OLIVE

On ***L***ine ***I***nteractive ***V***alidation ***E***xercise

F. Baret, M. Weiss, S. Garrigues

Justification

- Successive versions (collections) of products
- New products
- Traceability / transparency
- Consensus framework for validation
- Capitalization of information
  - of the products evaluated
  - of the ground measurements
- Easy access for the community

- **OLIVE:** **O**n Line **I**nteractive **V**alidation **E**xercise
  - Supported by ESA

OLIVE

CALVAL Portal

CEOS/LPV

1. Information to the community

2. Stand-alone comparison to existing products by potential product producer: *Test Mode*

3. Actual validation with results visible by the community & addition of the product to the community database: *Validation Mode*

4. Addition of sites for direct validation by individual contributors

INFORMATION

Objectives

Results

References & Contributors

Database descr.

How to proceed

Input Formats

EVALUATION

Histograms/PFT

Scatterplots

Temporal continuity

Temporal consistency

Spatial consistency

Direct validation

Candidate Product

Stand-alone Report

Internal DATABASE

Existing products BELMANIP2-Valid

Existing products BELMANIP2-Test

DIRECT

Candidate Contribution To DIRECT

Evaluation criterions

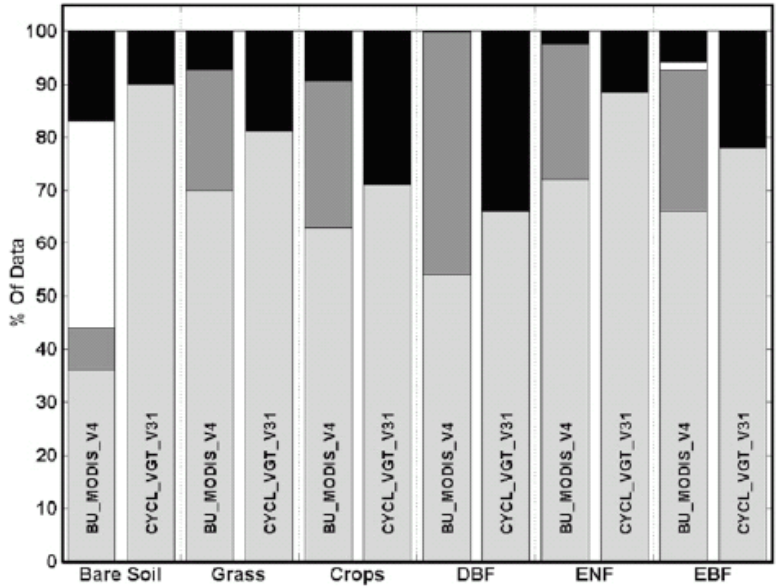
Inputs

- **candidate product**
  - Need extracts over the sites (BELMANIP and DIRECT)
  - specified projection sinusoidal (3x3 km² or 10x10 km²)
  - Documentation required about:
    - Definition of products
    - ‘Test’ or ‘validation’ mode
    - References …
- **Internal data base**
  - Extracts of existing products over BELMANIP2
  - Compilation of DIRECT measurements
  - Documentation of sites/variables definition/references

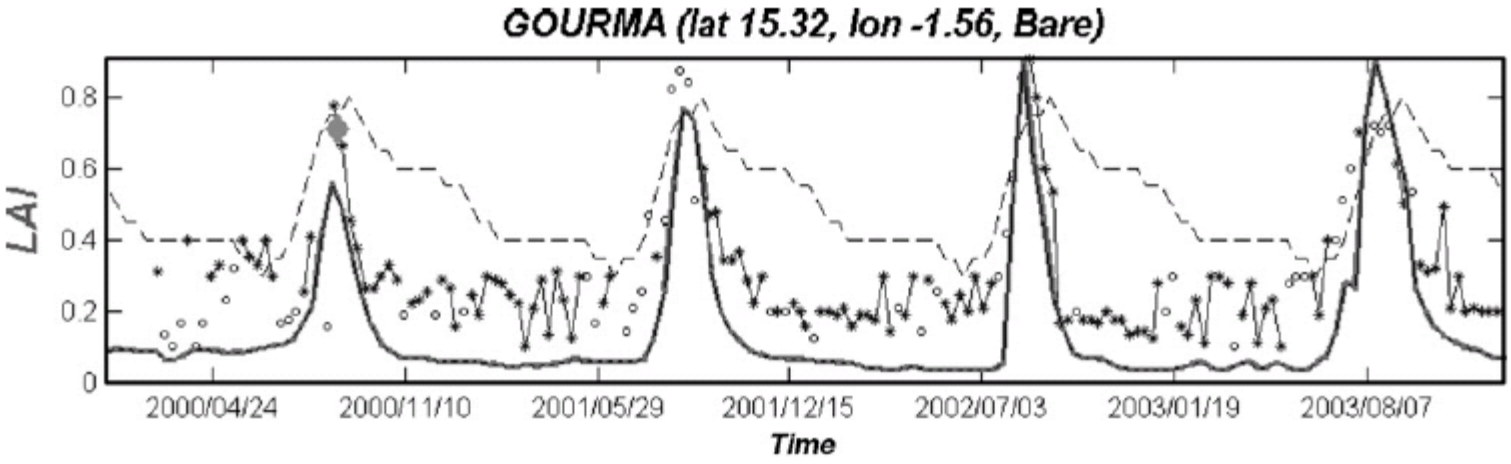
Typical outputs

- **Temporal continuity**
- **Temporal consistency**
- **Temporal smoothness**
- **Histograms/PFT**
- **Scatterplots**
- **Spatial consistency**
- **Direct validation**

