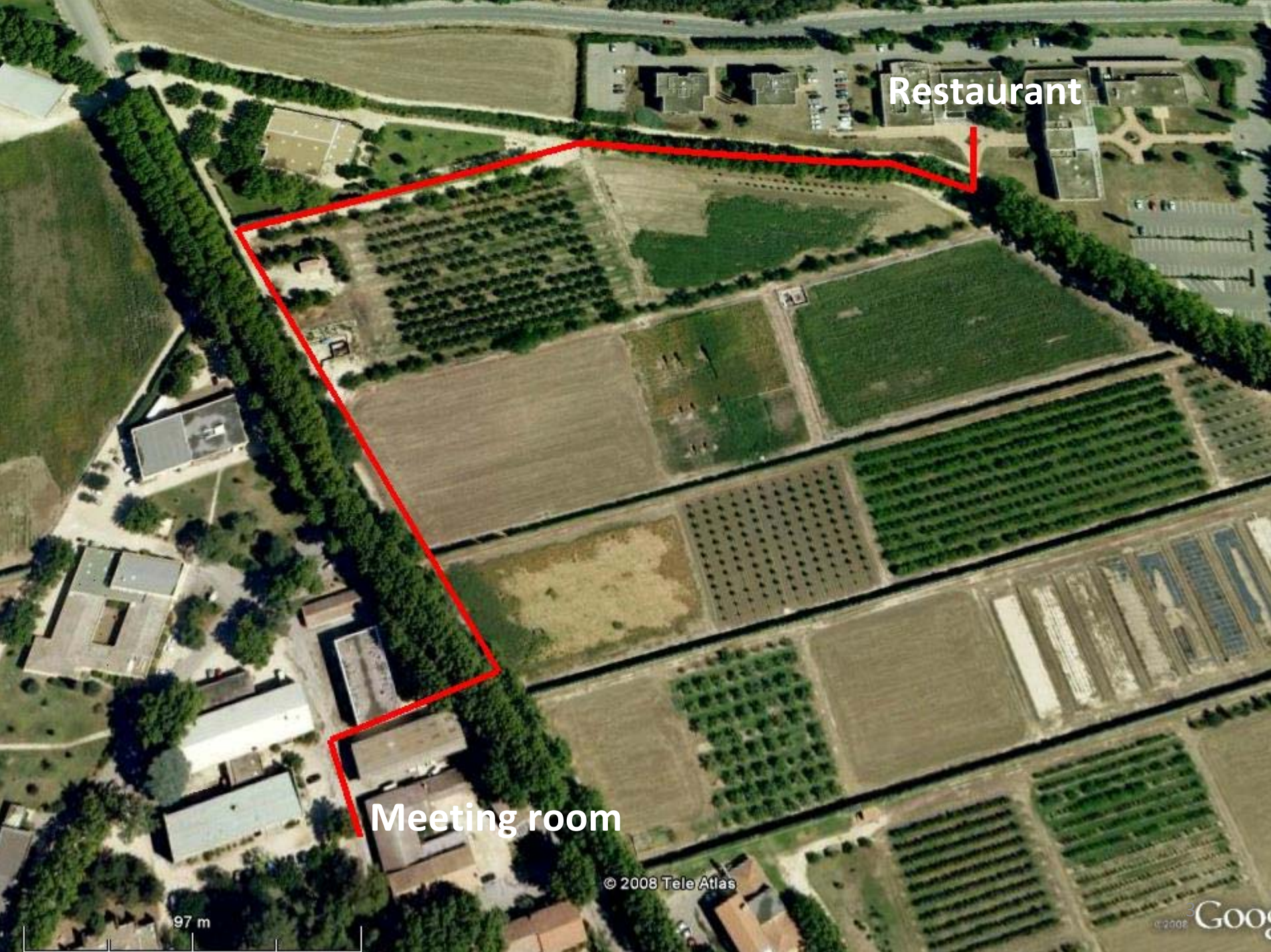
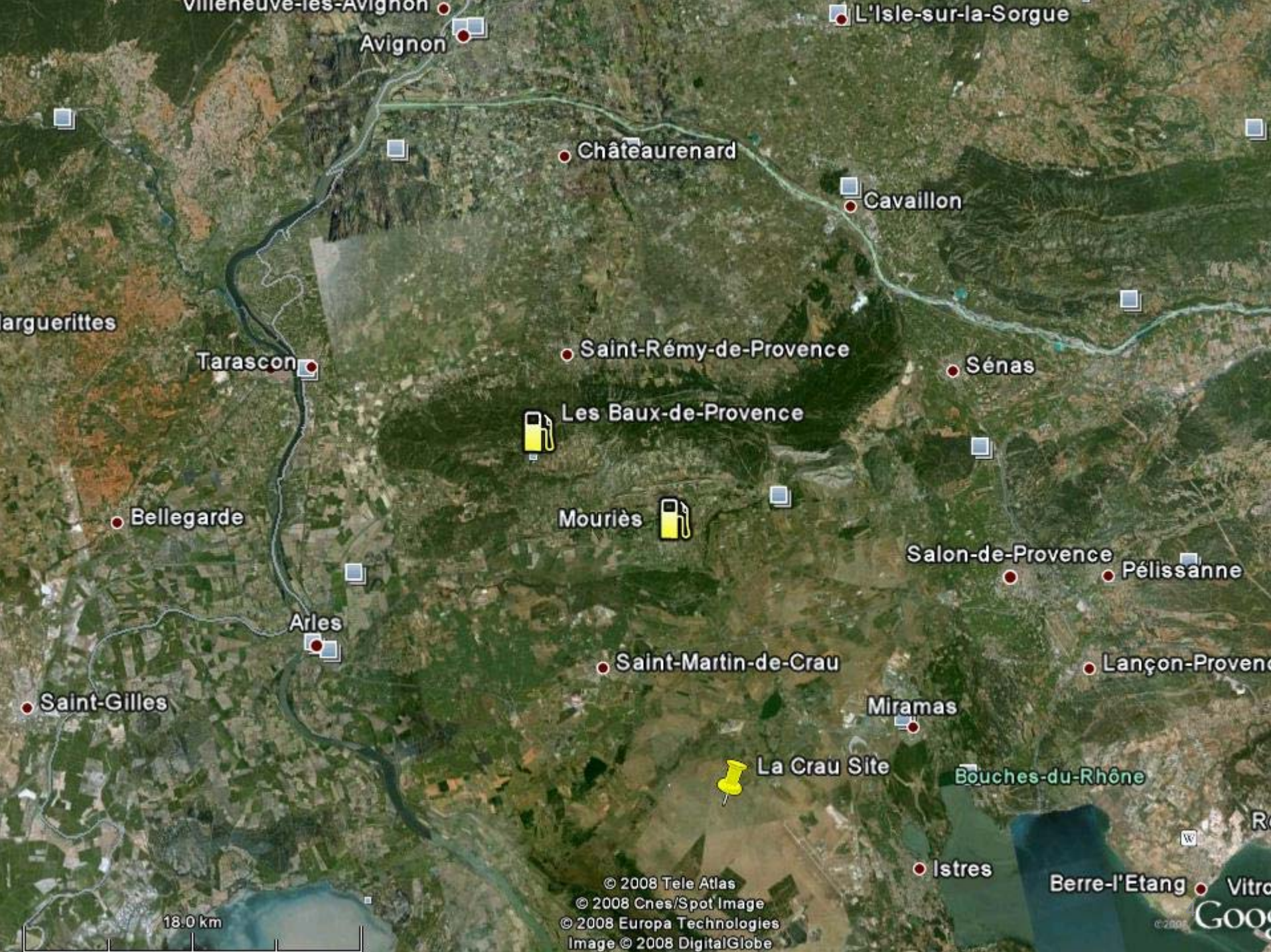
Welcome to the 29th CEOS WGCV

Avignon 30 September – 3 October

Some logistics

- WIFI access: take account name and password
- Lunch
  - About 500m from meeting room.
- Dinner on Wednesday 20:00
  - D'ici et d'ailleurs
- La Crau site Visit on Thursday 14:00
  - 14:45 Visit Les Baux de Provence (60 minutes)
  - 16:15 Mouries (Olive oil) (30 minutes)
  - 17:15 Visit La Crau Site (30 minutes)
  - 19:00 Back in Avignon


Restaurant
Meeting room
© 2008 Tele Atlas
97 m


Villeneuve-les-Avignon
Avignon
L'Isle-sur-la-Sorgue
Châteaurenard
Cavaillon
Saint-Rémy-de-Provence
Sénas
Tarascon
Les Baux-de-Provence
Mouriès
Bellegarde
Salon-de-Provence
Pélissanne
Arles
Saint-Martin-de-Crau
Lançon-Provence
Saint-Gilles
Miramas
La Crau Site
Bouches-du-Rhône
Istres
Berre-l'Etang
18.0 km
© 2008 Tele Atlas
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INRA Key figures

