# Investigation of aerosol-cloud-radiation interactions using NCEP global models

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## Abstract

While understanding the climate impacts of the complex cloud-aerosol-radiation interactions remains a major frontier in climate sciences, there have been significant processes in developing process-level representations of clouds and aerosols as well as in understanding the processes relevant to aerosol-cloud-radiation interactions. Efforts are underway to improve Global Forecast System (GFS) by implementing physically-based schemes. For instance, the Goddard Chemistry Aerosol Radiation and Transport model (GOCART), and two-moment cloud microphysics from Morrison and Gettleman (MG) have been implemented into GFS physics suite. The overarching goal is to improve the representations of aerosol processes, cloud microphysics, and aerosol-cloud-radiation interactions in the NCEP global models (GFS and Climate Forecast System, CFS).

The impact of aerosols on aerosol-cloud-radiation interaction is investigated using the GFS with physics upgrade. Cases are selected to demonstrate the impact of aerosols to cloud microphysics by the zonal mean liquid water and ice content.