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Vegetation Index Time Series Analysis for environment monitoring. Examples from the MODIS NDVI time series (2000-2022) on Sri Lanka

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Remote sensing is a powerful tool for environment monitoring for because most of the remotely sensed data is intercomparable in space and time. In other terms a correct analysis of remotely sensed data enables to detect the same objects in different places (therefore, to map all the objects of a region) (Gosh et al., 2022) and same objects in different periods (therefore, to map changes) (Andrieu, 2017; Andrieu, 2018, Andrieu et al., 2019).

Remote sensing is progressively changing from a little number of data sets with low to moderate resolution (spatial and temporal) (Andrieu, 2017; Andrieu et al 2019) to a large number of data sets of high to very high resolution (Andrieu, 2018; Gosh et al., 2022). Intercomparability has somehow been the "victim" of the target put on resolution. Mapping changes in land cover, or in vegetation, in a country like Sri Lanka with data as LANDSAT time series would suffer from 2 main weaknesses. First, a lot of different scenes are necessary, creating errors on the edges between two scenes. then most of the images contain important cloud cover. It's even worse with Very High-resolution imagery either the expensive one or the free one accessible on Google Earth.

For these reasons this conference will illustrate the potential of a very different kind of data, rarely used on Sri Lanka, and however having a high potential to monitor environment. The Very high intercomparability of NDVI and the interesting temporal resolution (16 days) of the MOD13Q1 dataset indeed offers the possibility of a very accurate bioclimatic mapping a robust capacity to detect changes in land cover and vegetation such applications will be presented. Some statistical methods will be presented with their applications to Sri Lanka.

Figure 1 illustrates the interest of mapping, for each pixel, the value of the Kendall correlation which reveals the trends in a series of values (here a trend in time) and tests the significance of the trends. The majors patches of changes (either of places where vegetation indexes increase or decrease in time) are put

forward and the mean annual profile of two decades (2000-2010; 2010-2021) are shown as graphs to further investigate the changes.

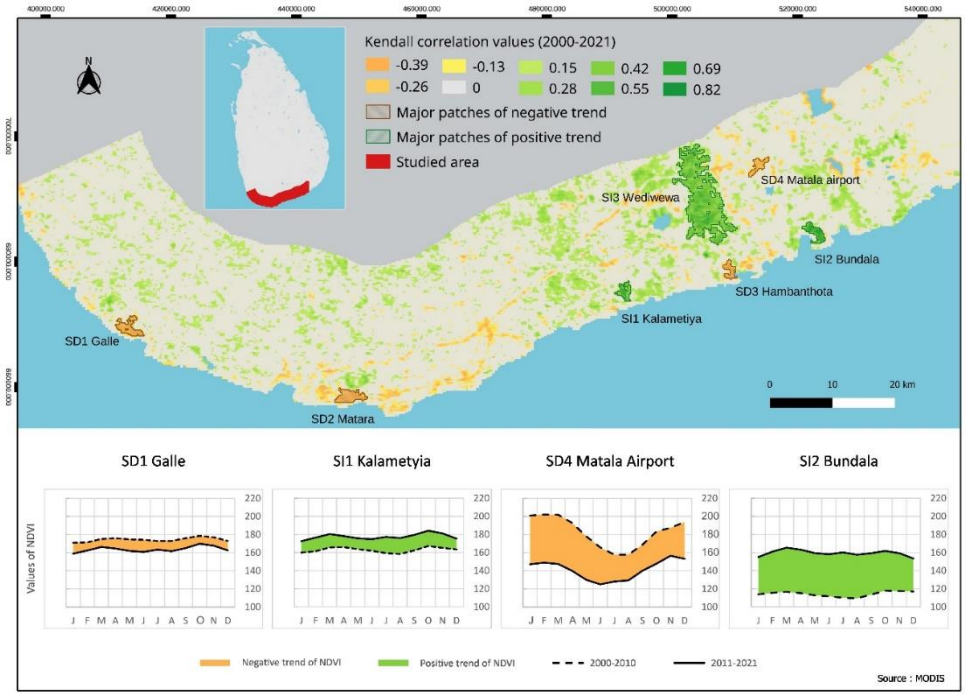

Figure 1: Kendall Correlation on NDVI values from 2000 to 2021 and time profiles of the main patches of changes.

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