Evaluation of AMSR-E soil moisture products based on ground soil moisture network measurements.

...in the context of the preparation of the SMOS project.

Soil Moisture: an Ocean Salinity

CONTEXT

● Soil Moisture is an essential variable of the water cycle.

● Scientists among them are nowadays interested in accessing soil moisture dynamics at centennial and global scales.

● This paper aims at evaluating AMSR-E and SMOS products provided by NASA (http://modis.gsfc.nasa.gov/data accessed by K. Saleh, 2004).

REGIONS OF VALIDATION

DATA

AMSR-E

● Brightness Temperatures are recorded at 6.9, 10.7, 18.7, and 89 GHz.

● From these radiometric products, Soil Moisture and Vegetation Water Content (SMVWC) products are estimated by NASA (AMSR-E product, Njoku et al., 2004).

● Polarimetric Ratio: \( PR = (T_{9.7GHz/18.7GHz}) \)

● Resolution of Level-3 NASA product is 25 km.

RESULTS (Fig. 4)

SOMSREX

● AMSR-E capture increases of SM correlated to rainfall anomalies.

● Amplitude less accurate.

● Seasonal cycle of AMSR-E well captured in this case. This is particularly the case in regions where AMSR-E is not very available, such as desert regions or at high latitudes.

GoREX

● AMSR-E SM increase is not in agreement with SMOSREX measurements.

● No amplitude in the signal.

AMMA-Gourma

● AMSR-E SM is better than the other study regions.

● Good phasing of SM increase between ground station and AMSR-E.

● Lowest soil moisture level, during dry season is overestimated by AMSR-E.

METHODS

Comparison

● Spatial average: Due to pixel resizing and overlap, high correlation (\( > 0.9 \)) between adjacent pixels is obtained with AMSR-E products. The resulting regionally averaged soil moisture is thus suitable for comparison with ground measurements (Fig. 2).

● Comparison with stations: For each over pass of AMSR-E collection is performed between AMSR-E products and ground measurements (previous years).

● Temporal stability can be calculated by means of the mean relative difference (MRD). MRD close to zero and small error bars, indicates a good agreement of the considered station in terms of bias and RMSE, with the soil moisture averaged over the network (Fig. 3).

● Soil moisture has a large spatial variability. The Spearman coefficient indicates if the spatial organization of the soil moisture heterogeneities remains identical over a long period. (Vochoz et al., 2005; Codr et al., 2004).

...RESULTS...