EVALUATION OF REMOTE SENSING PRODUCTS OVER THE AMMA-CATCH OBSERVATORY IN WEST AFRICA.

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Abstract

The aim of this poster is to present a global picture of the ongoing activities on the validation of remote sensing products over the of the AMMA-CATCH observatory in West Africa.

The AMMA-CATCH observatory consists of three sites on a north-south axe sampling across the 100-1300 mm/annum rainfall gradient of the Sahel, Sudanian and North-Guinean bioclimatic zones.

- the Gourma site (14.8°N to 17.3°N), in Mali, reaching the northermost part of the Sahel , monitored since 1984;
- the South-West Niger site (13°N to 14°N) in the central Sahel region of Niamey, monitored since the Hapex Sahel campaign in 1990;
- the Ouémé catchment site in Benin (9°N to 10.2°N), the southermost site in Sudano-Guinean zone, instrumented since 1997.

These three sites were more intensively instrumented under during the African Monsoon Multidiciplinary Analysis (AMMA) project to monitor on one hand the climate forcing, and, on the other hand, the spatio-temporal variability of geophysical surface variables at different spatial scales, from the local to the meso to the local scale.
The AMMA-CATCH observation strategy is particularly suited for the evaluation of medium and coarse resolution satellite products. Of special interest is the simultaneous evaluation of vegetation, radiation and and soil moisture product, since the latter are influenced by the former.

The main results presented here concern the validation of vegetation products, like the leaf area index (LAI), the vegetation cover fraction (FCover) and the fraction of aborbed Photosynthetic Active Radiation (FAPAR), as well as surface soil moisture and albedo products derived from different remote sensing instruments.

Concerning the vegetation products and the LAI in particular, study sites of 1 x 1 km in size have been selected, whenever possible, within 3 km x 3 km similar homogeneous surfaces, over which tree and herb LAI is estimated using hemispherical images. Since 2000, the sites have been integrated in the site network of the Validation of Land European Remote sensing

Instruments (VALERI). Among the selected validation sites, the Gourma site stands out as the site with the lowest spatial heterogeneity when high- (SPOT) and low- resolution (MODIS) products are compared

The soil moisture measurement network has been developed to sample the major soil types within the study area and to characterize soil moisture at different scales including local, kilometric and meso scales. In addition to the local stations network, including 30 soil moisture pits, transect measurements were performed on different sandy sites, using portable impedance probes. The AMMA-CATCH sites have been retained as ESA calibration/validation site for the forthcoming Soil Microwave and Ocean Salinity (SMOS) mission. The ground measurements were compared to soil moisture products derived from microwave remote sensing sensors such as those from the Advanced Microwave Scanning Radiometer (AMSR-E, [1]) and the ENVISAT-Advanced Synthetic Aperture Radar (ASAR, [2]). The comparison with ground measurements also allowed an intercomparison among different products derived from passive (AMSR-E) and active (QuickSCAT) microwave satellite sensors.

Finally, surface albedo products derived from MODIS have been evaluated with the albedo measured by in situ sensors from automatic weather stations, showing a good agreement regarding both the seasonal and interannual albedo variability ([3]).

Considering that environmental monitoring is specially important in Africa, because of the size of the continent, the relative scarcity of in situ observation sites and the imprint of climate variability on ecosystems and population, the AMMA-CATCH network offers important possibilities to evaluate remote sensing products. Adequate sampling strategy, combined measurements of different variables and the availability of ancillary data (like sun-photometers data) allow to address the issue of earth observation product quality in an environment where it is rarely done.

References

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