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Classification of ecosystems at the African continental scale using a hybrid clustering approach based on 1 km resolution multi-annual SPOT/VEGETATION data

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Information related to ecosystem is immensely important for biodiversity conservation and biogeochemical studies. In order to minimize the role of the analyst and to improve the accuracy of the results, innovative and efficiency approaches for the classification of ecosystems continue to appear in the literature. Here we developed and implemented a new hybrid unsupervised classification approach to derive ecosystems using multi-annual time series by combining hierarchical and partitioning clustering principles. The latter approach is applied on 8-years time series (2000-2007) of 10-day composite Normalized Difference Vegetation Index (NDVI) recorded by SPOT/VEGETATION. After the first segmentation of the mainland in bioclimatic ecoregions using the Fast Fourier Transform (FFT), successive k-nearest neighbour (k-NN) clustering enhance the discrimination of ecosystems and yields to the production of a new ecosystem classification for the African continent. The nomenclature relied on the Land Cover Classification System (LCCS) of the Food and Agricultural Organization (FAO). On the basis of validated continental and national maps, a pixel-by-pixel analysis is conducted to assess the accuracy of the new classification and the one obtained by only the means of a k-NN classifier using the same NDVI datasets. The hybrid clustering facilitates the identification/labelling process and the obtained results may also deserve vegetation cover modelling at regional and local scale.