SPECTRAL UNMIXING OF HYPERSPECTRAL AND MULTISPECTRAL REMOTE SENSING IMAGES FOR PREDICTIVE MAPPING OF SURFACE SOIL ORGANIC MATTER

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KEY WORDS:

ABSTRACT:

Remote sensing is an efficient tool for the assessment and monitoring of natural resources. Mixed pixels, however, may lead to inaccurate classification results in most conventional image classification algorithms. Spectral unmixing may solve this problem by resolving those into separate components. The main objective of this research was to explore the applicability of spectral unmixing in hyperspectral and multispectral images to identify potential areas of surface soil organic matter (SSOM). The study was carried out using hyperspectral (DAIS) and multispectral (Landsat TM) images in the semi-arid environment of Antequera area in Spain. The DAIS image covers only a small part of the study area (a strip running NW to SE) whereas the TM image covers the whole study area. Optimum numbers of DAIS and Landsat TM bands for discriminating SSOM levels were selected for the strip area. A relationship has been established between these bands using regression analysis (R^2=0.75). The established relationship was used to create a modeled DAIS image. A comparison of the three images in the strip area showed that DAIS, modeled DAIS and Landsat TM images discriminate SSOM levels with an accuracy of 80%, 71.7% and 44.4% respectively. This shows that integration of RS images by means of statistical models help to improve discrimination of SSOM. Next the modelled DAIS image was extrapolated to the whole study area where only the TM image was available. Linear spectral unmixing was applied to the three images in the strip area. The RMSE values obtained from unmixing analyses of DAIS and modeled DAIS were 0.02 and 0.1 respectively where as for TM it was 0.56. Mapping of potential areas of SSOM was done using endmember abundance images derived from the unmixing analysis for both the strip and the whole study area.

TOPIC: Multi-spectral and hyperspectral remote sensing
ALTERNATIVE TOPIC: Microwave remote sensing