PA27) Sensitivity Analysis of Aerosol Chemical Mechanisms in Air Quality Modeling (WRF-Chem): Model Inter-comparison Study of Aerosol Chemical Mechanisms in Korea

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Korean operational air quality prediction of PM_{10} and $PM_{2.5}$ surface concentrations has been implemented since 2014, highly accurate forecasting of surface concentrations is required. As a tentative plan to employ the WRF-Chem-based forecast supporting system developed by National Institute of Environmental Research in Korea, we assessed PM prediction performance by carrying out WRF-Chem model by new forecast system in Korea, and the results are compared with intensive field campaign observations. It has been noted that the different chemical and meteorological parameterizations used in WRF-Chem may result in diverse model biases, and also model domain, emission dataset, together with chemical and aerosol modules are all important controlling factors. In this study we payed attention the influence of different parameterization used in the various aerosol chemical mechanisms such as MADE/VBS and MADE/SORGAM aerosol modules with/without aqueous chemistry on aerosol concentrations of sulfate, nitrate and ammonium of $PM_{2.5,}$ and identified the optimal options for current northeast Asian domain. We found our large discrepancies in $PM_{2.5}$ concentrations including sulfate, nitrate and ammonium derived between with and without aqueous-phase chemistry, whereas aerosol chemical options are less sensitive to $PM_{2.5}$ concentrations than the case between with/without aqueous phase. In addition to aerosol constituent concentrations, gas?phase concentrations of NO_2, SO_2, HNO_3 were analyzed (as their precursors) to examine the response of aqueous-phase atmospheric chemistry. The aqueous phase chemistry was discussed here and others such as the diversity of processes inducing underestimation of PM in model simulation are also discussed.