



Centre d'Études Spatiales de la BIOSphère
Unité Mixte de Recherche 5126
CNES-CNRS-UPS-IRD
Toulouse France

France OSR

Midi Pyrénées Site

JECAM/GEOGLAM Science Meeting

Brussels, Belgium

16-17 November, 2015

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OSR: Site description

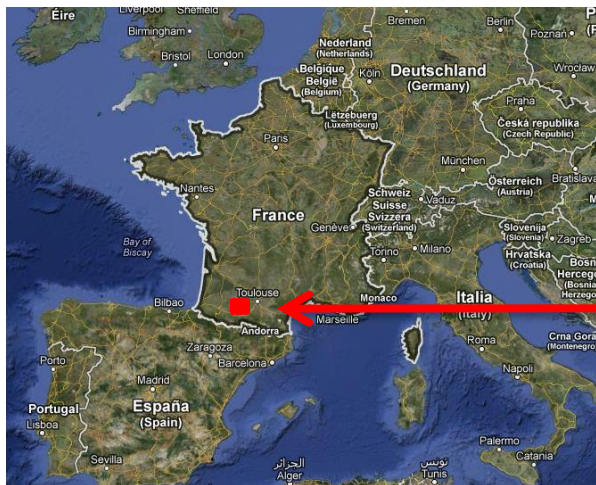
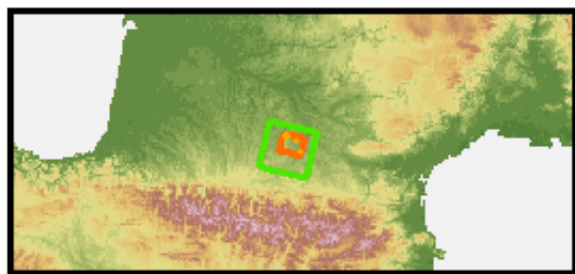
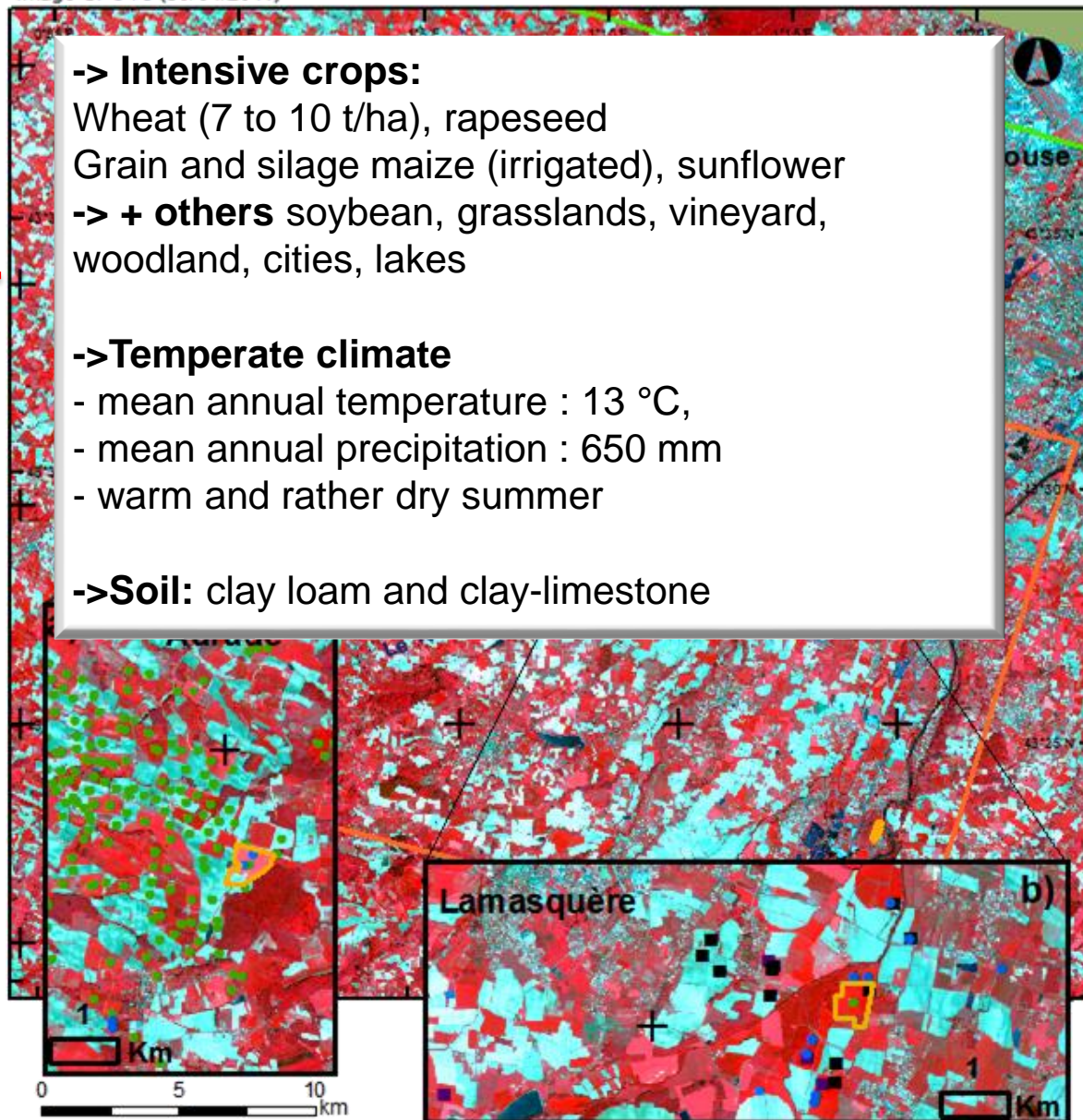


