

## Regional Scale/Regional Climate Model Development and Its Applications at Goddard

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A Regional Land-Atmosphere Climate Simulation System (RELACS) is being developed and implemented at NASA Goddard Space Flight Center. One of the major goals of RELACS is to use a regional scale model (Penn State/NCAR MM5) with improved physical processes and in particular land-related processes, to understand the role of the land surface and its interaction with convection and radiation as well as the water/energy cycles in the Indo-China/South China Sea (SCS)/China, N. America and S. America region.

The Penn State/NCAR MM5 atmospheric modeling system, a state of the art atmospheric numerical model designed to simulate regional weather and climate, has been successfully coupled to the Parameterization for Land-Atmosphere-Cloud Exchange (PLACE) land surface model. The PLACE allows the effects of vegetation, and thus important physical processes such as evapotranspiration and interception are included. The PLACE model incorporates vegetation type and has been shown in international comparisons to accurately predict evapotranspiration and runoff over a wide vari-

ety of land surfaces. The coupling of MM5 and PLACE creates a numerical modeling system with the potential to more realistically simulate atmosphere and land surface processes including land-sea interaction, regional circulations such as monsoons, and flash flood events. In addition, the Penn State/NCAR MM5 atmospheric modeling system has been (1) coupled to the Goddard Ice Microphysical scheme; (2) coupled to a turbulent kinetic energy (TKE) scheme; (3) modified to ensure cloud budget balance; (4) coupled to Goddard radiation package and its interaction with clouds; and (5) incorporated initialization with the Goddard EOS data sets at NASA/Goddard Laboratory for Atmospheres.

In this paper, the Goddard regional scale and regional climate model and its applications to identify the physical processes associated with heavy precipitation events that occurred in Florida, Taiwan and the South China Sea.