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Towards a forecasting system of air quality for Asia using the WRF-Chem model

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The degradation of air quality in Asia resulting from the intensification of human activities, and the related impacts on the health of billions of people have become an urgent matter of concern. The World Health Organization states that each year nearly 3.3 million people die worldwide prematurely because of air pollution. The situation is particularly acute in Asia.
Improving air quality over the Asian continent has become a major challenge for national, regional and local authorities. A prerequisite for air quality improvement is the development of a reliable monitoring system with surface instrumentation and space platforms as well as an analysis and prediction system based on an advanced chemical-meteorological model.

The aim is to use the WRF-Chem model for the prediction of daily air quality for the Asian continent with spatial resolution that will be increased in densely populated areas by grid nesting.
The modeling system covers a nearly the entire Asian continent so that transport processes of chemical compounds within the continent are simulated and analyzed. To additionally account for the long-range effects and assess their relative importance against regional emissions, the regional chemical transport modeling system uses information from a global modeling system as boundary conditions.
The first steps towards a forecasting system over Asia are to test the model performance over this large model domain and the different emissions inventories available for Asia.
In this study, the WRF-Chem model was run for a domain covering 60°E to 150°E, 5°S to 50°N at a resolution of 60 km x 60 km for January 2006 with three alternative emission inventories available for Asia (MACCITY, INTEX-B and REAS).
We present an intercomparison of the three different simulations and evaluate the simulations with satellite and in situ observations, with focus on ozone, particulate matter, nitrogen oxides and carbon monoxide. The differences between the simulations using different emission inventories are discussed.