Geophysical Research Abstracts, Vol. 8, 03391, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03391

Contribution of remote sensing methods and techniques in the detection of submarine springs in Eastern Crete, Greece.

Rokos E.(1,2), Koumantakis J. (1,3)

1. Department of Mining and Metallurgical Engineering, National Technical University of Athens
2. E-mail : vag@metal.ntua.gr
3. E-mail : mmgski@central.ntua.gr

Remote sensing combined with geological and hydrogeological data has been used elsewhere for the detection of fresh water discharges by employing:

- tectonic lineament mapping since tectonic structures facilitate ground water flow and subsequent discharge into the sea water,
- identification of geologic and hyrdrolithologic units and their conditions where these are appropriate for the formation of submarine and coastal springs,
- detection of thermal anomalies on the seaside that could be indications of fresh water discharge into the sea and therefore existence of submarine springs

Thermal sensors onboard of satellites such as LANDSAT 7 and ASTER have been used in the past to provide accurate information on temperatures contrasts. ASTER has an advantage because of the number of available bands and its resolution. ASTER is an advanced multispectral imager and covers a wide spectral region with 14 bands from the visible to the thermal infrared with high spatial, spectral and radiometric resolution. The spatial resolution varies with wavelength: 15 m in the visible and near-infrared (VNIR), 30 m in the short wave infrared (SWIR), and 90 m in the thermal infrared (TIR). Each ASTER scene covers an area of 60 x 60 km.

The objective of this research was the investigation of remote sensing methods and techniques for the detection of submarine springs and fresh water discharges towards the sea through thermal anomalies, in a karst area in Eastern Crete. The interest in this area stems from the intrusion of sea water into the mainland and the loss of valuable ground water resources. Earlier research has located two submarine springs. The lithology of the area is mainly composed of limestones and neogene formations. The tectonic structures of the region are characterized by NE-SW fault system.

An Aster image was selected for this study because of its five thermal bands (10-14) and their satisfactory resolution. The date of the Aster image was 26-11-2001. This November image was selected because the autumn rainfalls lead to higher extent of ground water discharges into the sea and thus thermal anomaly detection can be facilitated.

Various image processing techniques were applied on each of the thermal bands and their combinations including selected RGB composites, band ratios, and principal components analysis and two of the known submarine springs were identified.

The results are encouraging and it is expected that by further image processing and hydrogeological criteria additional submarine springs could be located.