**Basic source-receptor example**

To illustrate the idea of using source-receptor matrices, consider a highly simplified example:

* A fictional country called “PMLandia” that consists of two regions, east and west1.
* PM pollution contributed by only two kinds of emissions: primary PM and SO22.

The emissions inventory for PMLandia, broken down by region and species is:

|  |  |  |
| --- | --- | --- |
| Emissions (tonnes/yr) | PM | SO2 |
| East | 780,000 | 1,620,000 |
| West | 520,000 | 180,000 |

The source-receptor matrices3 for primary PM and SO2 emissions are as follows (all values are g/m3 per tonnes/yr):

|  |  |  |
| --- | --- | --- |
| S-R matrix Primary PM | E | W |
| E | 4.00E-06 | 1.00E-06 |
| W | 2.00E-07 | 3.00E-06 |

|  |  |  |
| --- | --- | --- |
| S-R matrix SO2 | E | W |
| E | 1.80E-06 | 7.00E-07 |
| W | 3.00E-07 | 1.50E-06 |

1. Compute the resulting primary PM concentrations for both East and West PMLandia.
2. Compute the resulting concentrations of PM-sulfate (resulting from SO2 emissions) for both East and West PMLandia
3. Compute the total PM concentrations for East and West PMLandia.

Notes:

1: The number of locations in a source-receptor model varies based on the size of the domain and the desired spatial resolution. However, it is typically at least several thousand. The number of rows and columns in the source-receptor matrix increases accordingly.

2: Extension to additional precursor species is straightforward. Each contribution adds linearly.

3: The source-receptor matrices are fictional but realistic in the following ways: a) they predict realistic PM concentrations for the given emissions rates; b) the diagonal elements of the source-receptor matrices are largest, reflecting the fact that emissions from each region have the strongest impact in the same region; c) matrix elements for SO2 are lower than for primary PM since only some SO2 forms PM; d) the impacts of gaseous precursors are more spread out compared to primary PM; e) there is an implied prevailing wind of west to east, and the impact of emissions from the east on West PMLandia is small.