Institut National de la Recherche Agronomique

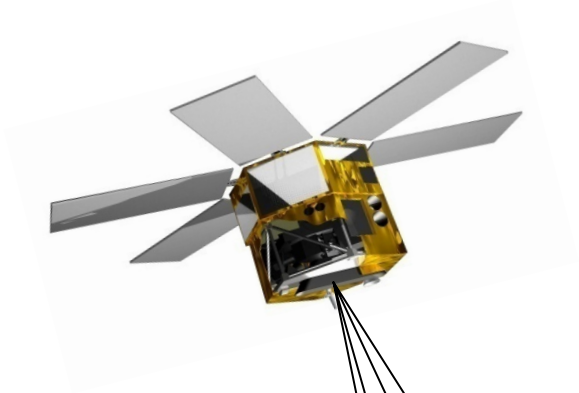
- 8,504 staff members, including:
  - -1800 researchers
  - -2400 engineers
  - -1800 PhD students
  - - 250 post-doc
- 14 research divisions,

- 20 regional centers,

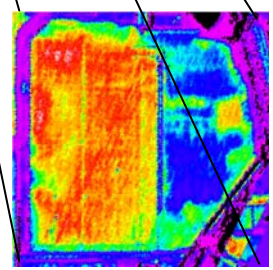
- €800 millions budget

- First ranked research institute in Europe for publications in Agriculture and Food

- Second ranked in the world



Remote sensing Activities at INRA



Institut National de la Recherche Agronomique

UMR 1114 INRA-UAPV
Environnement Méditerranéen et Modélisation des Agro-Hydrosystèmes

General Objectives

Characterizing vegetation functioning from the local to the global scales for:

- Improving knowledge on canopy processes:
  develop, calibrate, validate canopy process models
- Develop monitoring techniques (space and time),
- Provide information to models for decision making

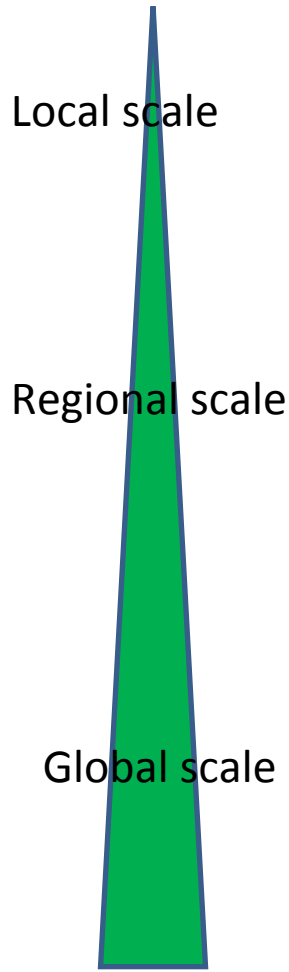
Applications

- **Precision farming**

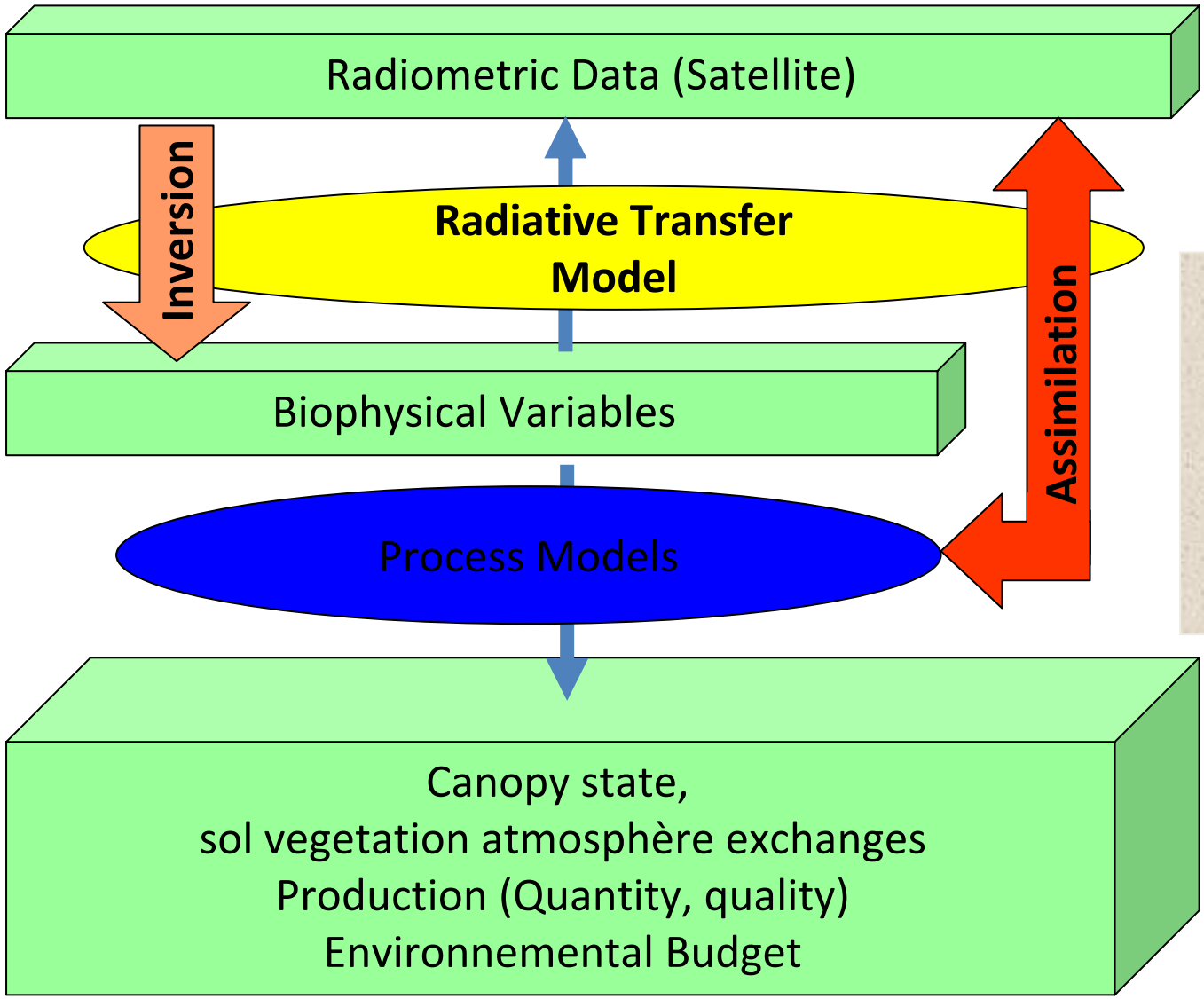
- **Hydrology**
- **Environmental budget**
- **Production estimation**
- **Landscape management**

