



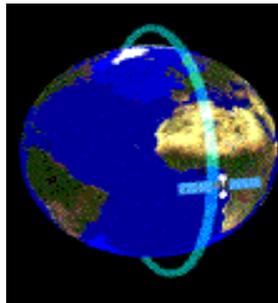
Use of Space Technology for Water Resources Management in Syria

Marwan Koudmani

EPSDS, Damascus, SYRIA

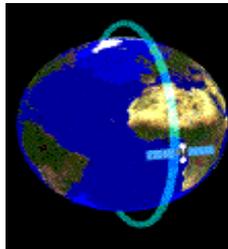
Tel: +963 11 2741238 Fax: +963 11 2773615

Koudmani.m53@gmail.com env-pro@scs-net.org



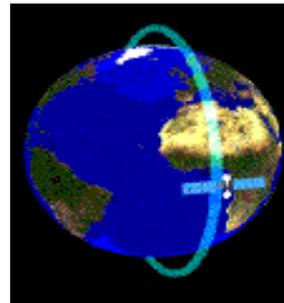


Many countries in the world complain of water problems especially our region complains of great water shortage. This problem increases greatly in result of great increasing of the population, agricultural projects and investments. That will make additional pressure on water resources. Also, the water storage had begun complaining of pollution problems.





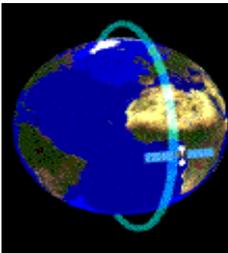
Remote sensing satellites provide data on several key water-related variables (for example, rainfall, precipitations, water storage, soil moisture and evaporation) using spatial and temporal scales that are appropriate for reliable assessment. A satellite-based approach to assessment and management of water resources is especially important in countries and regions of the world where adequate hydrological networks do not exist.





Syria sets to combat the water problems in by the following directions:

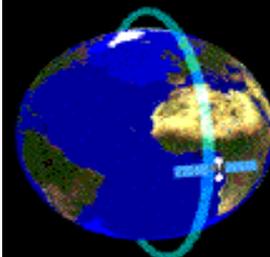
1- Exploration of new sites of groundwater for providing the water needs. We had identified many locations in Salamyeh, Sweida, Dara,a, Lattakia, Tartous and Damascus cities by using remote sensing techniques. We had drilled many of wells in the studied perspective locations, and we had good results.





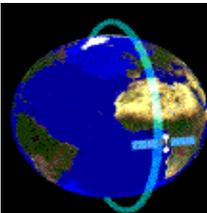
2- Management of available water resources. As Water Resources Management of EL- Zabadani Basin and rainwater harvesting (It capture, diverts, and stores rainwater for later use)in Idleb, Palmyra and other areas by using space technology.

3- Protecting of water resources from the pollution. As Protecting the Water Resources from Pollution in the Coastal Area by using space technology.



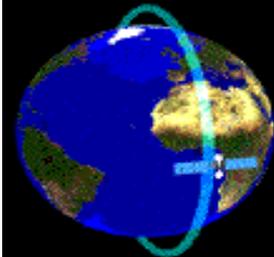


The new technologies of remote sensing, geographic information system and global positioning system had a great importance in groundwater exploration. Whereas the space images taken by Landsat TM, radar images by European Remote Sensing satellite ERS, using geographic information system GIS, global positioning system GPS and previous geological, tectonic, hydrological and hydrogeological studies of study regions contributed as ideal method in exploration of groundwater in those regions.





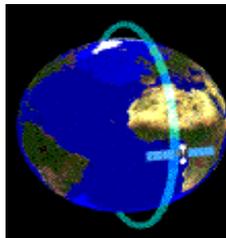
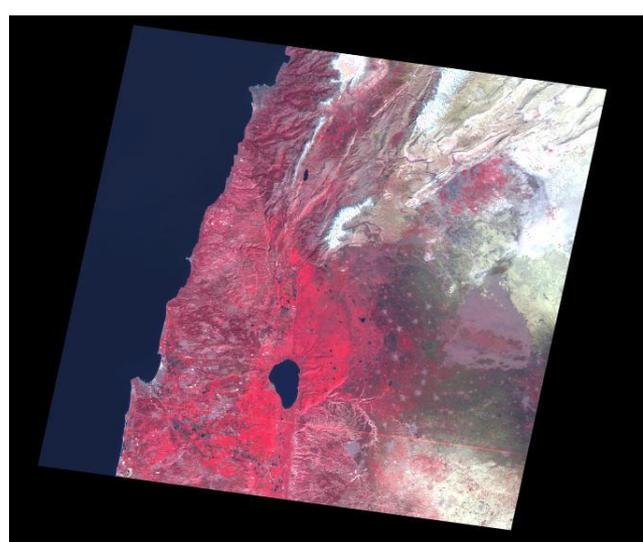
By processing , analyzing of space images, compiling thematic maps of drainage, lineaments and main faults with their intensity and crossing in addition to maps of all drilled wells with their discharge and existing springs in the study of each area, study of wet faults at the end of summer through thermal band in Landsat images, subsurface faults through radar images, cross of separated faults with their accurate coordinates by using GPS and carrying out geo-electrical sounding for perspective locations and analyzing the resulted curves and assurance of existing groundwater with their water table.





