REMOTE SENSING FOR SOIL DEGRADATION USING HYPERSPECTRAL TECHNOLOGY

Eyal Ben-Dor[1], Naftaly Goldshlager[2], Ido Liven[1], R. Lugassi[1] and G. Eshel[2]

[1] The Remote Sensing and GIS Laboratory, Department of Geography, Tel Aviv University
[2] Soil Erosion Research Station, Soil Conservation and Drainage Division, Ministry of Agriculture and Rural Development, Israel.

This paper will provide several innovative studies on how to recognize soil degradation status by using reflectance spectroscopy using field, air and space borne imaging spectrometers. The degradation factors that will be presented are: physical crust, salinity, and mineral deformation caused by fire. The physical crust consists of a thin layer of small particles that emerge on the soil surface as a result of rain drop energy. The physical crust blocks water infiltration into the soil profile and increases runoff and soil degradation substantially. We will review the innovative spectral method that was developed by us to assess this phenomenon, and we will provide an example of this concept by using an airborne spectral imaging sensor (1,2,3,4). The soil salinity factor causes soil particles to disperse and deform the soil structure, ultimately causing instability. We will provide a case study in which soil salinity is assessed by field spectroscopy and spectral imaging information obtained from ground, air and space domains using imaging cameras (5,6). To that end we will show that this information enables better management of the field especially when passive and active remote sensing means such as FEDM and GPR are combined. The third soil factor is soil degradation induced by fire. It was shown that the entire soil body (minerals and organic matter) are changing during fire event and demonstrate that this can be assessed by measuring the reflectance radiation from the soil surface that has undergone fire. Significant spectral changes in the soil mineralogy are shown whereas the post spectral measurements were found to be correlated with temperature of the fire during the burning event (7). This measurement is suggested to be a spectral-based parameter to estimate the soil degradation process remotely. This paper will also discuss other spectral parameters that

are capable of assessing soil degradation processes and can be applied to current and future orbital spectral imaging sensors.

References

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