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Towards a soil moisture climate data record in support of GCOS: where are we?

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Across many landscapes, soil moisture provides the link between terrestrial water, energy, and carbon cycles and determines the partitioning of precipitation into infiltration and runoff. The availability of better spatial estimates of soil moisture will therefore help to improve forecasting of precipitation, droughts and floods, further climate projections and predictions, and support water management. The importance of soil moisture in the global climate system has recently been underlined by the Global Climate Observing System (GCOS) by endorsing soil moisture as an Essential Climate Variable. In the 2010 update of the Implementation Plan for Global Observing System for Climate in Support of the UNFCCC GCOS outlined two core actions: i) Develop a record of validated globally-gridded near-surface soil moisture from several satellites and, ii) Develop a Global terrestrial Network for in-situ Soil Moisture. Already, significant effort towards the realization of these goals has taken place during the last few years. A first step towards characterization and merging of various operationally available satellite-based soil moisture data sets has been provided by numerous comparison studies performed by several research groups and within the WACMOS project funded by the European Space Agency. In the framework of this project, four radiometer-based (SMMR, SSM/I, TRMM, and AMSR-E) and two scatterometer-based (ERS and ASCAT) soil moisture products were merged into a single data record spanning the period 1978-2010. First validations and trend analyses of this data set are currently being performed. Concerning the realization of a global network of standardized in-situ soil moisture measurements, a great leap forward was made with the establishment of the International Soil Moisture Network (http://www.ipf.tuwien.ac.at/insitu) where ground-based soil moisture measurements from various local and regional networks are harmonized, quality controlled, and distributed to users. This presentation will give an overview of the status of the two actions en show the challenges that still need to be addressed. Future activities will have to focus on in-depth and objective quality assessment of the various available products, both satellite-based and in-situ, and on enhancing flexible merging frameworks for past, current, and upcoming satellite missions.