We had identified many locations in Salamyeh, Sweida, Dara, a, Lattakia, Tartous and Damascus cities by using this methodology. We had drilled many of wells in the studied perspective locations, and we had good results.

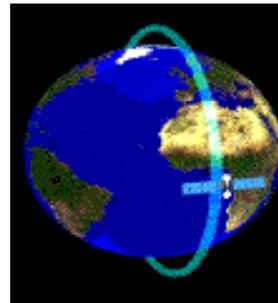
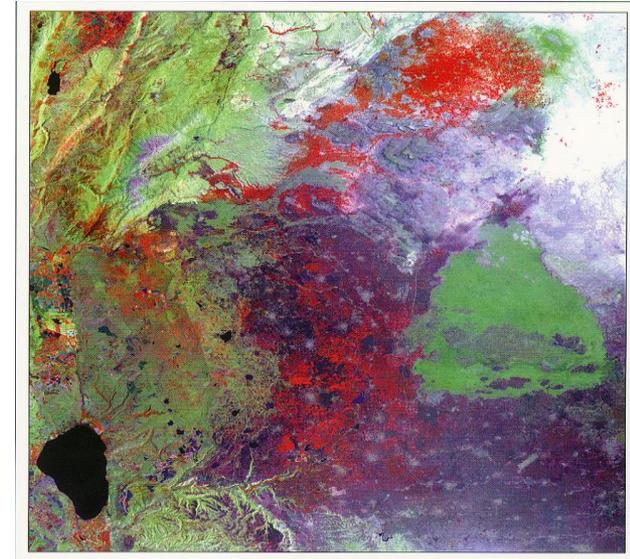
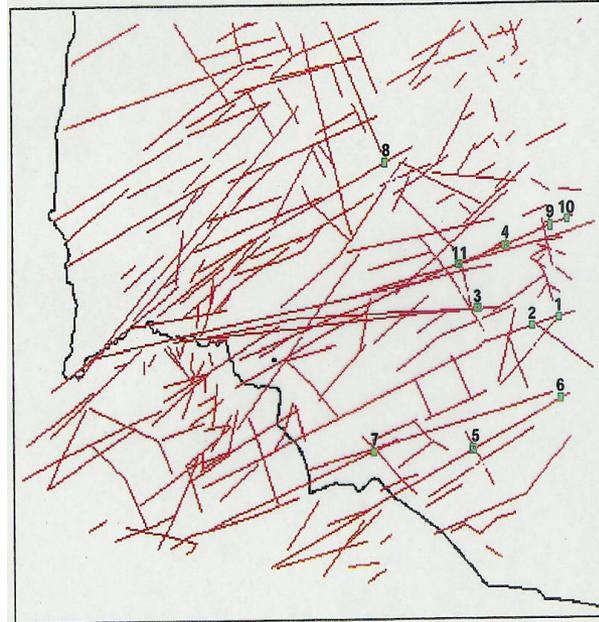
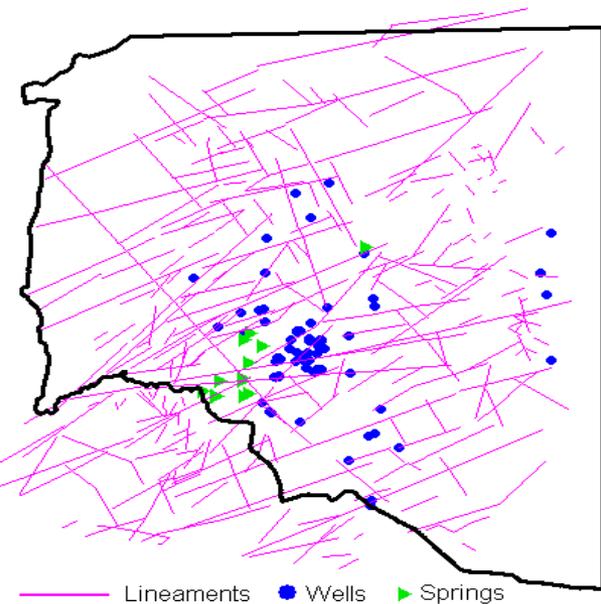
1-Studying the snow cover with snow pack in Syria

