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SHORT ABSTRACT

Abstract title: Effect of the uncertainty in meteorology on air quality model predictions

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Abstract text

An operational air quality forecasting model system has been developed and provides daily forecasts of ozone, nitrogen oxides, and particulate matter for the area of Hungary and three big cites of the country (Budapest, Miskolc, and Pécs). The core of the model system is the CHIMERE off-line chemical transport model. The AROME numerical weather prediction model provides the gridded meteorological inputs for the chemical model calculations. It is essential to have a quantitative understanding of the uncertainty in model output arising from uncertainties in the input meteorological fields.

The main aim of this research is to probe the response of an air quality model to its uncertain meteorological inputs. Ensembles are one method to explore how uncertainty in meteorology affects air pollution concentrations. During the past decades, meteorological ensemble modeling has received extensive research and operational interest because of its ability to better characterize forecast uncertainty. One such ensemble forecast system is the one of the AROME model, which has an 11-member ensemble where each member is perturbed by initial and lateral boundary conditions. In this work we focus on wintertime particulate matter concentrations, since this pollutant is extremely sensitive to near-surface mixing processes. Selecting a number of extreme air pollution situations we will show what the impact of the meteorological uncertainty is on the simulated concentration fields using AROME ensemble members.

Motivation

It is undeniable that the impact of meteorology-related uncertainty on estimated air quality is substantial. The use of the ensemble modelling approach could contribute to improved model results. Harmo21 could offer a nice opportunity to discuss this subject.