High-Resolution Convective Modeling using WRF and GCE coupled to LIS

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The NASA/GSFC Land Information System (LIS; http://lis.gsfc.nasa.gov) has now been successfully coupled to the Weather Research and Forecasting (WRF; http://www.wrfmodel.org) and Goddard Cumulus Ensemble (GCE; http://rsd.gsfc.nasa.gov/912/model/model.html) models using parallel techniques in a manner compliant with the Earth System Modeling Framework (ESMF; http://www.esmf.ucar.edu). LIS is a high-performance Land Data Assimilation System (LDAS; http://ldas.gsfc.nasa.gov) that encapsulates the capabilities of the North American LDAS (NLDAS) and the Global LDAS (GLDAS) into a single software infrastructure. The original LIS consists of several land surface models run in an uncoupled manner (i.e. "offline") using observationally-based precipitation, radiation and meteorological inputs, and surface parameters including Moderate Resolution Imaging Spectroradiometer (MODIS)-based Leaf Area Index (LAI). In this study, LIS is first executed in an uncoupled manner ("spun up") in order to provide soil moisture and soil temperature initial conditions for a case study period (the 2002 International H2O Project (IHOP) field program). Then, during the case study period, the land surface (LIS) and atmospheric (WRF/GCE) models are executed in a coupled manner using the ESMF infrastructure and superstructure. In addition to demonstrating the ESMF technologies, results from the June 12 IHOP case study indicate a strong sensitivity to observationally-based initial conditions, particularly with respect to the timing and location of convection.

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