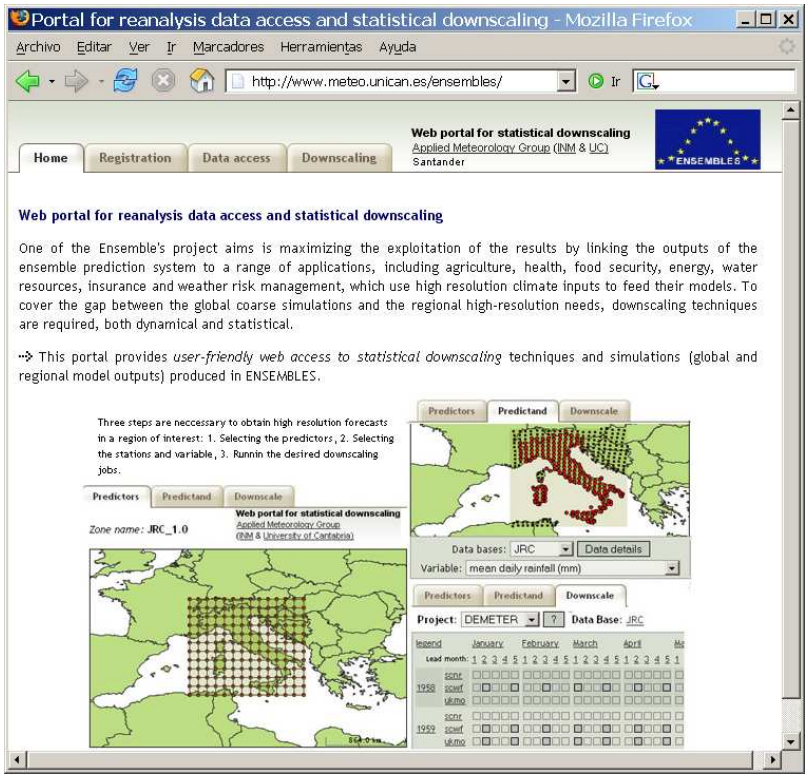
GO-ESSP Workshop 2009.
October 6th-8th, 2009, Hamburg

http://www.meteo.unican.es

The ENSEMBLES Downscaling Portal

A user-friendly GRID based tool for GCM post-processing and downscaling



Antonio S. Cofiño

D. San-Martín, J.M. Gutiérrez, C. Sordo, J. Fernández, D. Frías, M.A. Rodríguez, S. Herrera, R. Ancell, M. Pons, B. Orfila, E. Díez

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predictia INTELLIGENT DATA SOLUTIONS

Motivation

There are many projects around the world producing global (GCM) and regional (RCM) simulations of climate change.

The ENSEMBLES project (contract number GOCE-CT-2003-505539) is supported by the European Commission's 6th Framework Programme as a 5 year Integrated Project from 2004-2009 under the Thematic Sub-Priority "Global Change and Ecosystems".

Many of these projects involve end-uses from impact sectors ...

The project aims to:

- Maximise the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including agriculture, health, food security, energy, water resources, insurance and weather risk management

However, it is still difficult for end-users to access the stored simulations and to post-process them to be suitable for their own models: daily resolution, interpolation to prescribed locations, etc.

*There is a need of **friendly interactive tools** so users can easily run interpolation/downscaling jobs on their own data using the existing downscaling techniques and simulation datasets (AR4, Prudence, ENSEMBLES, ...).*

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www.meteo.unican.es/ensembles

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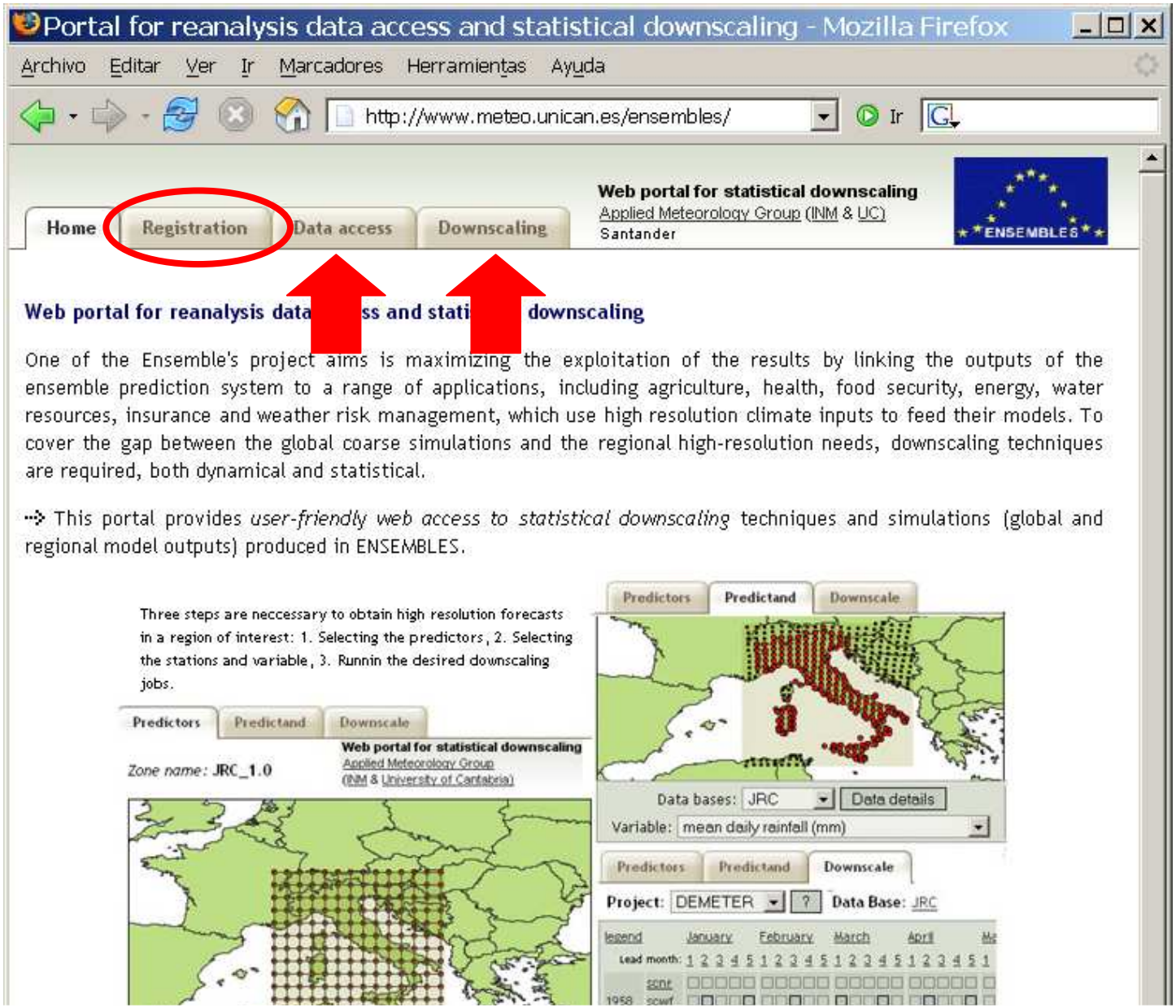
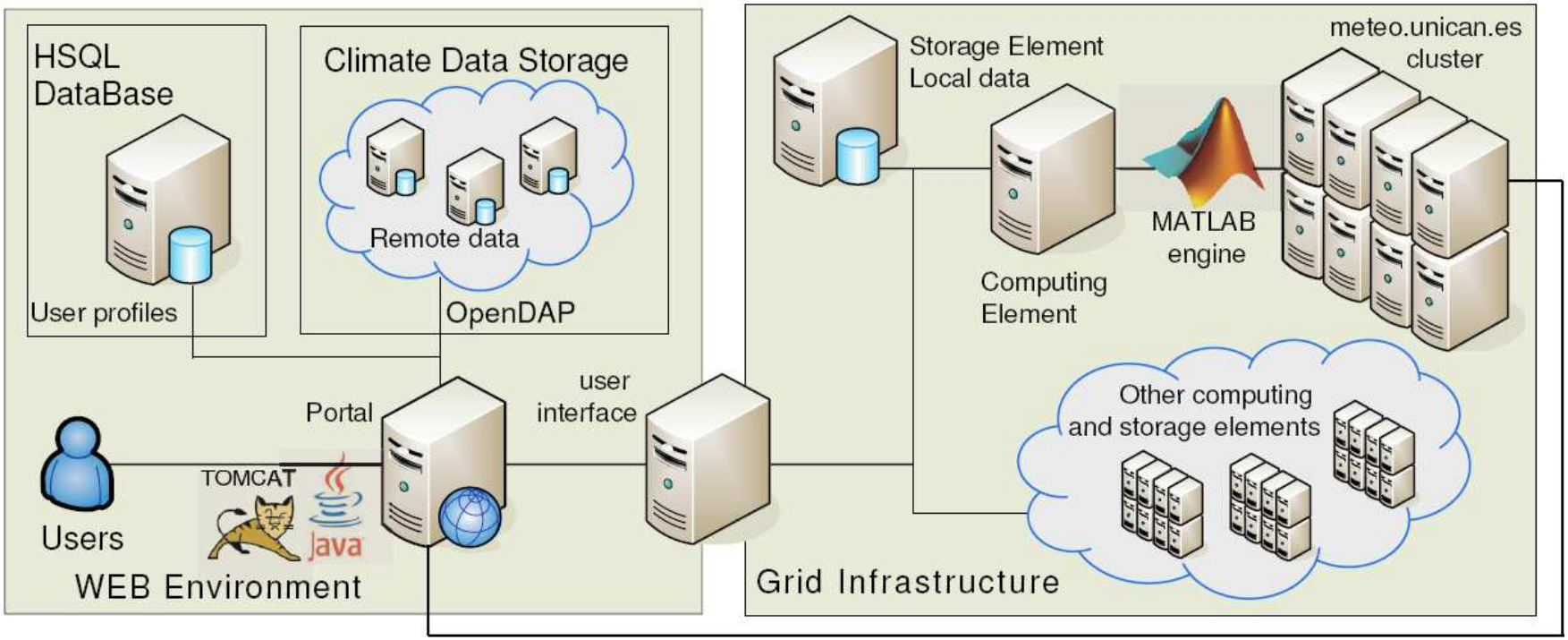


