Geophysical Research Abstracts, Vol. 8, 08456, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08456

The NASA Energy- and Water-Cycle Study (NEWS)

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Earth is a unique, living planet due to the abundance of water and the vigorous cycling and replenishing of water throughout our global environment. The water cycle operates on a continuum of time and space scales and exchanges large amounts of energy as water undergoes phase changes and is moved from one part of the Earth system to another, and as such, it is a major driving agent of global circulation. Further, water is essential to life and is central to society's welfare, progress, and sustainable economic growth. So while the water cycle delivers the hydrologic consequences of climate changes, it is also necessarily and intimately entwined with the global energy cycle. In fact, the most significant manifestation of climate change for humans and the environment is an intensification of the global water cycle, leading to increased global precipitation, faster evaporation, and a general exacerbation of extreme hydrologic regimes, floods, and droughts. Water is at the heart of both the causes and the effects of climate change. It is essential to establish current rates of, and possible changes in precipitation, evapotranspiration, and cloud water content.

With its unprecedented new observation capacity, and revolutions in modeling capability, NASA has a great opportunity to make huge advances in water and energy cycle prediction. To realize this goal, NASA's must develop its unique discipline of prediction and verification role through the integration of water and energy cycle observations and models, and to verify model predictions against observed phenomena to ensure that its research programs delivers reliable answers to societies' questions. A scientific investigation is incomplete until it delivers predictions that can actually be compared with reality, and thus validated or invalidated by observation. Accomplishing these goals will require, in part, an accurate accounting of the key reservoirs and fluxes associated with the global water and energy cycle, including their spatial and temporal variability, through integration of all necessary observations and

research tools. To this end, NASA has established the NASA Energy and Water-Cycle Study (NEWS), whose long-term grand challenge is to document and enable improved, observationally-based, predictions of water and energy cycle consequences of Earth system variability and change. This presentation will feature an overview of the NEWS program, detail some of its central missions and projects, and lay out the plan for coordination with complementary international efforts.