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Modeling wet deposition and concentration of inorganics over Northeast Asia with MRI-PM/c

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Abstract. We conducted a regional-scale simulation over Northeast Asia for the year 2006 using an aerosol chemical transport model, with time-varying lateral and upper boundary concentrations of gaseous species predicted by a global stratospheric and tropospheric chemistry-climate model. The present one-way nested global-through-regional-scale model is named the Meteorological Research Institute–Passive-tracers Model system for atmospheric Chemistry (MRI-PM/c). We evaluated the model's performance with respect to the major anthropogenic and natural inorganic components, SO_4^{2-} , NH_4^+ , NO_3^- , Na^+ and Ca^{2+} in the air, rain and snow measured at the Acid Deposition Monitoring Network in East Asia (EANET) stations. Statistical analysis showed that approximately 40–50 % and 70–80 % of simulated concentration and wet deposition of SO_4^{2-} , NH_4^+ , NO_3^- and Ca^{2+} are within factors of 2 and 5 of the observations, respectively. The prediction of the sea-salt originated component Na^+ was not successful at near-coastal stations (where the distance from the coast ranged from 150 to 700 m), because the model grid resolution ($\Delta x=60$ km) is too coarse to resolve it. The simulated Na^+ in precipitation was significantly underestimated by up to a factor of 30.

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