GRID Computing Infrastructure

- Jobs submission based on gLite middleware.
- A lot of ongoing work for GRID integration making the end-user life easier.



- The EGEE project it is negotiating the license schema for using MATLAB in EGEE's sites.
- Currently we are handling locally 10TB of data from models and observations.

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Data Availability. Observations

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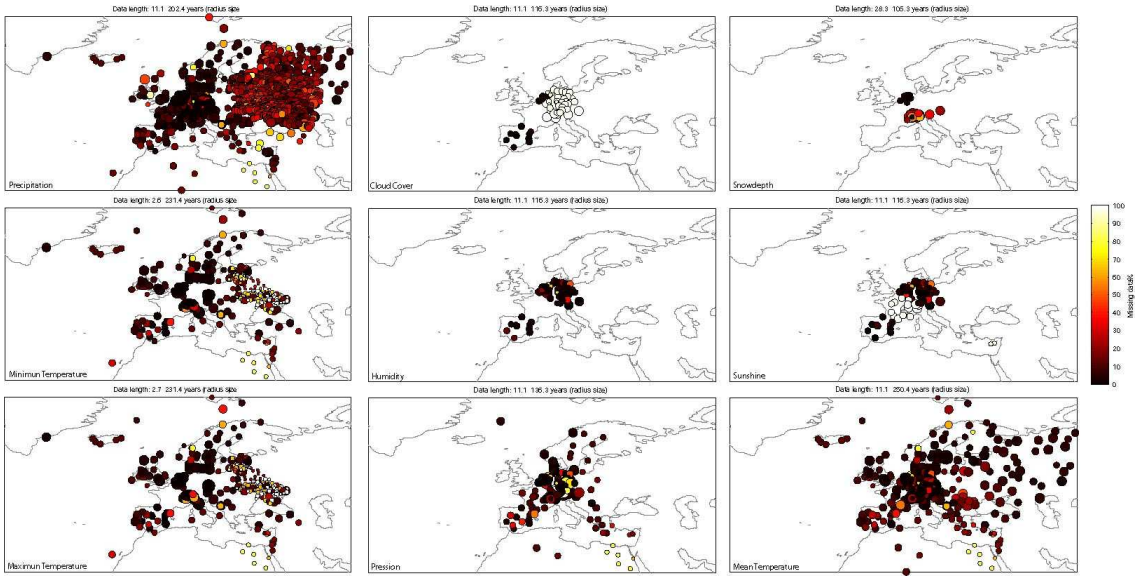
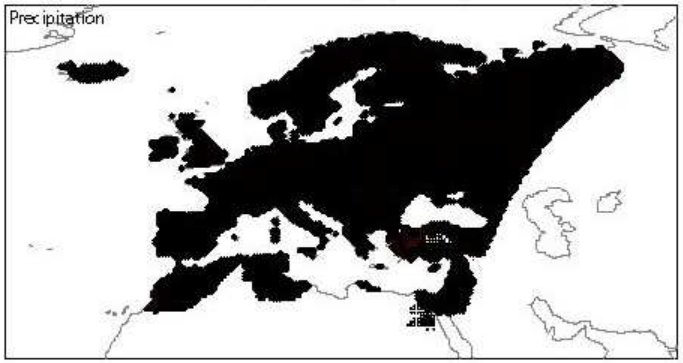
• **ECA** (European Climate Assessment & Dataset project). Daily datasets of precipitation, temperature, pressure, humidity, cloud cover, sunshine and snow depth since 1900 over networks of 100-1000 stations.



• **Ensembles 50km gridded daily observation records** of precipitation and surface temperature. 1950-2006.



Data Availability. GCMs

- **Minimum set of variables for each model:**

Variable (Code)	Levels	Time
Geopotential (Z)	yes	00-12
V velocity (V)	yes	00-12
U velocity (U)	yes	00-12
Temperature (T)	yes	00-12
Relative humidity (R)	yes	00-12
Specific humidity (Q)	yes	00-12
Potential Vorticity (PV)	yes	00-12
Relative Vorticity (VO)	yes	00-12
Divergence (D)	yes	00-12
MSLP (MSL)	no	
2m Temperature (2T)	no	
Minimum Temperature (Tn)	no	
Maximum Temperature (Tx)	no	
10m E-Wind Component (10U)	no	
10m N-Wind Component (10V)	no	
Total Precipitatation (PR)	no	

- **Not always possible due limitations in model data availability**

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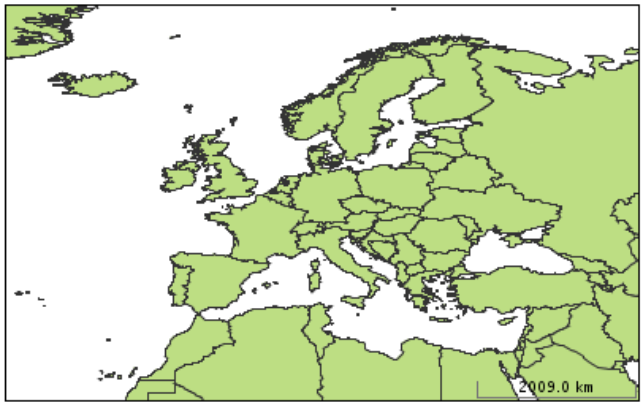
Data Availability. Reanalysis & S2D

