http://www.meteo.unican.es

The ENSEMBLES downscaling portal

Beyond the ENSEMBLES project

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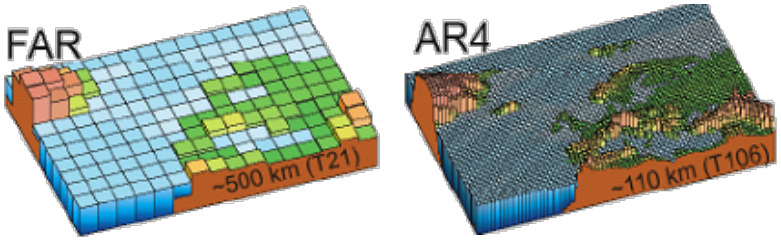
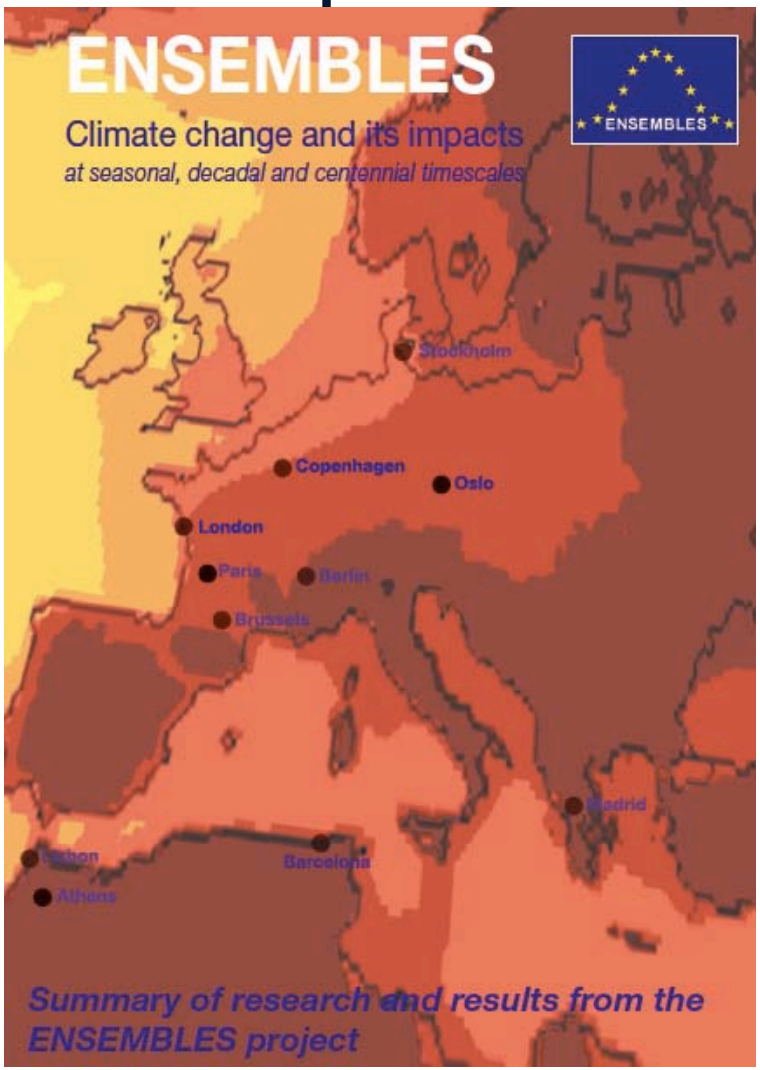


