AOI ECCOREV 2011

Common databases for field sites dedicated to experimental studies on climate change in Southern France

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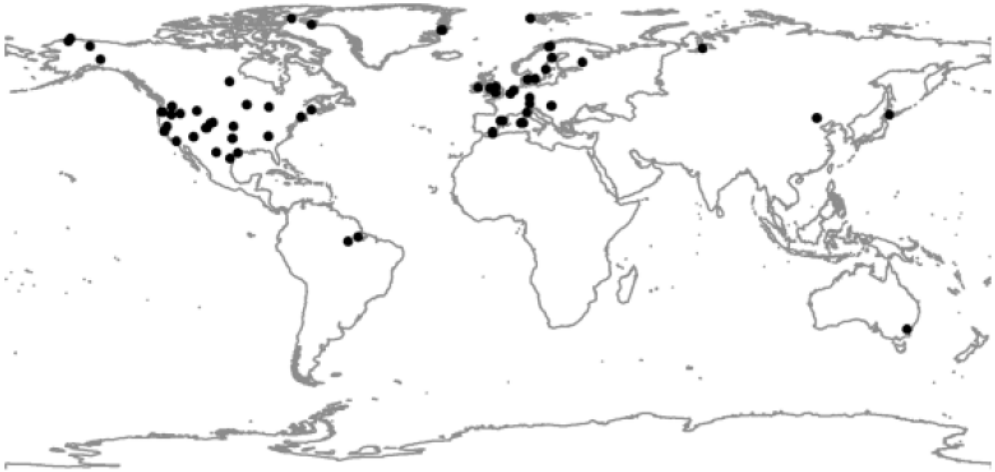
How do ecosystems respond to climate change

- species diversity
- spatial climate variability
- site variability

Temperature and precipitation response – meta-analyses

(1) Measure total and belowground biomass and productivity in addition to aboveground biomass and productivity. Aboveground biomass and productivity are commonly used to estimate responses of plant growth to climate change. However, belowground biomass and productivity play an important role in such responses, with which total biomass and productivity can be calculated to quantify ecosystem level responses to climate change.

(2) Conduct more experiments manipulating precipitation. Because of the variability and unpredictability of future precipitation projections, more precipitation manipulation experiments are needed to elucidate the impacts of wide range of possible scenarios. These experiments should manipulate not only precipitation quantity, but also alter precipitation timing, frequency, intensity as well as seasonality.



(3) Design multifactorial experiments in a wide range of ecosystems. Temperature and precipitation effects could be additive, so single-factor experiments can be very informative and provide the basic mechanisms for ecosystem responses. However, complex interactions do exist and may not be consistent among ecosystems or treatments. In this sense, a single factor experiment is not adequate to illustrate the responses of ecosystem under interactive climate change effects.

(4) Establish experiments in underrepresented biomes and environments. Multiple-factor experiments have been limited to herbaceous ecosystems. Yet, given the greater biomass, soil microbial biomass, soil C pools, and high C fluxes in woody communities, it is crucial to include more woody systems in multifactor manipulation experiments. However, the technological and cost constrains make mature forest ecosystem warming experiments very difficult. In addition, most manipulation experiments have been in mid-to-high latitudes in northern hemisphere, and new experiments are needed in low latitude and tropical systems to identify a systematic variation of responses across ecosystems.

Wu et al. 2011, Global Change Biology

How do ecosystems respond to climate change

- species diversity
- spatial climate variability
- site variability

- « changes in precipitation and temperature characteristics »
- « precipitation & temperature interaction »

