Geophysical Research Abstracts
Vol. 19, EGU2017-14115, 2017
EGU General Assembly 2017

Systematic evaluation of atmospheric chemistry-transport model CHIMERE

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Regional-scale atmospheric chemistry-transport models (CTM) are used to develop air quality regulatory measures, to support environmentally sensitive decisions in the industry, and to address variety of scientific questions involving the atmospheric composition. Model performance evaluation with measurement data is critical to understand their limits and the degree of confidence in model results.

CHIMERE CTM (http://www.lmd.polytechnique.fr/chimere/) is a French national tool for operational forecast and decision support and is widely used in the international research community in various areas of atmospheric chemistry and physics, climate, and environment (http://www.lmd.polytechnique.fr/chimere/CW-articles.php).

This work presents the model evaluation framework applied systematically to the new CHIMERE CTM versions in the course of the continuous model development. The framework uses three of the four CTM evaluation types identified by the Environmental Protection Agency (EPA) and the American Meteorological Society (AMS): operational, diagnostic, and dynamic. It allows to compare the overall model performance in subsequent model versions (operational evaluation), identify specific processes and/or model inputs that could be improved (diagnostic evaluation), and test the model sensitivity to the changes in air quality, such as emission reductions and meteorological events (dynamic evaluation).

The observation datasets currently used for the evaluation are: EMEP (surface concentrations), AERONET (optical depths), and WOUDC (ozone sounding profiles). The framework is implemented as an automated processing chain and allows interactive exploration of the results via a web interface.