The contribution of CEOP data to the understanding and modeling of monsoon systems

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Abstract

CEOP has contributed and will continue to provide integrated data sets from diverse platforms for better understanding of the water and energy cycles, and for validaintg models. In this talk, I will show examples of how CEOP has contributed to the formulation of a strategy for the study of the monsoon as a system. The CEOP data concept has led to the development of the CEOP Inter-Monsoon Studies (CIMS), which focuses on the identification of model bias, and improvement of model physics such as the diurnal and annual cycles. A multi-model validation project focusing on diurnal variability of the East Asian monsoon, and using CEOP reference site data, as well as CEOP integrated satellite data is now ongoing. Similar validation projects in other monsoon regions are being started. Preliminary studies show that climate models have difficulties in simulating the diurnal signals of total rainfall, rainfall intensity and frequency of occurrence, which have different peak hours, depending on locations. Further more model diurnal cycle of rainfall in monsoon regions tend to lead the observed by about 2-3 hours. These model bias offer insight into lack of, or poor representation of key components of the convective,and stratiform rainfall. The CEOP data also stimulated studies to compare and contrasts monsoon variability in different parts of the world. It was found that seasonal wind reversal, orographic effects, monsoon depressions, meso-scale convective complexes, SST and land surface land influences are common features in all monsoon regions. Strong intraseasonal variability is present in all monsoon regions. While there is a clear demarcation of onset, breaks and withdrawal in the Asian and Australian monsoon region associated with climatological intraseasonal variabillity, it is less clear in the American and Africa monsoon regions.

The examination of satellite and reference site data in monsoon has led to preliminary model experiments to study the impact of aerosol on monsoon variability. I will show examples of how the study of the dynamics of aerosol-water cycle interactions in the monsoon region, can be best achieved using the CEOP data and modeling strategy.