Source attribution of Particulate Matter for Berlin 2016-18, a study using the LOTOS-EUROS CTM

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Air Quality in Berlin is a particular problem during winter episodes. During this episodes, local emissions are only one factor contributing to the high concentrations. The other factors are the lowered height of the planetary boundary layer and the advection of pollutants, some of which are produced in Eastern Europe. To trace the share of total pollution in Berlin for 2016-18 back to its origins, the Chemistry Transport Model (CTM) LOTOS-EUROS v2.1 (LOng Term Ozone Simulation EUROpean Operational Smog, invented by TNO, Netherlands) is used, which also provides a labelling approach. Some specifications were made for the emission datasets used to drive the model, including emission dependencies on temperature (e.g. cold engine starts and heating degree-days for households).

The model results are evaluated using the German AirBase monitoring sites. An incremental approach (Lenschow et al., 2001) is used for the evaluation and estimation of the urban share of Berlin. The focus is on Particulate Matter (PM): PM10, PM2.5, and the coarse-mode fraction (PM10-PM2.5). Due to the seasonal variability of PM and its composition, seasonal differentiation is investigated. The labelling approach provided in LOTOS-EUROS allows to distinguish between the sources relevant for Berlin's PM pollution, with the focus of this work on local contributions such as households and traffic on the one hand and regional contributions from Berlin itself and Germany's Eastern European neighbors (Poland and the Czech Republic) on the other hand.

This study is in relation to the “Berliner Luftreinhalteplan” (Berlin Clean Air Plan).