

## **Ground observations and remote sensing data for integrated modelisation of water budget in the Merguellil catchment, Tunisia**

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The Mediterranean region is affected by water scarcity. Some countries as Tunisia reached the limit of 550 m<sup>3</sup>/year/capita due overexploitation of low water resources for irrigation, domestic uses and industry. A lot of programs aim to evaluate strategies to improve water consumption at regional level. In central Tunisia, on the Merguellil catchment, we develop integrated water resources modelisations based on social investigations, ground observations and remote sensing data. The main objective is to close the water budget at regional level and to estimate irrigation and water pumping to test scenarios with endusers. Our works benefit from French, bilateral and European projects (ANR, MISTRALS/SICMed, FP6, FP7...), GMES/GEOLAND-ESA) and also network projects as JECAM and AERONET, where the Merguellil site is a reference. This site has specific characteristics associating irrigated and rainfed crops mixing cereals, market gardening and orchards and will be proposed as a new environmental observing system connected to the OMERE, TENSIFT and OSR systems respectively in Tunisia, Morocco and France.

We show here an original and large set of ground and remote sensing data mainly acquired from 2008 to present to be used for calibration/validation of water budget processes and integrated models for present and scenarios:

- Ground data: meteorological stations, water budget at local scale: fluxes tower, soil fluxes, soil and surface temperature, soil moisture, drainage, flow, water level in lakes, aquifer, vegetation parameters on selected fields/month (LAI, height, biomass, yield), land cover: 3 times/year, bare soil roughness, irrigation and pumping estimations, soil texture.
- Remote sensing data: remote sensing products from multi-platform (MODIS, SPOT, LANDSAT, ASTER, PLEIADES, ASAR, COSMO-SkyMed, TerraSAR X...), multi-wavelength (solar, micro-wave and thermal) and multi-resolution (0.5 meters to 1 km).

Ground observations are used (1) to calibrate soil-vegetation-atmosphere models at field scale on different compartment and irrigated and rainfed land during a limited time (seasons or set of dry and wet years), (2) to calibrate and validate particularly evapotranspiration derived from multi-wavelength satellite data at watershed level in relationships with the aquifer conditions: pumping and recharge rate. We will point out some examples.