

# Monitoring evapotranspiration over the Crau Aquifer from remote sensing and flux tower data



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## Contexte and objectives:

**Evapotranspiration (ET)** is a fundamental variable of the hydrological cycle. There is a strong need of methods to monitor ET in space and time, e.g. for evaluating crop water use, improving knowledge in surface processes in hydrological or climate modelling, as well as for weather forecast.

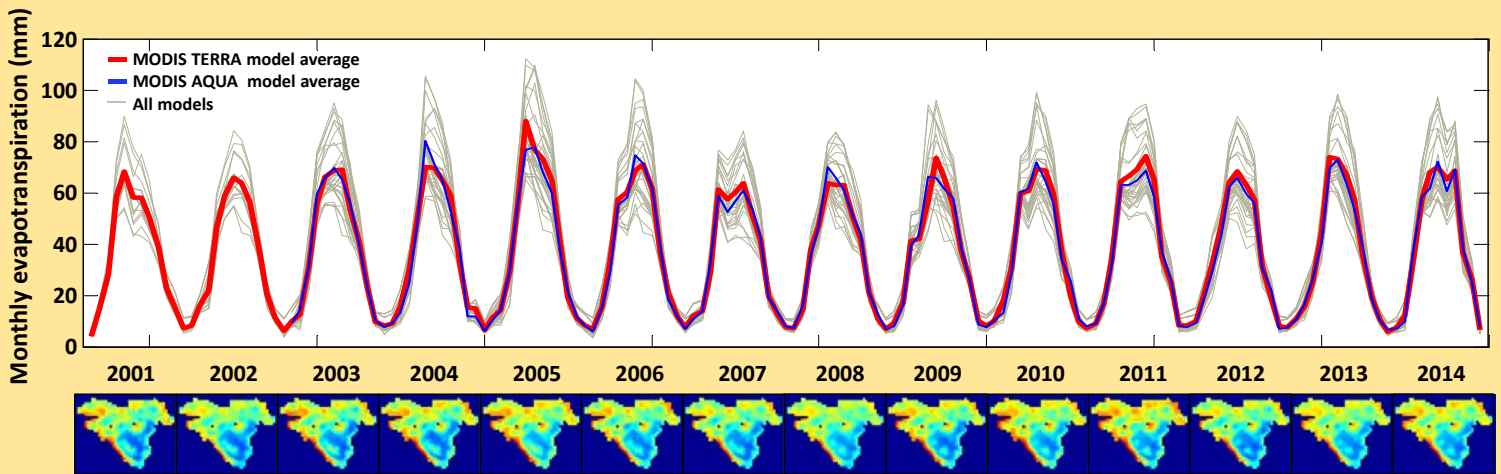
We have developed the EVASPA tool to provide continuous mapping of daily ET from remote sensing (RS) data at spatial and temporal scales relevant to hydrological or agronomical studies (Gallego-Elvira et al. 2013). In the frame of the SICMED-Crau project, EVASPA is used for monitoring evapotranspiration over the Crau aquifer (543 km<sup>2</sup>). Ground measurements of ET (flux towers) are used for evaluating RS estimations.

## Methods

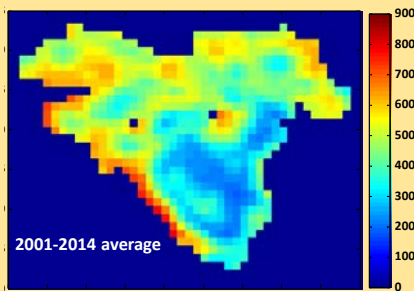
**EVASPA** was developed with specific characteristics:

- it includes several algorithms for estimating ET and various equations for estimating input information (net radiation, ground heat flux, evaporative fraction...); this provides a way to assess uncertainties in ET derivation
- it integrates various RS sensors and it can be easily adapted to new sensors
- interpolation procedures are used for calculating ET on days without RS images, so that continuous estimation is provided

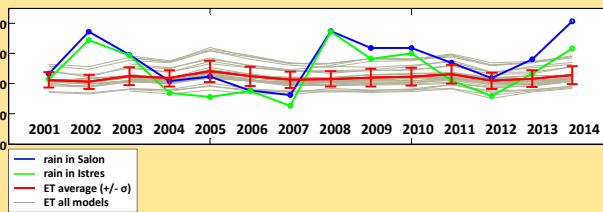
Over the Crau aquifer we used MODIS data from both TERRA and AQUA space platform. They provide daily RS data at 1 km spatial resolution since the year 2000



## Annual evapotranspiration (mm y<sup>-1</sup>)



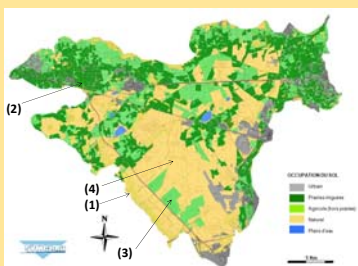
## Annual evapotranspiration and rain (mm y<sup>-1</sup>)



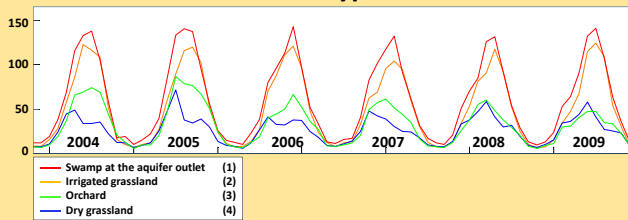
## Water balance of the Crau aquifer area

EVASPA	Olioso et al. (2013)
Rain (Salon)	299 hm <sup>3</sup>
Rain (Istres)	260 hm <sup>3</sup>
ET	ET (SAFRAN) 294 hm <sup>3</sup>
	ET (surface models) 321 hm <sup>3</sup>
	Irrigation 297 hm <sup>3</sup>
	Drainage 277 hm <sup>3</sup>

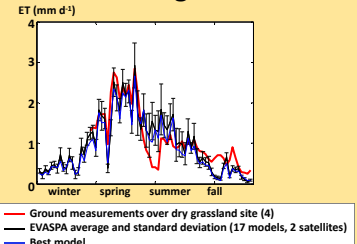
## Land use (~2000)



## Monthly evapotranspiration (mm y<sup>-1</sup>) for the main land use types



## Comparison of EVASPA estimates to ground data



References:  
Gallego-Elvira B. et al., 2013. EVASPA (Evapotranspiration Assessment from SPACE) tool. An overview. *Procedia Environmental Sciences*, 19, 303-310.  
Olioso A. et al., 2013. Modelling of drainage and hay production over the Crau aquifer for analysing impact of global change on aquifer recharge. *Procedia Environmental Sciences*, 19, 691-700.

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