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Simulations of South American hydrometeorology and effects of land surface processes

Yongkang Xue, Fernando de Sales, Weiping Li, and Chou Sin Chan

This paper presents our studies using the NCEP GCM and the Eta regional. In both atmospheric models, SSiB has been used to simulate the surface conditions. In the Eta/SSiB study, a climate version has been used for three-months continuous simulations through a dry season. This version includes updating surface boundary conditions, e.g., sea surface temperature, the distance between sun and earth, and other conditions. A vegetation map developed at the CPTEC has also been introduced. The observational data of precipitation and surface temperature from CPTEC have been used to verify the model output. The results show realistic simulations in the temporal and spatial variations of precipitation. The influence of land surface processes to the precipitation is through the atmospheric circulation and moisture flow. A coupled NCEP GCM/SSiB has also been used to investigate the interactions between land surface processes and hydrometeorology, in particular the interactions between land and monsoon system. Several sets of experiments are designed to investigate the role of the land surface process. Impacts of different surface models, initial soil moisture, and leaf area index are tested. In one experiment initial soil moisture is provided by the global soil moisture project. In another experiment, the leaf area index is from the satellite observation. In the third one, no explicit vegetation scheme but only soil model is used. These experiments show that the importance of the land surface parameterization and vegetation and soil condition in the simulations of hydrometeorological variability. In addition to the impact on the continent, the effect also extends to the East Pacific Ocean through the circulation. The impact on the Atlantic Ocean is relatively small.