Image SPOT5 (30/04/2011)



Experimental Sites (Fluxnet, ICOS)

ESU Biomass & Yield Data (2011)

Yield Data (farmers surveys)

ESU LAI & Biomass Data (2008)

LAI & Biomass Data (2010)

SAFRAN grid

SPOT window (since 2002)

Formosat-2 window (since 2006)

OSR: Site description

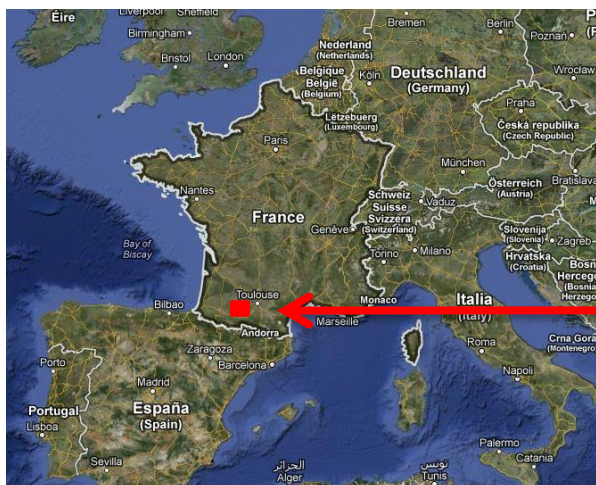
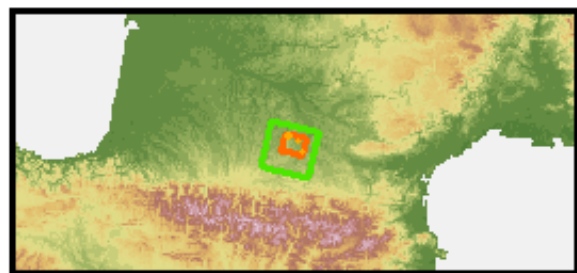
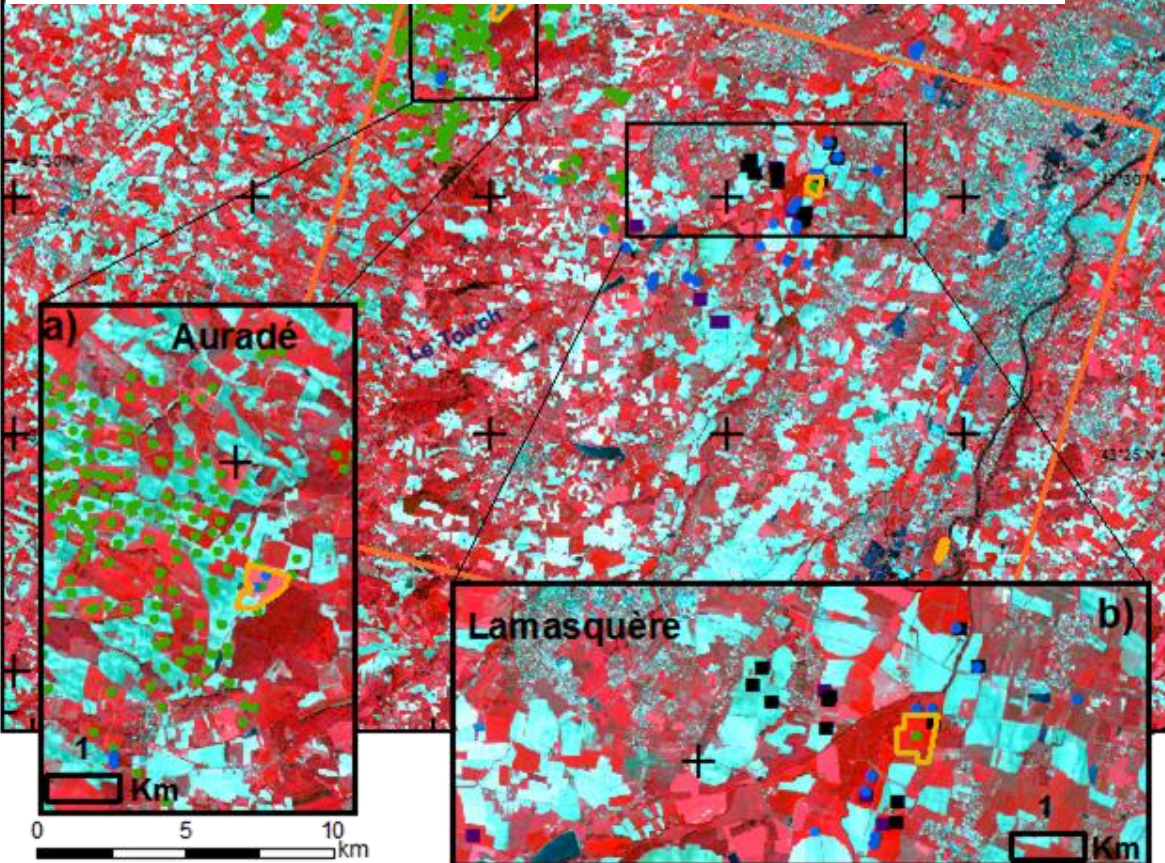


