Preparing for NASA's Soil Moisture Active Passive (SMAP) Mission

T. Jackson (1), D. Entekhabi (2), E. Njoku (3), P. O'Neill (4), and J. Entin (5)

(1) USDA ARS, Hydrology and Remote Sensing Lab, Beltsville. MD, USA (tom.jackson@ars.usda.gov), (2) MIT,
Cambridge, MA 02139 USA, (3) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109 USA, (4)
NASA Goddard Space Flight CenterSFC, Greenbelt, MD 20771 USA, (5) NASA HQ, Washington, DC 20546 USA

Soil Moisture Active/Passive (SMAP) Mission is one of the first satellites being developed by NASA in response to the National Research Council's Decadal Survey. SMAP will make global measurements of the moisture present at Earth's land surface and will distinguish frozen from thawed land surfaces. Direct observations of soil moisture and freeze/thaw state from space will allow better estimates of water and energy transfers between Earth's surface and atmosphere, which are primary driving factors for weather and climate. Soil moisture measurements are also of great importance in assessing flooding potential and as input to flood prediction models. Conversely, observations of widespread low soil moisture levels can provide early warning of drought conditions, reduced water supply and crop loss. SMAP observations can help mitigate these natural hazards, resulting in potentially great economic and social benefits. SMAP freeze/thaw timing observations will also reduce a major uncertainty in quantifying the global carbon balance and will help resolve the problem of the missing carbon sink. The SMAP mission concept would utilize L-band radar and radiometry. These instruments will share a rotating 6-meter mesh antenna to provide high-resolution and high-accuracy global maps of soil moisture and freeze/thaw state every two to three days. Soil moisture products at 3, 10 and 40 km resolutions will be derived. These will both complement and extend the records of the ESA SMOS mission and offer an order of magnitude improvement in spatial resolution. SMAP is currently in Phase A and scheduled for a 2013 launch. The science teams will be focusing on algorithm development and validation over the next few years. These efforts will be described.