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## LANDSAT SATELLITE DATA FOR SOIL INVESTIGATIONS IN AN APENNINES REGION OF SOUTHERN ITALY

**ABSTRACT:** LEONE A.P., TEDESCHI P. & WRIGTH G.G., *Landsat satellite data for soil investigation in an Apennines region of Southern Italy.* (IT ISSN 0391-9838, 1996).

Since the launch of first earth observation satellites at the beginning of 1970s, great attention has been paid to the use of satellite remote sensing techniques in soil studies. Some investigations have studied the relationships between soil surface characteristics and soil spectral behaviour, under both laboratory and field conditions. Others have focused their attention on the image processing techniques applied to satellite and airborne scanner spectral data. This paper presents the results of a research, using spectral information from a Landsat satellite source, for soil studies in a southern Italy Apennines region. Specifically, the objectives of the investigation were to determine the degree with which variations in soil parameters could be monitored and quantified on the basis of radiometric data gathered by the Landsat TM-5 satellite sensor. A spectral soil map has been produced over the test site. An accurate comparison between the latter and numerous available thematic maps has led to the formulation of an hypothesis about the actual and potential applications of radiometric data to soil spatial variability.

**KEY WORDS:** Remote sensing, Landsat TM, Soil, Southern Apennines, Italy.

**RIASSUNTO:** LEONE A.P., TEDESCHI P. & WRIGTH G.G., *Dati satellitari Landsat per indagini sui suoli in una regione appenninica del sud Italia.* (IT ISSN 0391-9838, 1996).

Fin dal lancio dei primi satelliti per lo studio della Terra agli inizi degli anni '70, una grande attenzione è stata rivolta all'uso delle tecniche di telerilevamento per lo studio dei suoli. Alcune indagini hanno riguardato lo studio delle relazioni tra caratteristiche superficiali e comportamento spettrale dei suoli, sia in condizioni di laboratorio sia di campo. Altre hanno concentrato la loro attenzione sulle tecniche di elaborazione di dati spettrali telerilevati da sistemi satellitari o aereoportati. Il presente lavoro riporta i risultati di una ricerca basata sull'uso di dati telerilevati dal sensore TM del satellite Landsat per lo studio dei suoli in una regione appenninica del sud Italia. In particolare, l'obiettivo dell'indagine è stato quello di determinare il grado in cui variazioni delle caratteristiche superficiali dei suoli possono essere monitorate e quantificate sulla base dei da-

ti radiometrici acquisiti dal sensore. Il confronto tra una mappa spettrale, prodotta attraverso un procedimento di analisi dell'immagine Landsat TM relativa all'area di studio, e la cartografia tematica esistente ha consentito di formulare interessanti ipotesi circa le possibili applicazioni dei dati radiometrici all'analisi della variabilità spaziale dei suoli.

**TERMINI CHIAVE:** Telerilevamento, Landsat TM, Suolo, Appennino Meridionale.

### INTRODUCTION

Soil can be defined as a discrete body, generated from the interaction between climate, vegetation and geological surface materials (OLSEN, 1981). It represents a major natural resource (FITZPATRICK, 1986). Therefore, a knowledge of soil, of its potential productivity, limitations of use and its spatial or temporal variability, is essential for correct land use planning. Soil studies at a regional scale, follow important field investigation procedures (MANCINI, 1984). However, these also represent the most onerous part of the whole soil survey program. In this respect it is becoming increasingly necessary to implement innovative tools and techniques able to produce a significant reduction in the total cost of an investigation.

Since the launch of the first earth observation satellites, a great deal of attention has been paid to the use of satellite remote sensing techniques for soil studies. In reality, the opinions of soil scientists about the possibilities of using such techniques have always been discordant, moving from overestimated enthusiasm to total scepticism. In fact, the possibilities of success, for aero-spatial remote sensing applied to soil studies, vary considerably in relation to the characteristics of investigated physical environment, the instruments used and, not least, the methods of image processing used. If the soil is not covered by vegetation, it is possible to obtain direct information about the surface pedological cover through the analysis of remotely sensed radiometric data. For this reason, the majority of remote sen-

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