



Surface soil moisture estimation of sahelian rangelands (Mali) using ENVISAT ASAR data

F. Baup (1,2), E. Mougin (1), P. de Rosnay (1), F. Timouk (1), F. Lavenu (1), I. Chênerie (2)

(1) C.E.S.B.I.O Centre d'Etude Spatioale de la Biosphère, Toulouse, France (frederic.baup@cesbio.cnes.fr), (2) A.D.M.M. Antenne, Dispositifs et Matériaux Micro Ondes, Toulouse, France

This paper aims to investigate the capabilities of ENVISAT ASAR (Advanced Synthetic Aperture Radar) data to estimate the surface soil moisture content of sahelian rangelands. Emphasis is put on the use of time series of ScanSAR images namely Global Monitoring (GM) and Wide Swath (WS) modes that were acquired during the 2004-2005 period. Both data sets combine medium to low spatial resolutions to a high temporal resolution.

The analysis is performed by comparing field measurements of Surface Soil Moisture (SSM) acquired over the AMMA (*African Monsoon Multidisciplinary Analyses*) local site in Mali (15.35°N, 1.48°W) with backscattering coefficient data derived from the ASAR images. Field data consists of measuring SSM along transects of 1 km long using a Theta Probe sensor. These data are complemented by measurements recorded by an automatic station. High correlation is found between field and automatic SSM data ($r = 0.98$). Besides, the vegetation cover is characterized during the whole period including the dry and wet seasons.

Results show a strong correlation between ASAR data at HH polarization and SSM measurements ($r = 0.74$). Furthermore, the correlation is improved when considering only the ASAR data acquired at low incidence angle ($<30^\circ$). In this case the correlation coefficient is 0.93 with a *rmse* of 1.16 %. These results suggest that ASAR images could be used to derive multi-temporal SSM maps during the wet season.