Image SPOT5 (30/04/2011)

In situ monitoring of the 2500 km² window :

- Sampling of land cover/use over ~300 fields
- LAI, biomass, farming practices on 10 to 30 fields
- Crop type from farmer declarations (thousands of fields)
- Irrigation from water authority



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Scientific objectives

- ❑ Research on the functioning of land surface: water and carbon fluxes, land cover/use, crop monitoring, ...
 - ◆ Calibration/validation of EO algorithms and products
 - ◆ Experimentations to prepare new EO missions (SMOS, Venµs, Sentinel 2)
- ❑ Approach: Long Term Experiment
 - ◆ Intensive and perennial in situ measurements: fluxes at the soil/vegetation/atmosphere interface, LAI, biomass, etc
 - ◆ Partnerships with local actors
 - ◆ Distribution of the data through internet OGC services (ongoing work)
- ❑ A regional component of the French Land Thematic Centre (Théia)
- ❑ CESBIO : a member of the Théia network of scientific expert laboratories

Two intensive monitored flux sites, part of the European ICOS network

Lamasquère site 43.78°N 01.40°E (started 2004), 32 ha

flat

Crop types: maize for silage and winter wheat.

Soil: Clay loam

Irrigation infrastructure for maize

Mineral and organic fertilization

Auradé site 43.91°N 1.17°E (started 2005), 23.5 ha

Crop types: winter wheat , rapeseed, sunflower

Soil: Clay limestone

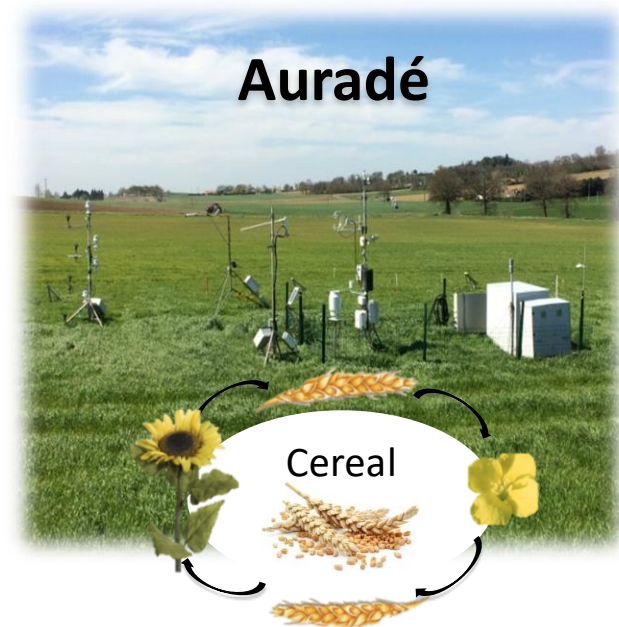
Mineral fertilization

More than 135 micro-meteorological variables

recorded every 30 minutes

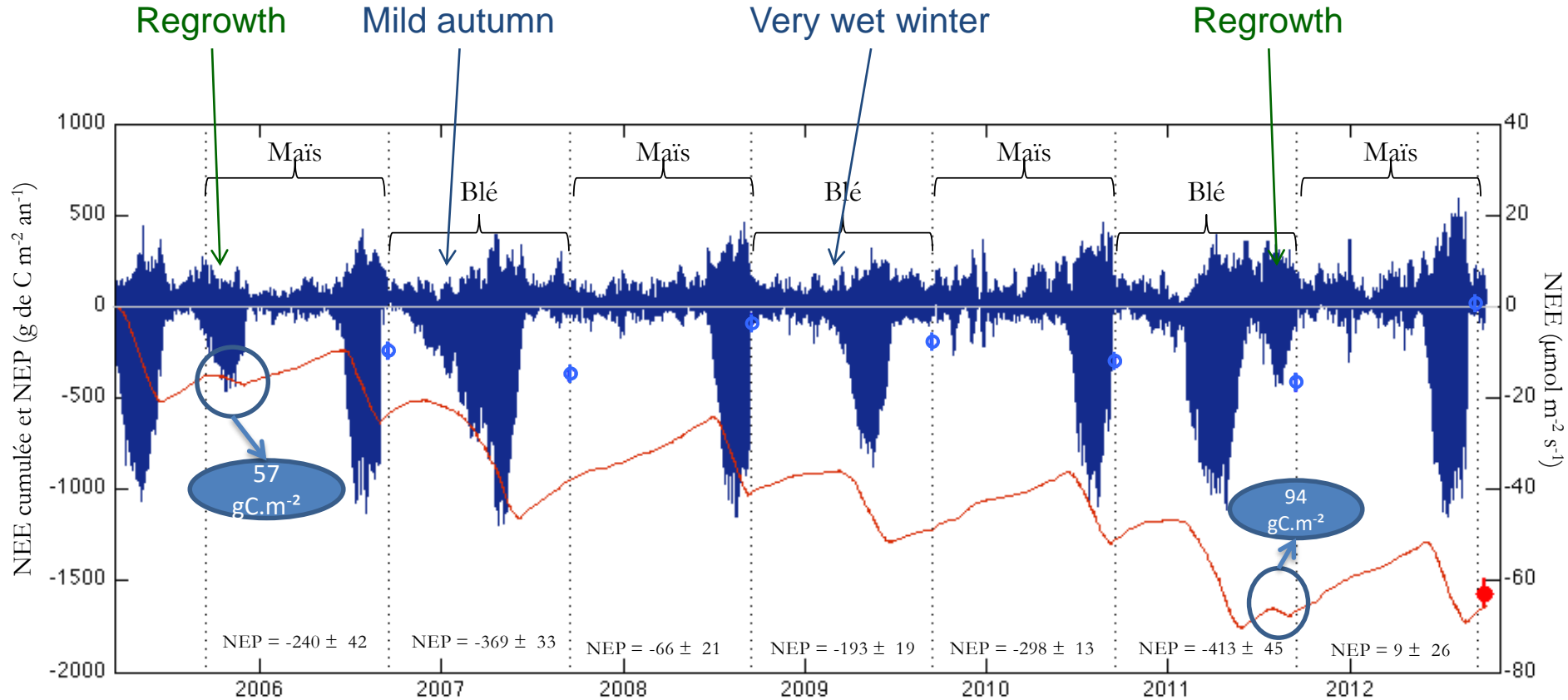
Micro-meteorological measurements: weather, radiation, eddy correlation for CO₂, H₂O and energy fluxes, automated chamber for soil respiration and N₂O fluxes,