- **Global change**

…

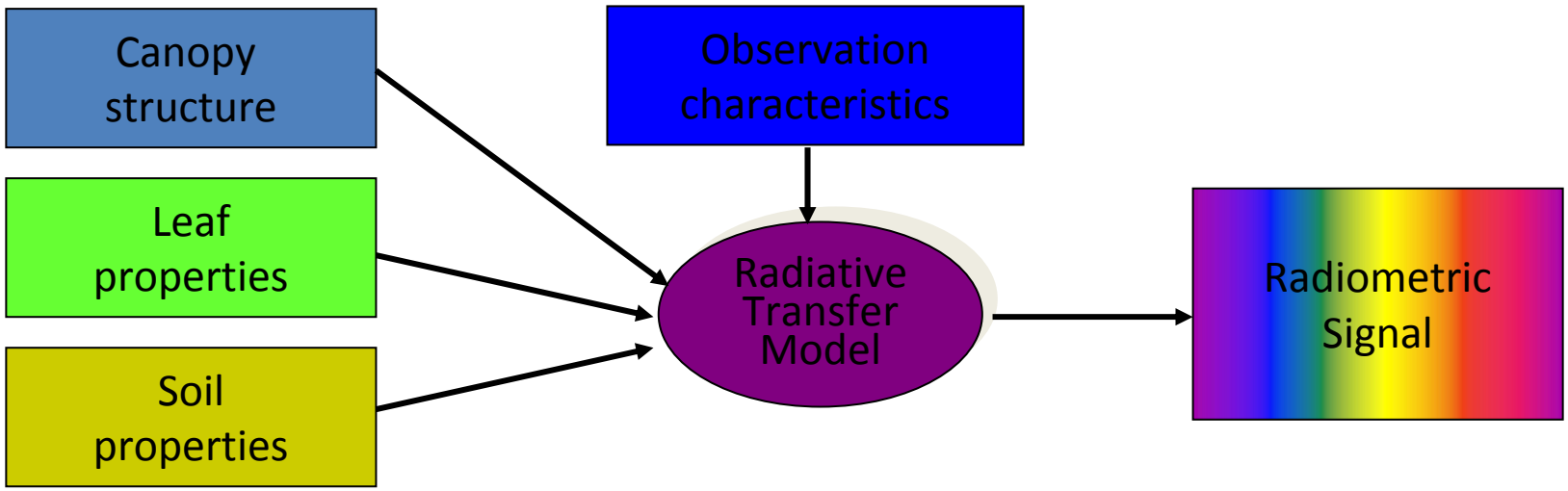


Research axes



3 axes
Modeling
Inversion
Assimilation

Radiative Transfer Modeling



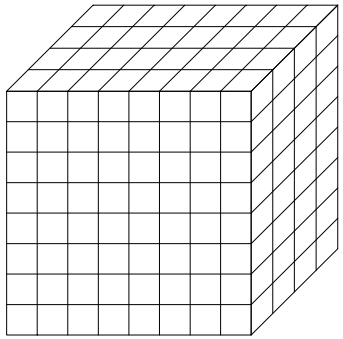
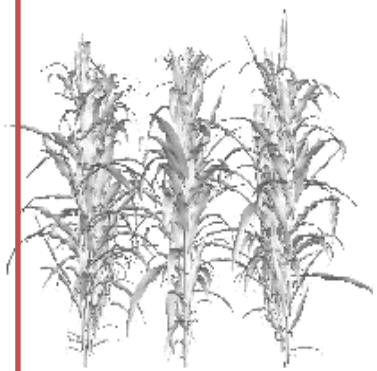
400-2500nm | 3-14µm | 1-30cm

Solar *(reflectance)*

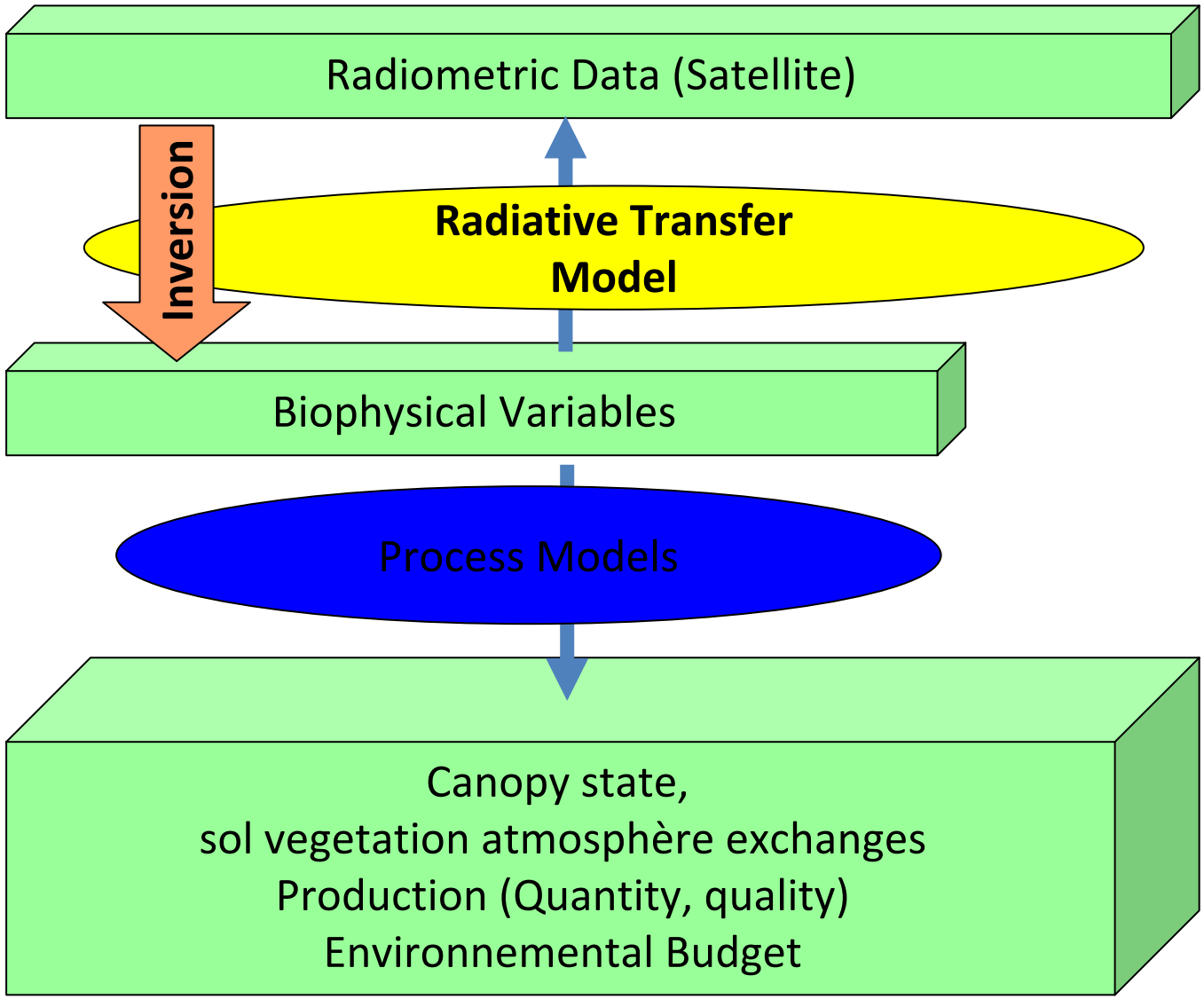
Thermal *(Temperature)*

µ-waves *(Backscatering, Temperature)*

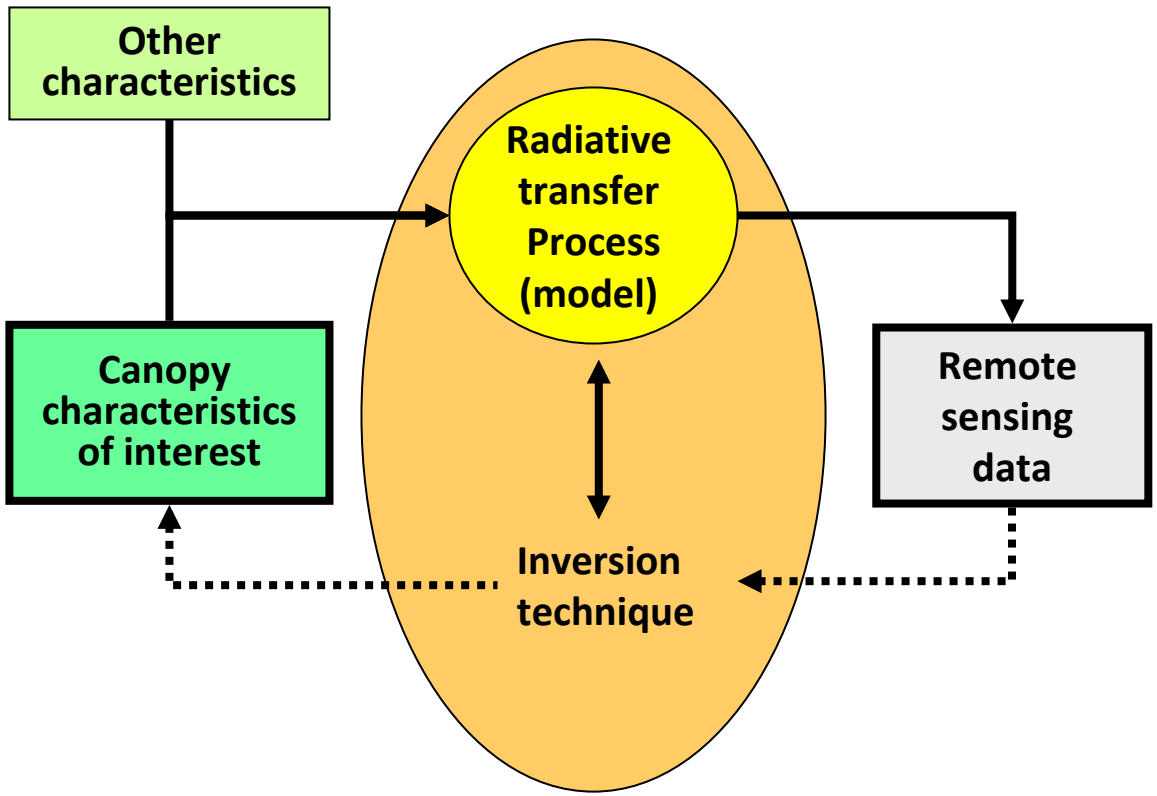
Canopy structure description

	Turbid medium	Geometric	Explicit	IDEAL
				?
Accuracy	**+**	**+ +**	**+ + +**	**+++**
Number of variables	**4**	**6+n**	**6+m**	**6+ε**
Computation speed	**+ + +**	**+ +**	**+**	**+++**