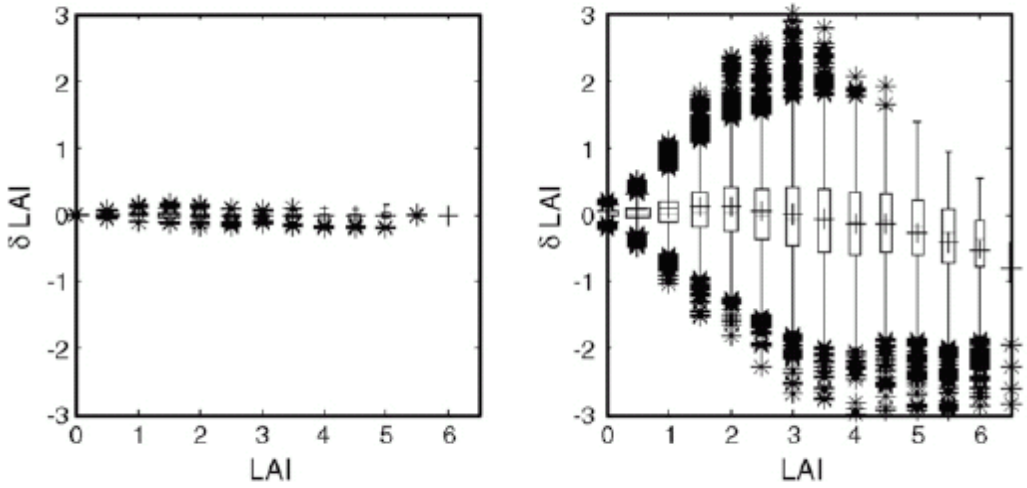
- **Temporal continuitv**



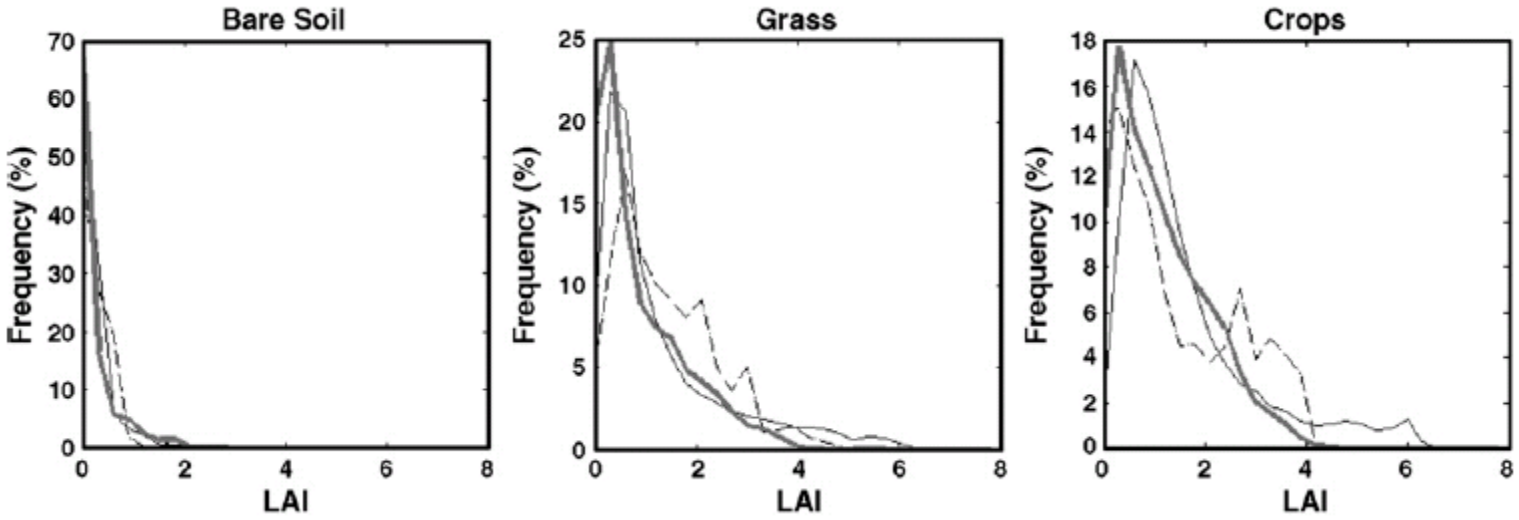
- **Temporal consistency**



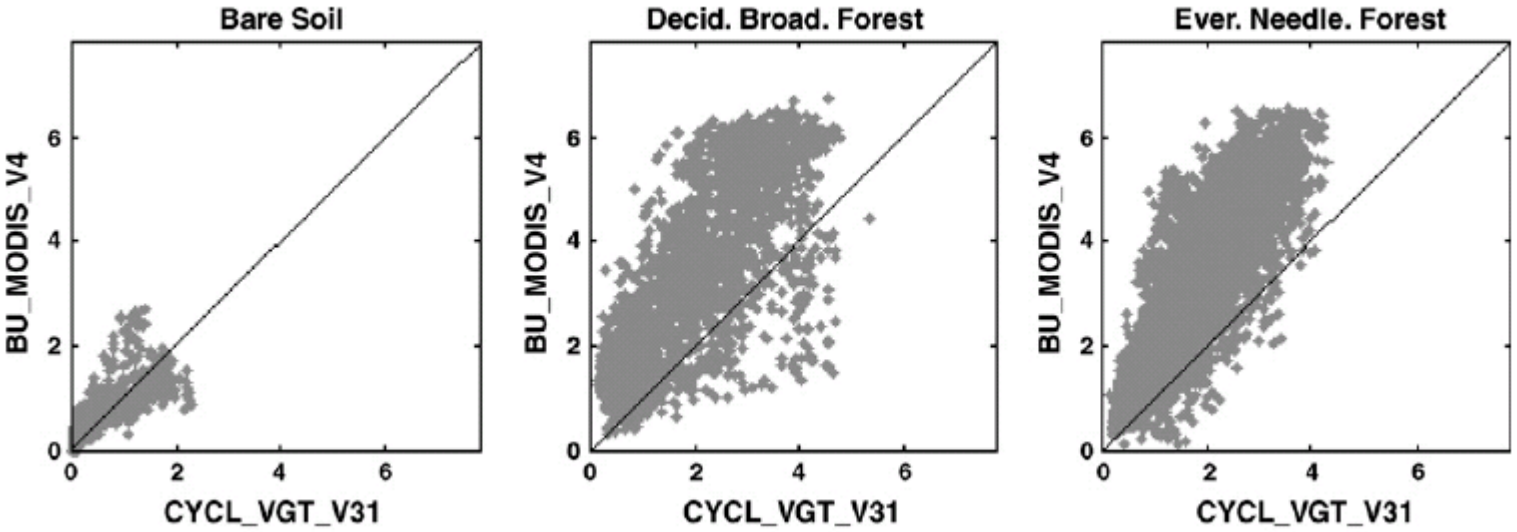
- **Smoothness of temporal evolution**



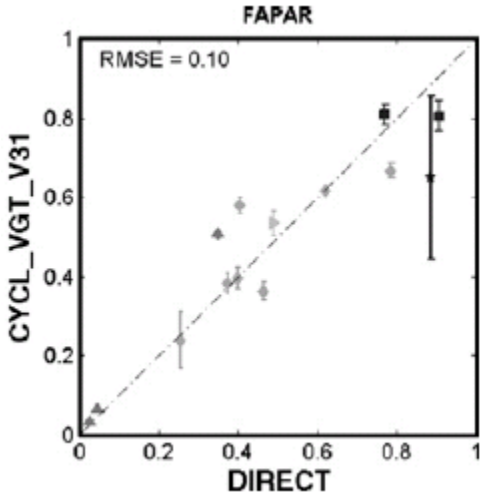
- **Statistical distributions**



- **Scatterplots**



- **Direct validation**



management

- Need criterions to decide which direct validation site to incorporate in the internal data base
- Steering committee (CEOS LPV) to:
  - propose the criterions for the selection (general)
  - Decide if including a new proposed site in the internal data base
  - Update of the base once a year?
- Reprocess all the data once a year? (to include new products/sites)

