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Preliminary validation of GIMMS time series on Mediterranean ecosystems

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The development of global AVHRR (Advanced Very High Resolution Radiometer) time-series facilities providing about thirty years of Normalized Difference Vegetation Index (NDVI) data has encouraged numerous studies on dynamics of vegetated surfaces and their interactions with climate. However, to draw reliable conclusions from multitemporal AVHRR-NDVI analyses focused on slight long-term vegetation changes, corrected global datasets necessitate to be carefully validated yet.

The comparison with ground data is impossible at global scale; moreover, there is no availability of long enough time series from other more stable sensors, and also validations based on the inter-comparison with different corrected AVHRR datasets could retain common biases. Therefore, efforts are still required to solve the uncertainties about the trends observed from global time series.

In such a context, the comparison with ground-truth validated AVHRR-NDVI datasets at full resolution representative of different ecosystems can be a useful approach.

On this basis, we investigated the NDVI time series (1985-1999) derived from the Global Inventory Modeling and Mapping Studies (GIMMS) dataset (8 km resolution) for Mediterranean ecosystems by comparing data with a ground validated time series at full sensor resolution (1.1 km).

Results obtained from such a comparison on the whole time series (including three satellite platforms) showed for the GIMMS dataset a lower inter-annual variability among the vegetation covers, linked to the coarser spatial resolution that averages the NDVI values of mixed pixels, and a reduced range for NDVI saturation over densely vegetated areas, due to the hard atmospheric correction. The analysis performed per platforms highlighted some anomalies: NOAA-9 data on average showed higher NDVI values than the validated dataset, whereas data from NOAA-11 are generally lower. Such differences slightly affect the NDVI trend estimations, in fact, for all the considered covers the obtained slopes are lower for the GIMMS dataset, but the errors in estimating trends are comparable for the two datasets. Moreover, the correlation values obtained per year were also globally significant. Despite the up-scaling effect, all of the correlation coefficients were high and significant with a confidence $>$99% testifying the goodness of GIMMS time series for analyzing the inter-annual variability of vegetation in Mediterranean ecosystems. Nevertheless, further investigations are required in order to assess the goodness of GIMMS dataset for performing analyses at pixel scale.