

Predicting agricultural water use at territorial scale – Can Remote Sensing help identify management rules?

Mentor: Gilles Belaud || Tutor: Christina Orieschnig

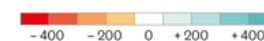
CONTEXT

- The Mediterranean area has been facing sustained water scarcity over the past years, making irrigation ever more crucial to agricultural production
- As water resources are limited, a thorough understanding of water demand (timing, flow demand) is essential. The demand for irrigation depends on physical environment, climate, infrastructure and equipment, crops, decision rules... which may largely vary according to the territories
- Modelling approaches can help us gain this understanding and make possible water demand prediction. However, in many areas the above information is not easily accessible. Large-scale models generally over-simplify the irrigation rules due to data scarcity.
- Remote sensing via satellites provides a potential solution to this scarcity.

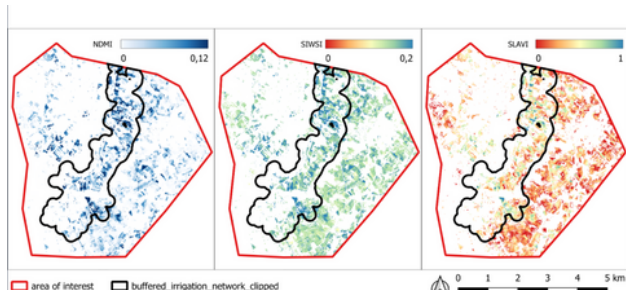
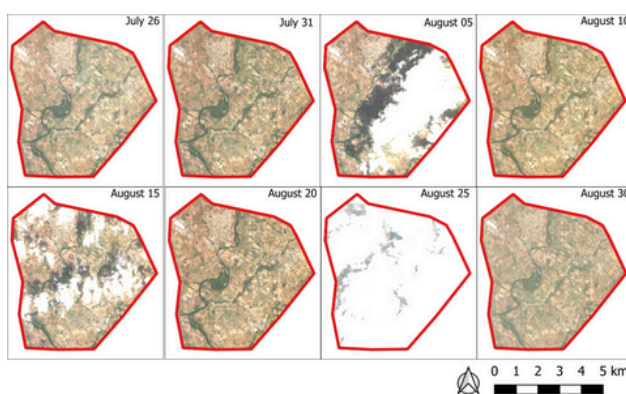


Drought in the Mediterranean Basin

Precipitation anomalies, in millimeters, during the last three months (December 2023 to February 2024), compared to the average for the same three months between 1980 and 2010



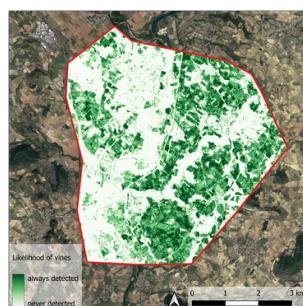
Le Monde Infographic • Source: CHIRPS



REFERENCES

Orieschnig, C. et al. "Input imagery, classifiers, and cloud computing: Insights from multi-temporal LULC mapping in the Cambodian Mekong Delta." *European Journal of Remote Sensing* 54.1 (2021): 398-416.

Coron, L. et al. (2021). airGR: suite of GR hydrological models for precipitation-runoff modelling. R package version 1.6. 12.



SCIENTIFIC OBJECTIVES

- Development of a method to identify fixed characteristics and decision rules explaining agricultural water demand
- Understanding the main drivers of this demand in selected Mediterranean watersheds
- Proposing a module to calculate agricultural water demand at basin scale, to be integrated in the AirGR-IWRM platform

THE MISSION

- Literature review on agricultural water demand modelling
- Data collection and analysis: open databases, on-site data collection with surveys and interviews, flow data collection from water associations, hydrological data
- Testing of remote sensing algorithms (Google Earth Engine) on selected areas; development and testing of specific indices; application to long-term series
- Identification of specific information from remote sensing and surveys (crops, crop stages, soil water storage capacity, irrigation periods, available water in reservoirs...)
- Parameterization and evaluation of a water demand module, applied at basin scale

THE RESEARCH UNIT: G-EAU

- G-EAU is an interdisciplinary research unit located in the North of Montpellier at the Agropolis campus
- It unites both social and natural scientists interested in the study of water – from hydrogeologists and remote sensing experts to human geographers and sociohydrologists
- Students will be able to integrate themselves into a rich and welcoming environment of scientific diversity. Weekly events include the Friday discovery seminar series (Vendredi Découverte), and the communal coffee social every Tuesday.

