SMOS: from soil moisture to climate monitoring and applications

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The SMOS (Soil Moisture and Ocean Salinity) satellite was successfully launched in November 2009. This ESA led mission for Earth Observation is dedicated to provide soil moisture over continental surface (with an accuracy goal of 0.04 m3/m3), vegetation water content over land, and ocean salinity. These geophysical features are important as they control the energy balance between the surface and the atmosphere. Their knowledge at a global scale is of interest for climatic and weather researches, and in particular in improving model forecasts.

The Soil Moisture and Ocean Salinity mission has now been collecting data for over 7 years. The whole data set has been reprocessed (Version 620 for levels 1 and 2 and version 3 for level 3 CATDS) while operational near real time soil moisture data is now available and assimilation of SMOS data in NWP has proved successful. After 7 years it seems important to start using data for having a look at anomalies and see how they can relate to large scale events. We have also produced a 15 year soil moisture data set by merging SMOS and AMSR using a neural network approach.

The purpose of this communication is to present the mission results after more than seven years in orbit in a climatic trend perspective, as through such a period anomalies can be detected. Thereby we benefit from consistent datasets provided through the latest reprocessing using most recent algorithm enhancements.

Using the above mentioned products it is possible to follow large events such as the evolution of the droughts in North America, or water fraction evolution over the Amazonian basin. In this occasion we will focus on the analysis of SMOS and ancillary products anomalies to reveal two climatic trends, the temporal evolution of water storage over the Indian continent in relation to rainfall anomalies, and the global impact of El Nino types of events on the general water storage distribution. This presentation shows in detail the use of long term data sets of L-band microwave radiometry in two specific cases, namely droughts and water budget over a large basin. Several other analyses are under way currently. Obviously, vegetation water content, but also dielectric constant, are carrying a wealth of information and some interesting perspectives will be presented.