notion: we might have never had this before

➔ experimentally it's a huge challenge

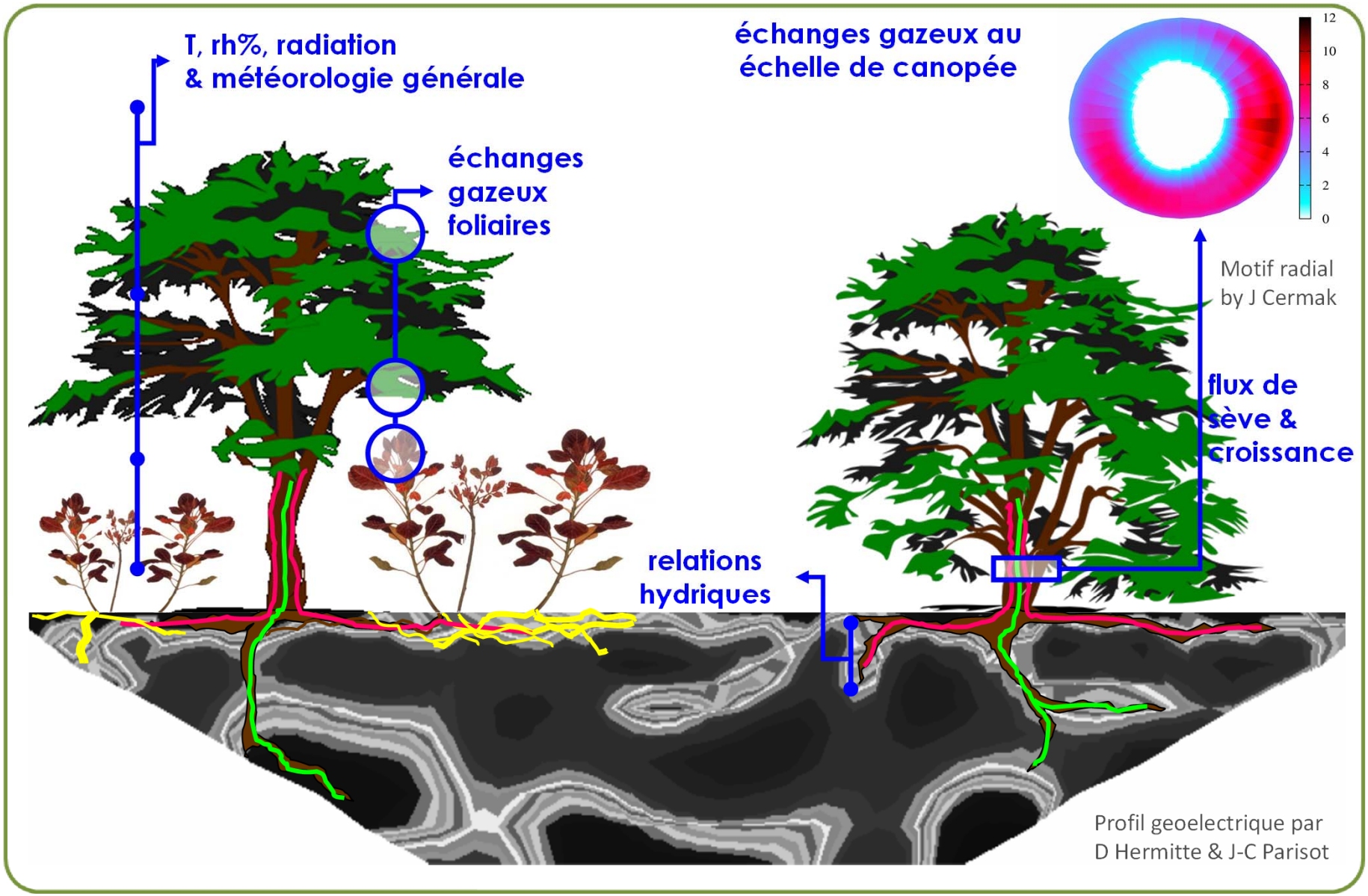
➔ need to work together at multiple scales & across disciplines, and on the long-term, i.e. Cooperate

Sites experimentals : Exclusion de pluies

principal idea

- management of data
- manipulate data
- be attractive to users
- identify user needs
- be attractive to ‘partner’ field sites
- assess actual research activity related to a site and it’s history
- interface experimentations and modelers

