2005 Fall Meeting
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HR: 13:40h
AN: **H13J-01 INVITED**
TI: A Strategy for Integrated Water Cycle Observations from Space
AU: *** Wood, E F**
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AB: The coupling of land surface hydrologic processes to atmospheric processes over a range of spatial and temporal scales is needed for understanding how atmosphere-land surface interactions operate and feed back onto the regional and larger scale climate system. An integral component of NASA's Global Water and Energy Cycle (GWEC) program and the World Climate Research is whether knowledge of land surface hydrologic states results in improved weather and short-term climate predictions. The inherent research strategy for NASA/GWEC and WCRP/GEWEX for investigating this is through the merging (assimilation) of remotely sensed observations of the surface hydrospheric state with process-based, terrestrial water and energy balance models. NASA assumes that remote sensing observations using current (TRMM, Terra, and Aqua) and planned (e.g. Global Precipitation Mission, HYDROS for surface soil moisture and freeze-thaw state, and possibly snow and surface water) platforms will provide sufficient estimates of surface hydrologic state variables. The extent to which this assumption can be realized remains an open question. The unmet needs facing the community in fully exploiting space-borne observations include: (i) having sufficiently accurate retrieval of physical surface states, including validation programs that can estimate retrieval error characteristics; (ii) overcoming satellite sensor programs that primarily focus on a single physical parameter; and (iii) having consistency between satellite observations and land surface models in terms of consistency in the retrieved variables as they relate to the spatial and temporal variability of the terrestrial

hydrosphere. This presentation will offer a new vision for water cycle observation and modeling that has, at its core, the concept of integrated observations as opposed to isolated observations, and consistency between models and observations. By integrated observations, we mean the simultaneous retrieval of related water cycle variables from a single satellite platform with sensors for multiple frequencies, combining passive and active sensors, and perhaps lidar. By consistency between observations and models, we mean the satellite observations be processed and utilized in an integrated manner with water cycle models. By recognizing that there are fast and slow components to the hydrosphere, an observational strategy can be developed that combines sensors in either Geostationary Earth Obit (GEO) for the fast components or Low Earth (polar) Orbit (LEO) for the slow components. The talk will present the challenges that need to be addressed and a roadmap for this vision. The challenges in developing an integrated observation strategy include innovative sensor and antennae technology, including the identification and selection of frequencies and sensors to meet the needs of water cycle research. For the modeling component, the challenge is in developing computational solutions that extract the maximum information from the integrated observations. This includes both retrieval algorithms that better relate model variables to satellite measurements and land models that more effectively reflect and describe the retrieved variables.

DE: 1836 Hydrological cycles and budgets (1218, 1655)
DE: 1855 Remote sensing (1640)
DE: 1878 Water/energy interactions (0495)
SC: Hydrology [H]
MN: Fall Meeting 2005

New Search