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Operational source receptor calculations for large agglomerations

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For Air quality policy an important question is how much of the air pollution within an urbanized region can be attributed to local sources and how much of it is imported through long-range transport. This is critical information for a correct assessment of the effectiveness of potential emission measures. The ratio between indigenous and long-range transported air pollution for a given region depends on its geographic location, the size of its area, the strength and spatial distribution of emission sources, the time of the year, but also - very strongly - on the current meteorological conditions, which change from day to day and thus make it important to provide such calculations in near-real-time to support short-term legislation. Similarly, long-term analysis over longer periods (e.g. one year), or of specific air quality episodes in the past, can help to scientifically underpin multi-regional agreements and long-term legislation.
Within the European MACC projects (Monitoring Atmospheric Composition and Climate) and the transition to the operational CAMS service (Copernicus Atmosphere Monitoring Service) the computationally efficient EMEP MSC-W air quality model has been applied with detailed emission data, comprehensive calculations of chemistry and microphysics, driven by high quality meteorological forecast data (up to 96-hour forecasts), to provide source-receptor calculations on a regular basis in forecast mode.
In its current state, the product allows the user to choose among different regions and regulatory pollutants (e.g. ozone and PM) to assess the effectiveness of fictive emission reductions in air pollutant emissions that are implemented immediately, either within the agglomeration or outside. The effects are visualized as bar charts, showing resulting changes in air pollution levels within the agglomeration as a function of time (hourly resolution, 0 to 4 days into the future). The bar charts not only allow assessing the effects of emission reduction measures but they also indicate the relative importance of indigenous versus imported air pollution.
The calculations are currently performed weekly by MET Norway for the Paris, London, Berlin, Oslo, Po Valley and Rhine-Ruhr regions and the results are provided free of charge at the MACC website (http://www.gmes-atmosphere.eu/services/aqac/policy_interface/regional_sr/). A proposal to extend this service to all EU capitals on a daily basis within the Copernicus Atmosphere Monitoring Service is currently under review. The tool is an important example illustrating the increased application of scientific tools to operational services that support Air Quality policy.
This paper will describe this tool in more detail, focusing on the experimental setup, underlying assumptions, uncertainties, computational demand, and the usefulness for air quality for policy. Options to apply the tool for agglomerations outside the EU will also be discussed (making reference to, e.g., PANDA, which is a European-Chinese collaboration project).