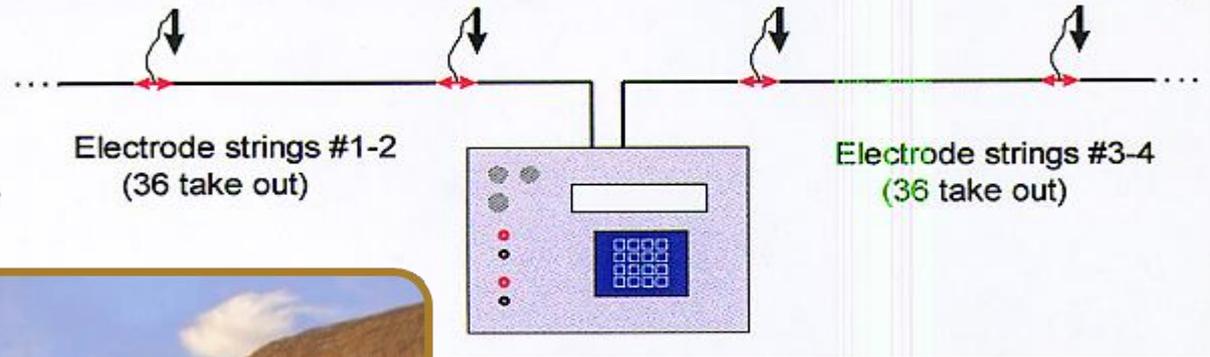




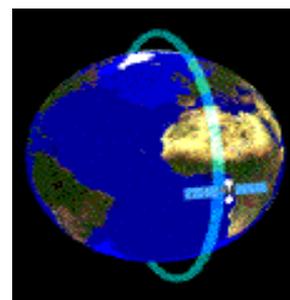
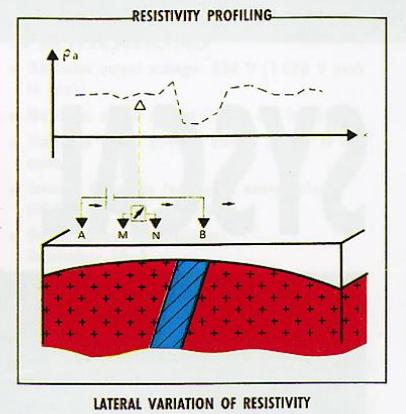
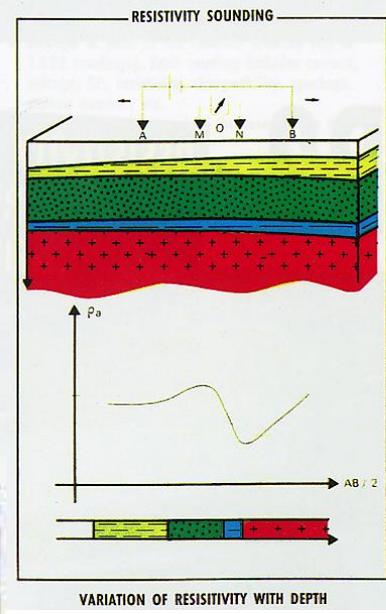
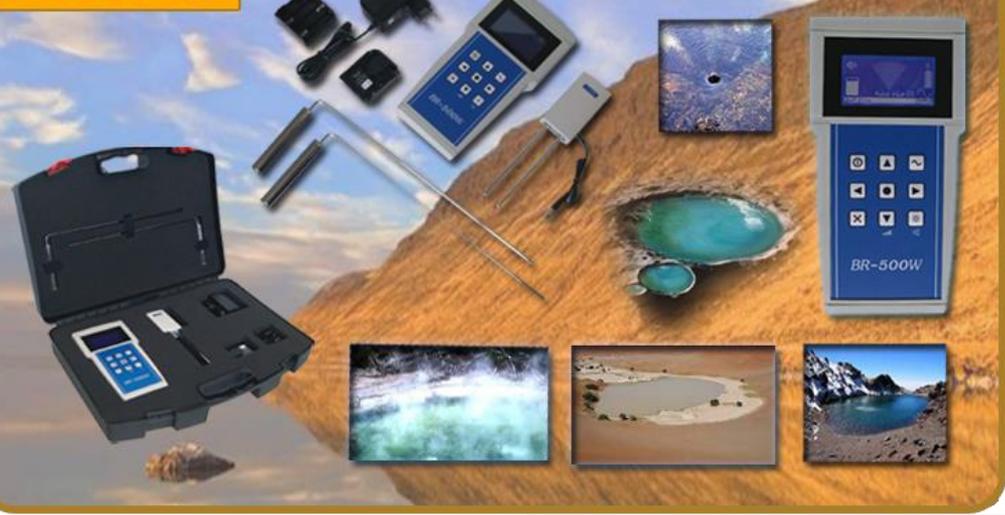
1- Exploration of ground water in southern part of Syria

