Checking vegetation changes with Remote Sensing: The case of the Trieste province (North – East of Italy)

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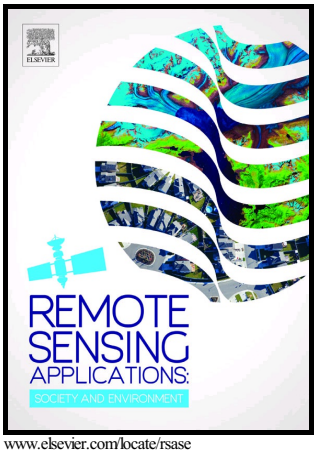

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Abstract

The main objective of this study is to monitor the main vegetation changes in the Trieste province (North-East of Italy) between 2001 and 2016. We applied remote sensing methods to three different images acquired during the observed period. To each satellite scene, we applied a vegetation index (EVI - Enhanced Vegetation Index) suitable to the physical characteristics of the studied landscape and to the sensors that acquired the images. The EVI values of each scene have been classified using class intervals and connected to four different land cover classes. Later, change detection analysis was also applied to the thematic map time series. The final result was numerical evidence of the changes in each class (sq. km) during the observed period and a thematic map showing the territorial distribution of the main changes between the first and the last image (2001 and 2016). We observed a widespread, almost scattered increase in the highest class of vegetation (wood) in the considered period. Especially in the Karst plateau of the Trieste province, our results may suggest a sort of 'regreening' of the area.

Key words: Landsat, Trieste, Karst, EVI, Change detection, Land cover.

1. Introduction

As is well known, the Earth Observation data (EO) acquired by artificial satellites has greatly improved human understanding of the changing Earth. In terms of the effect of building activities on the land, remote sensing has been successfully used to track changing urban development around metropolitan areas (see, among the recent many published papers: El Garouani et alii, 2017; Kantakumar et alii, 2016; Hou et alii, 2016; Jiao et alii, 2017; Qin et alii, 2017; Nor et alii, 2017). More recently, it has also been used to control the urban sprawl in Europe (see EEA reports n. 10/2006 and 11/2016)[1].
EO remote sensing methods are also frequently used to understand the dynamics of the ecosystem. For this, it is necessary "to monitor the vegetation through time and determine what changes in succession are taking place" (Jensen, 2000). It is well known that vegetation is visible on multispectral remote sensed images. Various mathematical combinations of satellite sensor spectral bands have been developed to show the presence and condition of green vegetation. The outcomes of these are referred to as vegetation indices.
The NDVI (Normalized Difference Vegetation Index), developed by Rouse et al. (1974), is one of the most widely used. NDVI is an efficient index for vegetation monitoring because of its simplicity and close relationship with vegetation productivity (Tucker, 1979). For this reason, it has been used

1 Among the different models developed to simulate land use change based on remote sensing imagery, we can cite the 'SLEUTH land use change model' (see: SLEUTH review by Chauduri and Clarke, 2013).