

Report on AOI ECCOREV 2011

COOPERATE

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

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Financed with 4 k€ (8 k€ demanded)

Description

This project aims at providing a database in terms of being a common resource to recover, exploit and share data among scientific partners, to monitor research activity, and to facilitate collaboration among local (Mediterranean) projects running in parallel and to link experimental and modelling aspects related to climate change studies. The O₃HP (Oak Observatory at the Observatoire de Haute Provence) currently being the starting-point for the development of a first prototype.

Four work packages had been defined

- WP I. Fathom requirements & specifications for a database as a common, user-friendly platform
- WP II. Structural realisation of the database
- WP III. Hardware: development and maintenance
- WP IV. Human resources

What has been achieved so far?

WP I: Conception of the database

A database structure has been defined in order

- to be able to manage data of several experimental sites
- to integrate data of a continuous measurements (currently, a network of environmental sensors of the O₃HP)
- to register users of the database, and their relation to research groups and to scientific projects making use of the field sites
- to register research activity, i.e. acquired projects, publications, conference contributions, participation in research groups on specific topics
- taking user demands into account, which mainly concern access restriction and visualisation

WP II: Realisation of the database

A set of interfaces have been developed for the administrative actions, user requests and to provide overviews to the activities and human resources (currently around the platform O₃HP)

Administration:

- interfaces to manage users, their affiliation and participation in workgroups, projects
- interface to register scientific presentations and publications

- interfaces as to define imported data and measurements (location, conversion, sensor description, images of in situ installation, comment etc.)

User requests (see Fig. 1)

- Visual interface for the selection of measurements
- Table for selecting (refining selection of) measurements
- Visualisation of selected measurements over time, very fast even for large datasets
- Export of raw & time-averaged data as ASCII text and optionally also the according figures as jpeg-files (option to zip results) to user specific data-stock

Overview (Interactive and dynamic tables, the best I've ever seen)

- summarizing members and projects
- showing related publications, and presentation
- showing setup of sensing network and describing measurements