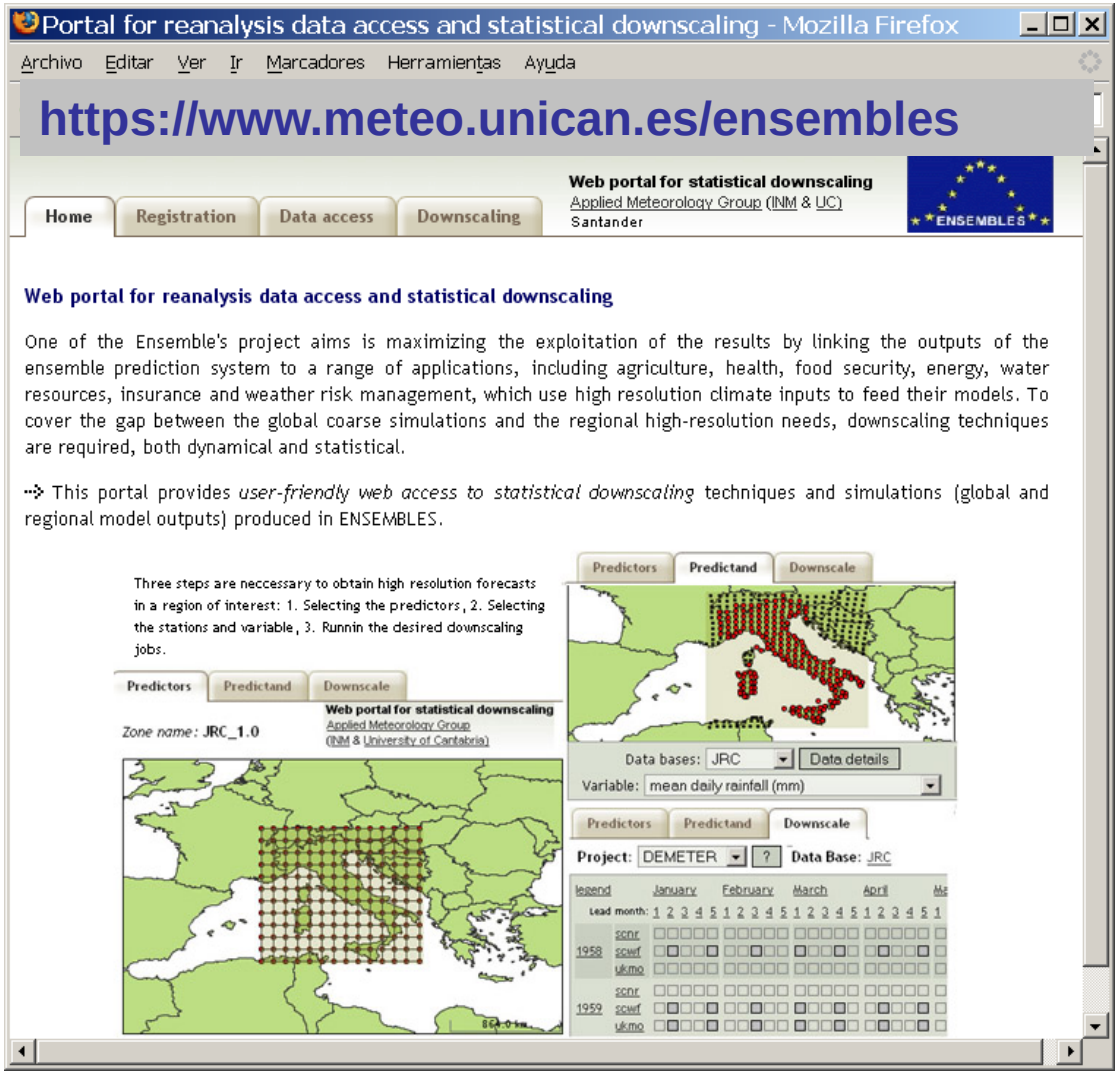
GO-ESSP 2011 Workshop May 10th – 11th, Asheville, North Carolina, USA

ENSEMBLES

EU funded Project (2004-2009)

http://ensembles-eu.metoffice.com/





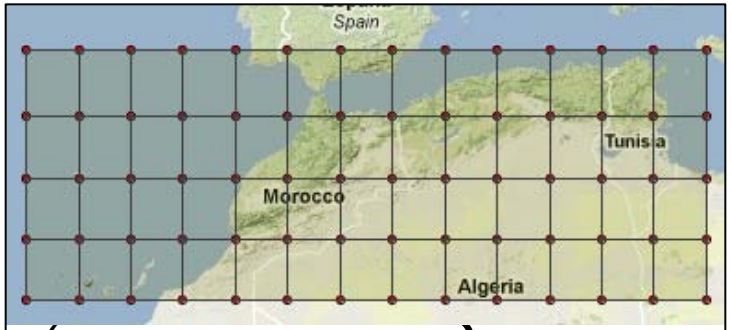
ENSEMBLES Downscaling Portal (version 2)

The ENSEMBLES downscaling portal allows to friendly perform statistical downscaling (advanced interpolation) for GCM.

The following elements need to be defined for a particular experiment:

- **Predictors** (large scale reanalysis fields)
- **Predictands** (local variables of interest for impact studies)
- **Statistical** downscaling methods

Large scale predictors



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

X_n

Downscaling Model

Analogs, reg., …

$Y_n = f(X_n)$

Statistical methods based on historical data to link large scale circulation to local climates.

Local predictands

Y_n

Variables for impact studies:
Precipitation
Temperature

ENSEMBLES User-Friendly Portals

ENSEMBLES datasets included in the portal:
All of them ate least are daily, some are 6-hourly.

- **These datasets are locally stored and made CDM compliant to be read by netcdf-java library (no for obs)**
- **Some datasets are be accessed by OPeNDAP (S2D).**

Observations (3D):

- **ECA stations** **+ GSOD**
- **E-OBS 50km** **+ Spain02**
- **E-OBS 25km** **+ Personal Obs.**

Reanalysis (4D global coverage):

- **ERA40**
- **NCEP**

Other reanalysis (but restricted access):
MERRA, CFS, 20thC, JRA25 and INTERIM

GCM scenarios (4D global coverage):

- **ENSEMBLES Stream1 (CMIP3):**
  - BCM2.0, CNRM-CM3, ECHAM5, ECHO-G, HADGEM, IPCM4
- **ENSEMBLES Stream2:**
  - CNRM-CM33, ECHAM5c, HADCM3C, HADGEM2, IPCMv2

Seasonal 2 Decadal simulations (4D Europe, SA and Africa):

- **DEMETER and ENSEMBLES S2D Stream2 dataset**

Follow on Activities

The activities started in ENSEMBLES have a follow on in several EU-funded and international projects, involving different impact communities.

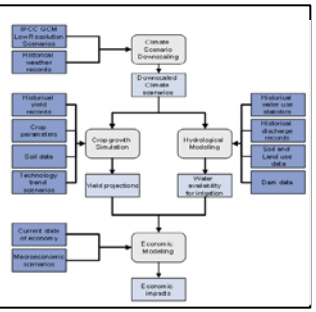
Impacts in forest **fires**

Impacts in **health**

Impacts in tourism, energy, and natural hazards

Appropriate **metadata** for GCMs and downscaling.

