Characterizing temporal vegetation dynamics of wavelet-filtered MODIS EVI to detect land use change in Java Island

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##### ABSTRACT:

##### Analysis of multi-year time series of land surface attributes and their seasonal evolutions indicate a complexity of land use change, especially in tropical regions. This paper explored the spatial and temporal complexity of land use change considering the land cover dynamics, in other words, distinguishing the actual and temporary changes of land surface attributes. This study is based on the hypothesis that consistent land use has a typical, distinct and repeated temporal pattern of vegetation index inter-annually, then a pixel representing a land use change while that inter-annual temporal dynamics is changed.

##### We analyzed the dynamics pattern of long-term image data of wavelet-filtered MODIS EVI from 2001 to 2007. The change of dynamics pattern was detected by differentiating distance between two successive annual patterns, which then indicates a land use change. Moreover, we defined the type of changes by performing the pattern clustering method, and then were validated by ground check points and statistics data sets.

##### The temporal pattern analysis was able to detect the actual change event, either by conversion of land use type or vegetation growth. The land use change that was detected by the change of temporal pattern, can be categorized into: 1) agricultural development (including some change trajectories such as: mixed garden changed to intensive agricultural cropping and developing a paddy field in mangrove), 2) urban development (e.g. mixed garden or upland converted into built-up), 3) deforestation (either naturally or man-made changes), 4) changes in mangrove area and 5) considering the plantation management (such as changes in plantation commodity).

##### Meanwhile, the temporary changes of land surface that have been also understood by this study explained that the climate regime was an important factor which affected the temporal vegetation dynamics of land use types, especially agriculture land, namely paddy rice field, upland and plantation. For example, many agricultural lands became a barren land, cropping system was changed and the planting time was postponed caused by the extreme dry season which influenced by ENSO in July-September 2006. The spatial and temporal dynamics analysis would provide sufficient, significant and useful information regarding the patterns of land surface change, improve an accurate database of land use and cover change and assist further research in understanding the dominant process of land use change allocation and to take it into consideration when land use change models are made.