Ancillary data LAI, biomass, yield+ farming practices, etc



Scientific activities around OSR

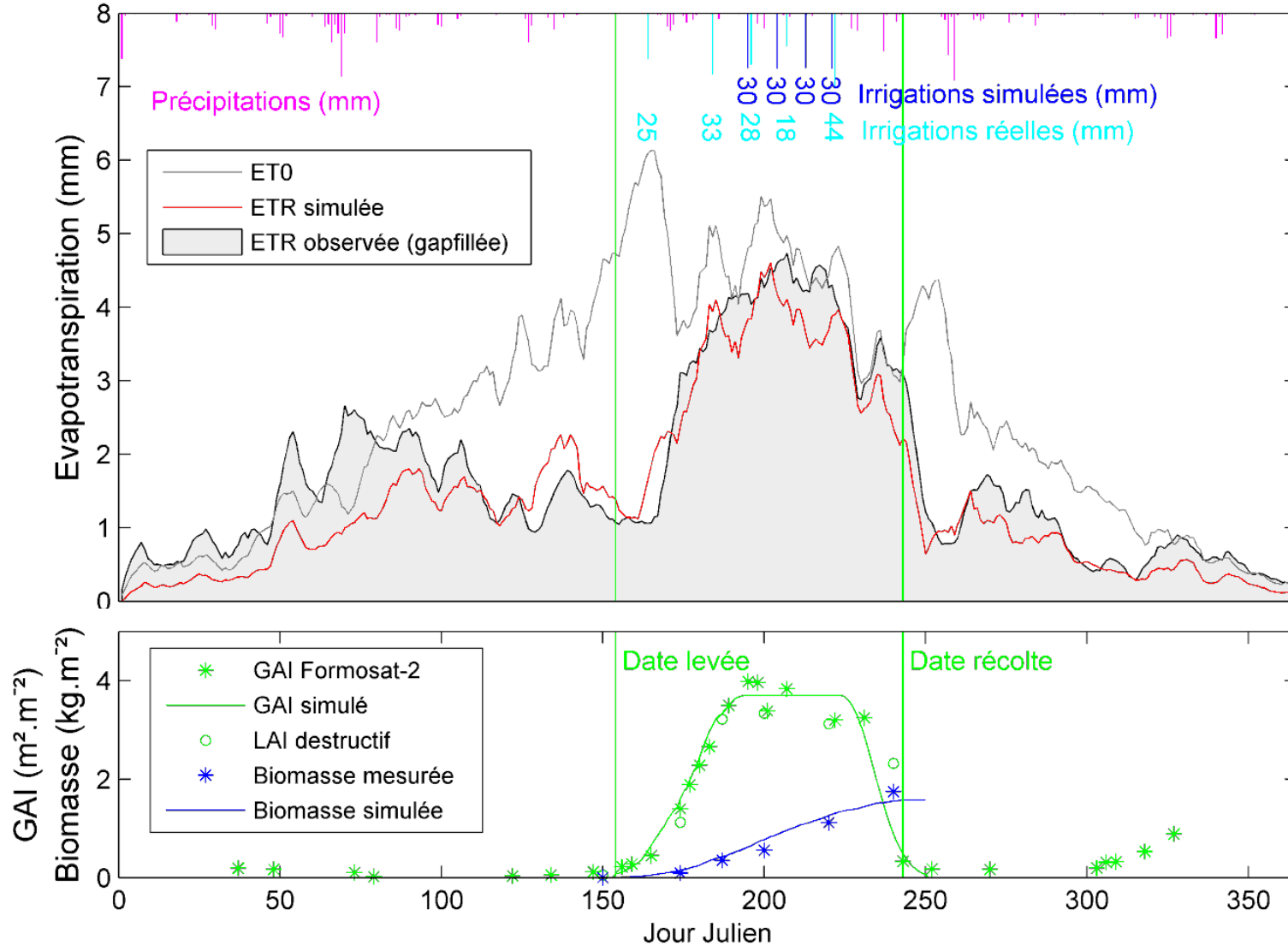
Analysis of net CO₂ fluxes at Lamasquère (2005 - 2012)



Scientific activities around OSR

SAFYE : modelling of crop functioning from plot to region scale

Observed and modelled evapotranspiration, irrigation, GAI (Green area index) and biomass of Maize crop (2006, Lamasquère)

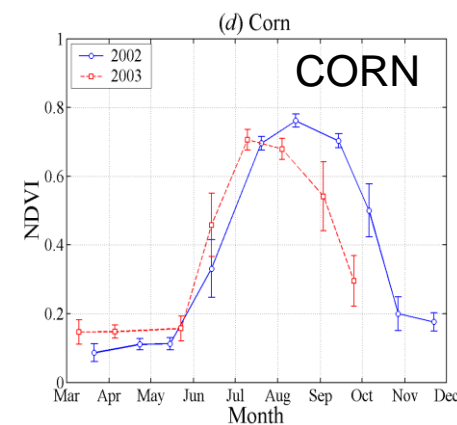
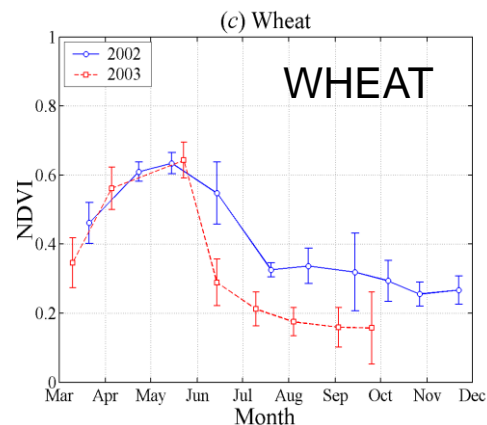


Remote Sensing Data

Continuous monitoring of the OSR area since 2002 in with Spot (2,4,5) and Formosat-2 with about a monthly sampling

