

USE OF LANDSAT ETM+ DATA TO DETECT AND MAP SAND DUNES FIELDS IN THE EMIRATE OF ABU DHABI, UNITED ARAB EMIRATES

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ABSTRACT

Up to 90% of the United Arab Emirates' (UAE) surface is covered by sand dunes and intervening inter-dune belts. The country is severely affected by problems related to sand dunes movement and aeolian deposits, recognized as a major contributor to desertification. This study discusses the use of publicly available Landsat TM and ETM+ data to detect sand dunes fields and enable monitoring of their movements in the Emirate of Abu Dhabi, UAE. The study focuses on developing a classification approach and applying it to historical Landsat data to produce consistent Land cover maps useable in subsequent change detection studies.

Landsat scenes acquired in 1993, 1998 and 2003 covering 2 study areas around the city of Al Ain and in the Western Region were used to evaluate different multispectral classification approaches and determine the accuracy of resulting classification maps. The methodology uses several configurations of supervised classification techniques that include different band combinations to determine those that produce the highest accuracy in mapping the predominant land cover classes in the area: Sand dunes, Sand sheets, Urban, Vegetation, Sabkhas, Limestone and Water. Preliminary results of applying these approaches indicate that the use of Principal Components as input to the classification algorithm leads to improved detection accuracy. However, all methods used exhibit a certain level of confusion between sparse vegetation and other classes. The use of NDVI as a discriminator helps improve the classification accuracy. To facilitate the use of resulting classification maps in change detection studies aiming at assessing and modeling sand dunes movement, a geodatabase is built containing resulting layers for further GIS analysis.

Keywords: Remote sensing, GIS, Landsat, Multispectral classification, UAE.