Geophysical Research Abstracts, Vol. 7, 10009, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10009

Detecting soil and land degradation by an integrated approach based on DTM terrain analysis and satellite remote sensing: an example from an area in Molise region (southern Italy)

P.P.C. Aucelli (1), A. Esposito (1), A.P. Leone (2), C. Maffei (2), C.M. Rosskopf (1)

(1) Molise University - Department S.T.A.T., (2) Italian National Reserach Council, Ist. For Agro-forestry Systems

Soil degradation is a global important problem in relation above all to the current climatic trends. Therefore the detection of land degradation phenomena is essential for a correct and sustainable land management. Traditionally, erosion processes are observed by integration of aerial photograph interpretation and field survey. This approach, although important, is very time consuming. With the advent of computer-based Geographic Information Systems new research approaches have been introduced to characterise land surface features which can be related to gravity and running water induced land degradation processes. Such approaches, especially those based on DTM analyses, allow only an unsupervised classification, and therefore need field data validation. It is possible in fact to highlight the shape of the single forms of surface degradation, but it is not possible to distinguish the genetic process as there may be morphologic convergence between forms. An interesting alternative to field survey may be the use of satellite remote sensing images. The spectral response of outcropping surfaces (e.g., soil or bedrock) results from the inherent spectral behaviour of single surface constituents (e.g., organic matter, minerals, water content). Therefore, land surface modification, as induced by erosion processes, are, to a certain extend, spectrally detectable using multi-spectral satellite images. To test and integrated approach between DTM analysis and remote sensing a research has been undertaken on a test area where strong mass wasting and erosion processes by running water are active. The test area corresponds to the watershed of the Rivo torrent, a major 6th order tributary of the Trigno river (one of the main Molise water courses draining to the

Adriatic Sea). The basin, which is largely representative for a wide surrounding area, is imposed on prevailing pelitic terrains and affected by huge and diversified erosion processes. The approach has been tested by producing a detailed mapping of the test area creating an informative layer of landforms related to mass wasting and water erosion. This layer has been then compared through a bi-variate analysis with the spectral maps derived from a multi-spectral high resolution SPOT image (10x10 m pixel) and morphometric data (slope gradient, longitudinal and transversal convexities and concavities) coming out from a medium scaled DTM (40x40 m pixel). The first results of the above described research highlight the usefulness of the proposed approach particularly in differentiating some similar landforms whose genesis is different. It is the case of huge landslides whose toes are fan like shaped and therefore morphologically convergent with alluvial fans morphologies located at the outlet of small catchments. The method allowed us furthermore to distinguish in automatic mass-wasting dominated areas from others which, instead, are mainly affected by degradation due to slope wash.