Geophysical Research Abstracts
Vol. 20, EGU2018-8041, 2018
EGU General Assembly 2018

Sensitivity and Improvement of PM2.5 simulation to the below-cloud washout schemes in an atmospheric chemical transport model

Xingcheng Lu (1) and Jimmy Fung (1,2)

(1) The Hong Kong University of Science and Technology, Division of Environment and Sustainability, Hong Kong (xingchenglu2011@gmail.com), (2) The Hong Kong University of Science and Technology, Department of Mathematics, Hong Kong (majfung@ust.hk)

Below-cloud washout (BCW) is an important process of removing the ambient pollutants in the atmosphere. Many BCW parameterizations have been proposed for application in different 3D air quality models. This study analyzes the sensitivity of PM2.5 simulation and source apportionment results by integrating different BCW schemes into the CAMx model during the rainy days. Furthermore, studies have considered the influence of different raindrop terminal velocity, raindrop mean diameter, and raindrop size distribution parameterizations on the simulation. PM2.5 time series, spatial maps and the average concentration of each individual city with using different BCW schemes are presented. Our results show that some different BCW schemes and raindrop size distributions can cause large discrepancies in a PM2.5 simulation. The influence from different raindrop terminal velocity and raindrop mean diameter parameterizations is limited. The source apportionment results for some cities (e.g. Hong Kong) are also sensitive to the choice of the BCW scheme. After implementing the self-calculated BCW coefficients and considering the effects of aerosol compositions, the PM2.5 simulation performance is better than the methods in CAMx v6.00 and CAMx v6.40. The BCW coefficients for specific aerosol compositions and raindrop size distributions offer two possible directions that worth the further efforts in order to acquire reliable simulation results for the rainy season.