



Modeling study of a severe aerosol pollution event in December 2013 over Shanghai China: An application of chemical data assimilation

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This study focuses on the importance of initial conditions to air-quality predictions. We ran assimilation experiments using the WRF-Chem model and grid-point statistical interpolation (GSI), for a 9-day severe particulate matter pollution event that occurred in Shanghai in December 2013. In this application, GSI used a three-dimensional variational approach to assimilate ground-based $PM_{2.5}$ observations into the chemical model, to obtain initial fields for the aerosol species. In our results, data assimilation significantly reduced the errors when compared to a simulation without assimilation, and improved forecasts of $PM_{2.5}$ concentrations. Despite a drop in skill directly after the assimilation, a positive effect was present in forecasts for at least 12–24 h, and there was a slight improvement in the 48-h forecasts. In addition to performing well in Shanghai, the verification statistics for this assimilation experiment are encouraging for most of the surface stations in China.