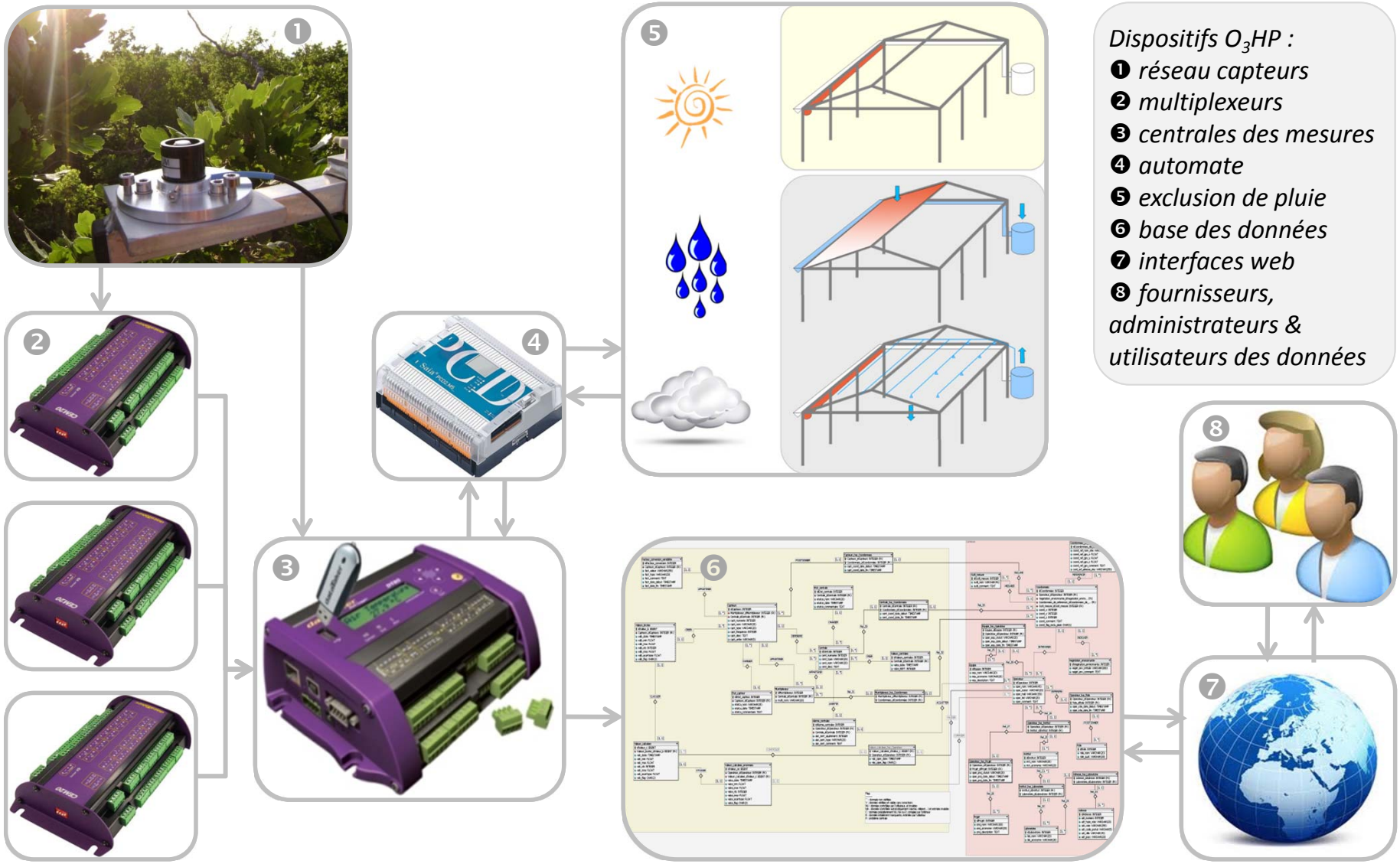
Mesures


T, rh%, radiation
& météorologie générale
échanges
gazeux
foliaires
échanges gazeux au
échelle de canopée
12
10
8
6
4
2
0
Motif radial
by J Cermak
flux de
sève &
croissance
relations
hydriques
Profil geoelectrique par
D Hermitte & J-C Parisot

Réseau des capteurs

capteurs	signale	fourchette	quantité	canaux	pas de temps
pyranomètre	tension	0-15 mV	2	2	1 s
PAR-mètre	tension	0-15 mV	9	18	1 s
T & rh% atmospherique	SDI12	numérique	10	1	120 s
precipitation	compteur	tension, valeur seuil	1	1	even.
vent vitesse & dir.	tension	0-2.5 V	1+1	2	1 s
T & H_2O% & conductivité du sol	SDI12	numérique	20	2	300 s
T & potentielle hydrique du sol	SDI12	numérique	8	1	900 s
moiteur foliaire	tension	0-2.5 V	2	1	
dendromètre	résistance	0-20 kΩ	12	24	+10 s
flux de sève 1(3)-points, fabrication interne	tension	0-0.1 mV	x	2x (6x)	+10 s
flux de sève 6-points	tension	0-0.1 mV	7	84	+10 s