Integration with impact tools: crop + hydrology + economy

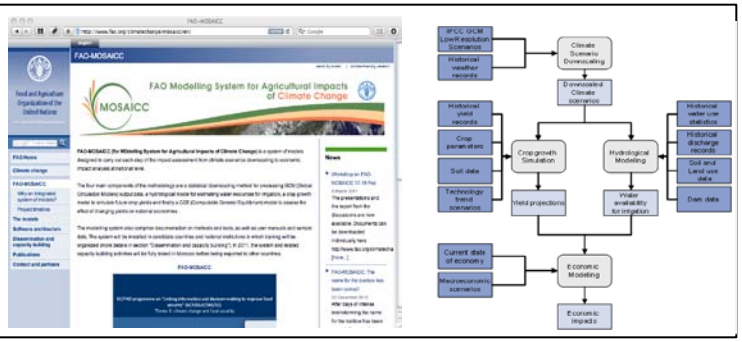


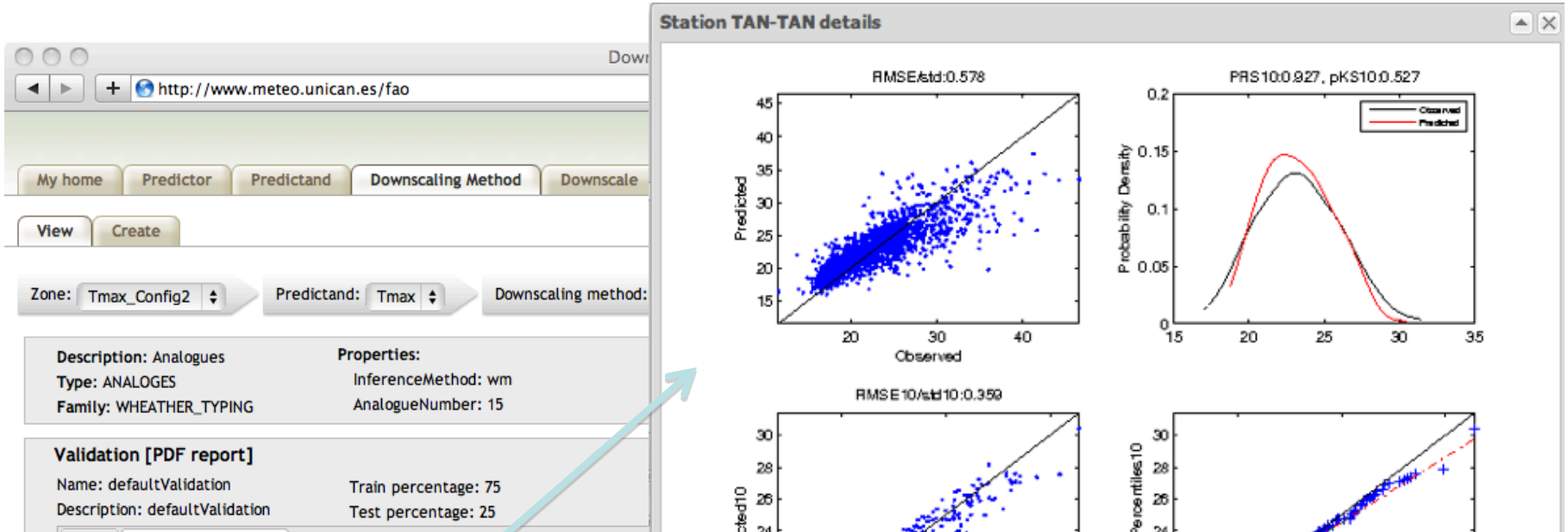
Improvements… New Downscaling Porta

The downscaling portal has been recoded using Spring, Struts, JMX, … frameworks to include new additional features and larger flexibility and integration capabilities.

Appropriate **metadata** for GCMs and downscaling.