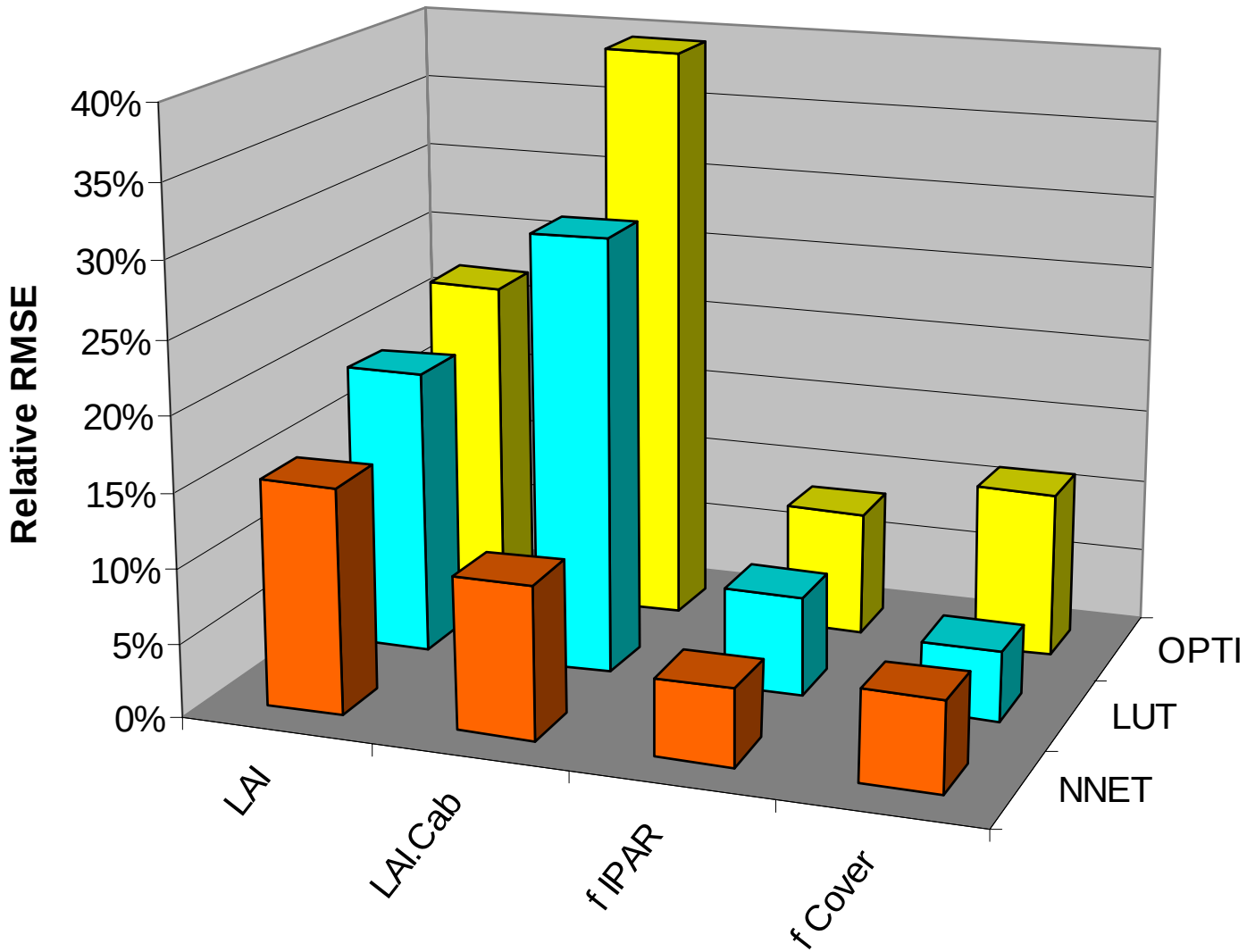
Model inversion



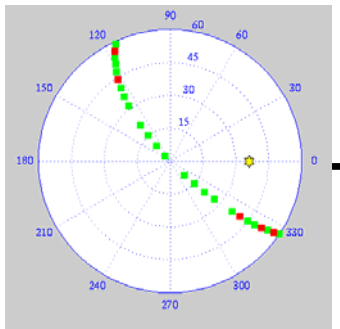
Model inversion to retrieve canopy biophysical variables



Comparison of model inversion techniques



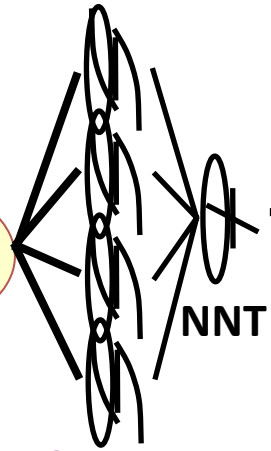
Exemples over ReSeDA 1997



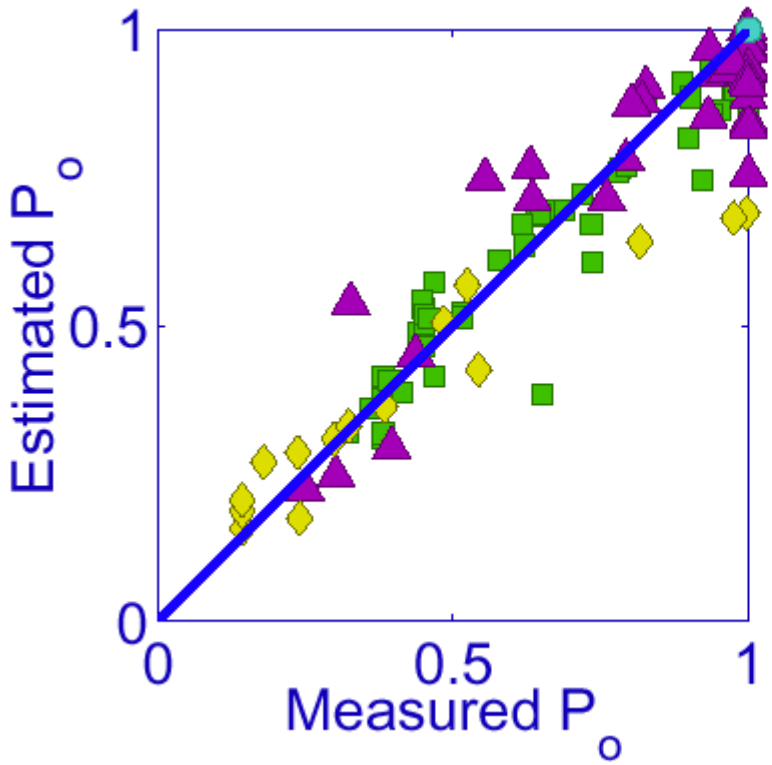
POLDER
Directional
sampling

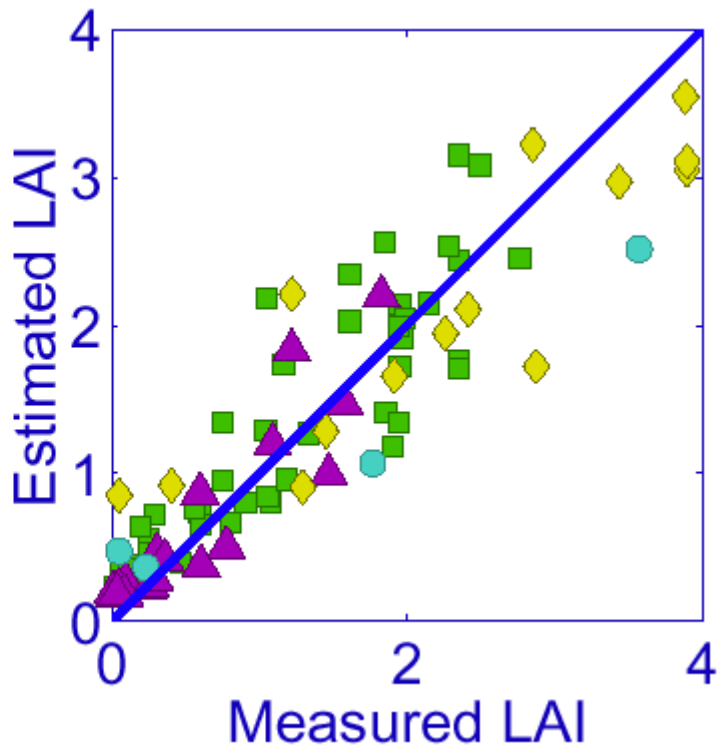
Pre-
processing

input
Variables



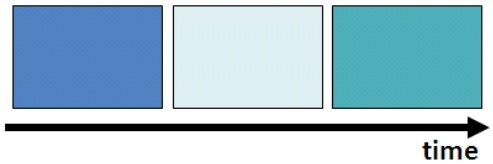
Biophysical
Variable



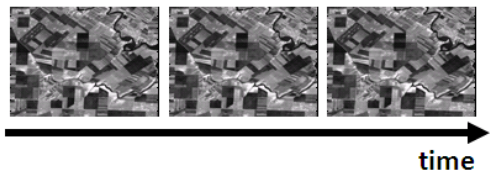


Adding constraints: Multitemporal patch inversion

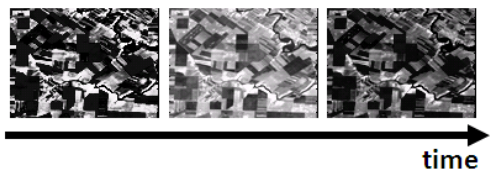
- **Atmosphere characteristics :**
  $A = (t_{550}, P_{atm}, C_{wv}, C_{03})$
  ➔ *fixed on a given spatial window (few kilometers) but varies with time*