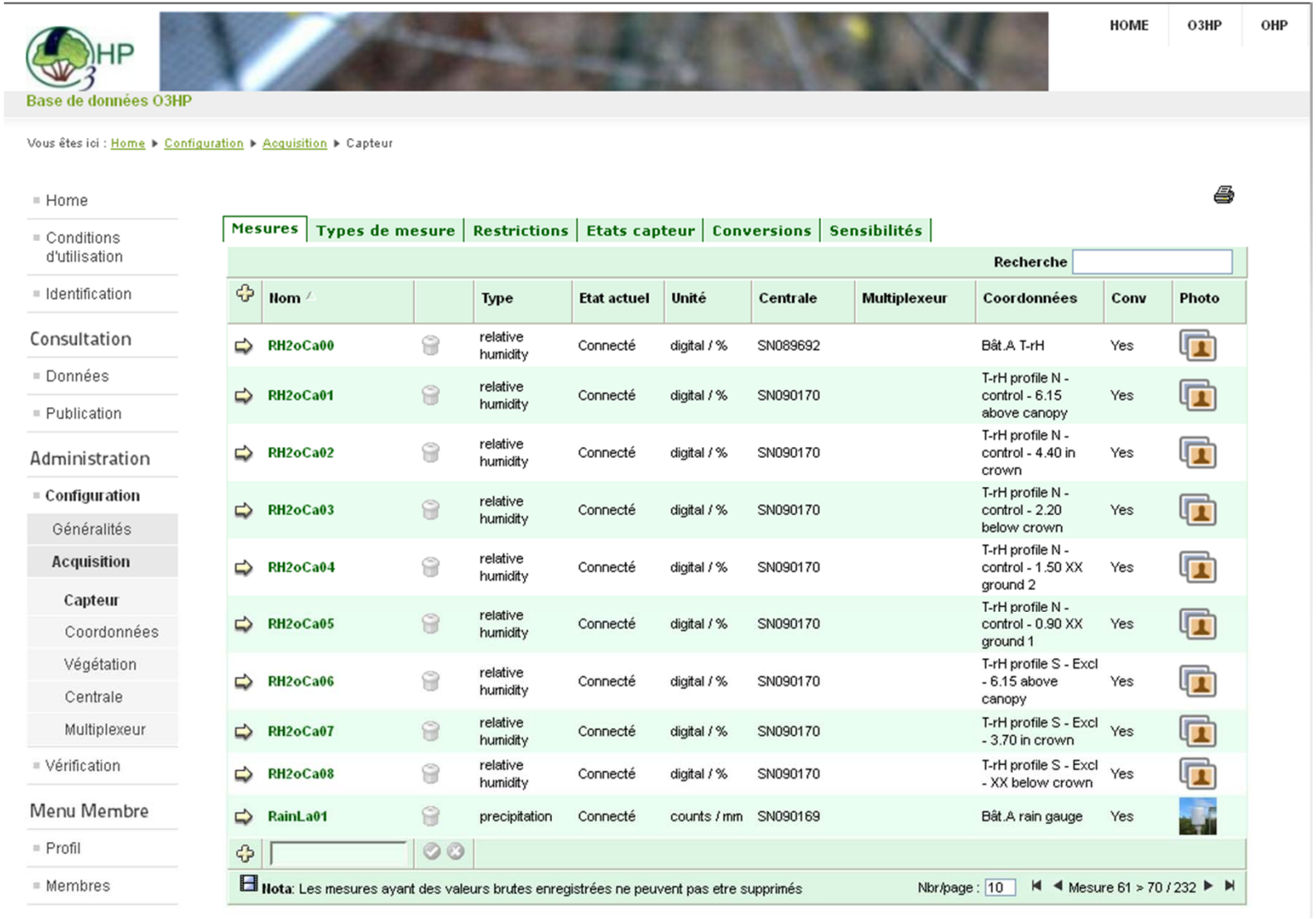
Vue synoptique des dispositifs O_3HP

