

THE ECOCLIMAP-II PROGRAMME: A NEW LAND COVER CLASSIFICATION AT 1 KM FROM MODIS AND VEGETATION DATA TIME SERIES OVER THE WESTERN AFRICA IN THE FRAME OF AMMA PROJECT

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The ECOCLIMAP database is twofold: first it encompasses a land cover classification per ecosystem based on the principle that they obey to a similar functioning. Secondly, it operated a dynamic mapping of surface parameters that relies on the former classification and look up tables (LUTs). ECOCLIMAP-I was based on AVHRR (http://www.cnrm.meteo.fr/gmme/PROJETS/ECOCLIMAP/page_ecoclimap.htm). In the first version, the land cover information (University of Maryland, IGBP) was combined with a global climate mapping (Koeppel and De Lond, FIRS), which led to 215 ecosystems in global. The second version relies on observations from satellites of the last generation like MODIS and VEGETATION, which propose enhanced radiometric and geometric qualities. The methodology is however globally similar in consisting on an analysis of time series of NDVI (Normalized Difference Vegetation Index) plus leaf area index (LAI) over 8 years (2000-2007). A new classification product was prepared over western Africa in support to the AMMA (African Monsoon Multidisciplinary Analysis) project. The initial classifications at 1 km from GLC2000 (Global Land Cover 2000) and ECOCLIMAP-I were split according to a supervised method of classification encompassing 8 years (2000 to 2007) of analysed data from MODIS and SPOT/VEGETATION. We also account for decision criteria such like the climatic factors, the GTOPO30 topography and the agricultural practices regionally operated. The reliability of the 37 classes of ECOCLIMAP-II for the AMMA studied area shows a general good agreement – within 75% - from classification products at 20 m from SPOT over confidence sites and GLOBCOVER at 300 m. The next step consisted to build the land surface parameters database. The determination of leaf area index (LAI) is taken from MODIS values organized by class, which contributes to reduce substantially the original pixel-by-pixel level of noise. Inter-class and intra-annual variability are also indicated as a product companion. The quality of the ECOCLIMAP-II LAI timing is finally checked against a comparison with a dynamic adaptation of LAI with NDVI from VEGETATION.

For meteorological applications, the ECOCLIMAP-II classes need to be disentangled in fractions of vegetation types of the SVAT (Soil-Vegetation-Atmosphere-Transfer) model ISBA used at Météo-France. The aggregation procedure relies first on the segregation of pure pixels of vegetation corresponding to an ISBA type at the resolution of 1 km. Secondly, a mixture analysis allows to separate two ISBA types in a given ECOCLIMAP class. The tool of aggregation is the LAI because it is less contaminated by soil effect than is the NDVI. The LAI, albedo and fraction of vegetation are indeed the more relevant biophysical variables of ECOCLIMAP. In this study, we investigate the intra-class and inter-annual variability of the LAI, albedo, and fraction of vegetation for the classes of interest (tree savannah, open/sparse grassland, tropical forests) and we also carried on a validation based on ground truth information. The follow-on of this work is to assess the impact of the new physiographic forcing ECOCLIMAP on the analysis of diagnostic meteorological fields as the temperature and humidity at 2 meters.