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E7.6-10397
CR-148184

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GEOGRAPHIC AND LANDFORM SURVEY OF NORTHERN APENNINI
(Inv. N. 28450)

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Quarterly Report N. 3

3 June 1976

(E76-10397) GEOGRAPHIC AND LANDFORM SURVEY
OF NORTHERN APENNINI Quarterly Report
(Milan Univ.) 4 p HC \$3.50 CSCL 08B

N76-26625

Unclas
G3/43 00397

The scope of this report is to illustrate part of the methodology utilized for the study, in general, of landslides and their effect as shown by Landsat II images.

Our goal is the analysis of a test area included in the larger "DISCO" test site.

For this study the images of June 14th and July 20th (2143-09275 and 2179-09273) have been examined in the form of prints and slides both in B & W and false colour composition form.

The scale of utilization was 1:250.000 but local enlargements were done up to the scale 1:50.000.

Moreover video electronic analysis was employed in detailed analysis of specific areas.

The territory object of our research is a large belt in Northern Appennini range included in the Italian official geological map (Sheet N. 71 and 72).

Our starting point was the mapping of landslides and to relate these phenomena to the geological units. These units were subdivided basing on their permeability.

This process was accomplished in three operational stages:

- Geological correlation of the outcropping formations considering also vegetative cover
- Distinguishing these units by means of their geolithological characteristics
- Classification of areas having permeability of different source, confirmed by an "ad hoc" local survey.

Ground control was necessary for a correct definition of this last goal.

In fact, in this area was noticeable the presence of formations having several lithological types with frequent alternations and flyschoid series.

For the above mentioned reasons surficial erosion is deeply connected with the outcropping type.

A separate situation was considered for rockfalls in limestone formations.

A thematic map was draft illustrating the different spectral characteristics of soil with special reference to the vegetative cover.

In detail it was observed that the presence of humidity in the saturated zone near the surface or a water table at a small depth is a source of a noticeable breakdown in the reflected radiance in the near I.R. wavelength (band 7).

In this way it was possible to map areas having a different humidity content.

It is clear that, in this case, owing to the large extent of the studied areas and to the ground resolution of the images the goal has not been only the absolute precision in mapping the phenomena but a better knowledge of their evolution on the basis of the analysis of some parameters obtained by iterative imaging.

For this reason best results have been obtained using in analog way the ratio between bands 5 and 7 (two passages) and their electronic enhancement by derivative (normal and absolute) method.

From a lithological point of view there are well differentiated areas (Geological sheet N. 71, formation of "Vallassa" sandstones); the same happens from a morphological point of view (Geological sheet N. 72) where are clearly identified the calanque structures of "Lugagnano" clays and glacio-fluvial Riss and Würmer deposits. A detailed ground survey is on work in order to clarify some anomalies yet not well justified.

On the basis of the previous work our study places its focus on

the so called phenomenon indicators: in our opinion the main factor is the humidity in not saturated portion of ground. So a large contribution to our research will be given in final report to the hydrological part of the study, especially in the analysis of some kinds of landslides such as earth flows and large rock falls.

From a statistical approach we will try to describe the dynamic behaviour of these phenomena.

This will be done utilizing two or more elaborations showing the spectral shift of the areas taking into account also some flights over selected portion of the territory.

February and November images will be also utilized for a more correct comparison.

P.I. recognizes the valuable help of Dr. E. Zilioli, geologist, in the analysis of Landsat 2 images and their utilization for the goals of this study.

Dr. Carlo M. MARINO