



The Hydros mission and validation of soil moisture retrievals

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The Hydrosphere State Mission (Hydros) is a pathfinder mission in the National Aeronautics and Space Administration (NASA) Earth System Science Pathfinder Program (ESSP). The objective of the mission is to provide exploratory global measurements of the earth's soil moisture at 10-km resolution with two- to three-days revisit and land-surface freeze/thaw conditions at 3-km resolution with one- to two-days revisit. The mission builds on the heritage of ground-based and airborne passive and active low-frequency microwave measurements that have demonstrated and validated the effectiveness of the measurements and associated algorithms for estimating the amount and phase (frozen or thawed) of surface soil moisture. The Hydros instrument is a combined radar (1.26 GHz with VV, HH, and HV polarizations) and radiometer system (1.41 GHz with H, V, and U polarizations) employing conical scanning across a swath of 1000 km. The radiometer measurements alone will allow retrieval of soil moisture in diverse (nonforested) landscapes with a resolution of 40 km. The radar measurements allow the retrieval of soil moisture at relatively high resolution (3 km). The mission includes combined radar/radiometer data products that will use the synergy of the two sensors to deliver enhanced-quality 10-km resolution soil moisture estimates. Validation of these soil moisture products will be critical to their acceptance and utilization, however, this will present significant challenges. The range of moderate to coarse resolution sensor footprints and high spatial variability of point scale soil moisture make it difficult (but not impossible) to design effective ground based schemes. There is also the issue of the ambiguous measurement depth of the satellite sensor and the limitations of insitu sensors (as well as models) to accurately represent this depth. These same issues impact the current AMSR and future SMOS soil moisture products. This paper will review the Hydros mission and validation plans.