Soil moisture: where are we?

Yann H. Kerr, Delphine Leroux, Philippe Richaume, Jean-Pierre Wigneron,
Arnaud Mialon, Ali Mahmoodi, Al Bitar Ahmad, Nathalie Novello, Claire
Gruhier, Thierry Pellarin, et al.

Soil moisture retrievals: where are we?

Y. Kerr (1), D. Leroux (1,2), P. Richaume (1), J.P. Wigneron (3), A. Mialon (1), A. Mahmoodi (4), A. Al Bitar (1), N. Novello (3), C. Gruhier (1), T. Pellarin (5), C. Rudiger (6), H. Lawrence (3,1), P. De rosnay (7), and C. Albergel (7)

(1) CESBIO, TOULOUSE CEDEX 4, France (Yann.Kerr@cesbio.cnes.fr), (2) Vega technologies, Toulouse, France, (3) INRA-EPHYSE, Bordeaux France, (4) Array systems, Toronto, Canada, (5) LTHE, Grenoble, France, (6) Monash University, Melbourne, Australia, (7) ECMWF, Reading, UK

Soil moisture is one of the most important variables regarding climate evolution ans plays a major role in the transfers between the soil and the atmosphere ([1]). Soil moisture needs to be considered as a global variable to improve our global comprehension of the climate. Several approaches have been developed to either model soil moisture or to retrieve it from satellite data. The European Center for Medium range Weather Forecasting (ECMWF) provides global maps of modeled soil moisture but there exists also regional climate models such as SIM, ???.

Recently, satellite missions, specially designed for soil moisture monitoring such as the Soil Moisture and Ocean Salinity,(SMOS) have been proposed. SMOS was indeed successfully launched in November 2009 and SMAP (Soil Moisture Active Passive) is scheduled for launch in November 2014. Several algorithms have been created to retrieve soil moisture from higher frequencies measurements obtained from existing satellites such as : SMMR (1978-87), SSM/I (1987), AMSR-E (2004), ERS-ASCAT (1991-2006). Even if their lowest frequencies (5-20 GHz) are not the most suitable for soil moisture retrievals (very sensitive to vegetation growth and atmosphere), it remains a valuable time series from 1979 until now.

All these products are obtained at a coarse resolution (typically around 50 km) and it is not always straight-forward to relate them to point measurements for the validation purposes especially at a global scale. It is thus necessary to validate coarse scale soil moisture estimates with model outputs or area representative points. SMOS validation has been performed on a number of sites but it is also necessary to inter-compare with other existing products (satellite products and model outputs) to identify the overall behavior at the global scale. The present paper deals with this topic.