Data available for the European region:

- **NCEP/NCAR** Reanalysis1. 1948-2007
- **ERA40** ECMWF: 1957-2002
- **JRA25** Japanese Reanalysis: 1979-2004

A smaller worldwide dataset is also available



Available for Europe

- **DEMETER**. Multi-model seasonal prediction experiment including seven models ran for six months four times a year using 9 different perturbed initial conditions (9 members)**.**

- **ENSEMBLES** Stream 2 Seasonal Hindcast, using OPeNDAP:

http://ensembles.ecmwf.int/thredds

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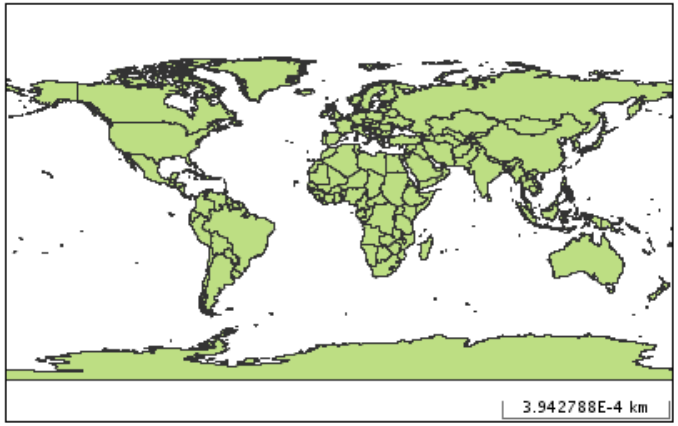
Data Availability. ACC

Daily global datasets obtained from different sources:

- **CERA**
- **IPCC data centre (*PCMDI)***
- **Local Providers.**



- **PCMDI_CGCM3.** Canadian Centre for Climate Modelling and Analysis, including **20th century** (from 1951 to 2000) and scenarios **A1B**, **B1** (periods 2046-2065 and 2081-2100).
- **CERA_MPI-ECHAM5,** including **20th century** data (1961-2000) and scenarios **A1B**, **B1**, and **A2** (2001-2100).
- **CNRM-CM3 (local provider),** including **20th century** (1961-2000) and scenarios **A1B**, **B1**, and **A2** (2001-2100).

We will continue including datasets as they become available and demanded by user.

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Data Access Portal

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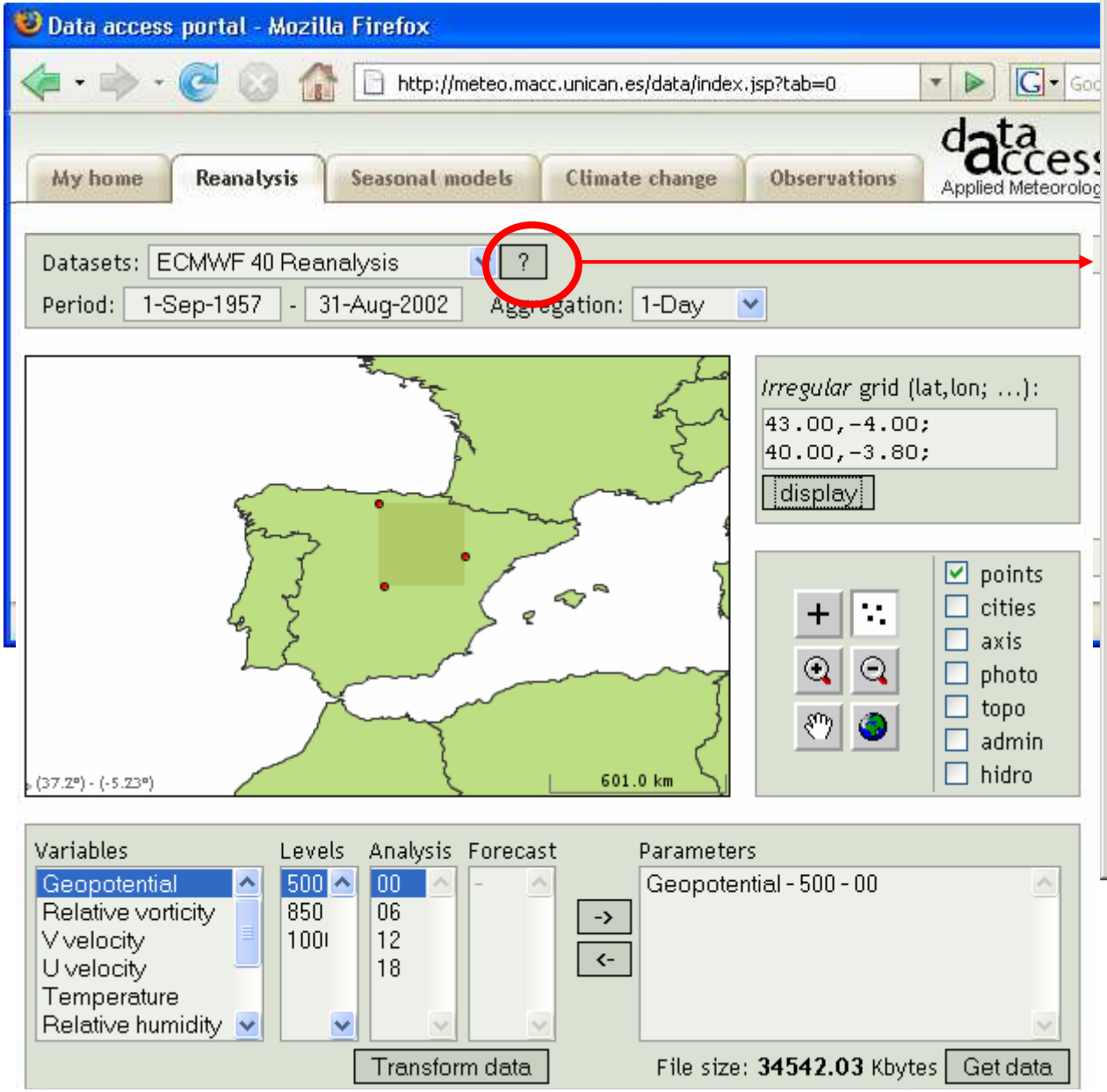

