

WATERMED - WATER use Efficiency in natural vegetation and agricultural areas by Remote sensing in the MEDITERRANEAN basin

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ABSTRACT

The general objective of the WATERMED project is to develop a comprehensive method for the study of the water use and the resistance to the drought of the natural and irrigated vegetation in the Mediterranean Basin (see Figure 1), by means of a combined historical and current space-based remote sensing database, vegetation models and field measurements. The general concept is to integrate all available data of the studied environments.

THE SYSTEM TO BE STUDIED

Figure 2 depicts the project schematic representation. The project aims at estimating the properties of the key components of the system through a combination of low and high resolution remote sensing data and direct field measures.

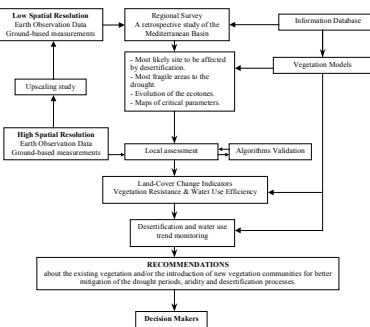


Fig. 2 - Schematic representation of the project.

SCIENTIFIC OBJECTIVES

1. A retrospective study of the Mediterranean Basin at the regional level, using NOAA data from 1981 to present. This objective is innovative respect to other previous projects related to the environmental management in arid and desert areas in the Mediterranean Basin and funded by the European Union in the last decade (DEMON, MEDALUS, ROSELT, CAMELEO, etc...) because it carries out a historical study of the whole region by means of remote sensing data of the last 20 years. Besides, the project will combine data from the visible (VIS), near infrared (NIR) and thermal infrared (TIR), which will permit:

1.1.- To carry out a climatology of the study area to distinguish the most fragile areas to the drought and the evolution of the ecotones. This allow to study the land cover change in the time period chosen.

1.2.- To provide maps of critical parameters at regional scale, such as land surface temperature, emissivity, atmospheric total water vapour content, normalised difference vegetation index (NDVI), albedo.

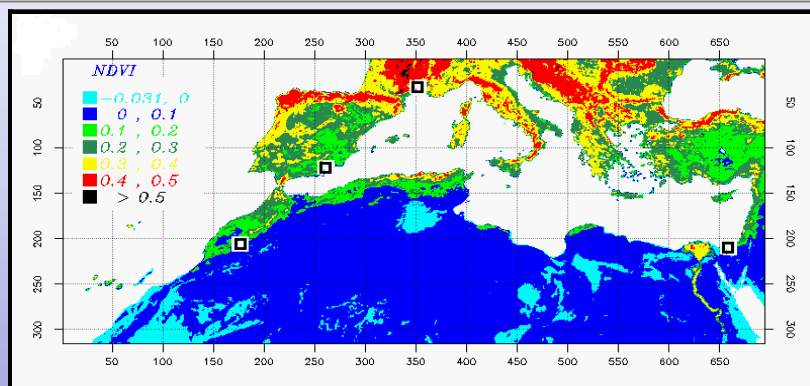


Fig. 1 - NDVI image of the region that will be studied in the WATERMED project. The image was obtained by the Global change Unit using Pathfinder AVHRR dataset. Squares represent the test areas of the project

INNOVATIVE PROJECT

The project is innovative because it approaches the problem, from the combination of retrieval history of the area, field data and the application of synoptic data such as those derived from different satellites. Different satellite spatial resolutions data are of great importance to monitor and study local and regional environmental problems. Remotely sensed data provide an adequate tool for such objective as it provide dynamics and global information about the surface of the earth that can be very useful in improving our understanding of surface processes. On the other hand, satellite remote sensing data can be used to quantify the photosynthetic capacity of the vegetation cover that produce spectral manifestation of reduced or altered interannual and/or intrannual photosynthetic activity associated with climatic data such as precipitation and temperature. Moreover, respect to other previous projects related to the environmental management in arid and desert areas in the Mediterranean Basin and funded by the European Union in the last decade (DEMON, MEDALUS, ROSELT, CAMELEO, etc...), the present project carries out a historical study of the whole region by means of remote sensing data of the last 20 years.

INTERNATIONAL EFFORTS CONTRIBUTION

2. A study of water use efficiency in four specific test areas chosen in the following critical zones: i) the Guadalentin Basin (SE Spain), ii) the Tensift Al Hauouz region of Morocco, iii) the lower Rhone valley (SE France), and iv) the northern region of the Sinai Peninsula in Egypt. This study will be made by using field measurements and high resolution imagery (LANDSAT, SPOT-HRV) and also airborne remote sensing measurements (DAIS, POLDER, MAIS). In these areas the methodology will be checked in more detail and the algorithms proposed will be validated and/or improved in different scenarios. In this way we can:

- 2.1.- check the different methodologies to estimate evapotranspiration from remote sensing data. This will be done firstly on the French area, and different methodologies will be compared (SEBAL, simplified relationship, microscale flux aggregation model, SVAT modelling).
- 2.2.- study an upscaling method to make possible the test of evapotranspiration estimation from coarse resolution sensor (like AVHRR).
- 2.3.- check the validity of applying the resistance indexes, developed in semi-arid areas, to more degraded areas.
- 2.4.- evaluate the vegetation resistance to the aridity and the severe drought periods (summer periods and the severe interannual periods) for mapping the grade of water use efficiency.
- 2.5.- evaluate the vegetation resistance and water use efficiency in relation to the environmental factors and Land Use.
- 2.6.- compare the models of emissivity and temperature retrieval in the different environments of the study area.

The aim of the WATERMED project is to contribute to the international efforts to efficiency in water use, in particular for the Mediterranean Basin countries. We intend to contribute to the general desertification framework for such a system by comparing results produced by simulation models with variables estimated from satellite observations, previously validated by means of in situ data. This requires implementing and evaluating methods and techniques for water use modelling and satellite estimation of some critical variables.

RESULTS PUBLICATION/DISSEMINATION PLANS

Publications in scientific journals and Transfer of results via WWW site
<http://www.uv.es/ucg/watermed>

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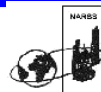
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EUROPEAN COMMISSION