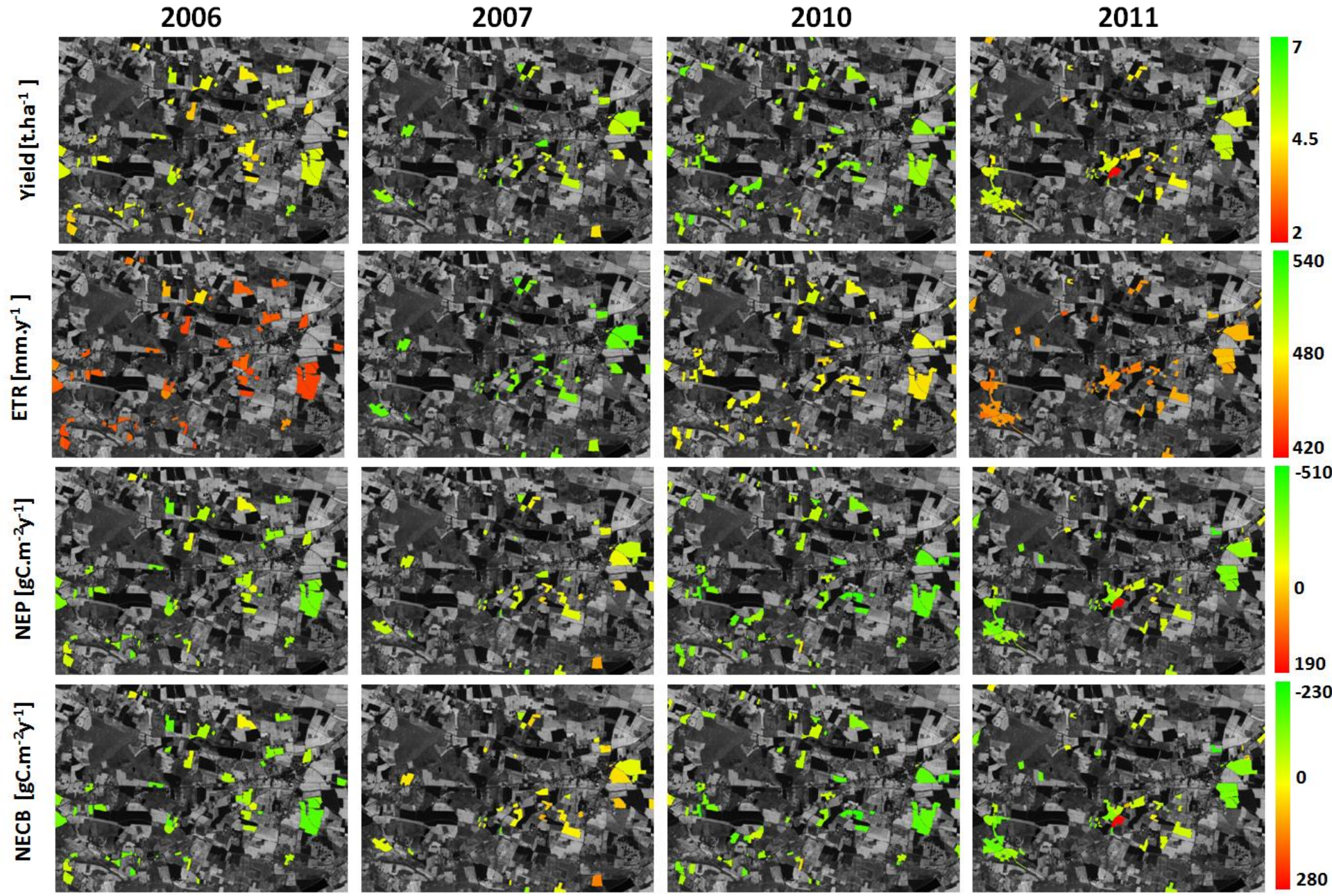
Additional image acquisition : Deimos 1, Pléiades, Radarsat, Alos-2, TerraSar-X, SPOT-4 and SPOT-5 Take 5 site

Landsat 8 : systematic processing by CNES (TOC reflectance) since launch



Mean and standard deviation of monthly NDVI over a 50x50 km area, in 2002 and 2003

