Impact of a Dynamic Vegetation Parameterization in the Numerical Simulation of Recent Warm-Season Weather. Preliminary results.

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Background and Motivation

Several studies have demonstrated that significant feedbacks occur on seasonal time scales when vegetation is allowed to evolve as part of the dynamic modeling system (Lu et al., 2001; Eastman et al., 2001).

The purpose of this NASA/NCCS GAPP project is to investigate the utility of applying a dynamic vegetation parameterization in an explicit predictive framework.

The coupled atmospheric-biospheric modeling system GEMRAMS (Sellers et al., 2001) is used to this objective. GEMRM is an eco-physiological process-based model that includes explicit C3 and C4 photosynthesis pathways to determine the assimilation of carbon (Fig. 1). Assimilated is calculated using the model-internal stomatal conductance parameterization. The model also includes a radiation scheme, a non-hydrostatic dynamics module, and a dynamic vegetation module.

Experimental Design

- Grid size: 40x40 km grid spacing
- Initial and lateral boundary conditions provided by NCEP/NCAR Reanalysis for a region from June 2000 to September 2001.
- Simulation period: 15 May to 1 September 2000 and 2001. Results for June 2000 are presented here.

LAI

- LAI in GEMRAMS simulations are based on satellite observations. The new GEMRAMS vegetation types for the 26 June 2000 from NASA/Goddard is used, together with the LAI-full database (Sellers et al., 1996) to provide initial LAI conditions.

Precipitation

Both GEMRAMS and RAMS capture the general precipitation pattern, as given by the observed precipitation (Fig. 8). However, in both model-averaged domain average precipitation was higher than observed. In terms of domain-average, RAMS simulated precipitation is higher than GEMRAMS. Positive differences appear in the center of the domain centered approximately 50-65°N. GEMRAMS appears to do a better job in the simulated precipitation in the center of Texas.

Surface Latent and Sensible Heat Fluxes

Leaf area index (LAI) initial conditions: Leaf area index initial conditions for GEMRAMS runs, according to GIMMS NDVI data set and Sellers et al. (1998) algorithm.

Simulations for another year with different precipitation and temperature conditions should provide insights into the atmospheric dynamics feedbacks between different seasonal vegetation evolution and atmospheric conditions.

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