Status

- Tools already developed, but running in matlab in ‘manual’ mode
- Outputs are recorded
  - in an html file for reporting (mainly graphics)
  - In Excel files (metrics)
- Need significant adaptations to run interactively through the eo web portal
- Discussions with ESA to start the activity

Ground measurements of LAI, fAPAR and fCover

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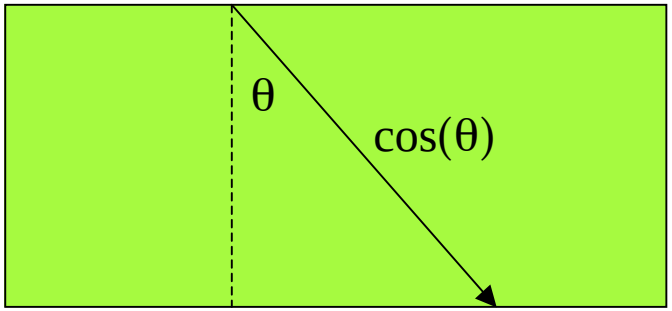
INRA-EMMAH

Avignon

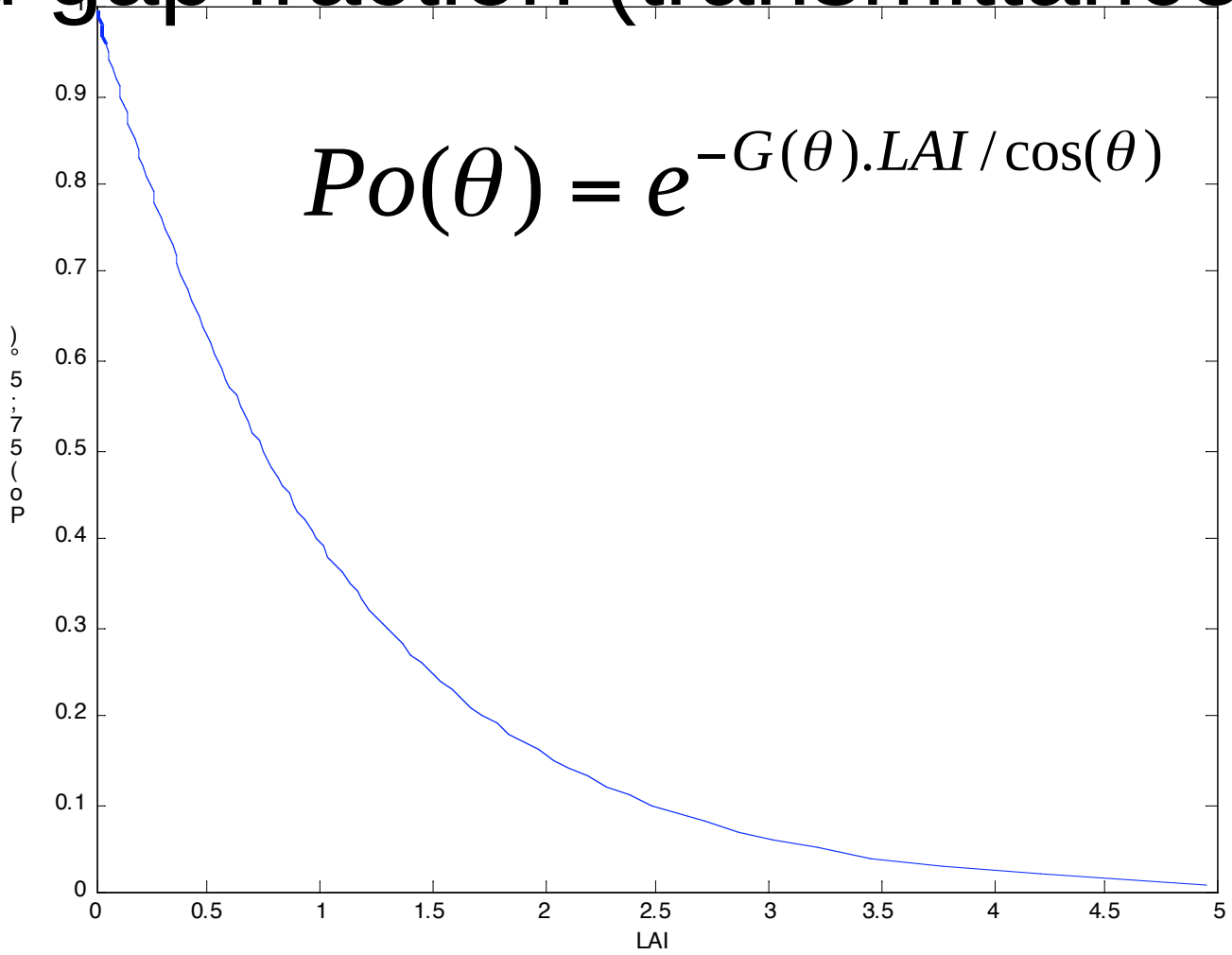
Interest of gap fraction measurements (transmission)

- fCover= $1\text{-}Po(0)$
- fAPAR(θ_s)≈fIPAR(θ_s)=$1\text{-}Po(\theta_s)$
- $$Po(\theta) = e^{-k.LAI} \qquad k = \frac{G(\theta, \theta_l)}{\cos(\theta)}$$

