Geophysical Research Abstracts
Vol. 16, EGU2014-1997, 2014
EGU General Assembly 2014

ESA's Soil Moisture and Ocean Salinity Mission - An overview on the mission's performance and scientific results

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The Soil Moisture and Ocean Salinity (SMOS) mission, launched on 2 November 2009, is the European Space Agency's (ESA) second Earth Explorer Opportunity mission. The scientific objectives of the SMOS mission directly respond to the need for global observations of soil moisture and ocean salinity, two key variables used in predictive hydrological, oceanographic and atmospheric models. SMOS observations also provide information on the characterisation of ice and snow covered surfaces and the sea ice effect on ocean-atmosphere heat fluxes and dynamics, which affects large-scale processes of the Earth's climate system.

This paper will provide an overview on the various aspects of the SMOS mission, such as

1. The performance of the mission after more than 5 years in orbit: The SMOS mission has been in routine operations since May 2010, following the successful completion of the 6-months commissioning phase. The paper will summarise the technical and scientific status of the mission, including the status of the RFI detection and mitigation and its effect on the data products. SMOS has so far provided very reliable instrument operations, data processing and dissemination to users. The paper will also provide an overview on the MIRAS instrument performance, including the instrument calibration and level 1 brightness temperature data processing.
2. An overview on the SMOS data products: SMOS provides continuously level 1 (brightness temperature) and level 2 (soil moisture and ocean salinity) to its scientific user community since summer 2010. SMOS also provides brightness temperature data (level 1 data) to ECMWF in near-real time (NRT), who assimilates the data into their forecasting system. New services have been established to deliver a tailored NRT data product via the WMO's GTS and EUMETSAT's EUMETCast data dissemination systems to other operational agencies. This will open up new operational applications for SMOS data. Other data products are under development, responding to the requirements of the science community in particular in the area of hydrology, climate, land use and ship routing, namely a frozen soil indicator, data products for freeze/thaw periods, sea ice thickness and vegetation water content.
3. Provide an update on the overall validation approach and recent activities: SMOS data products are continuously improved and approach the scientific mission objectives. Validation activities are essential to ensure high data quality. ESA in collaboration with national agencies and institutions maintains a frame for validation activities such as reference sites, ground based observations as well as campaigns. The paper will provide an update on recent activities, such as the activities at DOME-C.
4. Summarise the collaboration with other space-borne L-band sensors, such as NASA's Aquarius and SMAP missions.