



Obtaining land cover changes information from multitemporal analysis of Landsat-TM images: results from a case study in West African dryland

F. Nutini (1), M. Boschetti (2), P.A. Brivio (3), and M. Antoninetti (4)

(1) CNR-IREA, Via Bassini 15, 20133 Milano (nutini.f@irea.cnr.it), (2) CNR-IREA, Via Bassini 15, 20133 Milano (boschetti.m@irea.cnr.it), (3) CNR-IREA, Via Bassini 15, 20133 Milano (brivio.pa@irea.cnr.it), (4) CNR-IREA, Via Bassini 15, 20133 Milano (antoninetti.m@irea.cnr.it)

The Sahelian belt of West Africa is a semiarid region characterized by wide climate variations, which can in turn affect the livelihood of local populations particularly in rangeland areas, as happens during the dramatic food crisis in the 70-80s caused by rainfall scarcity.

The monitoring of natural resources and rainfed agricultural activities, with the aim to provide information to support Sahelian food security action, needs the production of detailed thematic maps as emphasized by several scientific papers.

In this framework, a study was conducted to develop a method to exploit time series of remote sensed satellite data to 1) provide reliable land cover (LC) map at local scale in a dry region and 2) obtain a LC change (LCC) map that contribute to identify the plausible causes of local environmental instability.

Satellite images used for this work consist in a time series of Landsat Thematic Mapper (TM) (path row 195-50) acquired in the 2000 (6 scenes) and 2007 (9 scenes) from February (Dry season) to September (end of wet season). The study investigates the different contribution provided by spectra information of a single Landsat TM image and by time series of derived NDVI. Different tests have been conducted with different combination of data set (spectral and temporal) in order to identify the best approach to obtain a LC map in five classes of interest: Shrubland, Cultivated Land, Water body, Herbaceous vegetation and Bare soil.

The best classification approach is exposed and applied on two years in the last decade. The comparison between this two LC results in land cover change map, that displays the changes of vegetation patterns that have been characterized the area.

The discussed results show a largely stable dryland region, but locally characterized by hot-spot of decreasing in natural vegetation inside the rangelands and an increasing of cultivations along fossil valleys where human activities are slightly intense.

The discussion shows that this hot-spot aren't fully explained by climatic variability as displayed by a comparison with rainfall satellite data, and suggest that there are localized area where vegetation development is driven by other anthropic factors which interfere in the dynamics of plant growing.