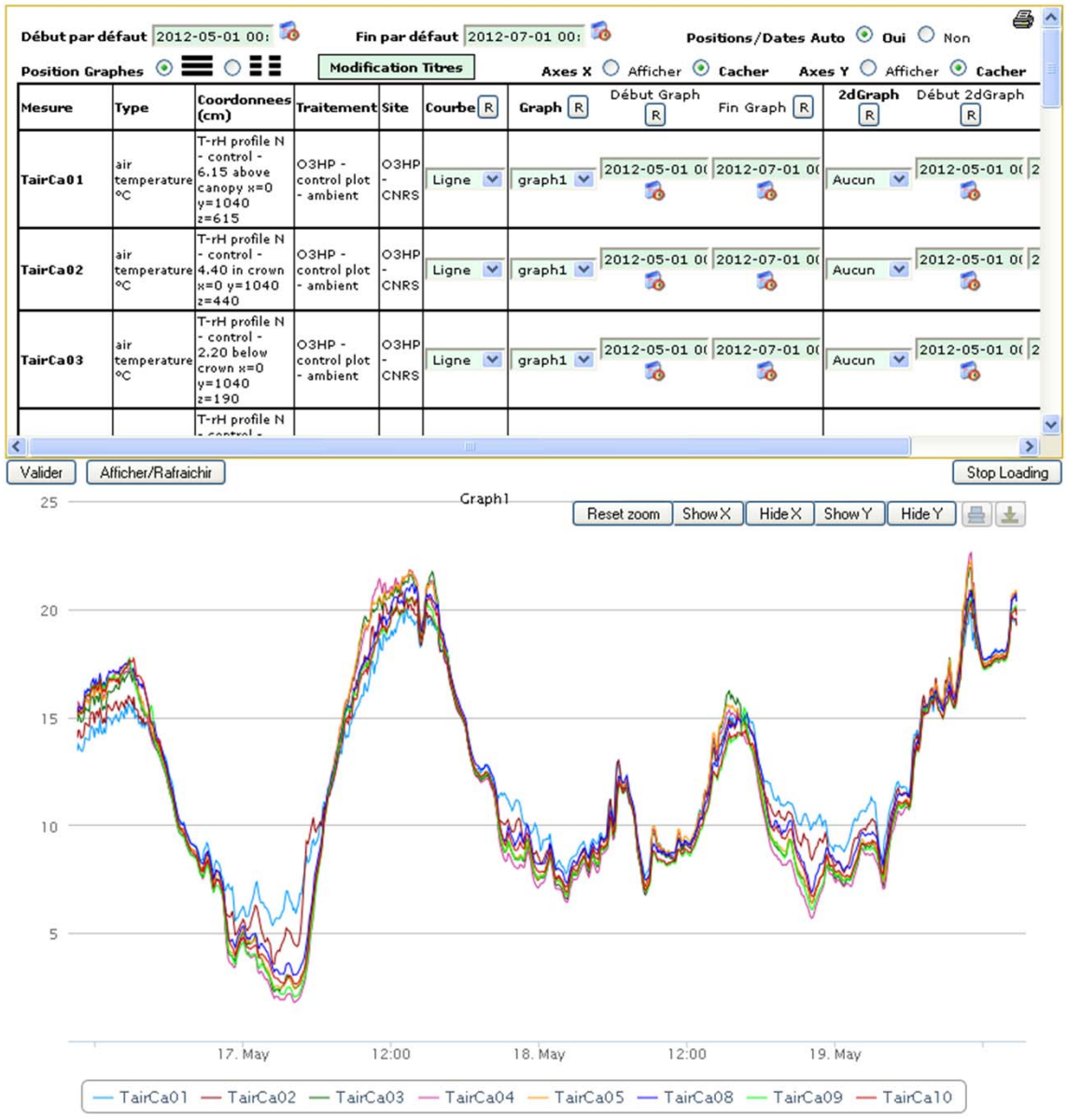


Dispositifs O_3HP :

