Geophysical Research Abstracts
Vol. 13, EGU2011-5232, 2011
EGU General Assembly 2011

Anthropogenic Aerosol Impacts on East Asia Summer Monsoon

Xiaohong Liu (1), Yiquan Jiang (1,2), Xiuqun Yang (2), Minghuai Wang (1), and Steve Ghan (1)

(1) Pacific Northwest National Laboratory, Atmospheric Science & Global Change Division, Richland, United States (xiaohong.liu@pnl.gov), (2) School of Atmospheric Science, Nanjing University, Nanjing, China

Aerosol can affect climate directly by scattering and absorption of radiation (both solar and terrestrial), and indirectly by modifying microphysical and radiative properties of clouds and precipitation processes. East Asia has experienced the fastest economic growth in the world during the last three decades. Along with severe aerosol pollution, significant changes in precipitation pattern, frequency and intensity have been observed in East Asia. In order to investigate the impacts of anthropogenic aerosols on precipitation and summer monsoon in East Asia, we analyze a series of simulations from the NCAR Community Atmospheric Model version 5 (CAM5). We find that anthropogenic aerosols reduce the surface solar flux and generate a surface cooling over the land. Meanwhile absorption of solar flux is enhanced in the low troposphere. This reduces the land-sea thermal contrast and weakens the East Asia summer monsoon. The precipitation shifts southwardly in east China with the weakening of monsoon. Contributions to precipitation changes from the semi-direct effect of black carbon and from the indirect effects of aerosol are isolated. These precipitation changes are also compared with those from a multiscale climate model (a two-dimensional cloud resolving model at 4 km horizontal resolution embedded within each grid column of the NCAR CAM5 to replace the GCM's conventional cloud parameterizations) to examine the robustness of our findings.