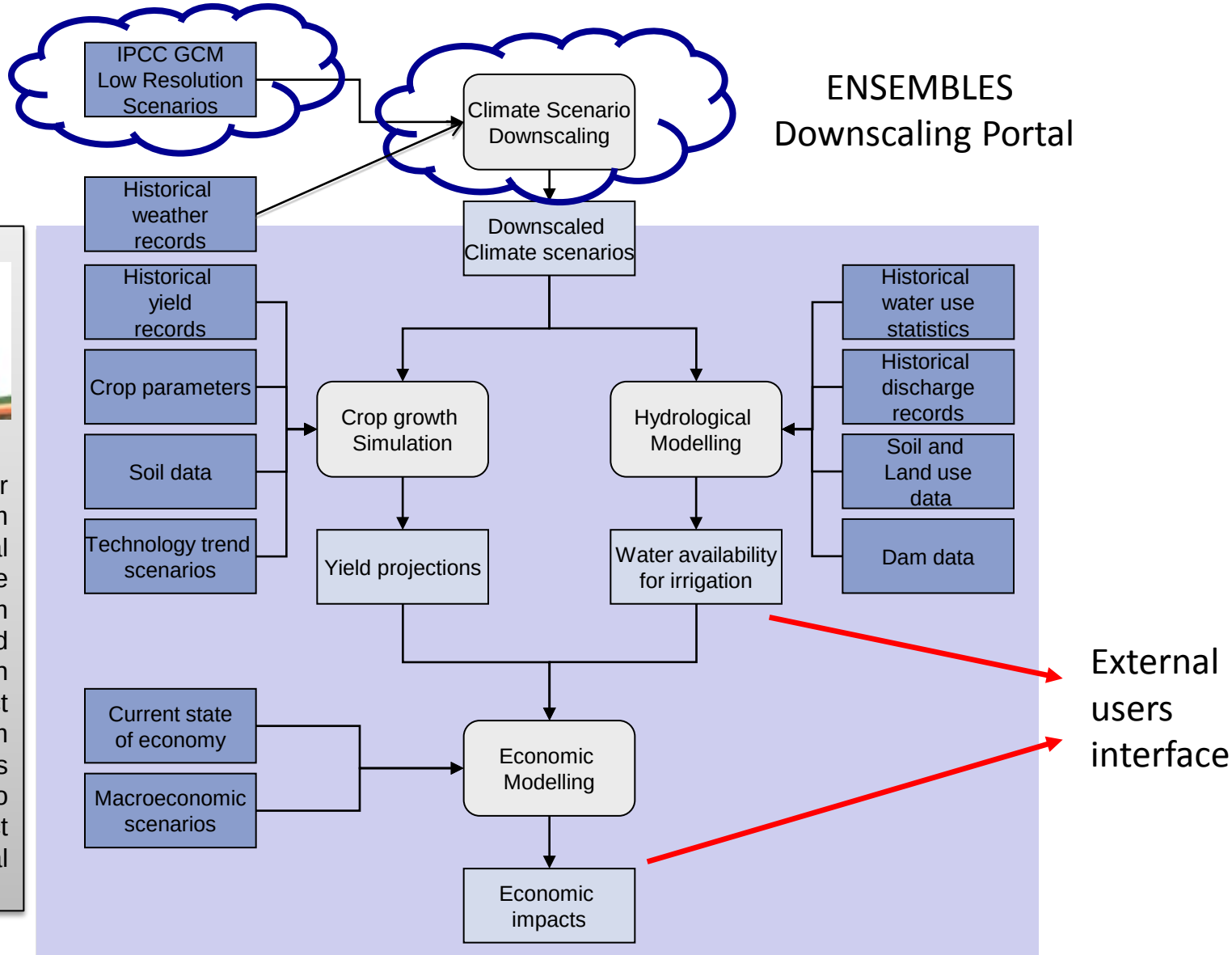
Integration with impact tools: crop + hydrology + economy





MOSAICC FlowChart

FAO-MOSAICC (for MOdelling System for Agricultural Impacts of Climate Change) is a system of models designed to carry out each step of the impact assessment from climate scenarios downscaling to economic impact analysis at national level.



