The Land Information System: Thinking Globally, Acting Locally

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NASA, Goddard Space Flight Center has developed a global Land Information System (LIS; http://lis.gsfc.nasa.gov) capable of modeling land-atmosphere interactions at spatial resolutions down to 1km. Like its predecessor, the Global Land Data Assimilation System (GLDAS), LIS consists of an ensemble of land surface models (e.g., CLM, Noah, VIC) run offline using satellite-based precipitation (SSM/I; TRMM), radiation and surface parameters, in addition to model-derived surface meteorology. Satellite-based surface parameters include AVHRR-based or MODIS-based land cover and Leaf Area Index (LAI). The high spatial resolution of LIS, enabled by the use of high performance computing and communications technologies, is capable of resolving mesoscale features, including urban areas, lakes, and agricultural fields. We will present results demonstrating LIS applied at ¼ degree and 1km resolutions for areas surrounding the Coordinated Enhanced Observing Period (CEOP) reference sites. The ¼ degree configuration of LIS is equivalent to GLDAS, and considers land cover heterogeneity using sub-grid patches or "tiles". Comparisons of the 1km and ¼ degree results demonstrate that: 1. Subgrid topography and soils play an important role in the area average fluxes; 2. High-resolution flux predictions are limited by the lack of high-resolution input radiation and/or precipitation data; 3. Current land cover and LAI products from MODIS, rather than AVHRR-based climatologies, have significant impacts on predicted land surface temperatures and surface water and energy fluxes; and 4. The CEOP reference site metadata must include adequate descriptions of topographic, soil and landscape characteristics to support water and energy balance studies.