



Predictability of the Annual Vegetation Cycles over Sahel from AVHRR-NDVI data : Distribution of the Horizon of Prediction

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The NOAA-AVHRR Normalized Difference Vegetation Index (NDVI) data set is the last updated and NOAA-16 calibrated data set (corrected for inter- and intra- sensors drift and for volcanic events). Data are extracted over Sahel window [lat: 12.5N – 17.5N; long: 17.5W – 17.5E] and spatially aggregated in windows of [8km]² (no aggregation), [128km]² and [1024km]² respectively, providing sets of time series with 828 samples each.

We here develop a prediction algorithm as follows: (1) a NDVI time series aggregated at a given spatial scale is split in two parts: one part to be used for the prediction; the other part is kept for estimating the accuracy of the prediction; (2) Aggregated NDVI time series are embedded in a N_d dimensional space; (3) A non parametric method based on radial basis functions is used to extrapolate the time evolution of the NDVI in the embedding space; (4) The predictive performance of this algorithm is evaluated by comparing the predicted NDVI data with the really observed data (2^{nd} part of the time series).

We then analyse the dependency of the prediction accuracy with regard to the scale of data aggregation, the parameters of the radial basis functions, the embedding dimension N_d , and length of the observation window (1^{st} part of the time series). From this analysis we deduce the statistical distribution of the horizons of prediction (time lag over which a “good” prediction can be performed) of the NDVI.