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Land cover change detection in Crete Island, Greece, using different combinations of biophysical indices in change vector analysis

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Land cover describes the general biophysical state of the surface providing also information about other aspects of the land, such as soils and water. Changes in land cover may have noticeable impact on the ecosystem biodiversity, water resources, climate system and socio-economic sectors. Therefore, the need for detecting these changes is more and more imperative, especially given the emergence of unbalances caused by natural and anthropogenic driving forces like climate change, intensive agriculture and wrong land management decisions. Land cover changes are mainly represented by changes in the biophysical properties of land surface. These properties can be measured by remote sensing-derived indices representing both the vegetation and soil conditions of a given region. In this research effort, by applying a change detection technique like change vector analysis (CVA), the relationship between the dynamic changes in such indices and land cover changes in Crete Island, Greece, was assessed and mapped for the time periods of 1999–2009 and 2009–2019. Vegetation indices such as normalized difference vegetation index (NDVI) and tasseled cap greenness (TCG), and soil indices such as albedo and tasseled cap brightness (TCB), were estimated by Landsat satellite images captured in 1999, 2009 and 2019. Based on two different index combinations (NDVI–albedo and TCG–TCB), CVA produced change results for each of the periods indicating the magnitude and type (direction) of changes, respectively. The most appropriate combination for land cover change detection in the study area was determined by an evaluation process resulting to the estimation of accuracy statistics (kappa index and overall accuracy). Although promising accuracy results were provided for both examined combinations, the change maps produced by the combination of NDVI–albedo were found to be more accurate.

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