



Reducing uncertainty on satellite image classification through spatiotemporal reasoning

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The natural habitat constantly endures both inherent natural and human-induced influences. Remote sensing has been providing monitoring oriented solutions regarding the natural Earth surface, by offering a series of tools and methodologies which contribute to prudent environmental management. Processing and analysis of multi-temporal satellite images for the observation of the land changes include often classification and change-detection techniques. These error prone procedures are influenced mainly by the distinctive characteristics of the study areas, the remote sensing systems limitations and the image analysis processes.

The present study takes advantage of the temporal continuity of multi-temporal classified images, in order to reduce classification uncertainty, based on reasoning rules. More specifically, pixel groups that temporally oscillate between classes are liable to misclassification or indicate problematic areas. On the other hand, constant pixel group growth indicates a pressure prone area. Computational tools are developed in order to disclose the alterations in land use dynamics and offer a spatial reference to the pressures that land use classes endure and impose between them. Moreover, by revealing areas that are susceptible to misclassification, we propose specific target site selection for training during the process of supervised classification. The underlying objective is to contribute to the understanding and analysis of anthropogenic and environmental factors that influence land use changes. The developed algorithms have been tested upon Landsat satellite image time series, depicting the National Park of Ainos in Kefallinia, Greece, where the unique in the world *Abies cephalonica* grows. Along with the minor changes and pressures indicated in the test area due to harvesting and other human interventions, the developed algorithms successfully captured fire incidents that have been historically confirmed.

Overall, the results have shown that the use of the suggested procedures can contribute to the reduction of the classification uncertainty and support the existing knowledge regarding the pressure among land-use changes.