MOSAICC integration

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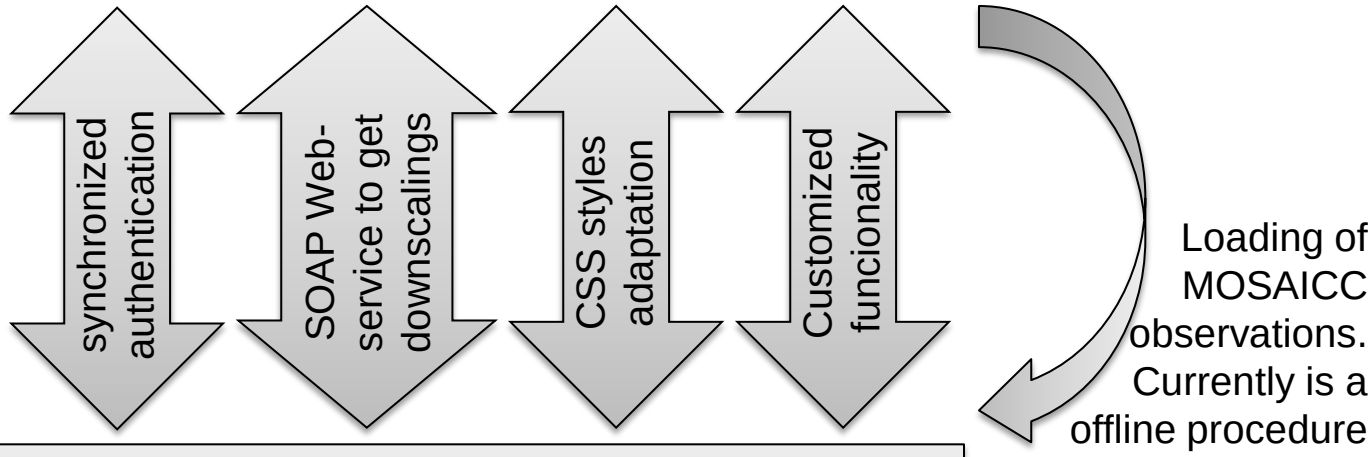
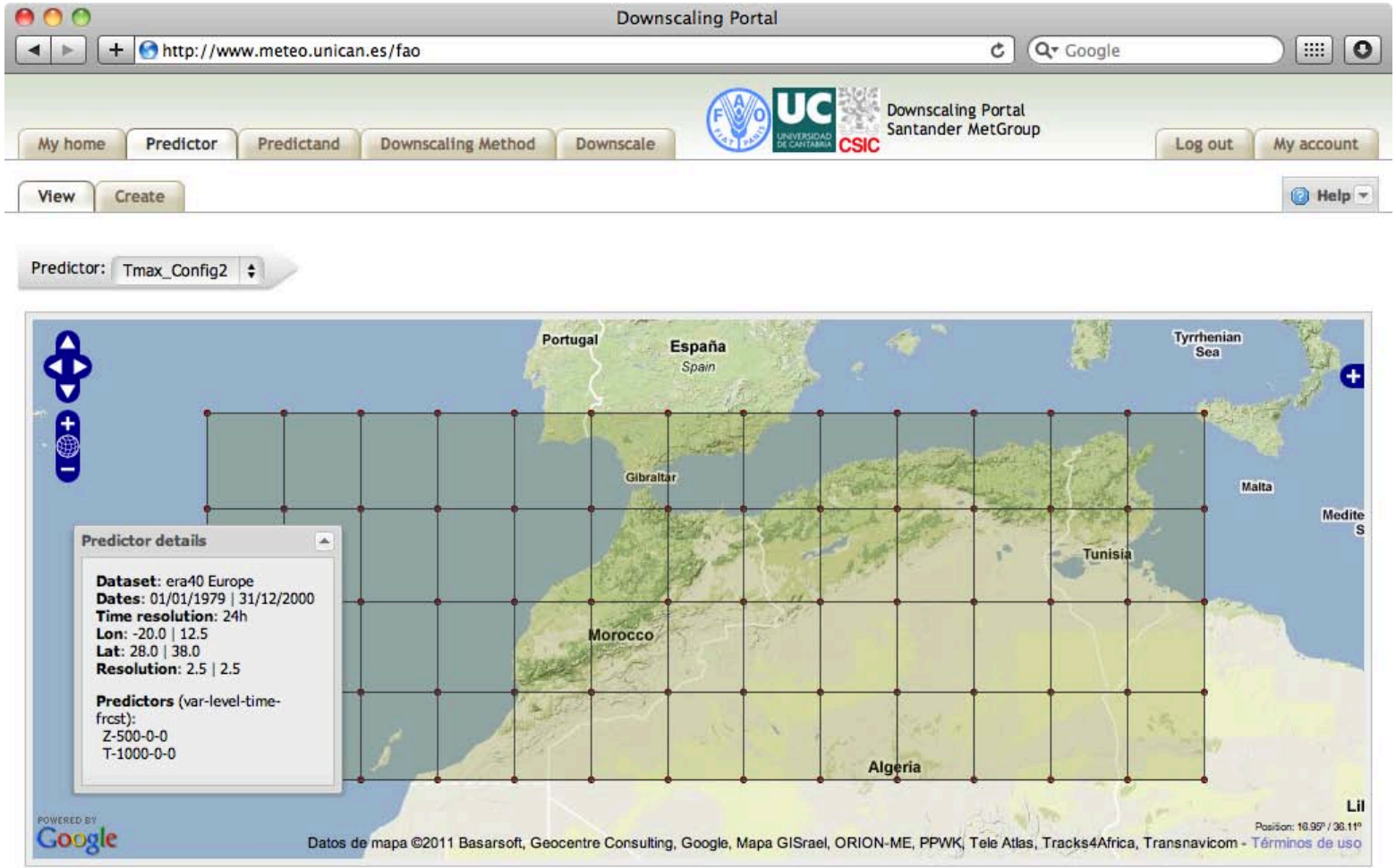


Authentic between	Several we developed data and n	The Dow adapted MOSAIC	New cus develope different	MOSAICC observations data has been loaded into the Downscaling Portal. A module to make this process online is being developed