This study has been carried out in south – west part of Syria by using remote sensing techniques (Landsat and SPOT images).
In Basalt Area.





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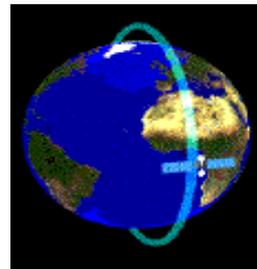
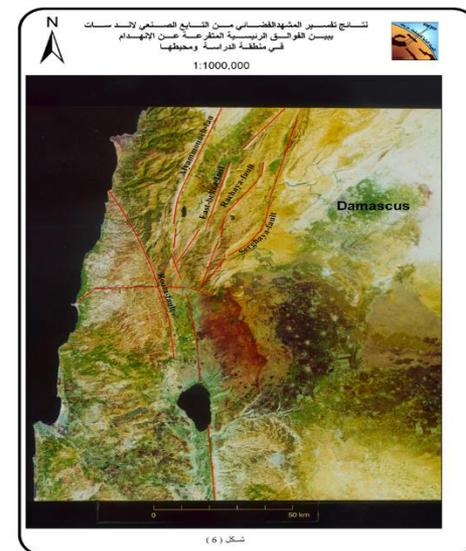
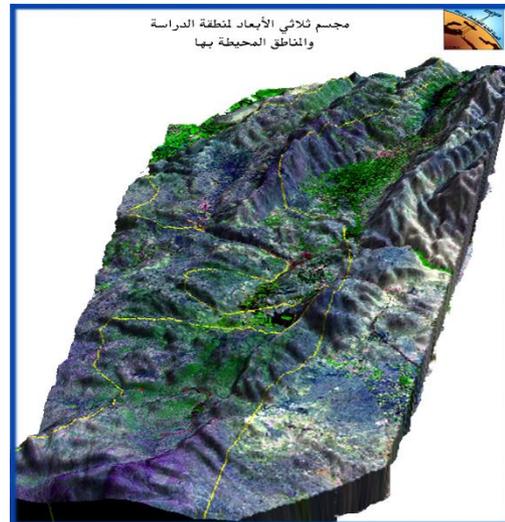
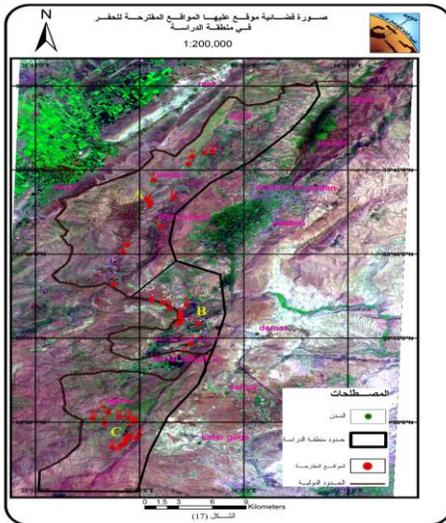




2 - Study of Water Perspective in Western Area of Damascus by Using Remote Sensing Techniques:

