Analysis of MSG SEVIRI daily NDVI time series over West Africa 2005-2010

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Most of NDVI time series available at global or continental scales are temporal composites derived from polar orbiting satellite data, and are computed from Maximum Value Composite algorithm applied to periods of 10 days or longer. The availability of geosynchronous MSG SEVIRI sensor data allows the elaboration of daily NDVI values, due to the high temporal resolution of data acquisition (1 image each 15mn). The aim of this paper is to investigate the reliability of such daily data; the study is focused on Western Africa region (25°West to 25° East, 20° North to 5° South). This region has been defined as test area for the international experiment AMMA (African Monsoon Multidiciplinary Analyses) [1], and satellite and ground data are available through the AMMA-SAT and AMMA-MOD databases [2].

Two sources of data have been considered, with different retrieval methods of NDVI from SEVIRI reflectance data:

- daily NDVI computed in the framework of the AMMA experiment : these values have been derived from spectral directional albedos in reflective SEVIRI channels, produced by EUMETSAT LSA SAF (Land Surface Analysis Satellite Application Facility) on a daily basis [3]. Daily NDVI data concerning the West African area are available from AMMASAT database, since 1st september 2005; data are reprojected (Plate carrée projection) and re-sampled at a spatial resolution of 0.05° [2];

- a pre-operational daily NDVI product has been elaborated by Turkish State Meteorological Service, in collaboration with EUMETSAT Operations Department, Darmstadt, Germany [4]. This product is available on a daily basis from 17 January to 31 August 2010. Data are in MSG projection and full-disk, with spatial resolution of 3km at nadir. Co-registration with the first data set has been done through reformatting, re-projecting and re-sampling of data.

A comparison is made between the two data sets, considering the time period of simultaneous availability of data (January-August 2010). Then, considering several land-use/land-cover units, defined from the global data base Globcover 2005 [5], temporal profiles have been computed for 5 years of data (September 2005 to September 2010). Results suggest that daily NDVI values derived fom MSG SEVIRI could provide improved accuracy for detailed phenological studies (defining start and end of growing season), and for assessment of vegetation response to rainfall events in arid areas. However, as anomalous day-to-day variations may occur at specific locations and dates, it is recommended to check the consistency of the daily profiles before analysing vegetation seasonal growth dynamics.

References

[1] AMMA, African Monsoon Multidisciplinary Analyses Website, available from http://www.amma-international.org , assessed 5 January 2011.

[2] AMMA Satellite and Models Databases Website, available from http://bddamma.ipsl.polytechnique.fr/ , assessed 5 January 2011.

[3] LSA SAF, Product User Manual : vegetation parameters (FVC, LAI, FAPAR), available from http://landsaf.meteo.pt/ , assessed 5 January 2011.

[4] A. G. Ertürk, S. Elliott, H. Barbosa, O. Samain, T. Heinemann, A. Yildirim, and L. van de Berg, "Pre-operational NDVI product derived from MSG SEVIRI", Proceedings of 10th EUMETSAT Conference, EUMETSAT P.57, Darmstadt, Germany, 7 pp., 2010.

[5] GLOBCOVER Website, available from http://ionia1.esrin.esa.int/, assessed 5 January 2011.