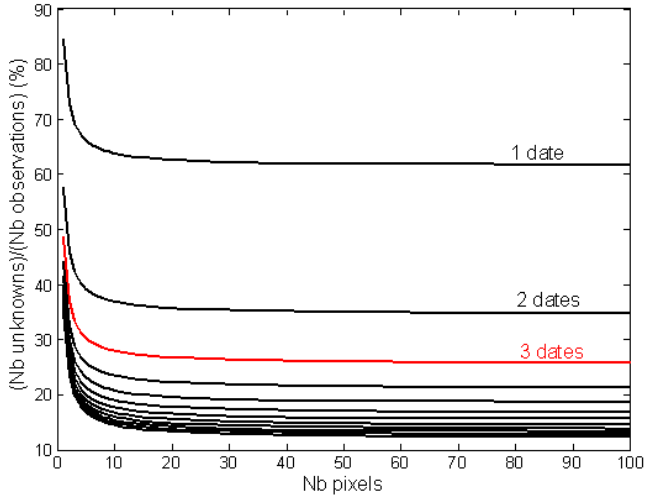


- **Leaves and Canopy properties :**
  C = (N, Cab, Cdm, Cs, LAI, ALA , Hot)
  ➔ *little variation in a given temporal window (10 days) but varies with space*



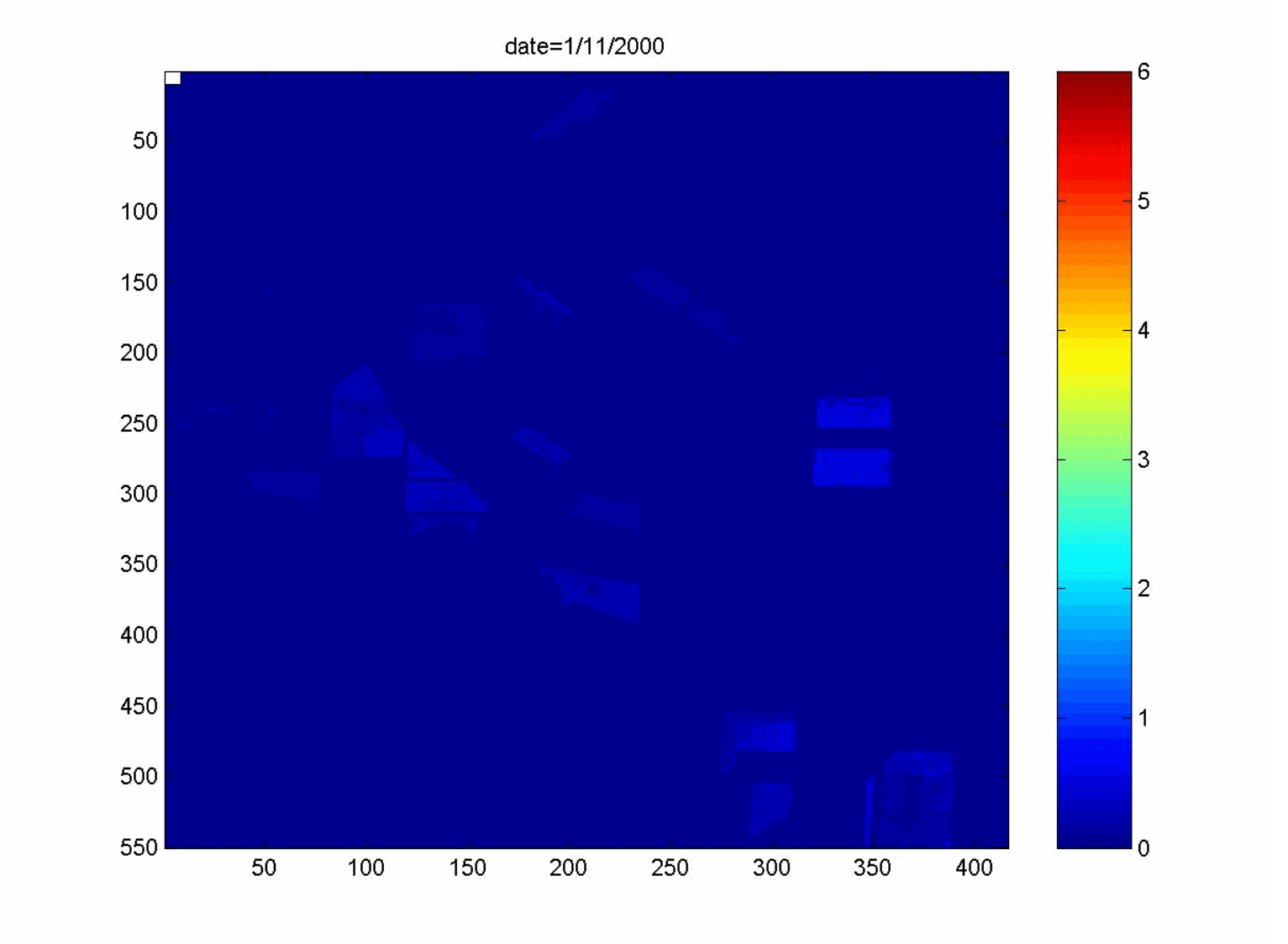
- **The background brightness** Bs
  ➔ *can vary both temporally and spatially*
  ➔ *unconstrained*



