



Assessment of North-Western Black Sea coastal zone erosion by satellite data

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Satellite remote sensing provides a means for locating, identifying and mapping certain coastal zone features and assessing of spatio-temporal changes. The Romanian coastal zone of the Black Sea and Danube Delta is a mosaic of complex, interacting ecosystems, exposed to dramatic changes due to natural and anthropogenic causes (increase in the nutrient and pollutant load of rivers input, industrial and municipal wastewater pollution along the coast, and dumping on the open sea). This study focuses on the assessment of coastal zone erosion changes based on fusion technique of time-series satellite remote sensing data . The evaluation of coastal zone landscapes is based upon different sub-functions which refer to landscape features such as water, soil, land-use, buildings, groundwater, biotope types .Mixed pixels result when the sensor's instantaneous field-of-view includes more than one land cover class on the ground. For mixed pixels, spectral mixture analysis and fuzzy classifiers are used to assign a pixel to several land cover classes in proportion to the area of the pixel that each class covers. These fraction values can be assigned to sub-pixels, based on the assumption of spatial dependence and the application of linear optimization techniques. A newly proposed sub-pixel mapping algorithm was first applied to a set of multi-spectral and multitemporal satellite data for Constantza and Black Sea coastal zone areas in Romania. A land cover classification and subsequent environmental quality analysis for change detection was done based on satellite images over a period of time from 1987 to 2007 , from Landsat MSS , Landsat TM , Landsat ETM, Quikbird, IKONOS and SAR missions . Spectral signatures of different terrain features were used to separate and classify surface units of coastal zone and sub-coastal zone area .

The change in the position of the coastline in Constantza area is examined and linked to the urban expansion in order to determine if the changes are mainly human induced or natural. A distinction is made between landfill/sedimentation processes on the one hand and dredging/erosion processes on the other. A quasi-linear model was used to model the rate of shoreline change. The vectors of shoreline were used to compare with wave spectra model in order to exam the accuracy of coastal erosion model. The shoreline rate modeled from vectors data of SAR images has a good correlation with a quasi-linear model.