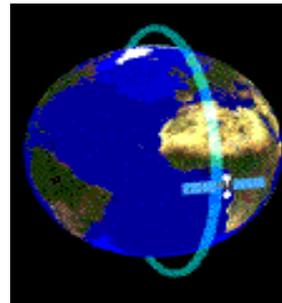
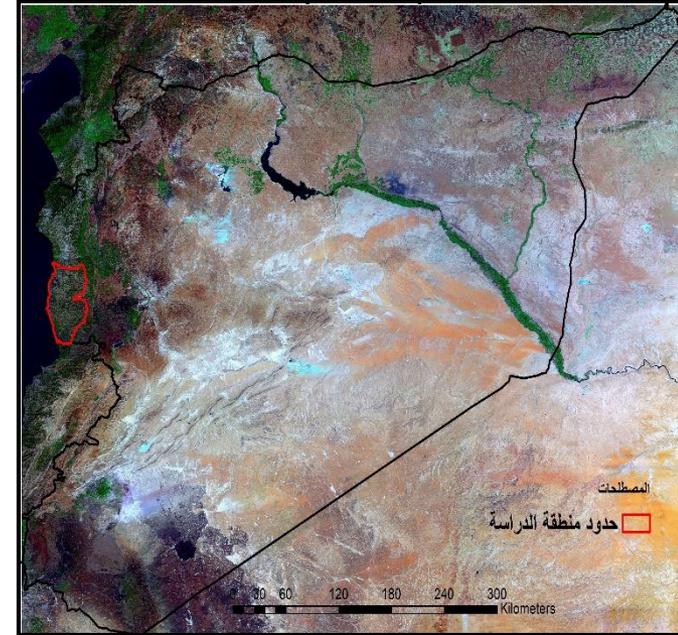
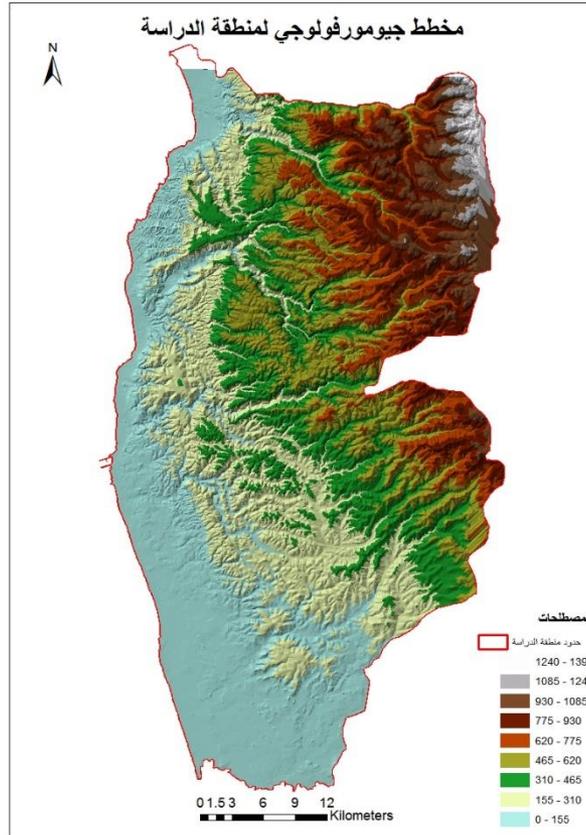
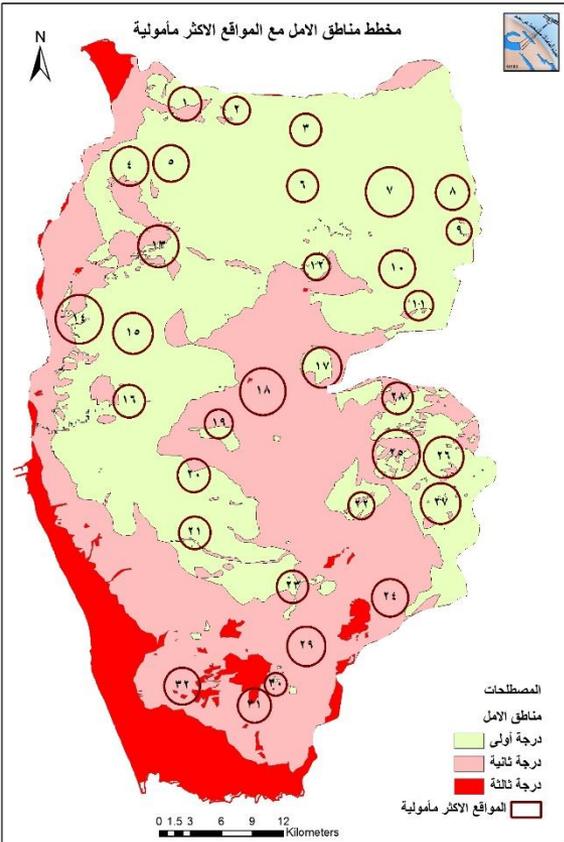
This study has been carried out for Western area of Damascus in the region from Maadar in the North to the West of Qattana in the South according to the request from the specialized bodies for getting the perspective sites for drilling water wells that will be a new water resource for Damascus City and its countryside.