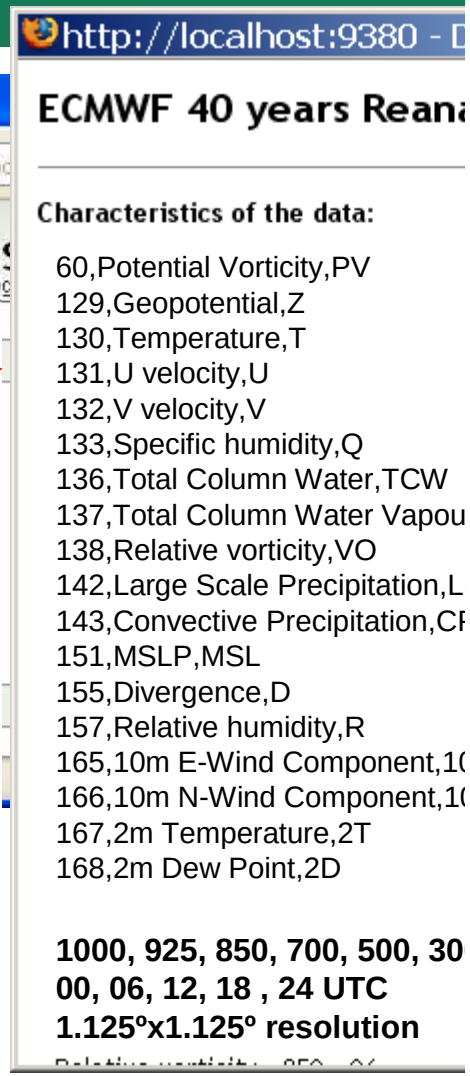

Data Access: s2d & acc

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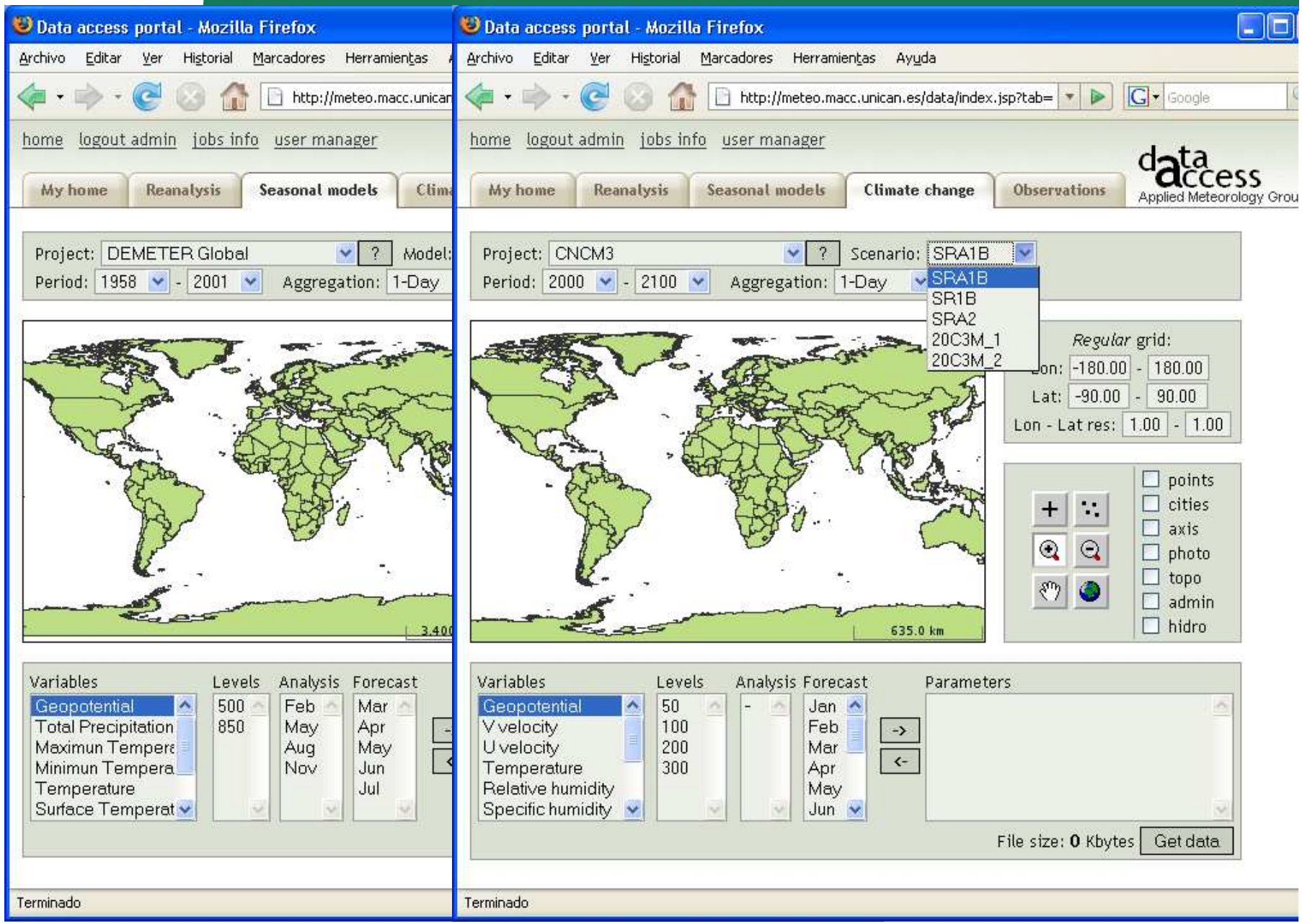
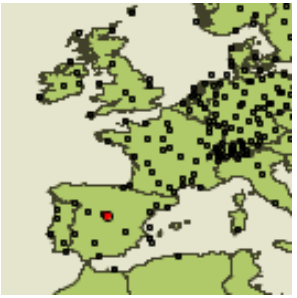


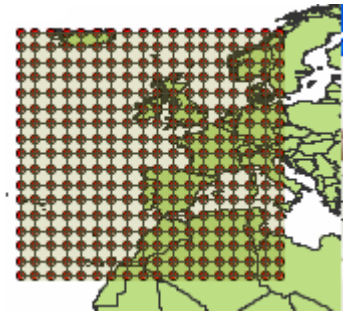
Statistical Downscaling Portal

http://www.meteo.unican.es

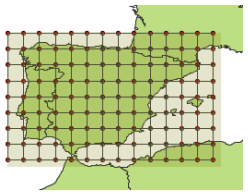
Problem: Local climate change prediction for Madrid (Spain): *maximum temperature*



Goal: Provide daily local values for the summer season june-august 2010-2040 in a suitable format (e.g., text file, or Excel file).



Regional zone



Local zone

Predictors

(**T**(1ooo mb),…, **T**(500 mb);
Z(1ooo mb),…, **Z**(500 mb);
H(1ooo mb),…, **H**(500 mb))

