Geophysical Research Abstracts
Vol. 15, EGU2013-14114-1, 2013
EGU General Assembly 2013

Detection of land use/land cover changes through the comparative analysis of NDVI-MODIS phenological clusters

Tiziana Simoniello, Vito Imbrenda, and Maria Lanfredi
Istituto di Metodologie per l'Analisi Ambientale (IMAA-CNR), Tito (PZ), Italy

The use of satellite time series provides precious information to understand vegetation dynamics. In particular, they can be profitably used for studying magnitudo and spatial extent of the Earth's land cover alterations, which affect directly biodiversity, can contribute to land degradation, and are linked to climate change by feedback mechanisms.
In the framework of PRO-LAND project (PO-FESR Basilicata 2007-2013), we used NDVI-MODIS satellite time series (250 m), available as 16-day composite from the NASA LPDAAC dataset, to analyze land cover changes occurred in Basilicata region (Southern Italy) during the period 2000-2010.
We performed a phenological clustering for the years 2000 and 2010 by means of the unsupervised classification fuzzy k-means which is able to identify gradual differences among phenological patterns. The time domain considered is from April to October in order to reduce disturbances due to the presence of clouds, which can distort actual vegetation phenological profiles.
The optimal number of clusters to capture the heterogeneity of the examined area was fixed at ten, because it seemed to be a good trade-off between the need of an efficient representation of ecosystems and the ability to detect local fragmentation effects.
Results show that the temporal patterns of the ten clusters can be organised in a continuum of phenological curves. They can be sorted unambiguously according to increasing percentage of man-made areas (decreasing percentage of natural areas) and allow us to well discriminate different land cover compositions by looking not only at differences in mean NDVI values but also at differences in the seasonal timing.
The cluster sequence for both the examined years mostly follows the spatial arrangement of the land cover classes, and the complex orography of the investigated region.
In general, results show that a slight variability characterize the arrangement of cluster cores, particularly for the clusters with a dominance of natural or anthropic covers, whereas a slightly higher variability appears at the cluster borders (especially for clusters where anthropic and natural covers are mixed).
Overall, this study puts into evidence a fair decrease in the number of patches ($\sim$ -10%) accompanied by the increase of the mean patch area ($\sim$ +10%), which means that there is a tendency to compaction of the areas that are classified in the same phenological cluster. This phenomenon is particularly interesting for mountainous natural areas. A coupled analysis of meteo-climatic conditions and implemented land cover management policies can enable to identify the causes behind the observed phenomena, allowing for a more complete picture and a better interpretation of the occurred land cover changes.