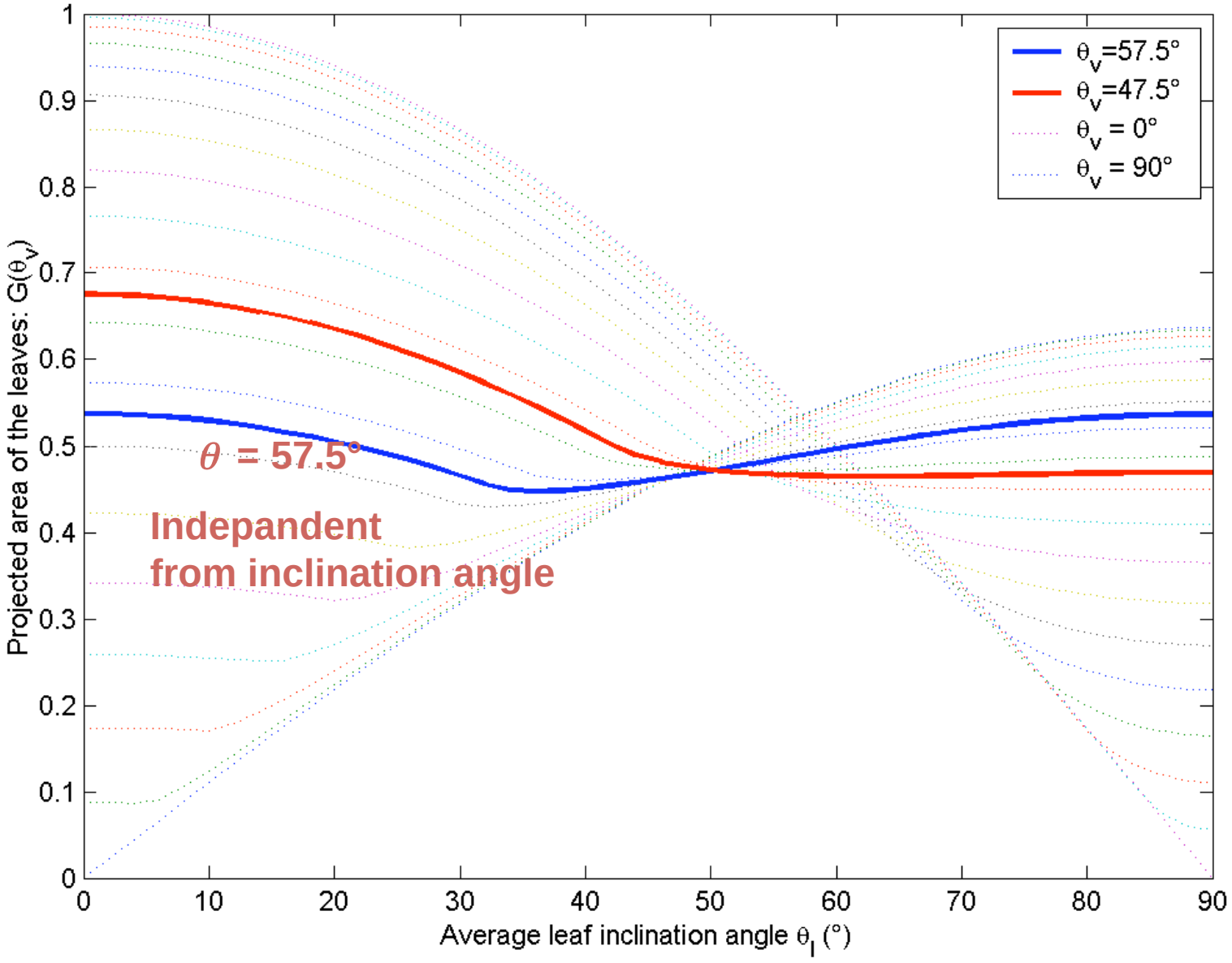


Principle: Relationship between LAI and gap fraction (transmittance Po)

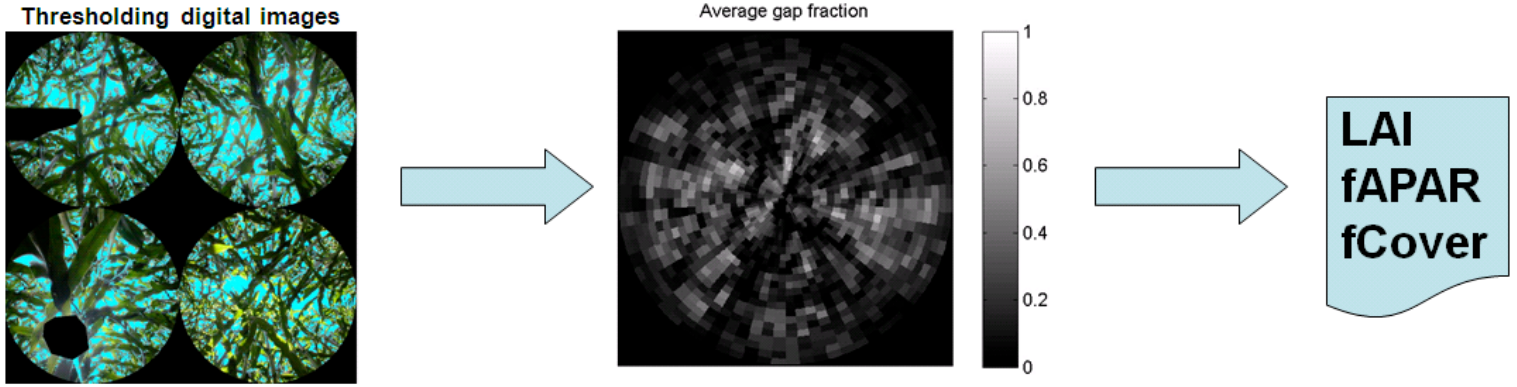
$$Po(\theta) = e^{-G(\theta).LAI/\cos(\theta)}$$



Projection Fonction G(q)