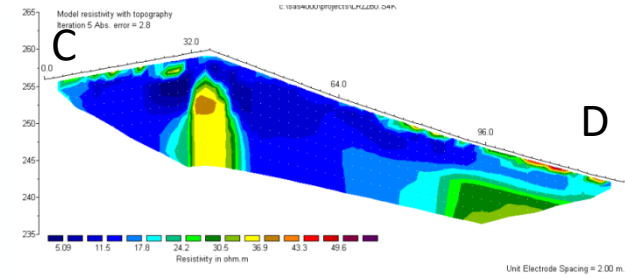
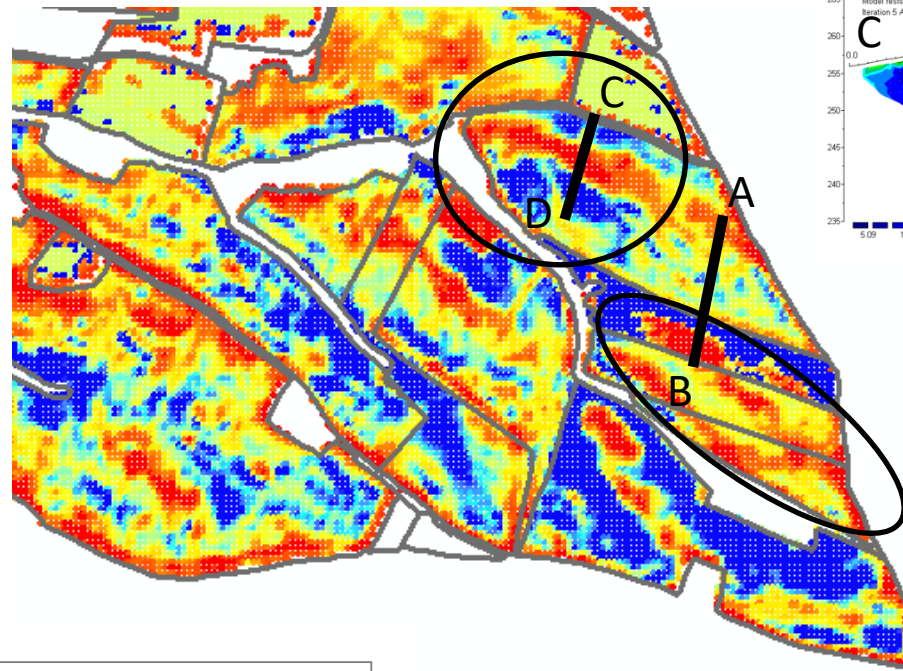
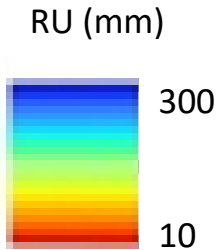
Regional estimates for wheat with SAFYE-CO2



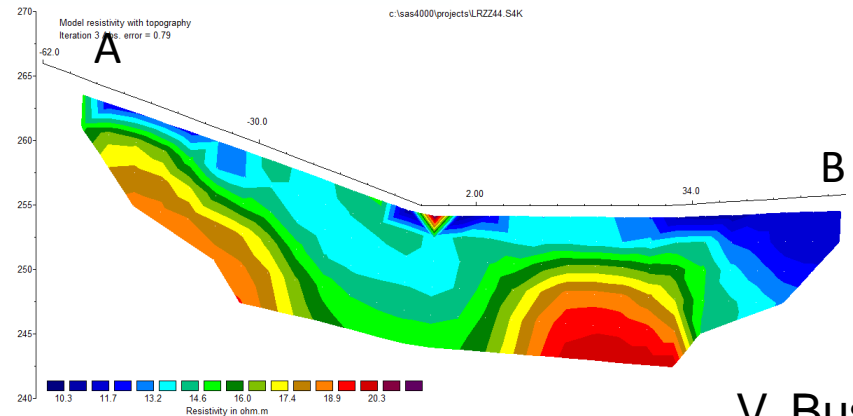
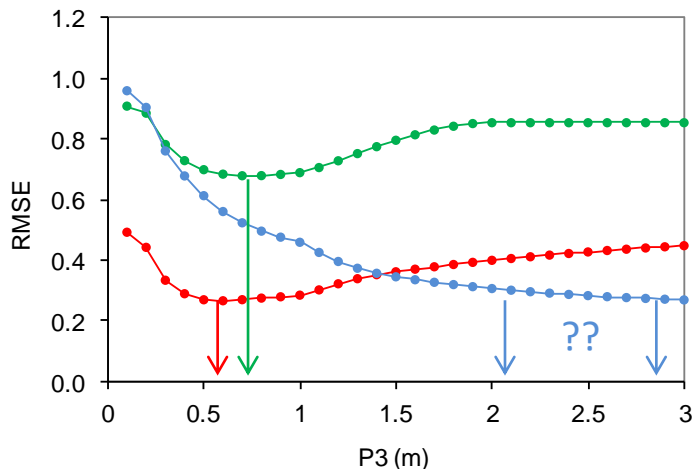
Mapping soil water holding capacity

Inversion of SAFYE by minimizing the $F=(LAI_{obs} - LAI_{safye})^2$ for each pixel