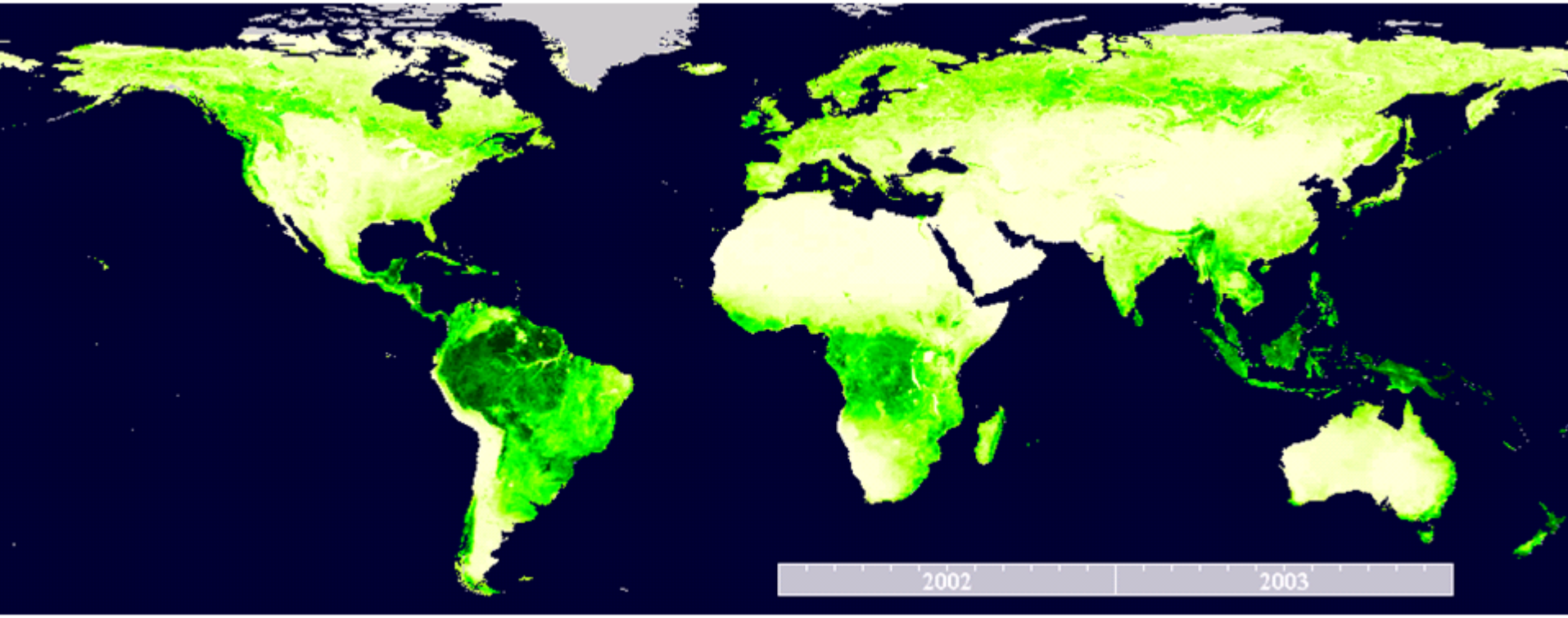


Application to the inversion from an heterogeneous ensemble of sensors

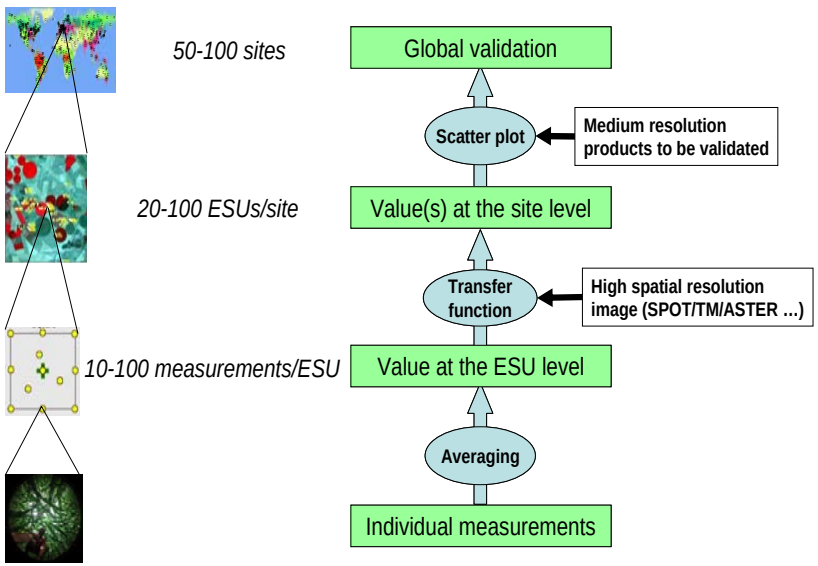
Resultats: LAI-dynamics (ADAM 2001)

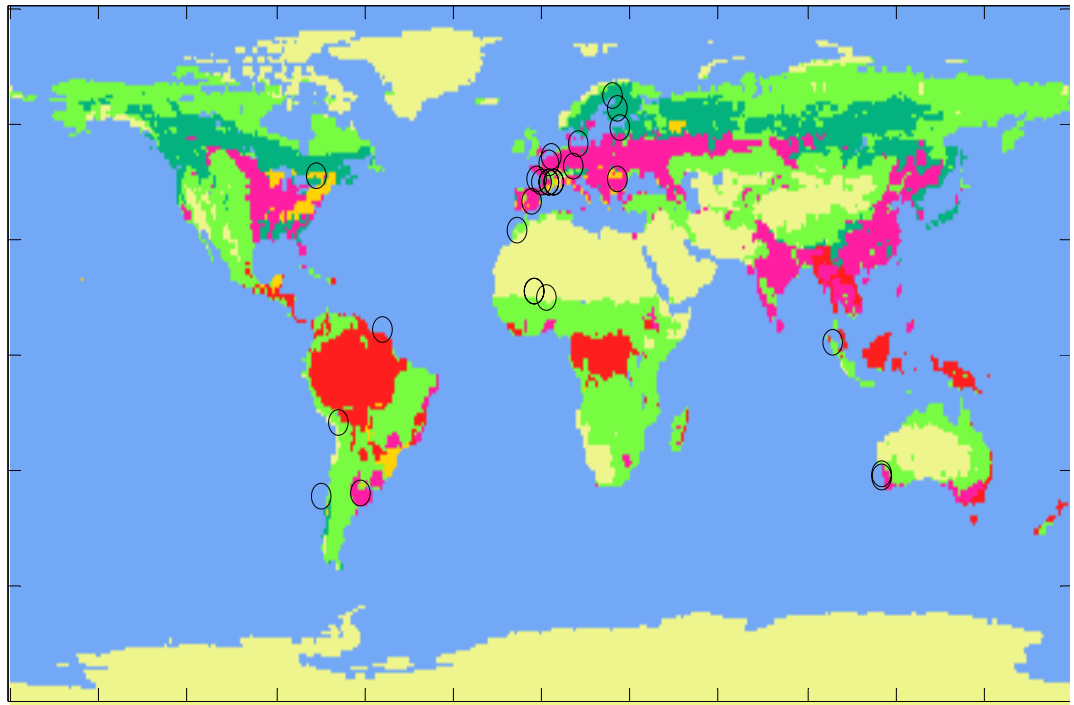


CYCLOPES LAI products from VEGETATION



VALERI
Validation of medium resolution sensors

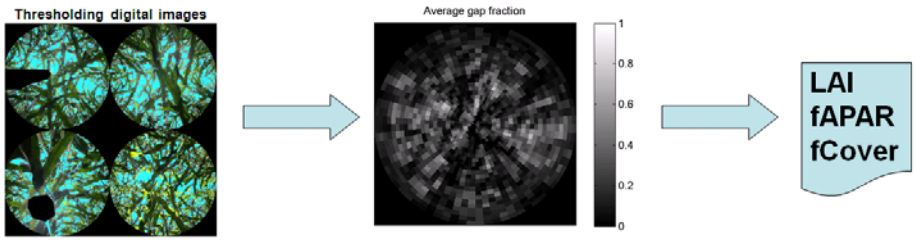


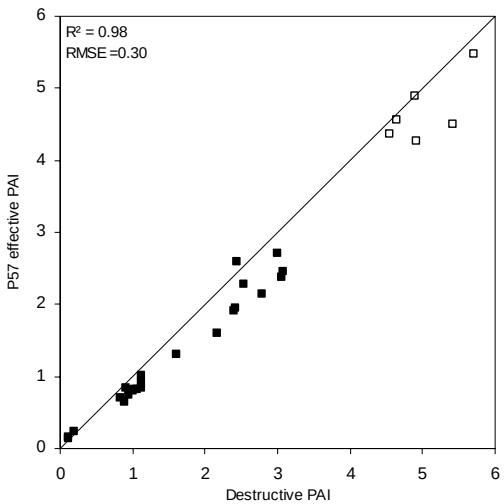


50 sites*year located around the globe; few sites have been sampled several times across season/years

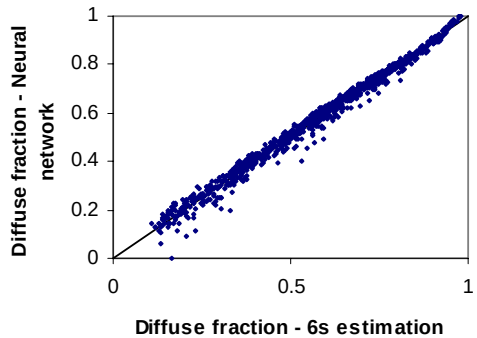
New Ground measurement methods

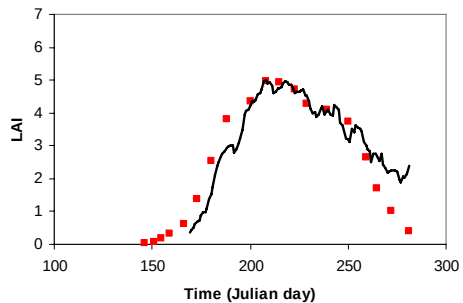
Digital photos (snapshot)