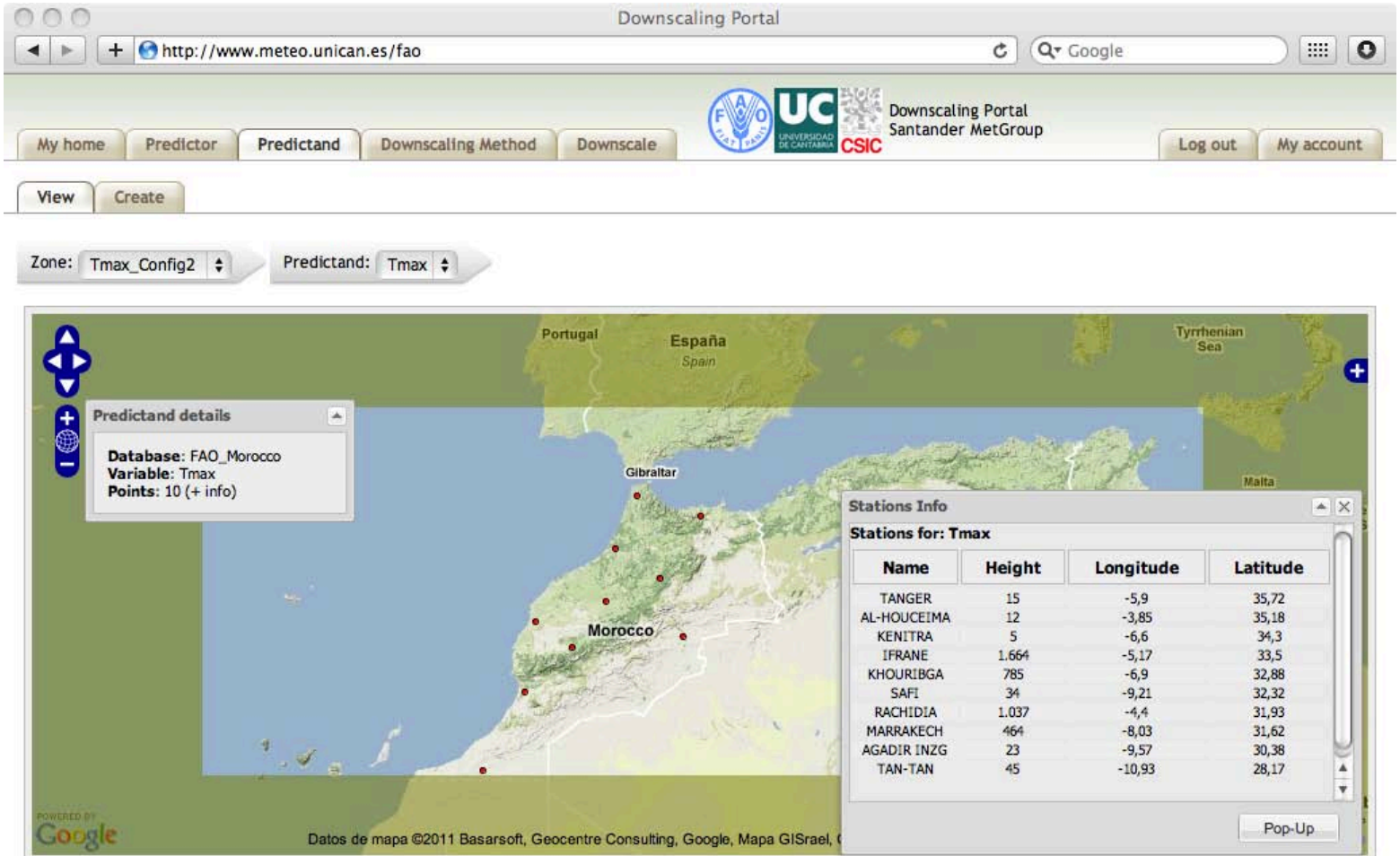
SD Portal: Predictors

The SDS Portal of *FAO-MOSAICC* allows creating downscaling experiments selecting a region of interest and the predictors to be used (Z500 and T1000 in this example).



SD Portal: Local predictands

It also allows selecting a local variable of interest (e.g. max. Temp.) in a number of stations from any of the available historical datasets (in this case a dataset developed for the project *FAO_Morocco*).



