Modelling interactions between the surface and hydro-systems over the Crau Camargue region

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Context & Scientific Issues

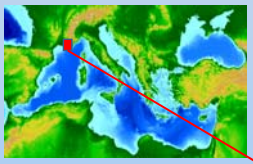
The Crau-Camargue region presents a wide variability of crops and natural ecosystems unique in Europe. It's a pilot site for the hymex project. With the global changes, we observed landuse and agricultural practices modifications. The human influence has strongly modified the water cycle. Different projects* were conducted to quantify the impact of these changes on the environment (in terms of indicators on the biomass, water resources: quantity, quality, salinity, ground table recharge). These studies allow to better understand all the interactions between surface and atmosphere, continental water and sea.

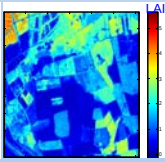
*described below

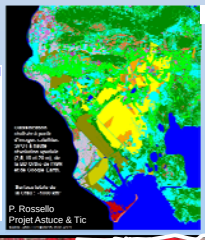
Tools & Data

Experimentation: numerous ground & airborne measurements
Remote sensing data at various spectral and spatial resolutions
Different Models:
1- radiative transfer models (SAIL,FLIGHT)->LAI, albedo, FAPAR, Fcover,Ts
2- SVAT (SURFEX, SEBAL,S-SEBI) -> surface fluxes (LE,H,Rn,G)
3- atmospheric models (Meso-NH, PBLs) -> crop microclimate, Tair
4- crop model (STICS) -> yield for various crops, biomass, water budget
5- geochimical model (PHREEQC) -> water and soil quality
5- hydro-geological models (MODFLOW) -> aquifers (recharge)
6- forecasting tool (METRONAMICA) -> landuse evolution (urban & crops)

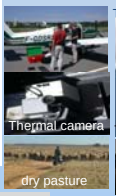
Estimation of biophysical variables

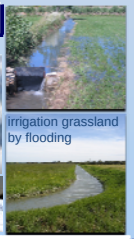


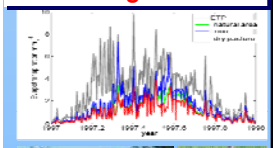


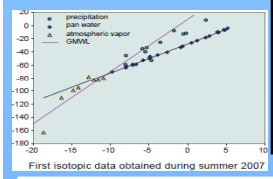
Airborne measurts



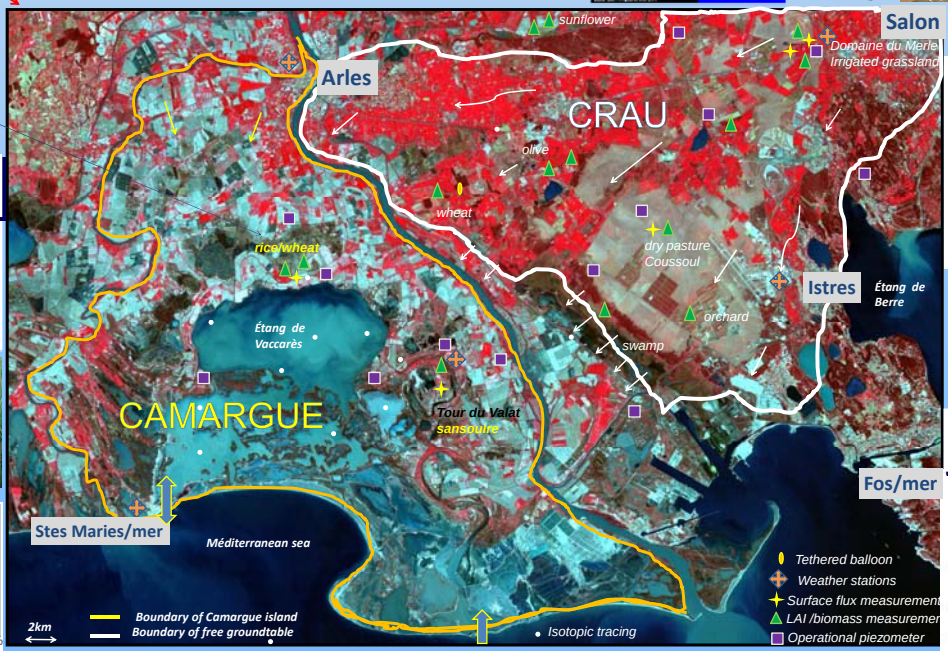


Evapotranspiration monitoring

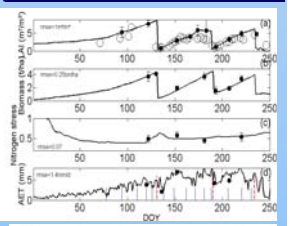


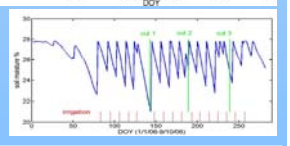



First isotopic data obtained during summer 2007

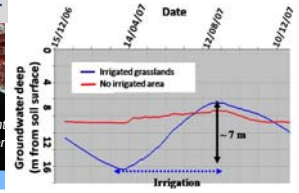


Grassland functioning

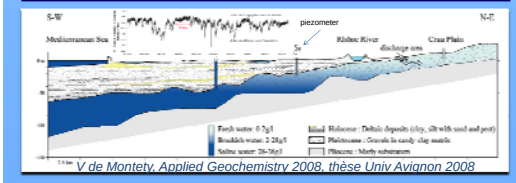




Impact of irrigation on ground table recharge

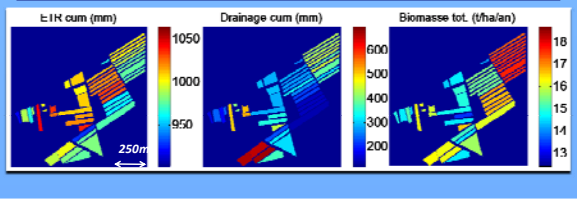


hydro-geological functioning of aquifer



V de Montety, Applied Geochemistry 2008, thèse Univ Avignon 2008

Mapping of AET, Drainage, & Biomass



Water budget: 60% of irrigation +rain-> ground table recharge

Rain mm	Irrigation mm	AET mm	Drainage mm	Biomass ton/ha
505	2300	936	1680	13.5

Projects TOSCA funded by CNES: Potentialities assessment of future sensors for water and crop monitoring (Venμs, Sentinel 2, MISTIGRI)

EC2CO-Cytrix funded by INSU, following RESYST (ORE): the objectives were -i) to develop tools for analyzing the sensitivity of surface and subsurface waterbodies to changes in agriculture and climate & -ii) to quantify Vaccarès water balance by isotopic tracing and quantify impact of irrigation on ground table recharge.

ASTUCE &Tic funded by FUI DGE (french ministry) - PACA region: the objective is to develop a collaborative tool to integrate soil and water resources for spreading cities, mixing competence in economy,geography,agronomy http://3w.g2c.fr/portail/rubrique.php3?id_rubrique=12853

SIRRIMED funded FP7, addresses issues related to sustainable use of water in Mediterranean irrigated agricultural systems, with the overall aim of reducing irrigation water use. Improving water use efficiency is considered at farm, irrigation district and watershed.

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