X_n

Downscaling Model

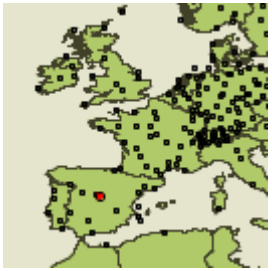
Regres, CCA, …

$Y_n = W^T X_n$

Precipitation
Temperature

Y_n

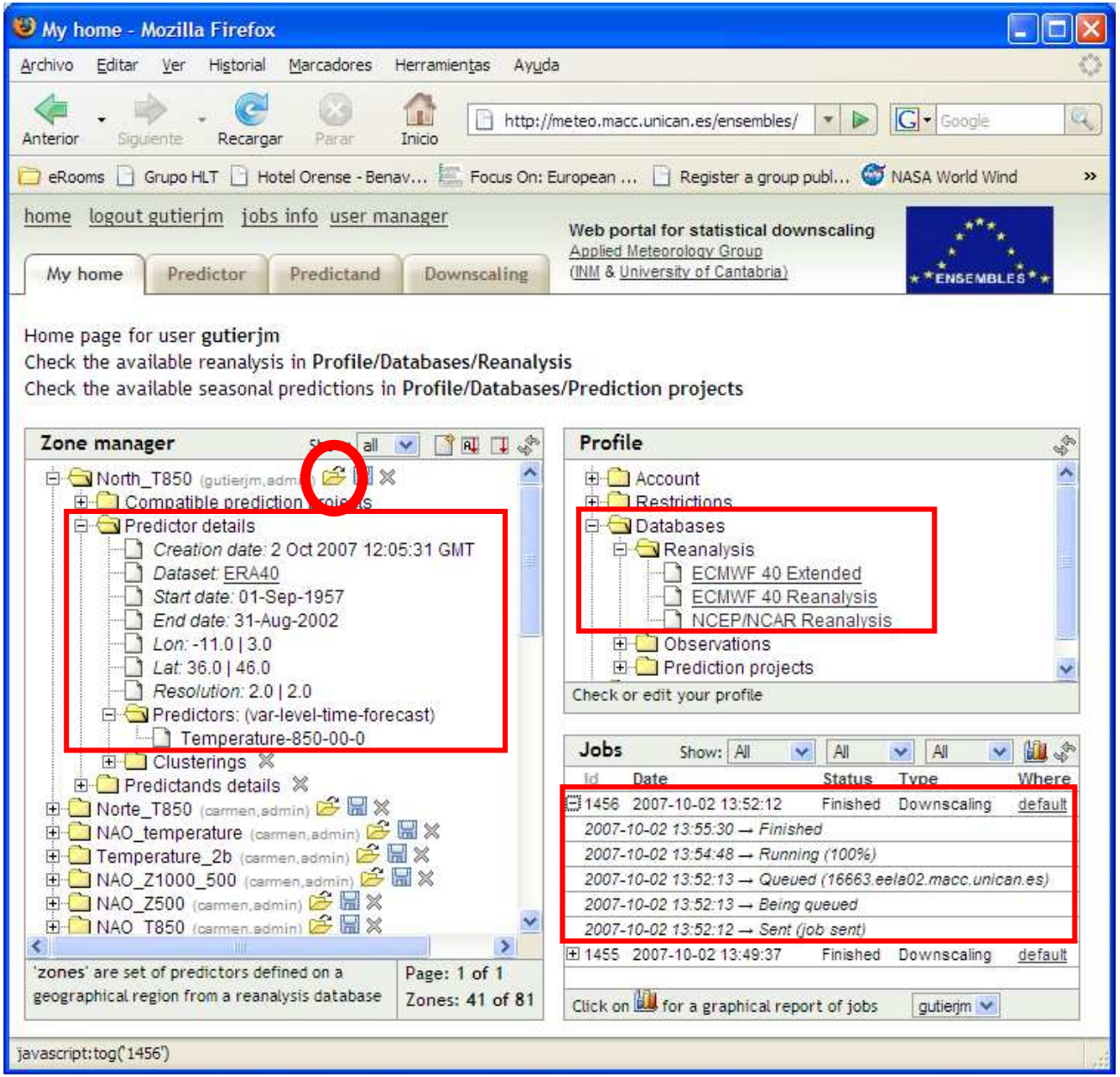
Predictands



This is the structure followed in the portal's design: predictors + predictand + downscaling method.

Demo... My Home

http://www.meteo.unican.es



The “My Home” tab allows the user to explore:

1. The **zones** (pre-defined regions).
2. The **profile** with the account information.
3. The status of the **jobs**: *queued, running, finished*.

Demo... Predictors

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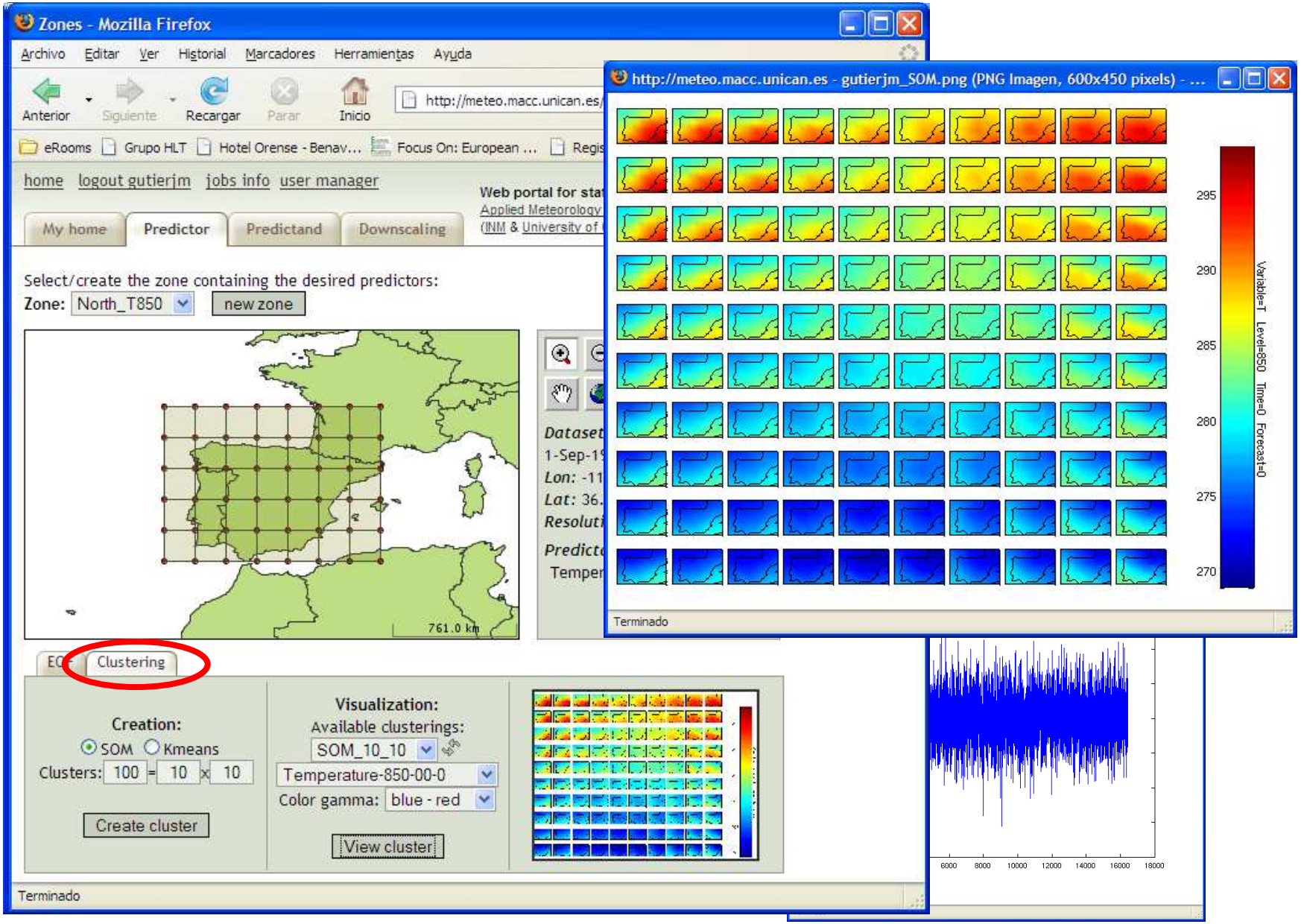
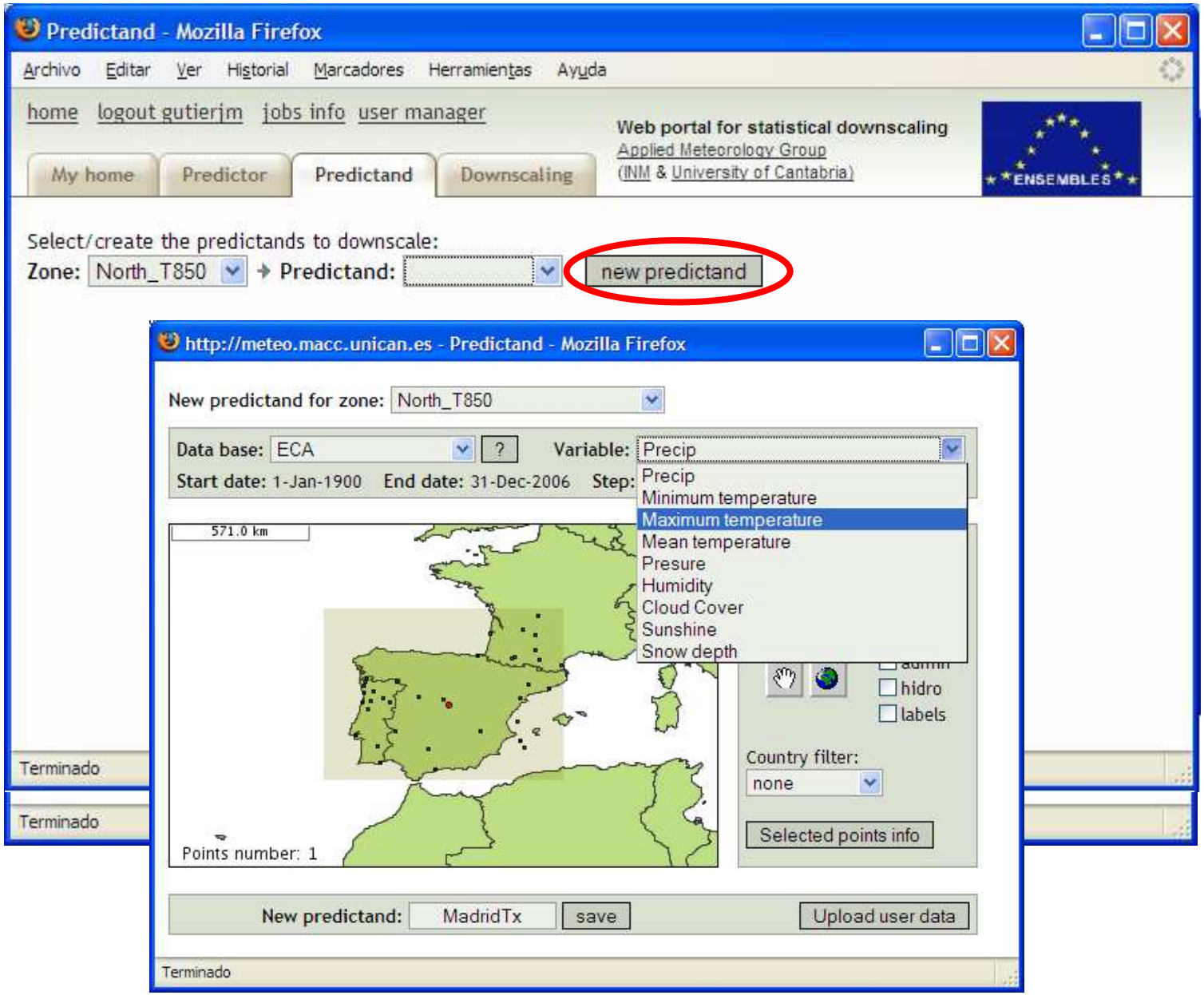