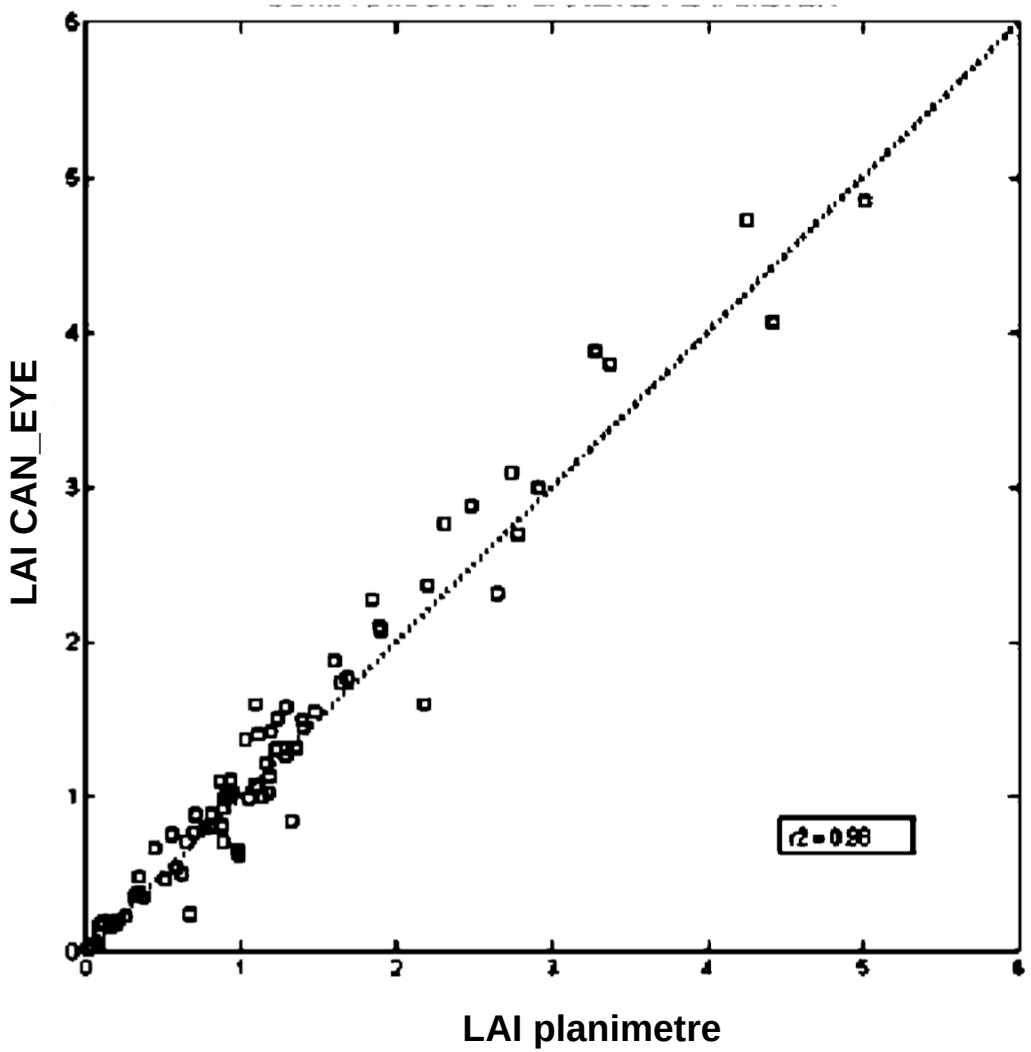


Development of processing tools

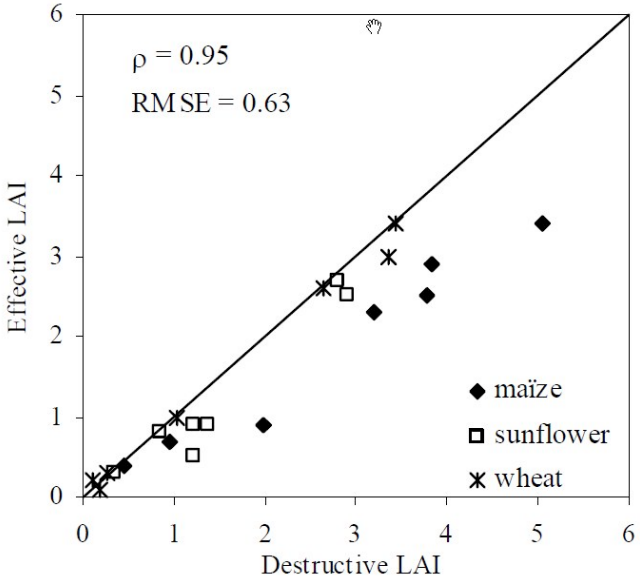


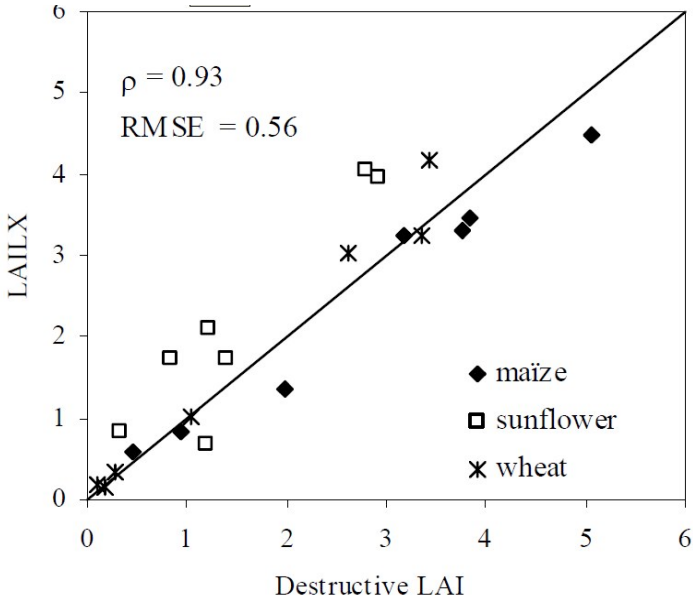
Freely available to the community: www.avignon.inra.fr/can-eye

