

2007 Fall Meeting  
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HR: 1340h

AN: **IN43B-1188**

**An Observing Systems Simulation Experiment for potential soil moisture retrievals using Aquarius instruments**

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**AA:** pathfinder Observing Systems Simulation Experiment (OSSE) experiment is being used to evaluate the potential of the radiometer and scatterometer instruments on-board the Aquarius satellite to provide soil moisture estimates for earth science application needs of water resources management and agricultural applications. The uncertainties involved in the soil moisture retrieval process using the Aquarius instrument will be evaluated and characterized, using a computational rapid prototyping environment, in the context of decision support. The current capabilities to monitor the state of the hydrosphere over land, either by in-situ network or space-borne measurement systems, are very limited. Aquarius is a new NASA Earth System Science Pathfinder (ESSP) mission to monitor global sea surface salinity (SSS) at a nominal resolution of about 100 km with

nearly 7-day repeat cycle in a sun synchronous orbit of 657 km. The instrument consists of an L-band radiometer/scatterometer operating at 1.143 GHz and 1.26 GHz respectively. Though primarily targeted for sea surface salinity (SSS) measurements, Aquarius has the potential to reasonably address the requirements for global soil moisture measurements, particularly in much of the western part of the United States. Our OSSE has been designed to simulate the Aquarius soil moisture retrieval process using: (a) one of the land surface models available in the NASA Land Information System (LIS) to create the "nature run (NR)" considered the "truth"; (b) a forward microwave emission and backscatter model (MEBM) to simulate the synthetic observations of radiometric brightness temperature and radar backscatter; (c) an orbit and sensor model (OSM) in order to sample the synthetic observations according to the orbital and instrument characteristics; and (d) a set of retrieval methods (RM) to derive simulated soil moisture measurements. The next step in the OSSE process is to make series of comparisons of the synthetically derived soil moisture estimates (using the various retrieval methods) against the nature run in order to characterize the uncertainties due to land surface heterogeneity, instrument error, and parameter estimates. This experiment employs three general land modeling tasks in order to evaluate: (a) the impact of Aquarius soil moisture products on land surface predictions; (b) the impact of Aquarius soil moisture products on land surface predictions when running different LSMs; and (c) the impacts of soil moisture products on land surface predictions when using different sets of surface characteristics (vegetation and soil properties). Implementation of our OSSE methodology and preliminary results from the experiment, especially characterizing the nature run, will be discussed during the presentation.

DE: 0520 Data analysis: algorithms and implementation

DE: 0550 Model verification and validation

DE: 0594 Instruments and techniques

DE: 0694 Instruments and techniques

DE: 1805 Computational hydrology

SC: Earth and Space Science Informatics [IN]

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