

5.071 Impacts of precipitation patterns on the wet deposition and lifetime of aerosols.

Early Career Scientist

Presenting Author:

Pei Hou, Michigan Technological University, phou@mtu.edu

Co-Authors:

Shiliang Wu, Michigan Technological University

Abstract:

Wet deposition is a major removal process for many air pollutants including aerosols and other soluble species. Global climate change can significantly affect the precipitation amount and patterns which have important implications for the wet deposition process. As part of a study examining the long-term changes in extreme air pollution meteorology based on the global observational data for the period of 1951-2010, we analyze the long-term trends in the precipitation characteristics including precipitation amount, frequency, intensity, duration, type (rain or snow) and diurnal variation. Some significant trends have been identified. For example, we find decreasing precipitation frequency over Europe, North Africa, Asia and South America. We then conduct multiple sensitivity simulations with the GEOS-Chem chemical transport model to quantify the impacts on aerosols from the changes in these precipitation characteristics. Our results show that the atmospheric aerosols' lifetime against wet deposition is most sensitive to precipitation frequency. This implies that the decreasing precipitation frequency would lead to longer atmospheric lifetime of aerosols, even the total precipitation amount remains unchanged.