



Examining interactions between climate, droughts and dust events in Central Asia

Irina N. Sokolik (1), Viatcheslav Tatarskii (1), Xin Xi (1), and Igor Shkolnik (2)

(1) Georgia Institute of Technology, Earth and Atmospheric Sciences, Atlanta, United States (isokolik@eas.gatech.edu), (2) Voeikov Main Geophysical Observatory (MGO), St.-Petersburg, Russia

Within the Central Asia region, dramatic climatic, environmental, and socioeconomic changes have occurred during the past century. These include significant changes in land cover and land use, floods and droughts, desiccation of the Aral Sea and dust storms, and massive land and water management projects. Given the intimate coupling between the land processes and wind-blown atmospheric dust and its importance in the Earth system, an improved understanding of how land-use/land-cover changes affect Asian dust and associated feedbacks is required to make regional climate change projections more credible. The present study addresses this issue by examining the linkages between climate, droughts and dust outbreaks in the region during the past 50 years.

The long-term series of climatic variables (temperature, precipitation, and surface winds) were examined in conjunction with dust event records from meteorological stations and more recently from satellite observations. Our analyses also include the NCEP re-analyses data and the results from the regional coupled dust modeling system WRF-Chem-DuMo. Spatiotemporal patterns of considered variables, and their seasonal and interannual variabilities and correlations were analyzed at different spatial scales. We also attempted to delineate the relative role of meteorological/climate conditions and land cover/land use changes in controlling dust loadings in Central Asia over the past 50 years. Formulation of the possible feedbacks in the coupled land-atmospheric dust system and implications for the integrated systems modeling will be addressed.