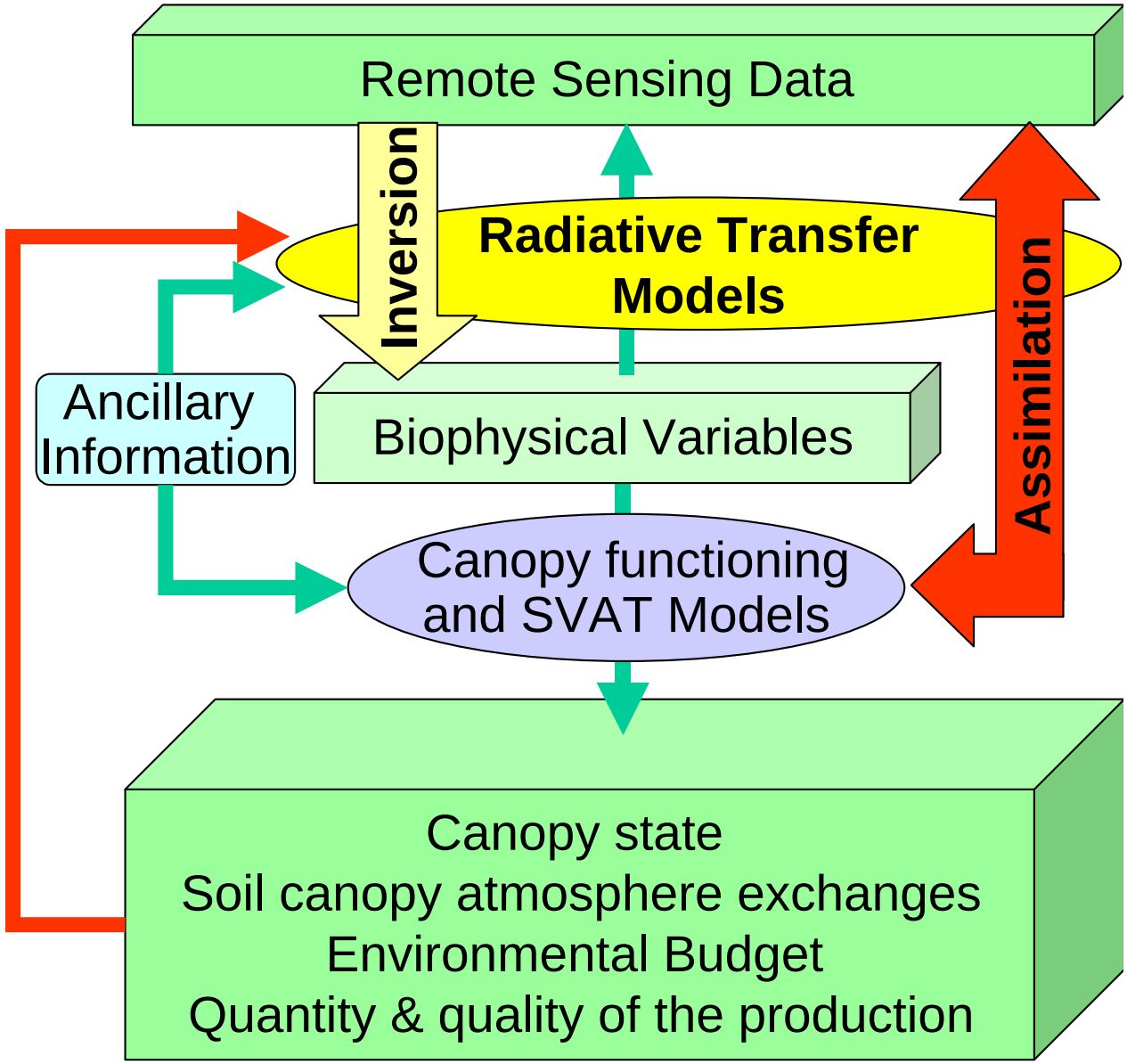


Continuous monitoring PAR@METER

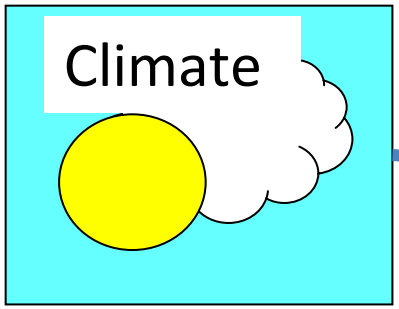


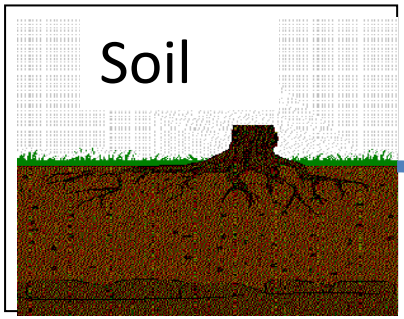


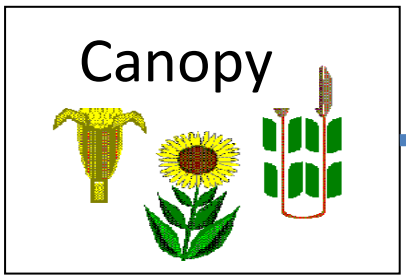
From Inversion … to Assimilation

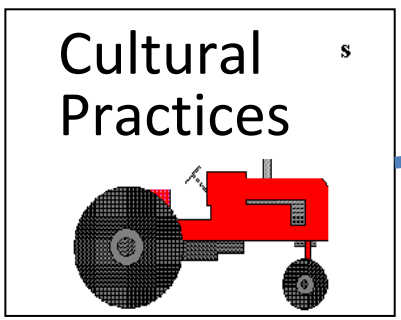


The STICS model









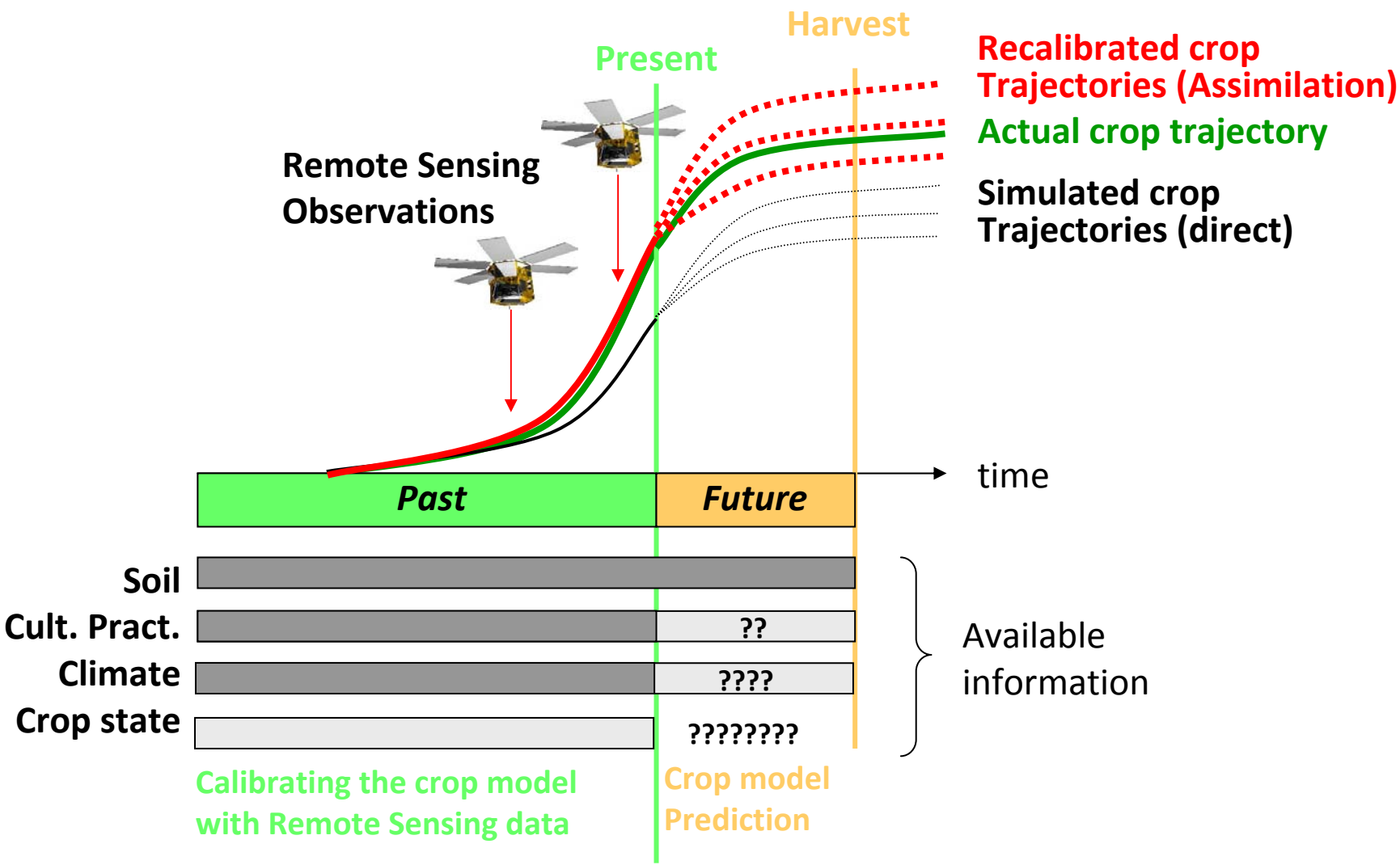
Carbon
NPP
Yield
Litter contribution

Water
evapotranspiration
drainage
capillary rise

Nitrogen
Organic matter
loss ...

