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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Land cover changes and forest landscape evolution (1985–2009) in a typical Mediterranean agroforestry system (High Agri Valley)" *by* T. Simoniello et al.

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REPLY TO REFEREE # 2

We thank the referee for his/her comments that provided the opportunity for better explaining our approach and methodologies.

REPLY TO DETAILED COMMENTS

1. Referee # 2: The whole "remote sensing" part seems to be rather blurred. The authors do not mention why they choose the specific classification algorithm rather than ISODATA algorithm or even better a supervised classification algorithm. They do

not also refer to any of their efforts for applying geometric, radiometric or atmospheric corrections to the images. Moreover, after the implementation of the classification process, they don't present any statistics concerning its accuracy (e.g. Kappa statistics).

1. Reply: The implemented classification procedure includes both an unsupervised algorithm (for a preliminary territorial partition) and a supervised classifier (for the class refinement by using the training areas). In particular, for the preliminary partition, we preferred to use the K-means algorithm as a simple and speedy tool for separating natural from anthropogenic covers and to iteratively identify macro-classes. We were not interested in the splitting/merging refinements of the ISODATA algorithm since, as explained in the old paper, the ultimate definition of the land cover classes was made by using training areas derived from orthophotos and field surveys in a supervised classification. This point has been better explained in the revised version of the manuscript by also adding the detail of the supervised classifier (Maximum Likelihood).

With reference to the image pre-processing (radiometric, geometric and atmospheric corrections) we did not include more discussions than we needed. We included information on the radiometric calibration applied to the Landsat images to specify the update of the adopted coefficients (Section 3.1, first paragraph). No specific information was included on the geometric corrections since we directly indicated the use of the widely adopted Landsat GTCE (Ground Terrain Corrected Enhanced) product, therefore no further geometric correction was implemented. Similarly, no atmospheric corrections were indicated since we did not apply any specific procedure; indeed "... it is not necessary to correct atmospheric effects prior to image classification if the spectral signature characterizing the desired classes are derived from the image to be classified" (Song et al., 2001) as in our processing based on a single-date image classification over a small area.

Finally, we apologize for the unaccountable omission of the paragraph on the accuracy, which evidently was dropped in the final editing of the paper. Anyway the overall accuracy obtained is about 85% for both the years, as reported in Section 4.1.1 of the

revised version of the paper.

2. Referee # 2: The "statistics" part seems to be rather weak. The authors should try incorporate some more statistical approaches to their study such as bivariate or pearson correlation analysis in order to depict the diachronic difference / or not in the LULC status of the study area (they could also relate the LULC changes with changes in socioeconomics, population or changes in fauna and flora regime of the broader area).

2. Reply: The statistical approaches suggested by the reviewer are generally adopted to understand macroscopic drivers of change in complex areas. Nevertheless, our transition matrix is explicit, refers to local variations, and changes have been directly associated to specific driving factors without any need of further statistical investigations (especially over broader area). Changes are mostly generated by natural dynamics of resilient vegetation, efficient land management plans, and re-colonisation of abandoned plots. Some very circumscribed sealing processes can be ascribed to the building of the oil/gas pre-treatment plants. This simple picture is coherent with the substantially “uniform” and “marginal” socio-economy of the valley, which is one of the least populated in Italy. As an example, population variations neither are significantly correlated with variations in agricultural areas (R2 =0.01) nor with grass and pasture (R2 =0.08). Actually, they are not even correlated with UAA (Utilized Agricultural Area) variations from census data (R2 =0.0003), which do not show significant inter-municipal variability. In particular, the glade-to-forest transitions, which appear in the form of very small patches randomly scattered in the whole forested area, mostly elude census control on land use (they are generally included within the forest surfaces; therefore this kind of variations can not be highlighted by census). Just an efficient use of remote sensing allowed us to capture them. More interestingly for the problem of the driving factors, we preferred to focus on the main determinant that is land management. The assessment of land tenure regimes (public or private) appeared us more compelling than extensive statistical analyses with improbable factors to understand

the ecological impact of anthropogenic activities and to improve policies and plans for the sustainable development of the area. The rationale of our approach about the problem of LULC change drivers has been explicitly discussed in the revised version of the paper.

3. Referee # 2: Please provide more details about the "Forest Map”

3. Reply: The Forest map of Basilicata region was elaborated by the National Institute of Agricultural Economics (INEA) in order to enhance the spatial distribution of the forest categories at different aggregation levels. The map, implemented by means of extensive field surveys and photo interpretation, is provided in shape data format and includes different parameters, such as the physiognomic class, the species composition, the relative abundance, type and degree of accessibility. (INEA, Forest map of Basilicata Region – Atlas, 100 pp., ISBN 88-8145-062-3, 2006). Further details on the Forest map have been added in the new version of the paper.

Reference

Song, C., Woodcock, C.E., Seto, K.C.: Classification and change detection using Landsat TM data: when and how to correct atmospheric effects? , Remote Sens. Environ., 75, 230-244, 2001.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 5427, 2014.