Geophysical Research Abstracts
Vol. 14, EGU2012-1452, 2012
EGU General Assembly 2012

Impact of aerosols on precipitation: A review of large-scale modeling and model-observation comparison studies

C. Wang
MIT, EAPS, Cambridge, United States (wangc@mit.edu)

On a global scale, aerosols could affect precipitation through microphysical and dynamical paths. The former path consists of a series of microphysical processes and microphysics-dynamics feedbacks, initiated by the activation of aerosols as CCN or IN. The resultant change in cloud radiation is commonly referred to as the indirect radiative forcing of aerosols. The dynamical path is implemented through changes in large-scale circulation by persistent aerosol direct or indirect forcing. The microphysical path would cause precipitation changes mainly confined to aerosol-laden regions while the dynamical path could alter precipitation remote to these regions. For example, over the tropics, current researches suggest that the direct forcing of absorbing anthropogenic aerosols can alter both quantity and distribution of critical precipitation systems ranging from Pacific and Indian to Atlantic Oceans, often in places away from aerosol-concentrated regions. To simulate the effects of aerosols on precipitation in a large-scale framework, models need to include the feedback of dynamical processes to aerosol forcing. Current modeling studies suggest that the precipitation changes caused by the dynamical path could be substantial comparing to that by the microphysics path. This presentation will summarize the previous and current efforts using global aerosol-climate models along with observational data to study the impacts of aerosol on clouds and precipitation.