❶ *réseau capteurs*
❷ *multiplexeurs*
❸ *centrales des mesures*
❹ *automate*
❺ *exclusion de pluie*
❻ *base des données*
❼ *interfaces web*
❽ *fournisseurs, administrateurs & utilisateurs des données*

interfaces web





interfaces pour

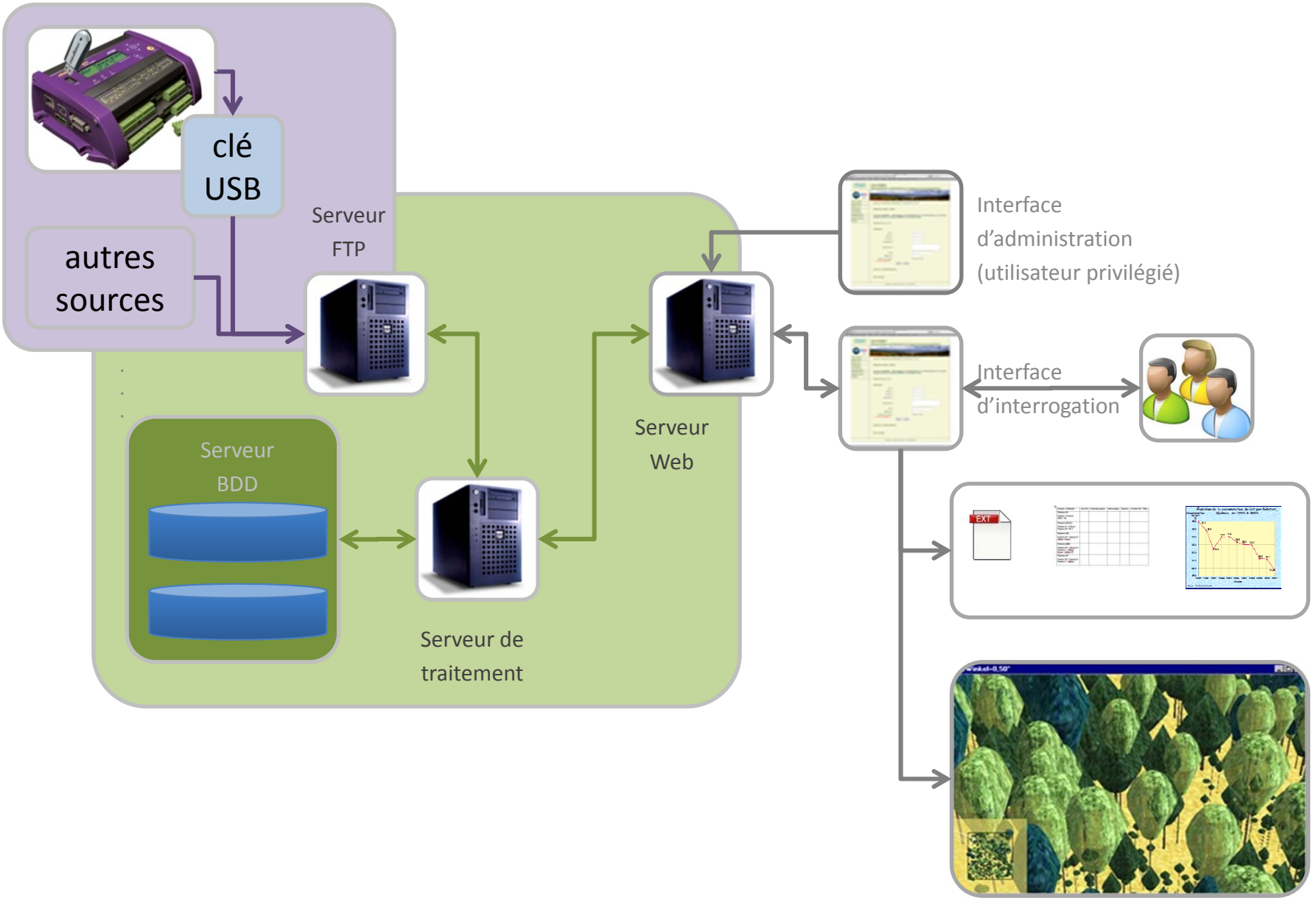
utilisateurs
équipes
projets

capteurs
visualisation
export

publications

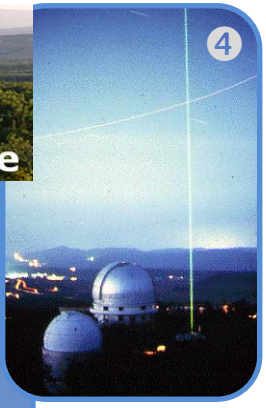
(report d'activité)