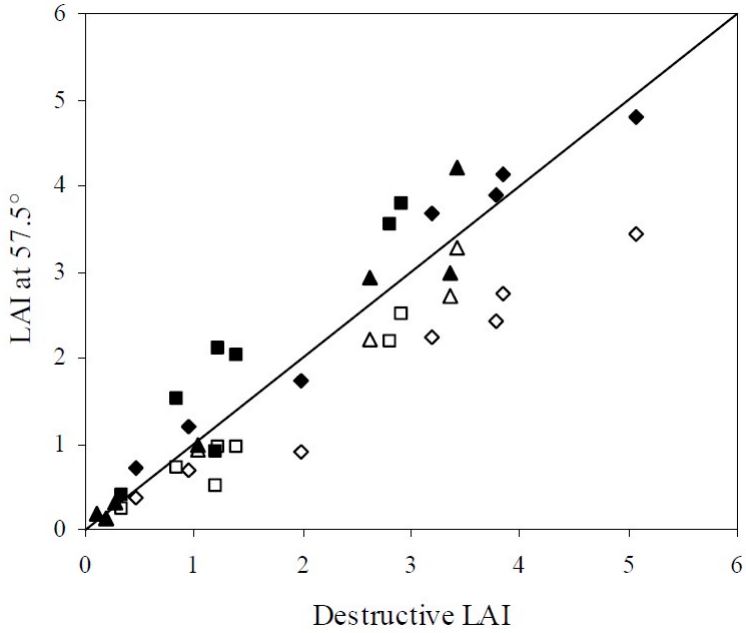
Results 1/2: Mali



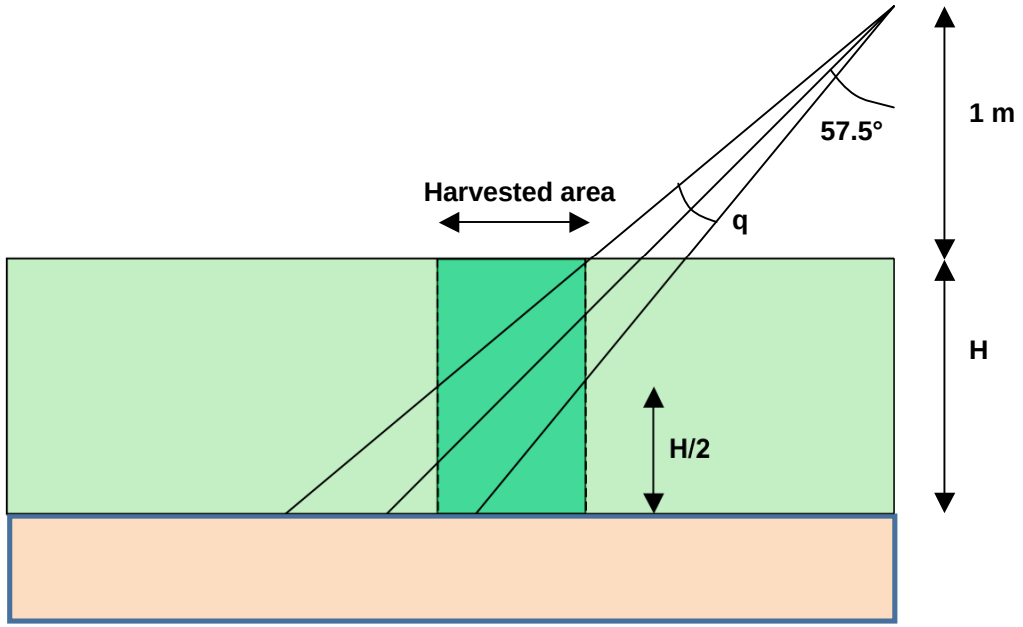
Resultats 2/2: Sud-ouest

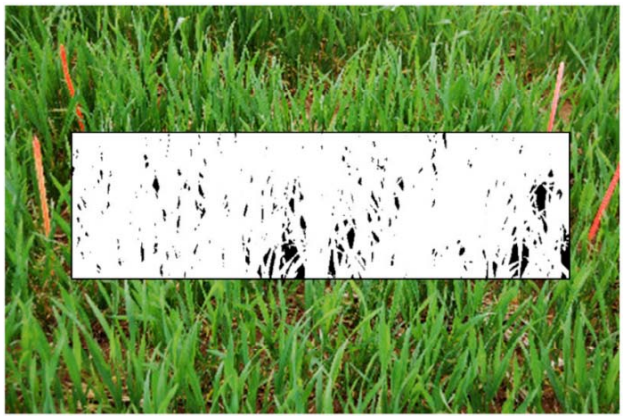






Measurements at 57°





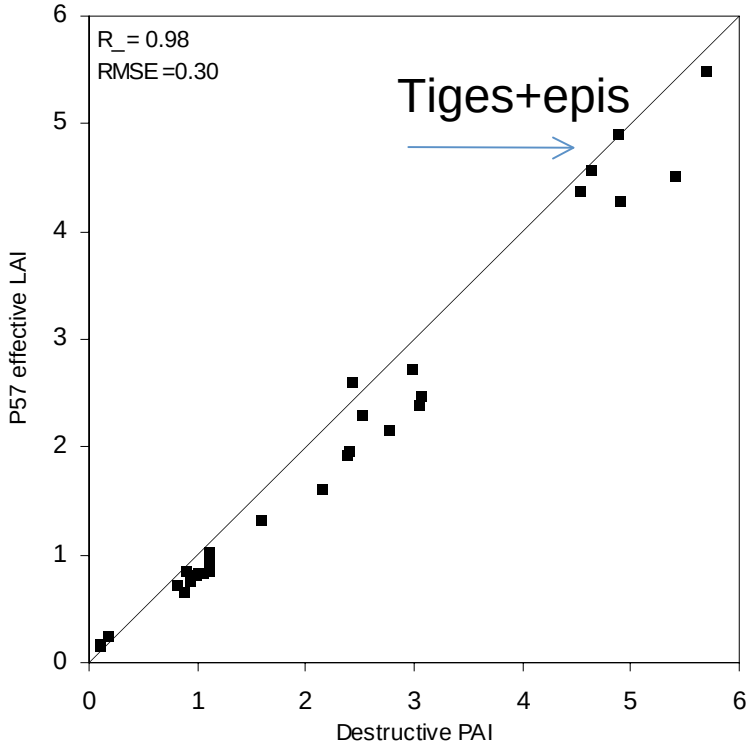
Advantages:

-More independent from architecture (leaf inclination and clumping)
-Improved spatial resolution
-Possible use for low vegetation
-More independant from illumination conditions (flash)

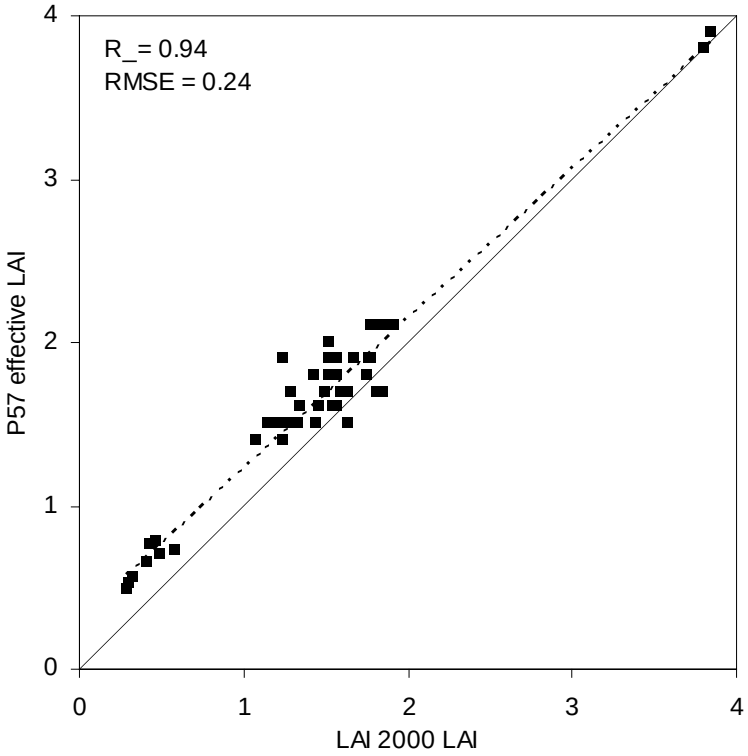
Problems:

