Development of methodology for the optimization of classification accuracy of Landsat TM/ETM+ imagery for supporting fast flood hydrological analysis

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One of the important tools for detection and quantification of land-cover changes across catchment areas is the classification of multispectral satellite imagery. Land cover changes, may be used to describe dynamics of urban settlements and vegetation patterns as an important indicator of urban ecological environments. Several techniques have been reported to improve classification results in terms of land use discrimination and accuracy of resulting classes.

The aim of this study is to improve classification results of multispectral satellite imagery for supporting flood risk assessment analysis in a catchment area in Cyprus (Yialias river). This paper describes the results obtained by integrating remote sensing techniques such as classification analysis and contemporary statistical analysis (maximum entropy) for detecting urbanization activities in a catchment area in Cyprus. The final results were incorporated in an integrated flood risk management model. This study aims to test different material samples in the Yialias region in order to examine: a) their spectral behavior under different precipitation rates and b) to introduce an alternative methodology to optimize the classification results derived from single satellite imagery with the combined use of satellite, spectroradiometric and precipitation data. At the end, different classification algorithms and statistical analysis are used to verify and optimize the final results such as object based classification and maximum entropy. The main aim of the study is the verification of the hypothesis that the multispectral classification accuracy is improved if the land surface humidity is high. This hypothesis was tested against Landsat derived reflectance values and validated with in-situ reflectance observations with the use of high spectral resolution spectroradiometers. This study aspires to highlight the potential of medium resolution satellite images such as those of Landsat TM/ETM+ for Land Use / Land cover studies under certain circumstances in the broader Eastern Mediterranean region.