Base(s) des Données O3HP



Echelle & interfaces

Activités du projet O_3HP ❶ à échelle de canopée avec un appui sur le sous-terrain Installations géophysiques, permanentes et temporaires, vont permettre d'interfacer des processus entre la biosphère et l'atmosphère ❷❸❹.



integrated carbon observation system

A European infrastructure dedicated to high precision monitoring

80 km

35 km

100 m

MEDEE

15 m

6 m

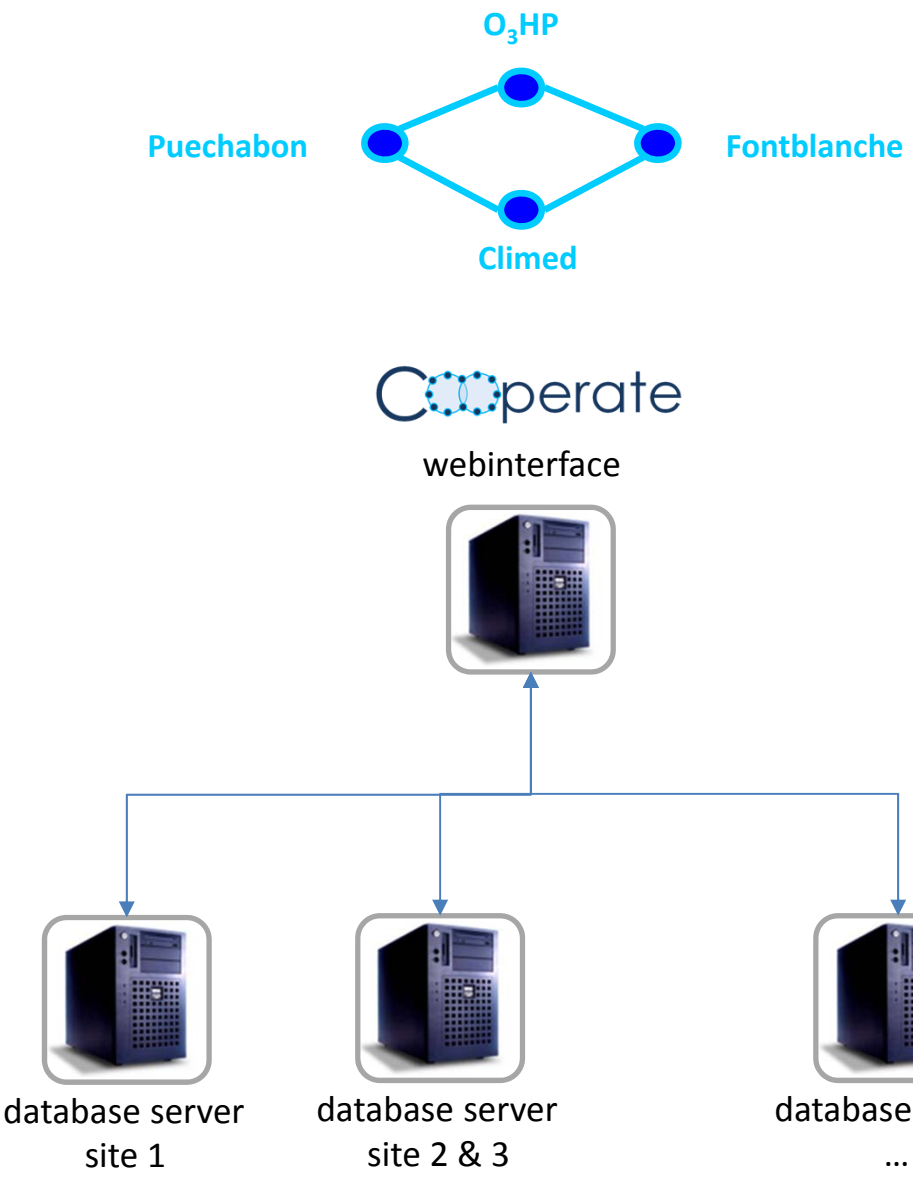
0 m

-8 m

❷ *MEDEE – analyses des composants organiques volatiles, CO_2 & H_2O à l'echelle de peuplement (Laboratoire Aerologie, Toulouse)*