Demo... predictand



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Demo... Downscaling Method

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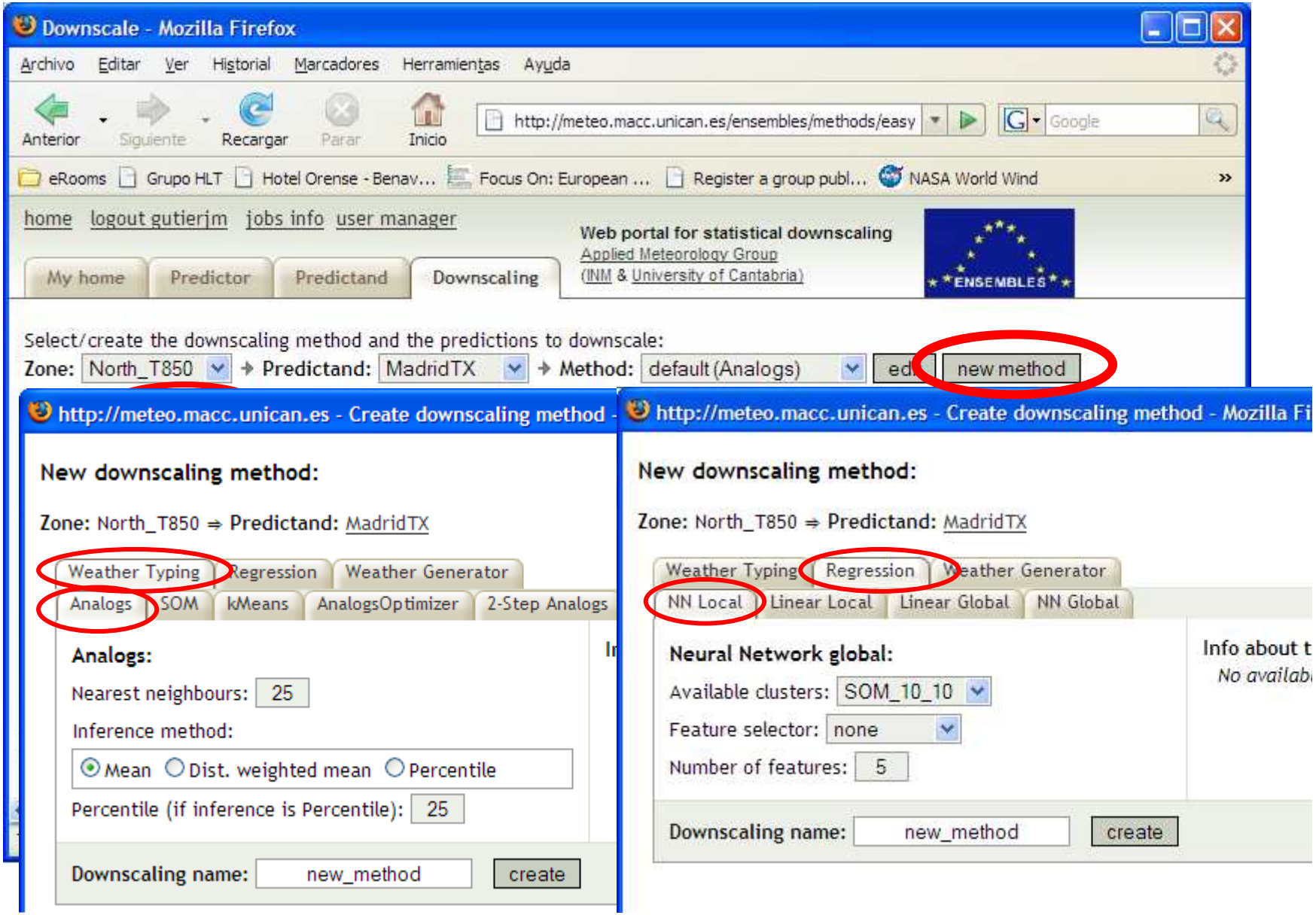
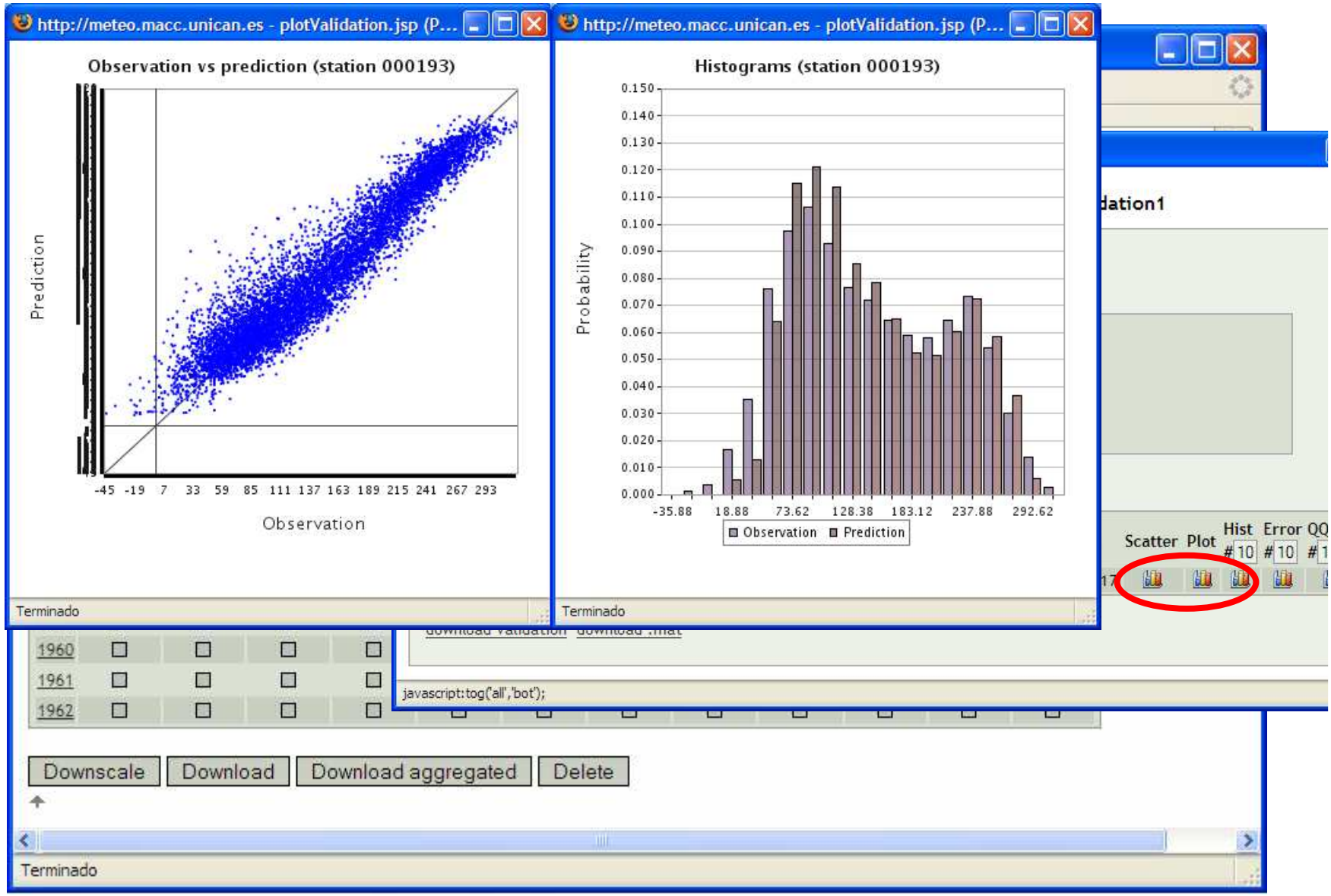


