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Obtaining burnt area cartography from the combined used of Landsat TM data with non-parametric classifiers in a Mediterranean setting

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The objective of the present study has been to evaluate the ability of Landsat TM imagery combined with non-parametric classifiers such as Artifical Neural Networks (ANN) and Spectral Angle Mapper (SAM) for obtaining a burnt area mapping in a Mediterranean setting. For this purpose the Mt. Parnitha area located near the capital of Greece, at which one of the most catastrophic fires occurred during the summer of 2007, was used as a case study.

The efficiency of the two algorithms for deriving burnt area estimates from the Landsat TM imagery was determined by the results obtained from the classification accuracy assessment. In addition results were compared to independent satellite-derived burnt area estimates available for the study region from operational services.

Overall, classification using the ANN appeared to outperform (overall accuracy 90.29%, Kappa coefficient 0.878) the SAM classifier (overall accuracy 83.82%, Kappa coefficient 0.795). The potential particularly of ANN in combination with Landsat TM imagery analysis in burnt area mapping was clearly demonstrated in this study, as these results in terms of the total burnt area estimate were closer to the corresponding estimate from the other operational sources, in comparison to that obtained from SAM implementation.

Keywords: Landsat TM, burnt area mapping, Artificial Neural Networks, Spectral Angle Mapper, Greek forest fires 2007