-Reduced footprint: more measurements required
-Reduced field depth (distance mini between 0.5 and 1.0 m)

Results



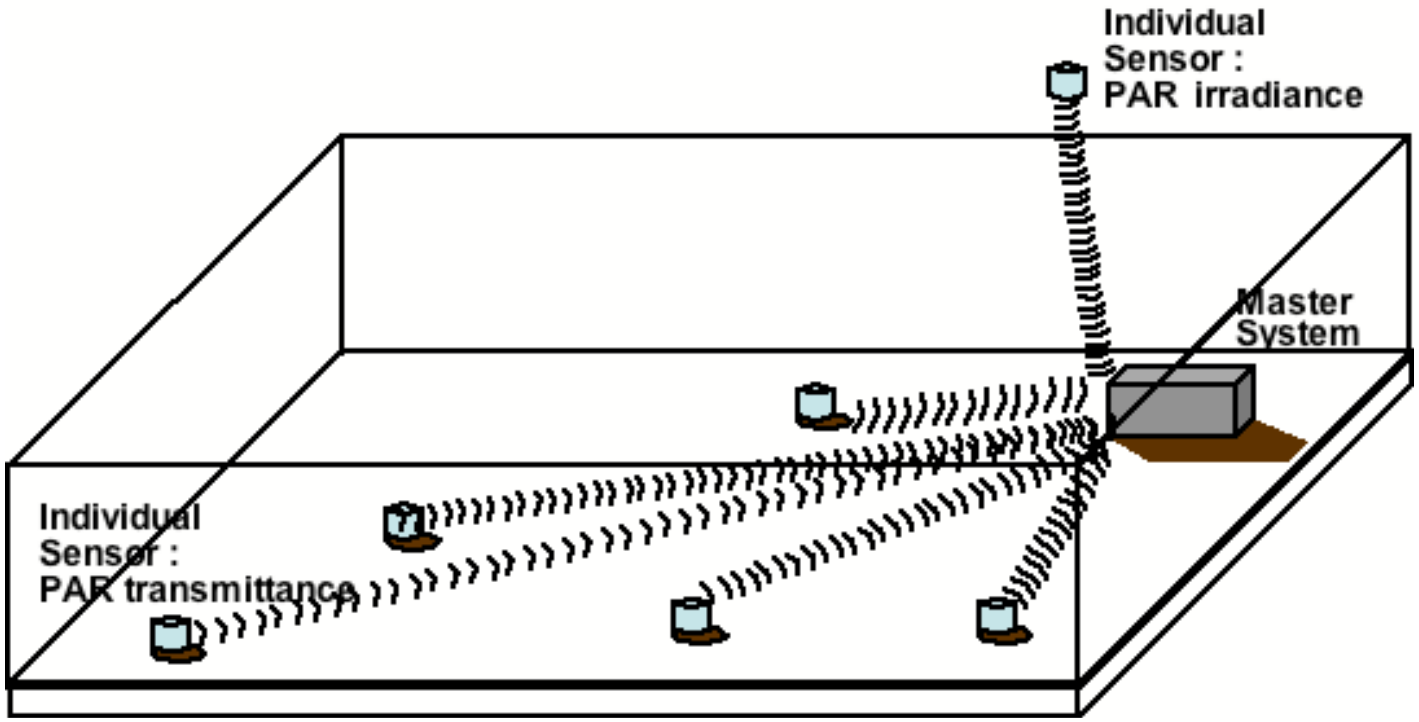
Comparison with destructive measurements



Comparison with LAI2000 measureme

Acces to the green PAI

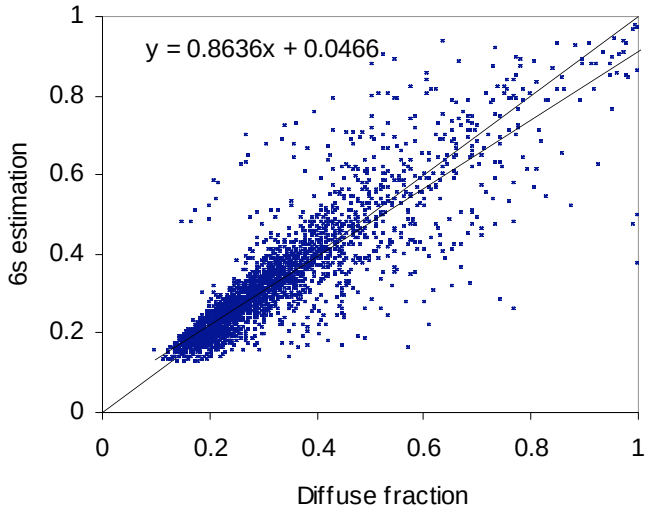
Continuous measurements: PAR@METER



Autonomy in energy and data storage (2 mois)
range (without obstacles) at least 150 m
Possible connection to internet via GSM
Cost for one ESU (area of about 20x20 m) ≈ 1 kEuros

Sample Results

Measurements each 5 minutes (flexible)
Estimates of the diffuse fraction (*f*)



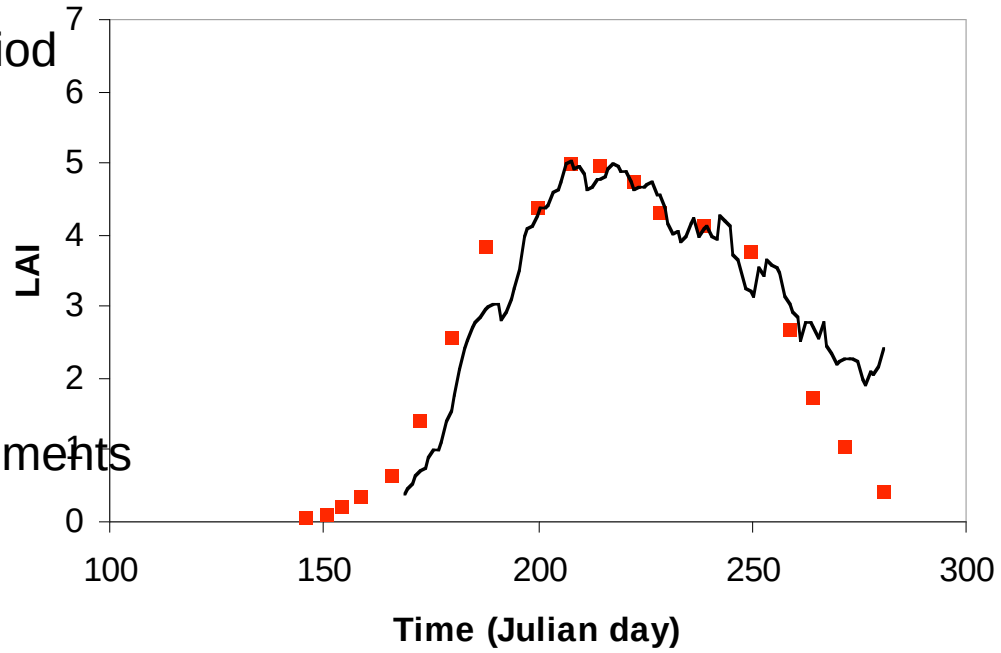
$$[Po(\theta)] = [1 - f] \cdot e^{-G(ALA,[\theta]).LAI/\cos([\theta])} + [f] \cdot e^{-G(ALA,h).LAI}$$