Demo... Validation



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Demo... Regional Projection

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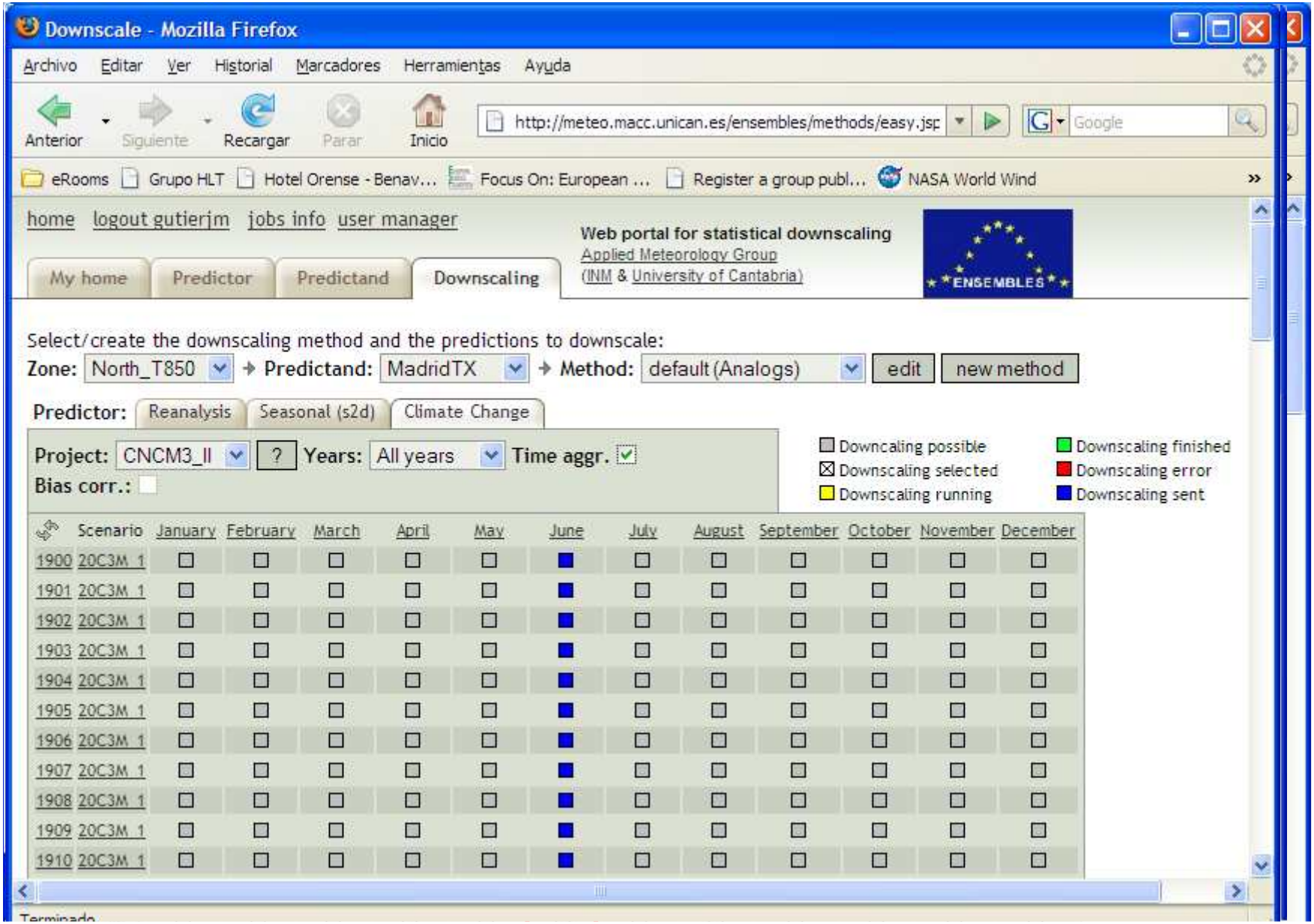

