Mapping erosion and deposition rate changes along the Axios-Aliakmonas rivers Delta, North Greece based on Landsat TM imagery analysis

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Coastlines movement mapping due to erosion and deposition is a topic of major concern in coastal zone management. Coastlines with very dynamic characteristics can potentially cause significant hazards to human activities and settlements. Remote sensing, with its repetitive acquisition and synoptic capability combined with Geographical Information Systems (GIS), has shown a promising potential in detecting and monitoring coastlines movement over large areas.

Axios and Aliakmonas rivers, located in Northern Greece, are two of the largest rivers of the country, being recognised as extremely rich and fertile ecosystems. The rivers Deltas in particular, due to their highly dynamic nature, provide a very good case to evaluate the potential capability of a range of image processing algorithms applied to multispectral data for monitoring coastline changes.

The objective of our work had been to evaluate the exploitation of a range of image processing techniques when combined with Landsat TM imagery for mapping the coastline movement of the Axios and Aliakmonas and of each river Delta for the period 1984-2009. A further objective had been to quantitatively estimate for the same time period the erosion and deposition rates taking place in the studied region. The ability of the different techniques in mapping coastline changes as well as erosion and deposition rates was quantitatively evaluated versus corresponding estimates provided by image-photo-interpretation carried out in the same TM images.

Results from the time series analysis conducted showed similar patterns between the different techniques in terms of coastline transformation for both rivers. Generally, areas in which coastline transformation appeared to be changing were commonly identified between all techniques. However, differences between the techniques were found in the rates of erosion and deposition for the two rivers. Those were largely attributed to the ability of the different techniques in utilising the spectral information content included in the TM data.

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