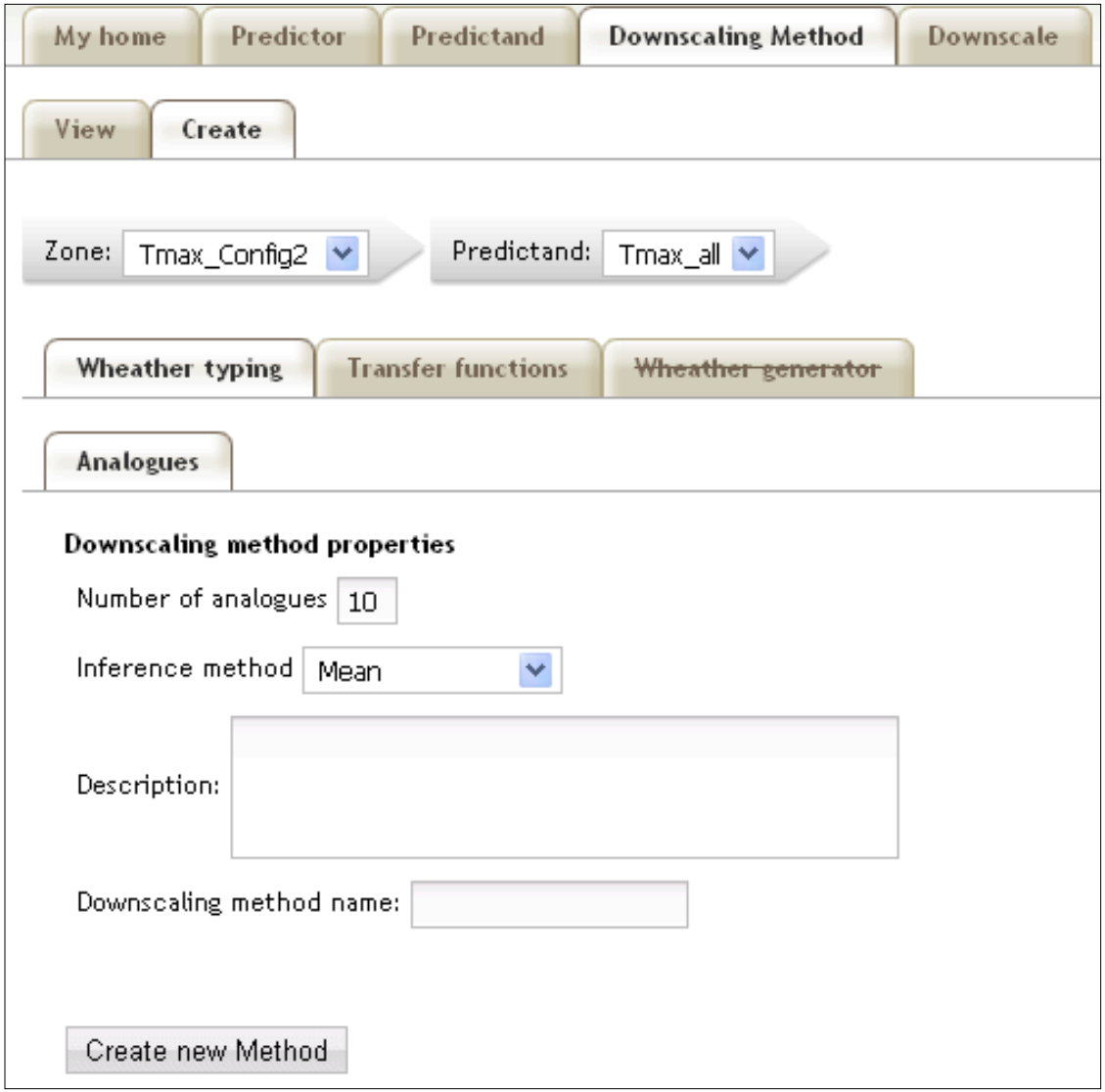
SD Portal: Downscaling Method

It also allows selecting a particular downscaling algorithm from the different families of methods:

- **Analogs**
- **Regression + GLMs**
  - From CPs
  - From grid-points
- **SOM weather types**
- **Weather generators**

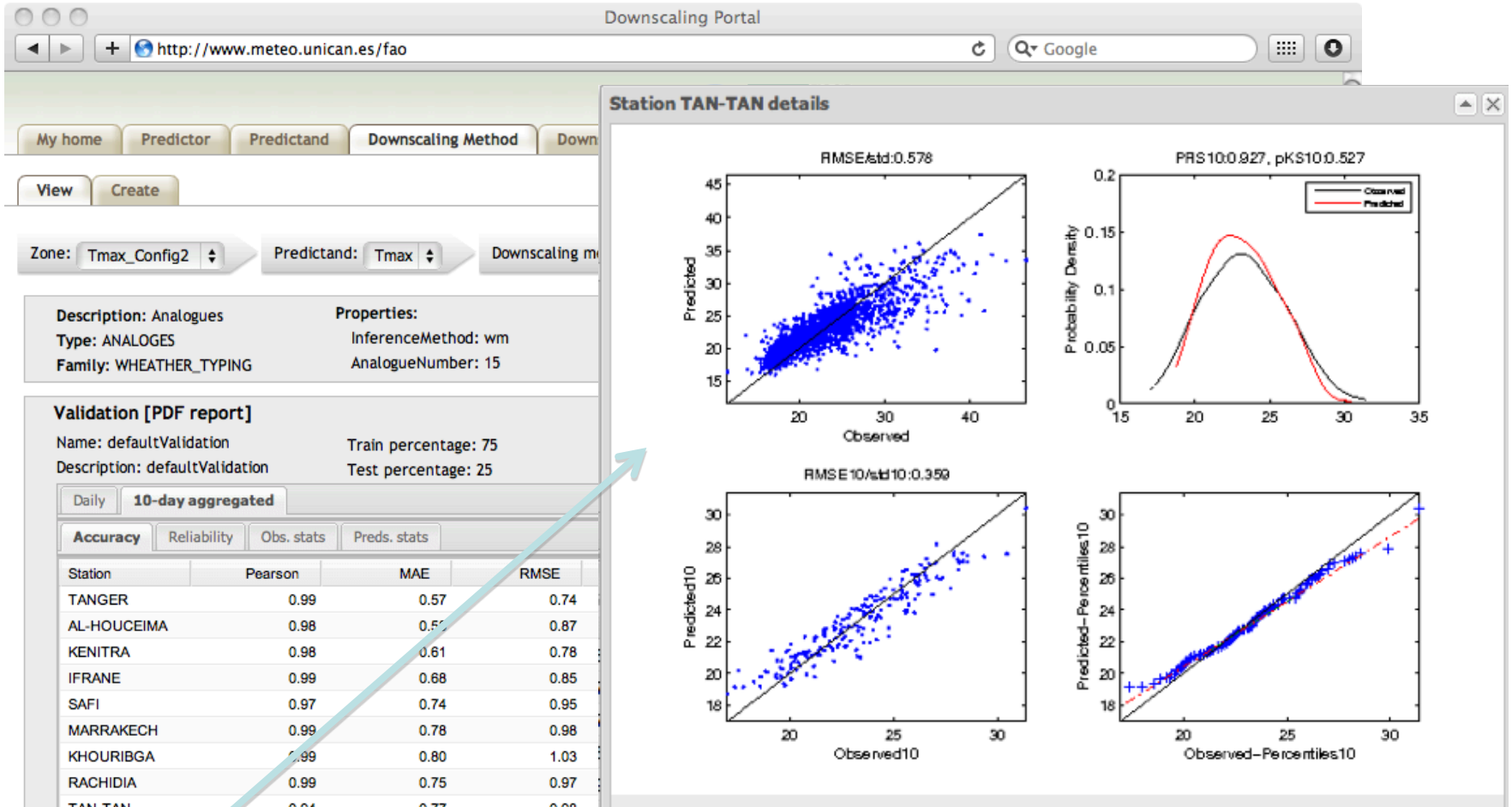
and defining a particular configuration:

- Number of analogs
- Numer of CPs.
- Etc.