Test of 30 depth values => selecting the minimum for each year

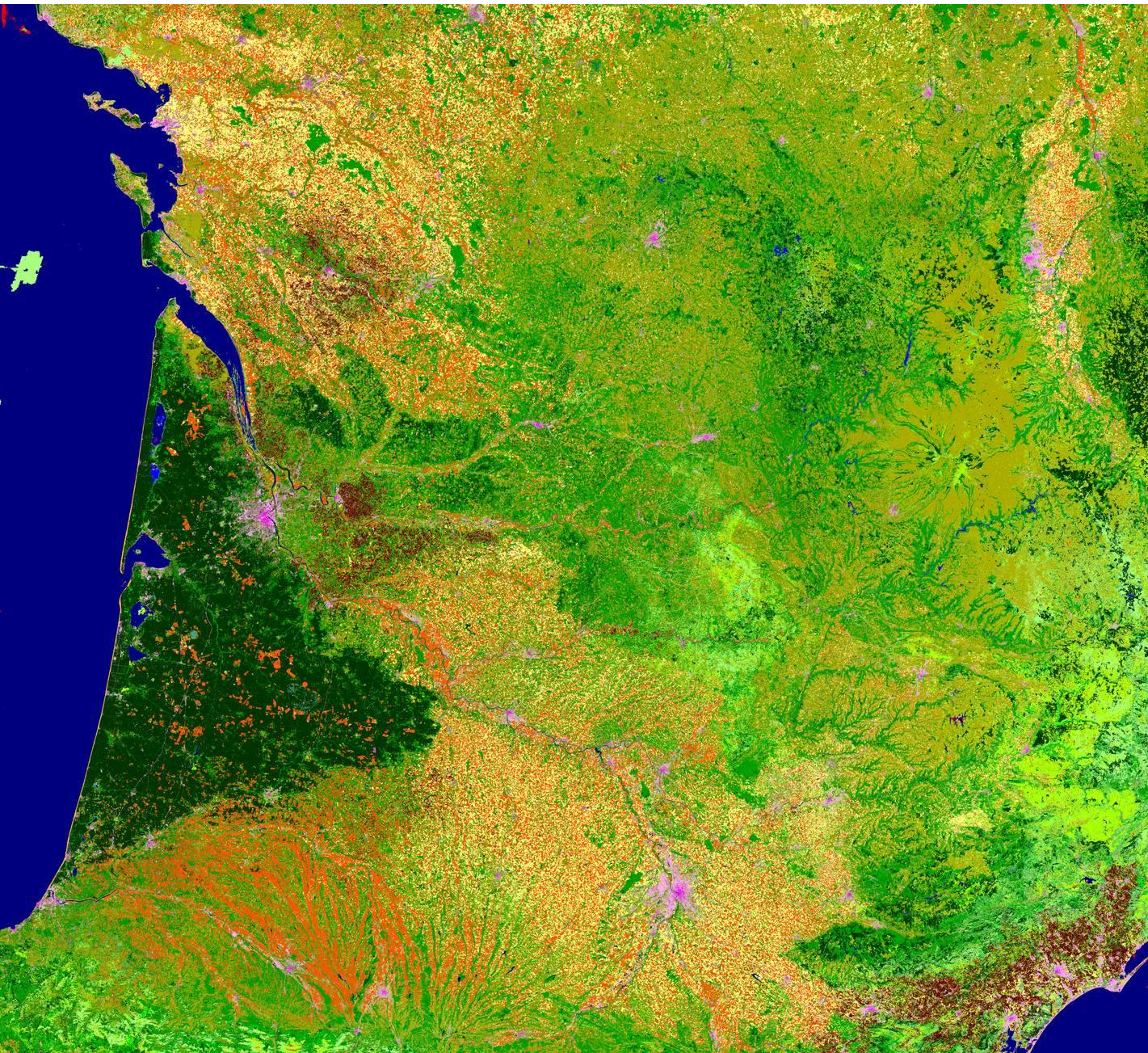


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Factors limiting \neq RU



Research plans for the next growing season

- Continuation of in situ-measurements and surveys
 - Continuation of research work on, for instance, EO data assimilation within crop/surface models
 - Main challenge : exploitation of Sentinel 1 and Sentinel 2 data over large areas
- ⇒ Sen2Agri project : production over 3 countries and five 300x300km² areas
- ⇒ Land cover mapping over France
- ⇒ Crop irrigation : test of DSS



Classe	FScore
11: Culture été	0.9086
12: Culture hiver	0.9184
31: Forêt feuilles caduques	0.7785
32: Forêt feuilles persistantes	0.7895
33: Forêts mélangées	0.2472
34: Pelouses	0.4690
35: Estives-landes	0.3454
36: Lande ligneuse	0.2378
41: Bâti dense	0.5775
43: Autre bâti	0.7096
45: Surfaces minérales	0.5622
46: Plages et dunes	0.6335
51: Eau	0.0973
52: Neige et glace	0.9931
53: Glaciers et neiges éternelles	0.0798
211: Prairie permanente	0.7974
221: Verger	0.1377
222: Vignes	0.7616
223: Olivier	0.0011
224: Arboriculture	0.0000
255/0: No data	

Land cover from Landat 8, 20 classes, 30m resolution, 600 km wide

Thank you for listening

And many thanks to the colleagues from CNES and CESBIO and to the partners in France, Morocco and Tunisia

<http://www.cesbio.ups-tlse.fr>

SMOS'Blog :

http://www.cesbio.ups-tlse.fr/SMOS_blog/

Take 5 / SPOT-4 Blog :

<http://www.cesbio.ups-tlse.fr/multitemp/>

Theia

<http://www.theia-land.fr/>