

7.4 Implementation of aerosol-cloud microphysics-radiation coupling in NASA Unified WRF with results from recent simulations

Shi, Jainn Jong, Toshi Matsui, Wei-Kuo Tao, Christa Peters-Lidard, Mian Chin, Zhining Tao, and Eric Kemp, *National Aeronautics and Space Administration*

It is well known that aerosols in the atmosphere often serve as condensation nuclei in the formation of cloud droplets and ice particles. As a result, these aerosols exert considerable influence on the microphysical properties of both warm and ice clouds. Recent research efforts have led to notable progress in increasing our understanding of their microphysical properties and the factors that enable them to act as cloud condensation nuclei and ice nuclei and therefore the indirect effects on cloud formation. On the other hand, these same aerosols also have a direct effect on how longwave and shortwave radiations are absorbed in the atmosphere and consequently the heating in the atmosphere and at the surface. Given the complexity of aerosol effects on cloud microphysics and radiation and their subsequent effects on deep convective clouds, there is also a need to assess the combined aerosol effects of microphysics and radiation.

In this latest model development, the Goddard microphysics and longwave/shortwave schemes in WRF are coupled in real-time with the Goddard Chemistry Aerosol Radiation and Transport (GOCART) in WRF-Chem to account for the direct (radiation) and indirect (microphysics) impact. We will present the framework of the aerosol coupling including a supporting program for inserting aerosol initial and boundary conditions into wrfinput and wrfbdy files, respectively. The framework also includes the use of Global Fire Emissions Database (GFED). Results from the recent simulations for the AMMA (2006) special observing period August 6-7 using the newly developed coupling will also be presented.