

Development of a regional-scale aerosol chemistry transport model and its evaluation

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We have developed a regional scale aerosol chemistry transport model to simulate East Asian air quality. The evaluation of the model performance was made by comparing with detailed aerosol measurement data conducted at Gosan, Cheju Island, Korea during ABC-EAREX 2005 campaign. The chemical transport model is off-line coupled with a meteorological model (MM5). NCEP final analysis data were used as initial and boundary conditions of MM5 simulation. The boundary concentrations of trace gases and aerosols are set using a simulation result of a global chemical transport model, GEOS-chem. The temporal variations of model results show good agreement with those of the observation results of inorganic aerosol component and black carbon measured by PILS and PSAP, respectively. During the observation period, we have detected 3 transport events, when the observed concentration peaks at 26.0, 16.8 and 18.6 micro g/m³, respectively. The model concentration peaks are 53.0, 7.1 and 19.2 micro g/m³ at the respective observed transport events. The contribution from outside the simulation domain, East Asia, was less than 1% at the extreme events (99% is Asian continental origin) while it amounts to 50-90% when high-pressure system was prevailing. During the whole observation period (20 days), the average of measured concentrations of sulfate is 3.0 micro g/m³, the simulation result is 3.44 micro g/m³ and the contribution of the boundary condition is 17.0%. It is indicated that the contribution of transport from outside of East Asia is not negligible on monthly mean concentrations of aerosols at Cheju Island.