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Using Multi-scale Modeling Systems to Study the Precipitation Processes

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Recently, a multi-scale modeling system with unified physics was developed at NASA Goddard. It consists of (1) a cloud-resolving model (Goddard Cumulus Ensemble model, GCE model), (2) a regional scale model (a NASA unified weather research and forecast, WRF), (3) a coupled CRM and global model (Goddard Multi-scale Modeling Framework, MMF), and (4) a land modeling system. The same microphysical processes, long and short wave radiative transfer and land processes and the explicit cloud-radiation, and cloud-land surface interactive processes are applied in this multi-scale modeling system. This modeling system has been coupled with a multi-satellite simulator to use NASA high-resolution satellite data to identify the strengths and weaknesses of cloud and precipitation processes simulated by the model.

In this talk, a review of developments and applications of the multi-scale modeling system will be presented. In particular, the results from using multi-scale modeling system to study the interactions between clouds, precipitation, and aerosols will be presented. Also how to use of the multi-satellite simulator to improve precipitation processes will be discussed.