SUMMARIES

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THE NATURE AND EXTENT OF EROSIONAL AND DEPOSITIONAL FEATURES AND ROCK AND SOIL UNITS IN THE KHARGA OASIS REGION, EGYPT, AS DETERMINED FROM REMOTE SENSING

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SUMMARY

A study of the Kharga Oasis region of Central Egypt is underway using remote sensing techniques. Rock and soil units are being mapped using Landsat images and laboratory studies of the optical properties of certain unit materials. Remote sensing techniques are being developed in the process of producing maps and understanding the surface modification processes.

The Kharga region is of interest as a case study because it is arid, soil and rock units of general importance to this part of the Earth are exposed here, and erosional depositional processes occur here which are of interest to those studying arid regions as well as Mars. The sparse vegetation in these regions makes the remote sensing techniques particularly effective. The processes under study are important to many arid regions for land use studies and resource assessment, for example.

Nine samples of rock and soil units were obtained and their reflectance spectra in the 0.3 to 2.5 μm region were measured in the laboratory. These spectra show absorptions due to Fe³⁺, Fe²⁺, H₂O, and OH. The range of spectral properties within one unit is smaller than the difference between units, so that in most cases the units can be distinguished on the basis of spectra properties.

The spectra were computer processed to determine the values of Landsat image ratios which should correspond to the individual units, after the approach of Adams, et al. Most units seem to have ratio values associated which are distinguishable in Landsat images. The Landsat images of the region are being digitally processed to determine the areas which have ratio values associated with each unit and the resulting maps are being compared with other data on the region.

The maps of this region are being used to study the erosional and depositional processes operating and to study the basic geology. In some cases the weathered surface of the units is what is being observed. Therefore laboratory studies are underway to understand the weathered material and the resulting changes in optical properties in terms of the physical and chemical processes creating them.
The mixing on microscopic and macroscopic scales of the several units is also of interest for this is a common complication. Studies are underway to develop mixing models and the results are being applied in the Landsat image analysis to define as far as possible the location and extent of mixed zones.

In the poster presentation we will show examples of the reflectance spectral analysis and the process of defining the units in the Landsat images. Unit maps will be shown and compared with other data on the region. The geologic setting will be described and the modification processes (erosional, depositional, weathering) will be addressed pictorially.