

## **Estimating response to changes in emissions over Europe**

The responses to changes in emissions of specific regions have been traditionally calculated by performing brute-force calculations in which the corresponding emission inventory is perturbed, the simulation is repeated, and the effect of the emission change is calculated by taking the difference with the base case results. This is a computationally expensive approach that often delays considerably the inclusion of the state-of-the-science in the corresponding source-receptor matrices. We have explored the hypothesis that the desired responses of PM components to the emission changes in a region can be estimated by multiplying the sensitivities to the uniform changes with the source-receptor links (calculated with source apportionment algorithms). To test this hypothesis, we have chosen both primary and secondary components, over seven source and seven receptor regions too in Europe. The predictions of the simple approach have been compared with the predictions of the brute force approach, showing very promising agreement.