Inversion over data acquired during a period (moving) from 1 to 5 days

Access to the effective PAI

Needs correction from clumping and non green material fraction: literature, Hemispherical photo, destructive measurements

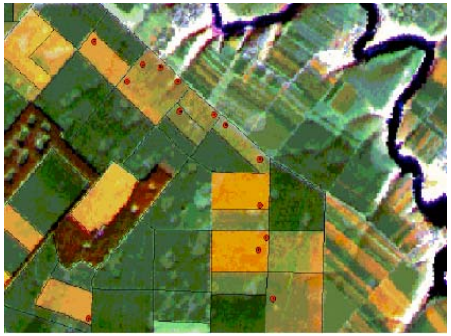
Allows to measure albedo



Empirical transfer fonctions

ADAM experiment

Romania - 2001



42 Elementary sampling units

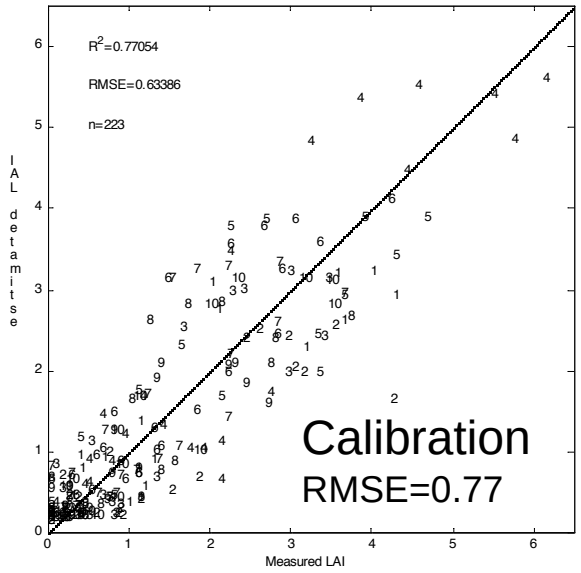
- LAI measurements
- 39 SPOT images

Empirical transfer functions

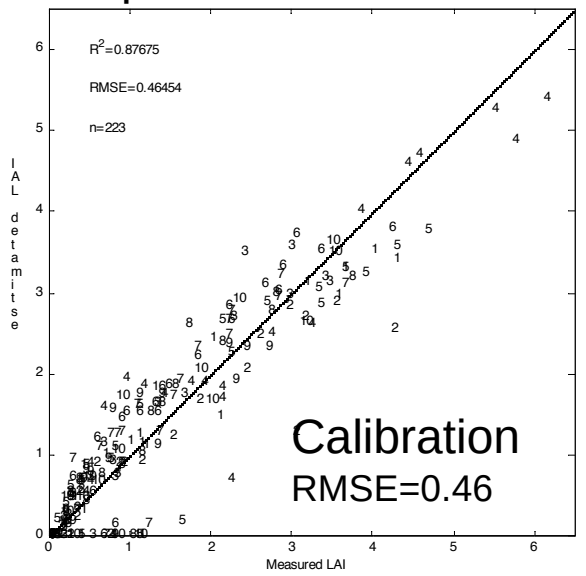
$LAI=a(t).\rho_{540}+b(t).\rho_{670}+c(t).\rho_{850}+e(t)$

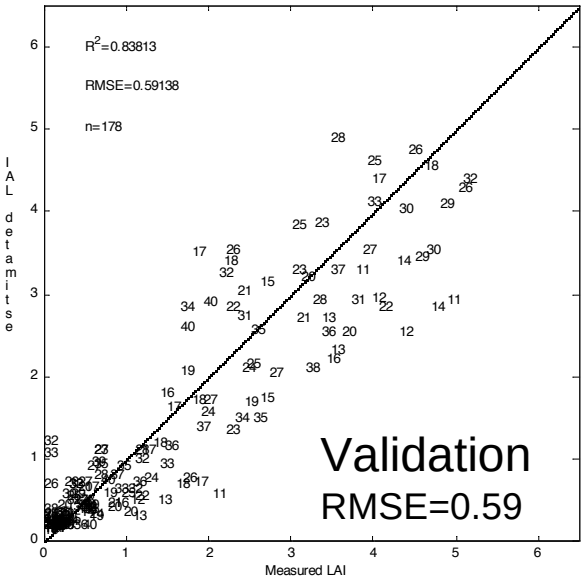
Very efficient when enough sampling!

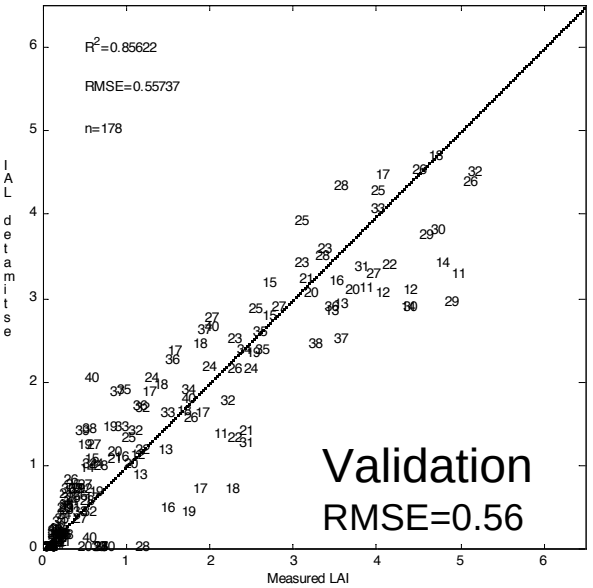
RT inversion



Empiric Transf. Function







Status of PAR@METER

- Systems have been developed
- First limited series under tests
- Important work on absolute calibration to retrieve the diffuse fraction
- PAR@METER will be installed in 2009 over
  - La Crau (30-40 ESUs)
  - 3 other sites (20 ESUs)
  - Wheat fields (FARMSTAR)