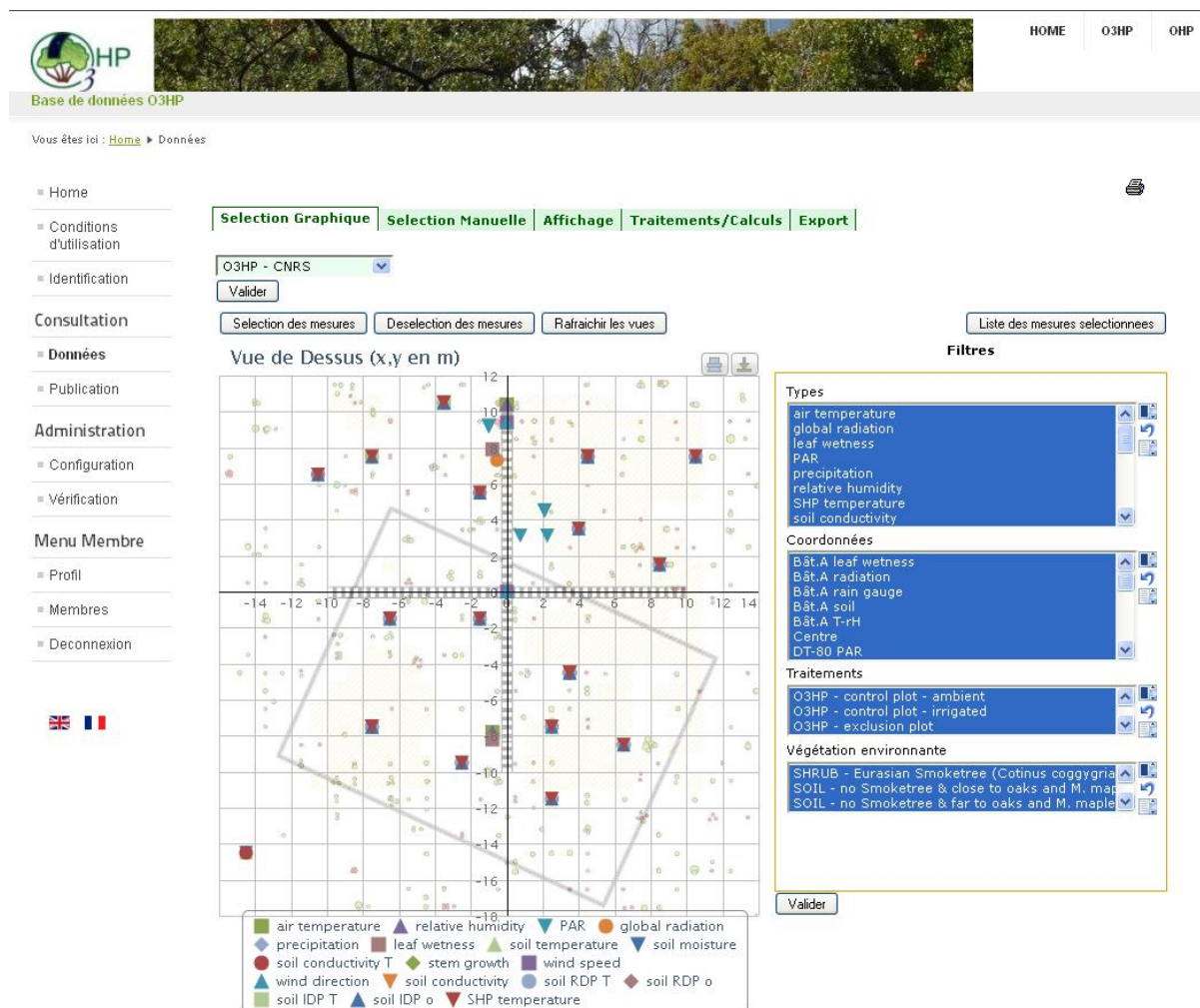


Fig. 1: Database developed according to the aims of COOPERATE, exemplified here for the field site of the O₃HP. Shown is a screenshot of the webinterface for consulting data. Here, the user performs data selection (rider “Selection Graphique” & “Selection Manuelle”) and its visualisation (“Affichage”), calculation requests (“Traitement/ Calculs”) and data export (“Export”).

WP III. Hardware setup

- The initial database development has been performed on hardware lent by the SIP of the OSU PYTHEAS and local resources of the OHP.
- Using a number of simulated but realistic user requests for real data (data logging intervals ranging from 1 s – 15 min) the hardware limits of several system setups (CPU, RAM, harddisk types) were tested for the speed of the execution of the requests. A hardware setup has been defined and that allows good mid-range performance and that copes with request of even large datasets.
- Hardware has been acquired which consists of two servers, one hosting the database (specific to each site) and one managing the user requests and hosting the web-interfaces (see above, common to all sites)
- hardware has been funded by the OT-Med, SEMAFOR and this AOI ECCOREV.

WP IV:

Human resources

For the moment no further candidates for the database development have been identified that are envisaged to join the project. However, the project has been presented by G.Castagnoli at meetings dedicated to databases organised by the OSU Pytheas and the IMBE.

Current Collaborations

Project PHENOMAD

A collaboration between the O(3)HP and AUSY Touch to develop a field deployable touch-screen application (PHENOMAD) to register phenological observations is ongoing and awaiting the signing of a convention. A specific database for phenological data is being developed in order to interface exchange data with the database of the GDR Phenologie (c/o I. Chuine, CEF, Montpellier).

Interfacing of experimental (field) and modelling approaches: Near-real-time Modelling and Visualisation of tree physiology

The recent season has again shown huge heterogeneity among individuals in response to combined drought and temperature stress at the O3HP. This calls for a better a priori understanding of the state of each tree individual as to best adapt experimental designs and methods.

Two workgroups have been contacted that manage and develop models (CASTANEA c/ Hendrik Davi, INRA Avignon and BALANCE c/o Thomas Seifert, TU-Munich Germany) based on tree individuals that integrate information to the stand scale. Both have the possibility to visualize stand structure and potentially also ecophysiological parameters. Therefore, a physiological parameterisation of the CASTANEA model for Downy Oak is planned for the next season and will be established via a Master student (funding acquired). Further bilateral funding is envisaged via the PROCOPE EGIDE program with the German collaborator.

Perspectives

Integration of further sites

As stated the concept allows integration of other sites. The ICOS@OHP project is envisaged to be hosted (first data expected mid-2013), and the data of the CLIMED site, which awaits continuous data acquisition, can be integrated as foreseen. The concept of the database to manage data, users and project information as to give an overview over current and past scientific activity and output,

has been presented at a SEMAFOR (SICMED Mistral, network over 4 field sites in Southern France) meeting. Participation is pending and will be re-discussed once the database project has integrated the data verification and interpolation/calculation procedures.

Belowground investigations

Meetings with researchers in the field of forest modelling have shown that as to perform realistic model runs on individual trees in Mediterranean forest stand, as the ones of the oak stand of the O₃HP, requires establishing a set of species-specific parameters and a mapping of the tree individuals (initiated).

To integrate essential information as the heterogeneity of space, water and nutrient availability in the ground, models need to be adapted, and measurements are needed showing the location and the dynamics of belowground resources. Using soil-tomography as recently performed by the CEREGE at the O₃HP and by INRA Avignon seems an interesting tool to gain new insights in plant behaviour in relation to heterogeneity of soil water availability and dynamics thereof. Efforts to acquire (funding for) such instrumentation and to establish a regular assessment of such datasets are ongoing.

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