❸ *ICOS – monitoring des gazes d'effet serre au echelle locale-regionale (réseau européen)*

❹ *Géophysique – analyses des gazes traces atmospheriques & radiation solaire (OHP)*


O_3HP
Puechabon
Fontblanche
Climed
Coperate
webinterface
database server
site 1
database server
site 2 & 3
database server
...

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CNRS-INEE SEMAFOR

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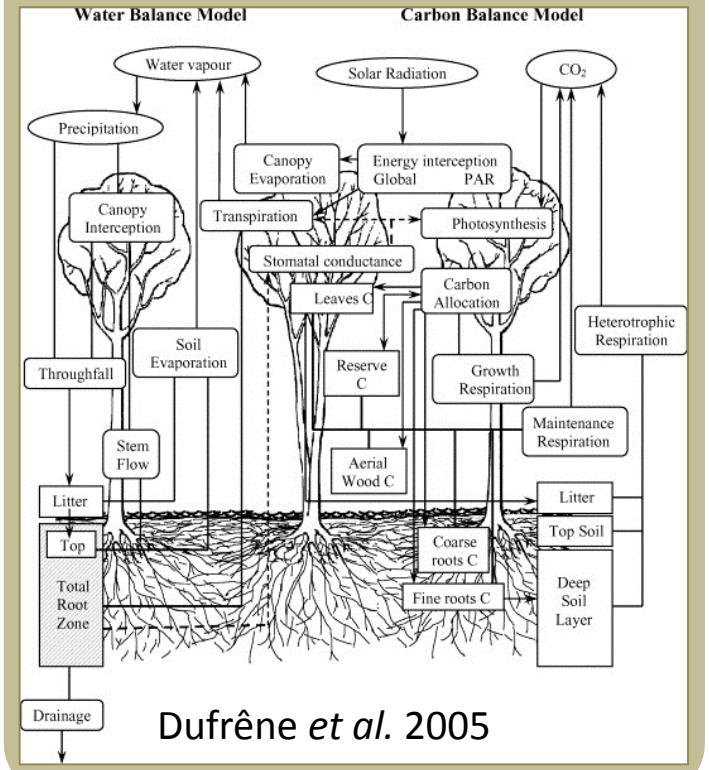
coopérations initiés

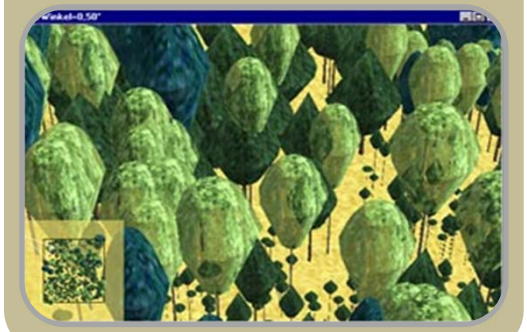
Model **CASTANEA** c/o
Hendrik Davi, INRA Avignon
parametrisation Fev 2013
+ Master2 (ANR SEC-PRIME²)



Dufrêne *et al.* 2005

Projet **PheNomad**
application nomade et tactile pour saisies phénologiques envisagé pour la communauté française (+international)

in spe
Model **BALANCE**
c/o Forest Yield Science
Univ. Munich



in spe
Site **CLIMED …**

Projet **ICOS@OHP**

principal idea

- management of data
  - continuous/long-term monitoring
  - short-term experiments
  - data export
  - data visualisation
- be attractive to other field sites
  - include user-friendly interfaces
  - develop helpful tools
- assess actual research activity related to a site and it's history
  - number, and type of person involved
  - projects having run/ running on the site
  - scientific output
- manipulate data
  - perform calculations
  - verify , correct, interpolate data
- interfacing experimentations and modelers
  - visualize plant/ecosystem physiology, state of stress, … close to real time
- identify user needs

---➔ facilitate and assure cooperation and collaboration for the long-term