36 suitable sites have been identified for drilling water wells in the study area.





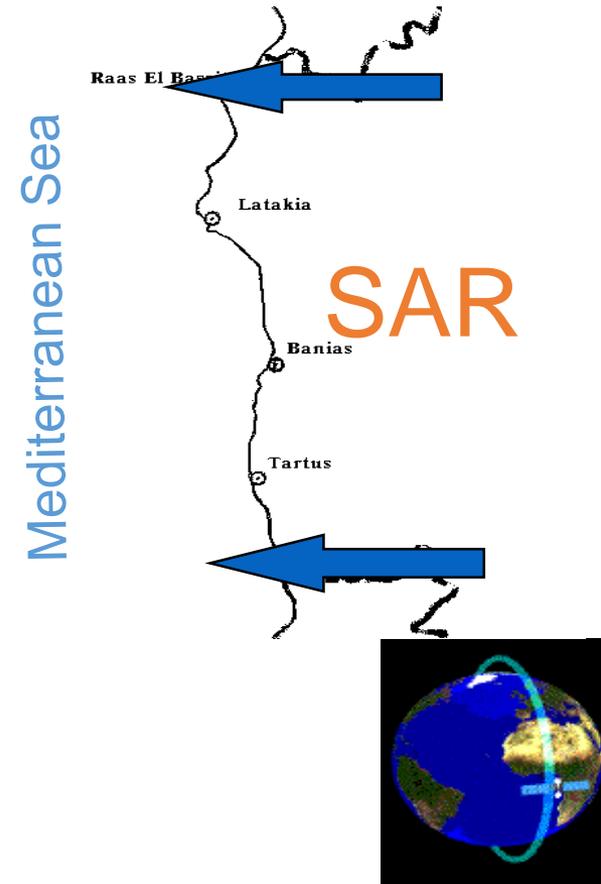
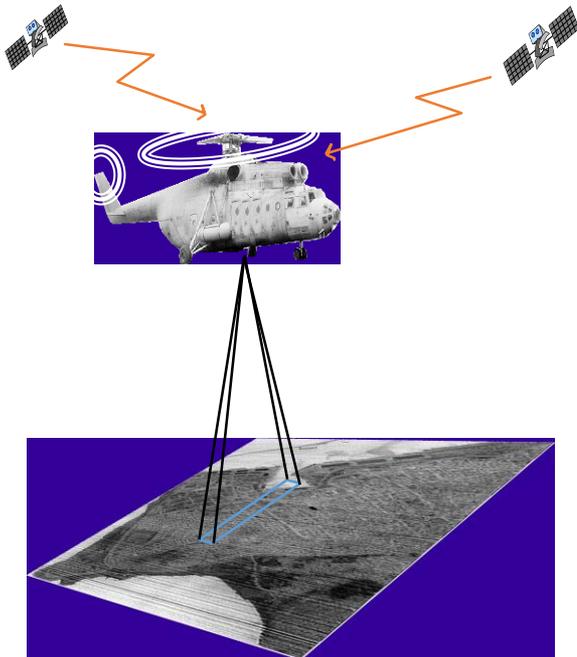
Exploration of Ground Water in Tartous Area





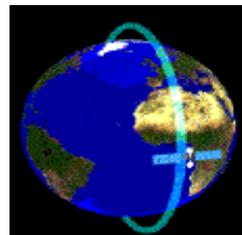
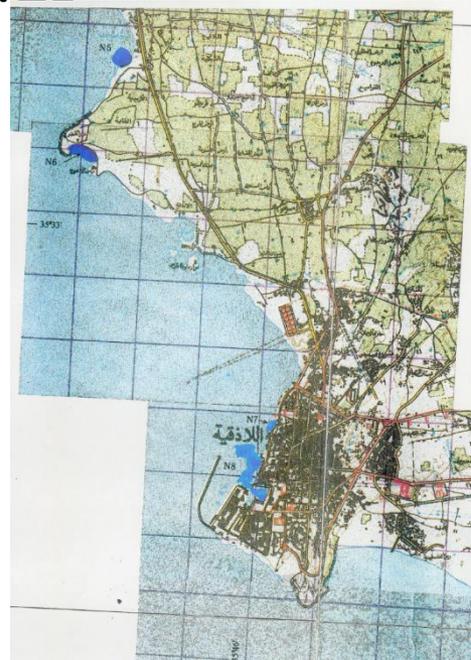
THERMAL SURVEY OF THE MEDITERRANEAN COAST OF SYRIA

The survey was aimed to find places of the unloading of fresh water springs under sea water according to supposed temperature anomalies at the sea surface.



