NOA	North Africa
NOS	North Sea
PL	Poland
PT	Portugal
RO	Romania
RS	Serbia
RU	Russian Federation
SE	Sweden
SI	Slovenia
SK	Slovakia
TJ	Tajikistan
TM	Turkmenistan
TR	Turkey
UA	Ukraine
UZ	Uzbekistan
VOL	Volcanic emissions

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

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

Primary Particulate Matter

- $PPM_{2.5}$. Effect of a 15% reduction in PPM emissions. Units: ng/m^3