Demo...Time to Compute

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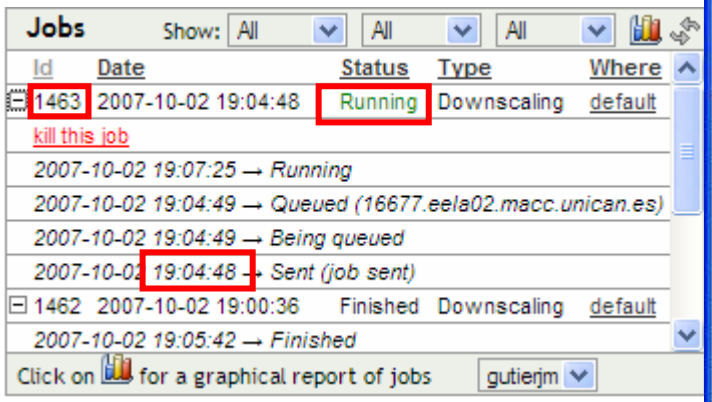
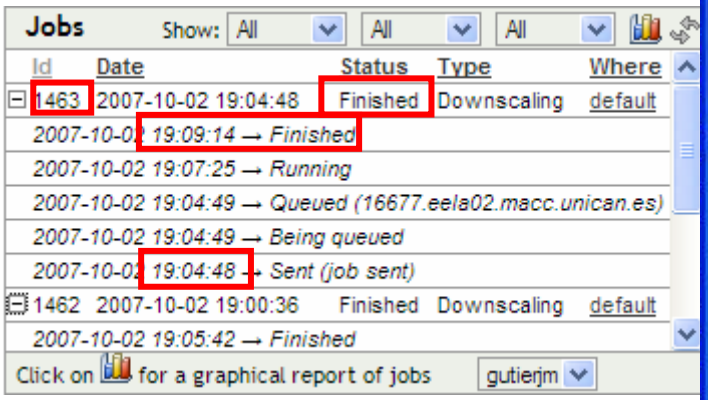
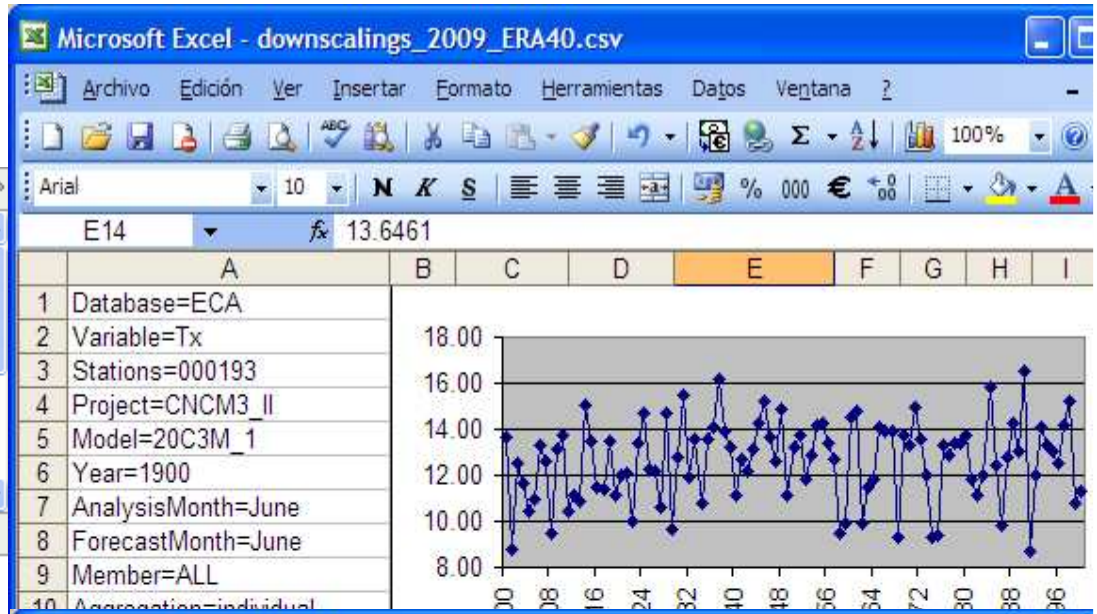
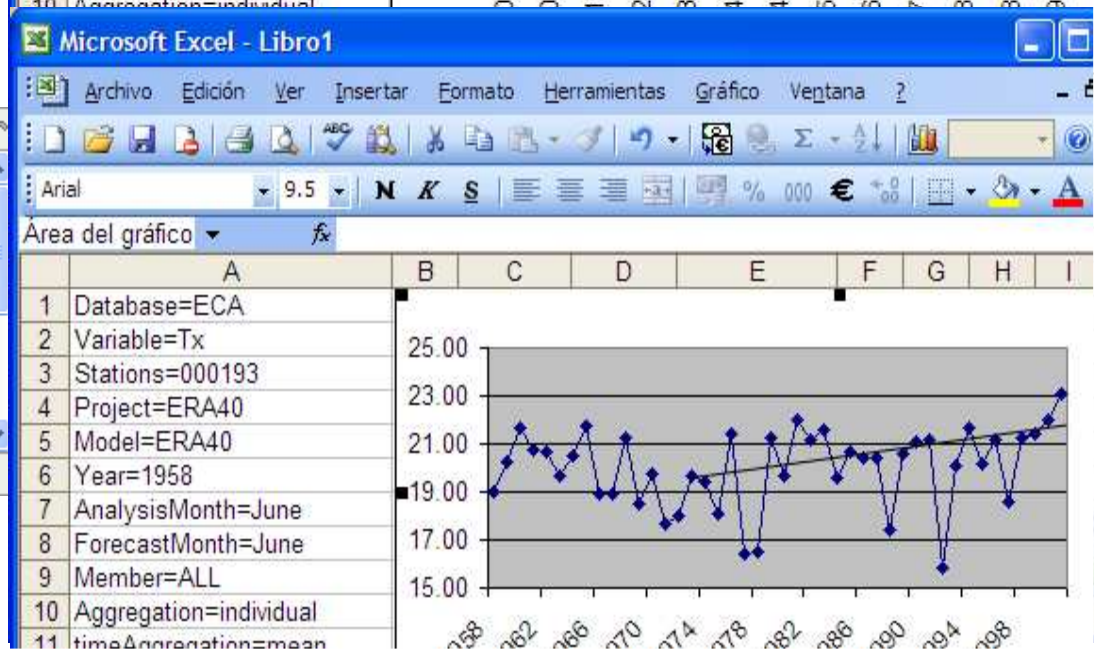
Scheduling the job



Five minutes later ...







Current Status

- Support for users in ENSEMBLES project.
- Data access for Reanalysis, Seasonal2Decadal and Climate Change models.
- Users can use common observations datasets or upload their own data for downscaling.
- Data access control based on user authentication and authorization.
- User can choose predictors, predictands and transfer function to be used in the downscaling process.
- Quality assessment of the downscaling.
- Download the downscaled data.

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Future actions

- End-user tool for new projects and applications:
  - •QWeCI: Quantifying Weather and Climate Impacts on Health in Developing Countries
  - •FUME (Forest fires under climate, social and economic changes in Europe, the Mediterranean and other fireaffected areas of the world)
  - •South America and India users
- Data access and storage: towards remote accessing of datasets based on OPeNDAP. Reanalysis, S2D & ACC simulations.
- Incorporate more statistical downscaling tools.
- Full integration with on GRID technologies to provide more resources for new users. Collaboration with EGEE, EGI, SSC-ES, EELA and others initiatives
- Integrate catalog capabilities for model and observation data. METAFOR, Climate-G initiatives (see tomorrow`s presentations)

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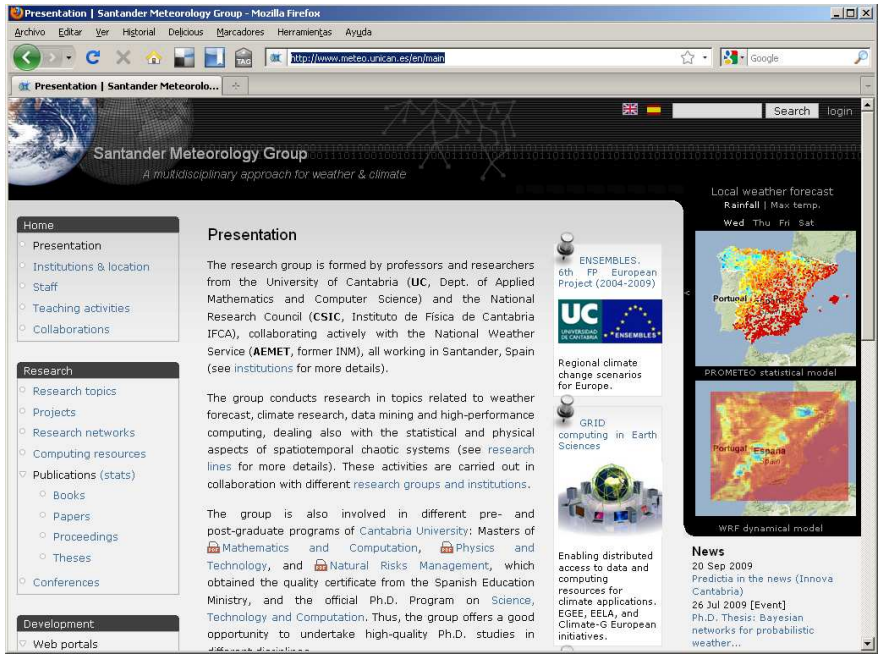
Thank you !!!

Please, for more information visit us at

http://www.meteo.unican.es

or e-mail us at

meteo@unican.es



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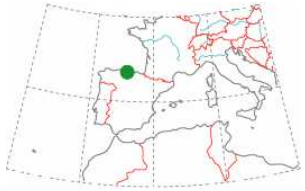

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