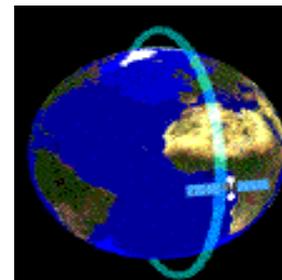
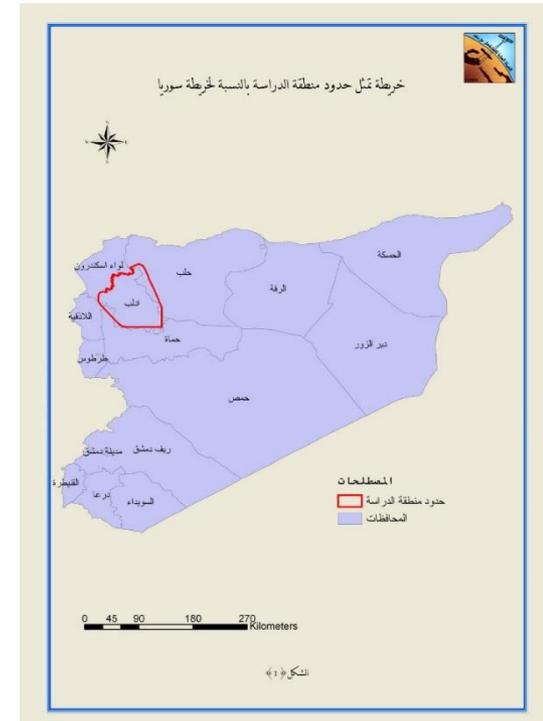
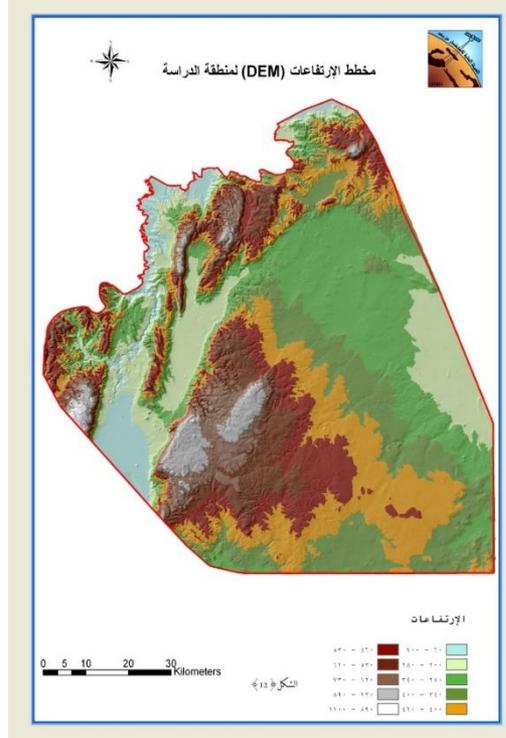
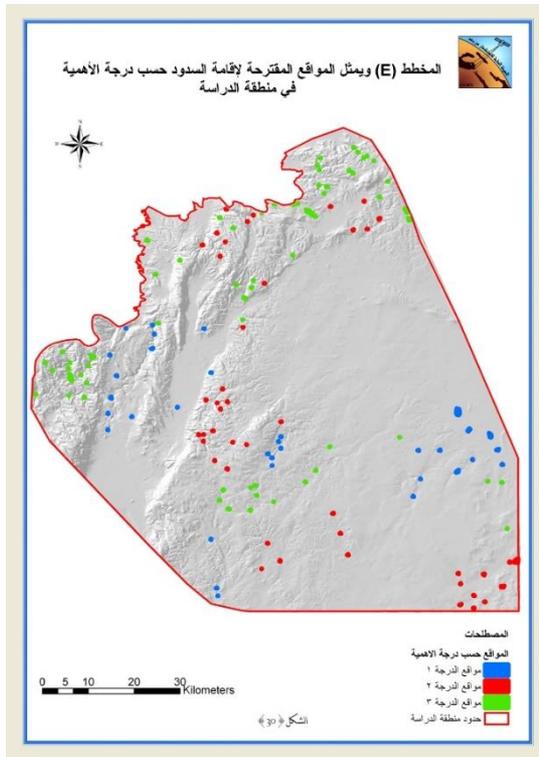


