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CYCLOPES prototype V4 LAI, fAPAR and fCover products derived from VEGETATION and AVHRR sensors: description and validation

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Inversion of biogeophysical and biogeochemical variables
Validation of remote sensing products

The CYCLOPES project aims at providing high level biophysical products such as LAI, fAPAR, fCover over the globe at 1 km spatial resolution at a 10 days time interval. To provide continuity over long time series, products have to be derived from different sensors while keeping the highest degree of consistency. The products are derived from the fusion of individual products estimated from VEGETATION, AVHRR sensors. The principles used to derive the products are derived from CYCLOPES version 3.1 products. , They mainly consist in radiometric inter-calibration of sensors using, cloud screening, atmospheric correction, BRDF normalization, and biophysical algorithm (for LAI, fAPAR and fCover). All these steps are made in a consistent way between all the sensors to ease the fusion. Emphasis is put on the biophysical algorithm, based on the training of a neural network over a learning data set made of radiative transfer simulations. Improvements have been implemented, based on the definition of the training data base used to calibrate the biophysical algorithm that better account for measurement and model uncertainties as well as prior information on the surface characteristics.
Products are validated against a series of about 60 3x3 km² sites where ground measurements are up-scaled to the spatial resolution of the products. The ground measurements are coming from several networks of sites including VALERI, MODLAND, BIGFOOT, CCRS. Products are then inter-compared along years 2000-2003 with MODIS LAI/fPAR products over the BELMANIP network of sites representing a large range of surface types. Statistical distributions of values per vegetation class, scatter-plots between homologue products, as well as temporal smoothness and consistency of products are presented. Results are then discussed.