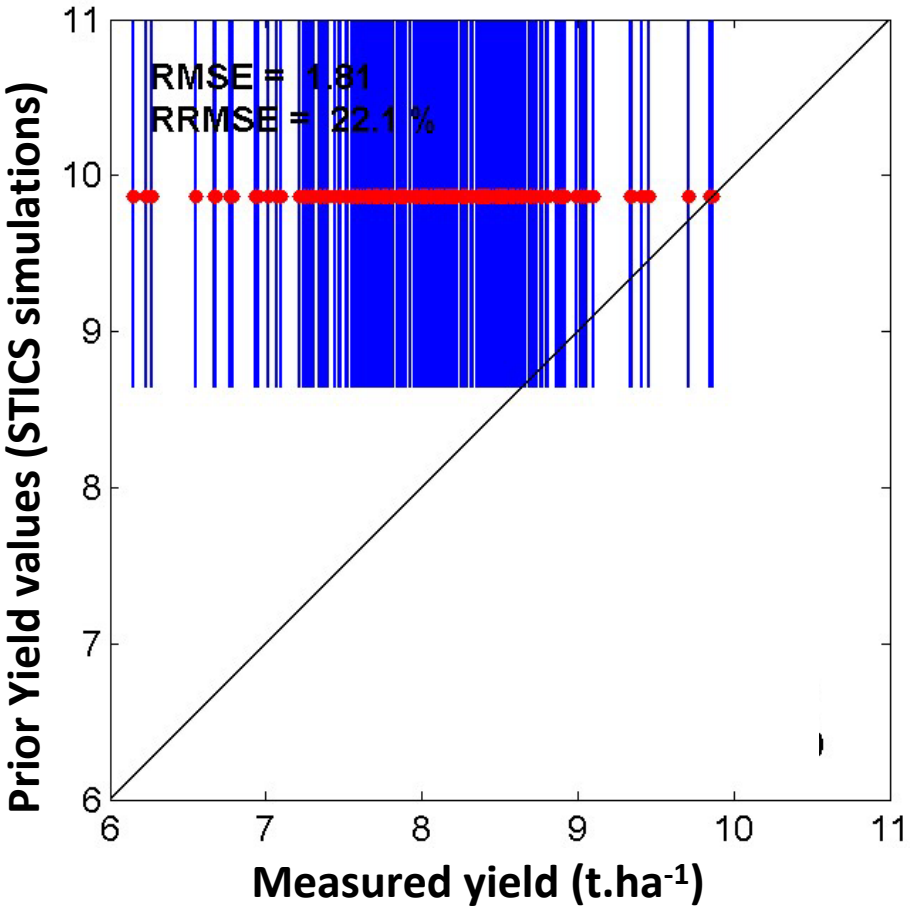
LAI,
Chlorophyll,
soil surface moisture

The approach

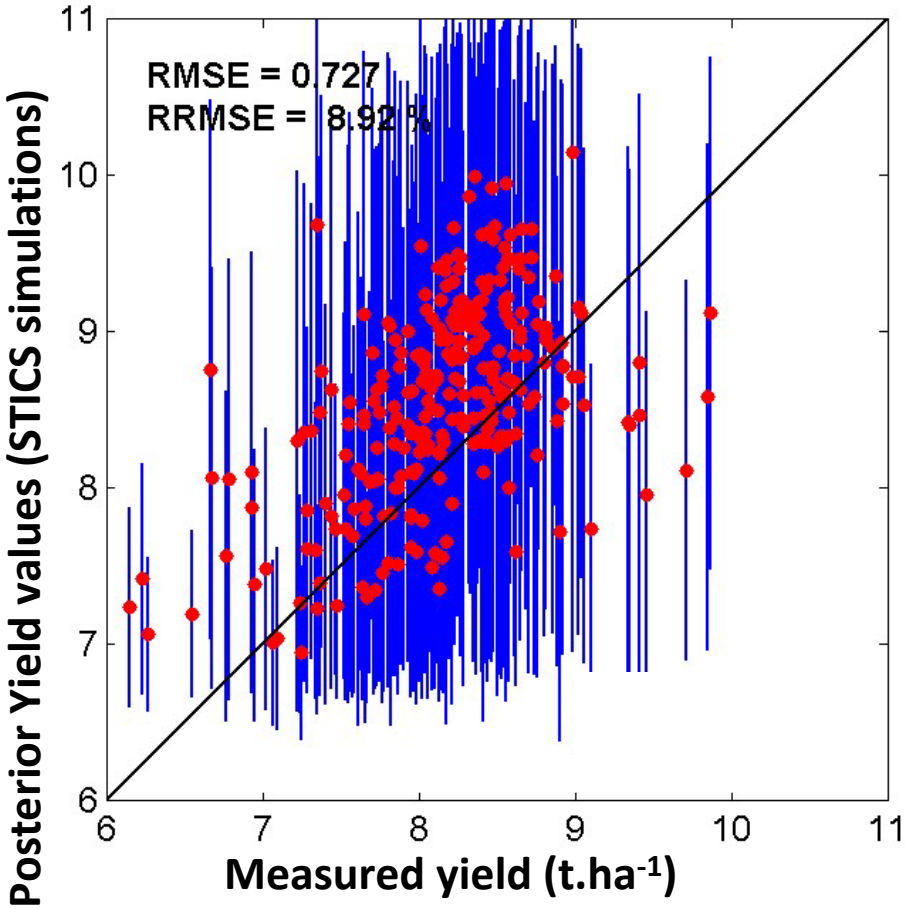


Results Yield

Before assimilation

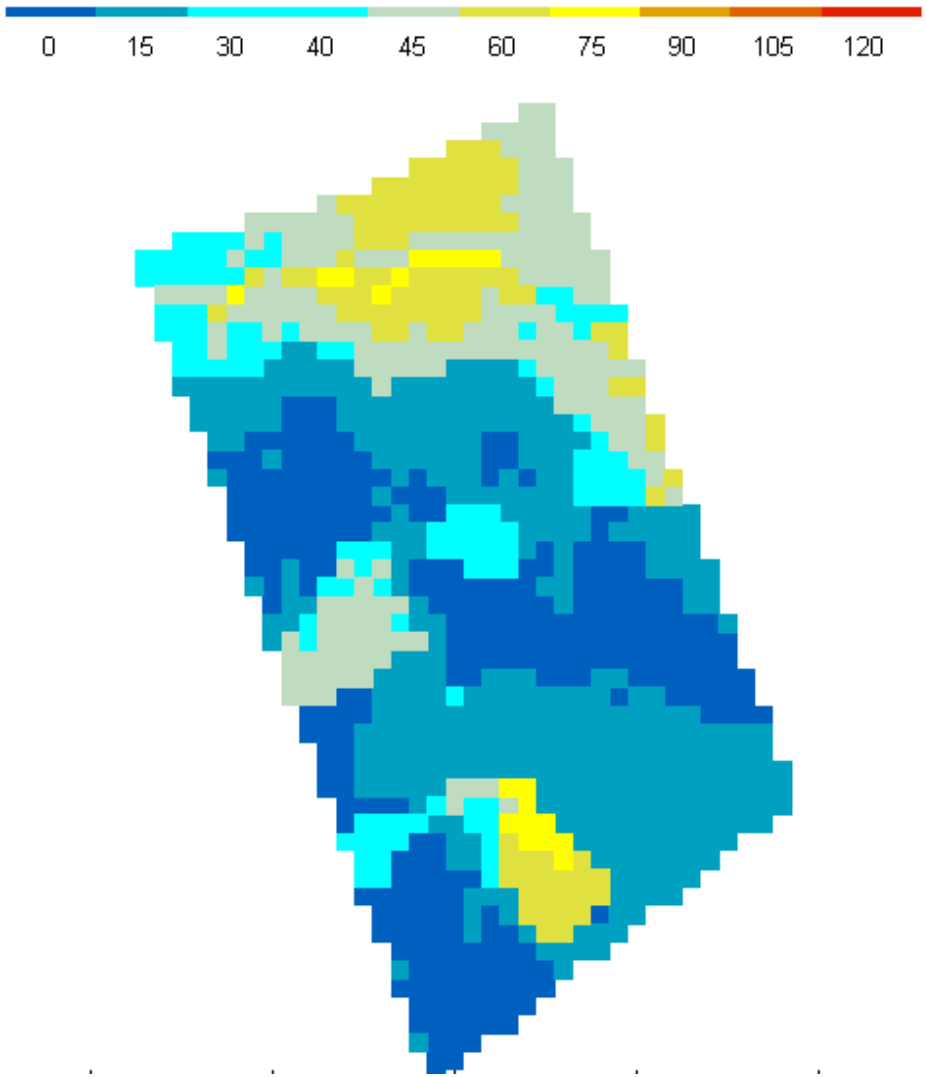


After assimilation



- Reduction of biases
- Description of the within-field variability

Results: Nitrogen amount map for the third application



Experiments

Vectors

Sensors

Radiometric measurements
Sun Photometer measurements
micrométéorology
Biological meaurements
Moisture measurements
…