SUB-WATER SPRINGS -PART OF THE COAST MAP WITH ANOMALIES



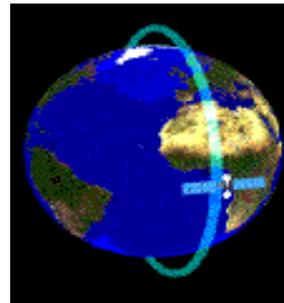
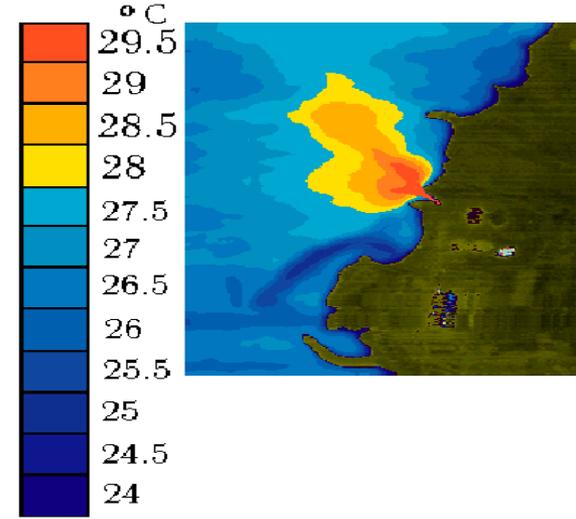
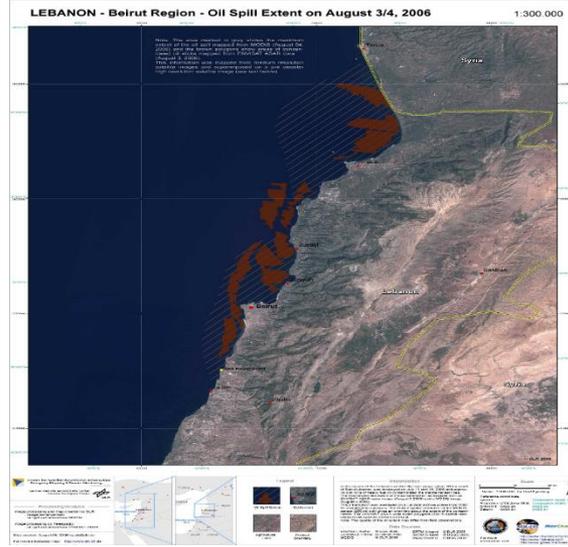
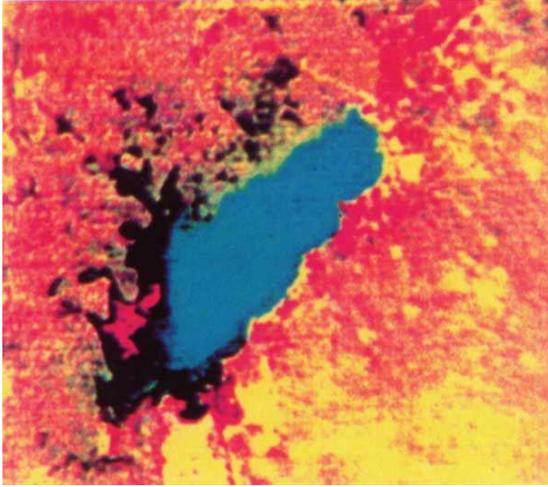


Water Harvesting in Edlib Area





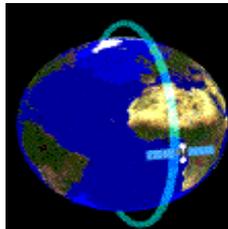
3- Protecting of water resources from the pollution:





Recommendations:

- 1- Water crisis will continue to be of central concern in the region, therefore more efforts are needed to reach best possible solutions utilizing available management techniques and devising policy options to ensure water resources sustainability and responsiveness to basic human needs.**
- 2- Recognize the need to apply a multidisciplinary approach in the formulation of water management policies.**
- 3- Integrated Water Resources Management (IWRM) should be further promoted in the region.**





4- Public awareness on water issues, including promotion of water conservation techniques should be fostered.

5- A regional database on water resources is needed to serve as a tool for analysis monitoring and decision making.

6- Capacity building means dealing with deferent components: Education, training and transfer of knowledge research, institutions building and institutional development it is a fundamental component.

