Evaluation of isoprene flux and its impact on oxidants and inorganic aerosols in East Asia

Kyung M. Han [1], *Chul H. Song* [1], *Rae S. Park* [1], *Jung H. Woo* [2], *Hyun K. Kim* [2]

[1] Department of Environmental Science and Engineering, Gwangju Institute of Science and Technology
[2] Department of Advanced Technology Fusion, Konkuk University
Contact: kmhan@gist.ac.kr

As a major precursor of the ozone and SOAs (secondary organic aerosols) formations, biogenic species are of primary importance in the atmospheric chemistry. Isoprene influences the level of inorganic aerosols (i.e. sulfate and nitrate) by controlling OH radicals. However, isoprene fluxes are highly uncertain in East Asia. While isoprene fluxes from the GEIA (Global Emissions Inventory Activity) and POET (Precursors of Ozone and their Effects in the Troposphere) inventories estimate approximately 20 Tg yr^{-1} in East Asia, those from the MEGAN (Model of Emissions of Gases and Aerosols from Nature) and MOHYCAN (MOdel for Hydrocarbon emissions by the CANopy) estimate approximately half of the GEIA and POET inventories. In order to evaluate and/or quantify the magnitude of the isoprene fluxes over East Asia, the HCHO columns obtained from the GOME (Global Ozone Monitoring Experiment) observations were compared with the HCHO columns from the CMAQ (Community Multi-scale Air Quality) simulations over East Asia. In this study, US EPA Models-3/CMAQ v4.5 modeling using the ACE-ASIA (Asia Pacific Regional Aerosol Characterization Experiment) emission inventory for anthropogenic pollutants and GEIA, POET, MEGAN, and MOHYCAN emission inventories for biogenic species was carried out in conjunction with the Meteorological fields generated from the PSU/NCAR MM5 (Pennsylvania state University/National Center for Atmospheric Research Meso-scale Model 5) model for the summer episodes of the year 2002. In addition to an evaluation of the isoprene fluxes, we investigated the impact of the uncertainty in biogenic emission inventory on inorganic aerosol formations and variations of oxidants (OH, O_3, and H_2O_2) in East Asia. The results show that isoprene fluxes from the GEIA, POET, and MEGAN are overestimated, particularly over South China. Also, differences in biogenic emission fluxes lead to changes in the levels of sulfate and nitrates by changing the OH radical concentrations.