Geophysical Research Abstracts,
Vol. 11, EGU2009-13373-2, 2009
EGU General Assembly 2009

Integration of remote sensing and morphological data for an optimal mapping of badland areas

T. Simoniello (1,2), M. Liberti (1), M.T. Carone (3,4), R. Coppola (1), M. D'Emilio (1,2), M. Macchiato (2,5)

(1) Institute of Methodologies for Environmental Analysis - Italian National Research Council (IMAA-CNR), TIto Scalo, Potenza, Italy (liberti@imaa.cnr.it), (2) Italian National Interuniversity Consortium for the Physical Sciences of Matter (CNISM),Naples, Italy, (3) University of Molise – Dipartimento Department of Sciences and Technologies for Environment and Territory Territorio (STAT), Isernia, Italy, (4) Regional Agency for Environmental Protection in Basilicata (ARPAB),Potenza, Italy, (5) Department of Physical Sciences (DSF), Federico II University, Napoli, Italy

Badlands are complex and peculiar types of erosional formations deriving from the action of geological, geomorphological and denudation processes. For soil erosion assessment such as temporal monitoring of badland areas, digital soil mapping from remote sensing images can be a valuable tool. It can allow for exploring both the role of climate effects on landform development and changes of erosion rate due to human influence. However, in order to effectively use multispectral satellite data, which are still a main source of information for multitemporal analyses, many attempts are required to solve the problems linked to low spectral separability of land features.
In particular, data from the Landsat TM/ETM series, recognized particularly appropriate for supporting both research and land conservation planning, showed their limit in accurately detecting eroded materials influenced by run-off processes.
These surface processes, indeed, are responsible for the increase in spectral confusion by spreading materials from badlands to the surrounding areas. To overcome this problem, we proposed the integration of spectral data with morphological information deriving from a Digital Elevation Model. We used slope and hillslope aspect as key parameters in identifying eroded formations. Therefore, our protocol was developed by testing all possible combinations of classification algorithm (Maximum likelihood Classifier and Parallelepiped) and input layers (spectral and morphological). Results obtained in a badlands sites located in Basilicata region (Southern Italy) showed a progressive reduction of misclassified badlands-pixels in the surrounding deposition areas by adding the terrain predictors. Our methodology allowed the improvement of badlands mapping: the best performance was obtained by applying MLC on all TM seven bands together with slope and aspect maps. Here, we show results from validation tests carried out on an other badland areas with similar heterogeneity which confirm the actual role of the proposed integrated methodology for an optimal badland identification.

References

Liberti M., T. Simoniello, M.T. Carone, R. Coppola, M. D'Emilio, M. Macchiato. Mapping badland areas using LANDSAT TM/ETM satellite imagery and morphological data. Geomorphology, in press, 10.1016/j.geomorph.2008.11.012.