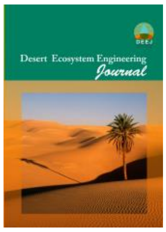
DEEJ (2018) 7 (19) 95-105

University of Kashan

Desert Ecosystem Engineering Journal

Journal homepage: http://deej.kashanu.ac.ir



Introduction of the simplest spectral ratios in order to detect some chemical properties of soil in arid regions using remote sensing technique (Case study: Dareh Anjir Kavir)

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Received: 24/04/2018 Accepted: 29/07/2018

Extended Abstract

Introduction: Understanding the spectral reflectance of different soils and other surface elements forms the basis for analyzing the process of interpreting remote sensing data. Spectral properties of the various phenomena of the Earth's surface are not constant and are changing, based on the complex time and space conditions. Determination of soil chemical properties using remote sensing techniques mainly affects their spectral reflectance, which is itself influenced by the amount and type of salts in the soil, the amount of moisture, the color and roughness of the soil surface. The use of various satellite image processing techniques, especially spectral ratios, is one of the most common methods for detecting the phenomena of the earth's surface. The purpose of this study is introduce the simplest and most suitable spectral ratios prepared using ASTER sensor data for the enhancement of saline, TNV, alkali and gypsiferous soils in the spatial range of the Dareh Anjir Kavir in Yazd province.

Mterials and methods: To determine the salinity, alkalinity, gypsum and TNV values of soils, in the spring of 2007 according to the time of the image, by placing a systematic random sampling grid on the image of the area, the location of 42 sampling points was determined and sampled. Soil samples were analyzed after the transport to the laboratory and the values of mentioned parameters were determined. The geometric correction of the ASTER images was carried out using the image to image method. The FLAASH algorithm was used in ENVI4.7 software to obtain ground reflection and atmospheric correction of images after converting the digital value recorded to radians. Then, 6 spectral ratios in the near visible and infrared spectral range, 30 spectral ratios in the middle infrared range and 20 spectral ratios were produced in the thermal infrared range. A point map prepared from the location of the profiles was crossed with all the information layers obtained from the spectral ratios and the value of the reflection of each pixel was extracted. By stepwise multi-variable regression, correlation coefficients and models related to each component were calculated. The extracted models were validated based on the higher values of the corrected explanatory factor and F factor as well as lower standard error. By fitting a straight line between observational and estimated values at the test points, the resultant coefficient was considered as the accuracy of the selected model for the study area.

Results: The initial results obtained from the establishment of regression relations between salinity, alkalinity, gypsum and TNV components with spectral ratios calculated based on the different band ratios showed that between three components of salinity, alkalinity and gypsum with spectral ratios has been established only one statistically significant relationship. But there are three significant relationship between the TNV component with band ratios that due to the existence of a significant correlation between the band ratios introduced in model number (3), we can not be cited statistically to the application of this model in the identification of TNV soils in the study area. Also, the results showed that the band ratios (b8/b6) and (b8/b5) can be used for enhancement of saline and alkaline soils with relatively high precision and band ratios (b11/b12) and (b9 / b8) in order to characterize the calcareous soils of the study area. Also, the results indicated that the only optimum spectral ratio for separating of gypsum soils from other soils is the band ratio is (b11 /b 13). The correlation coefficient between observational and estimated values at the test points (14 samples) for the mentioned components was relatively good and was estimated to be 0.66, 0.55 and 0.47, respectively. Also, the results

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DOI: 10.22052/deej.2018.7.19.59

indicated that the only optimal band ratio for separating of gypsum soils from other soils is (b11 to b13).

Discussion and Conclusion: The importance of a band in a region and its inappropriateness in another region is due to the varying degrees of salinity, alkalinity and humidity or different amounts of cations and anions, as well as different climatic, geographic and geological conditions which has led to a difference in the spectral reflectance of phenomena. Since, salinity, TNV and alkalinity models have been able to justify 66%, 55% and 47% of salinity, TNV and alkalinity changes in the study area with acceptable accuracy, By completing and expanding the research, can be done soil zoning in terms of the characteristics studied without the need for sampling. This technology, while providing more precision, can minimize sampling costs. Of course, considering other factors affecting the spectral reflection of different soils and the use of satellite data of other sensors that have a higher spatial resolution than ASTER sensor, or combining them with the data of the ASTER, can produce more precise models. Therefore, the use of ASTER sensor data can have acceptable performance in detecting the chemical properties of soil in arid areas.

Keywords: ASTER, Enhancement, Remote Sensing**,** Dareh-anjir, Band Ratio.