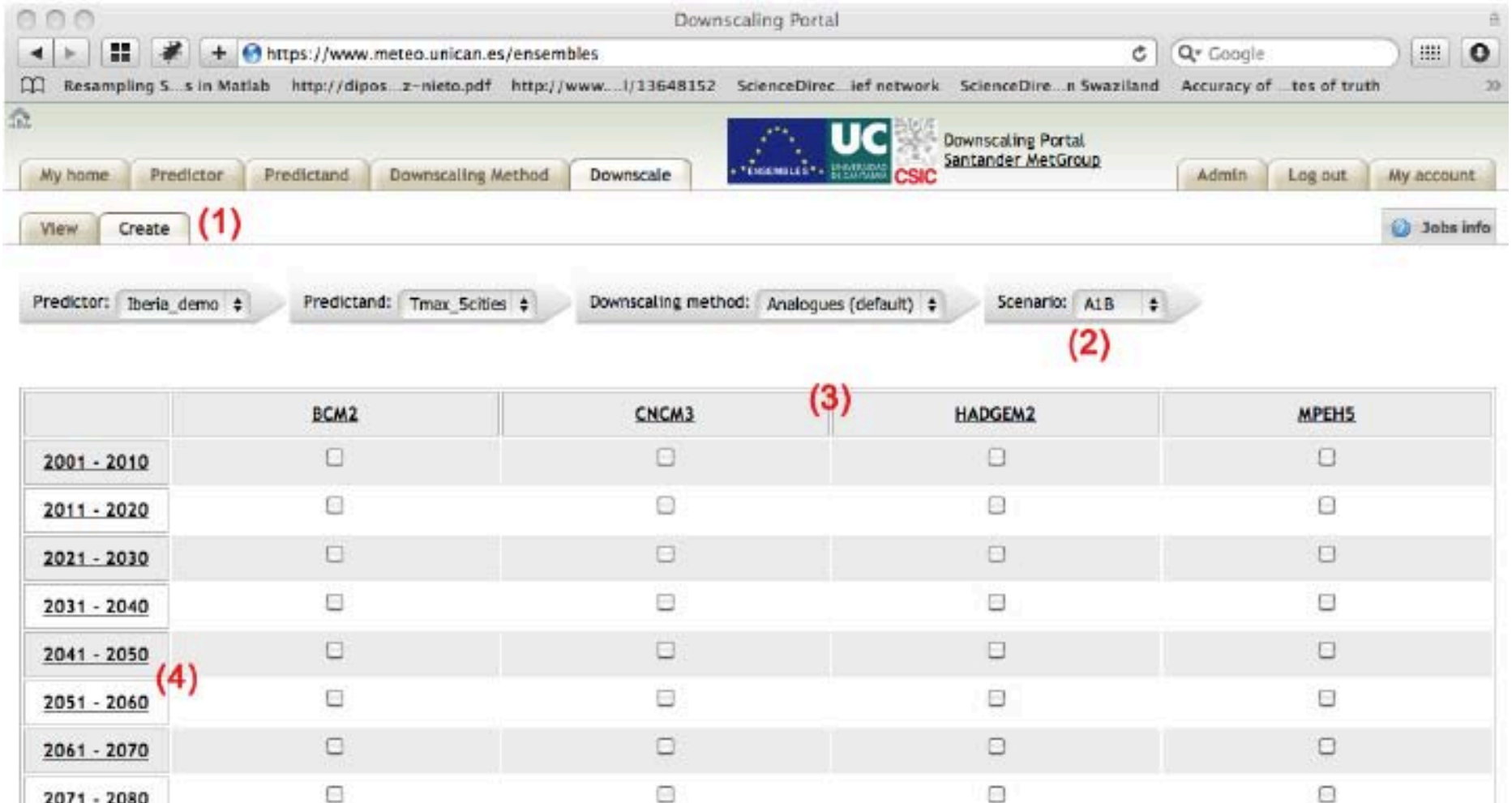
SD Portal: Calibration & validation

Finally, it allows selecting a downscaling method (from the list of available ones, including regression, analogs, weather typing, etc.) and obtaining a cross-validation in present climate using renalysis data.

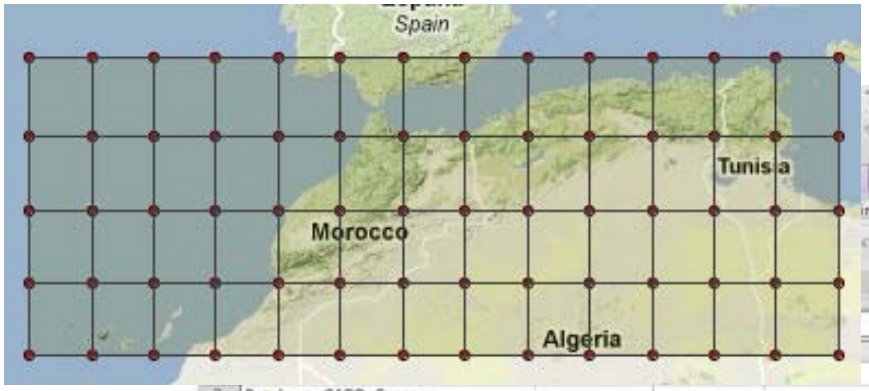


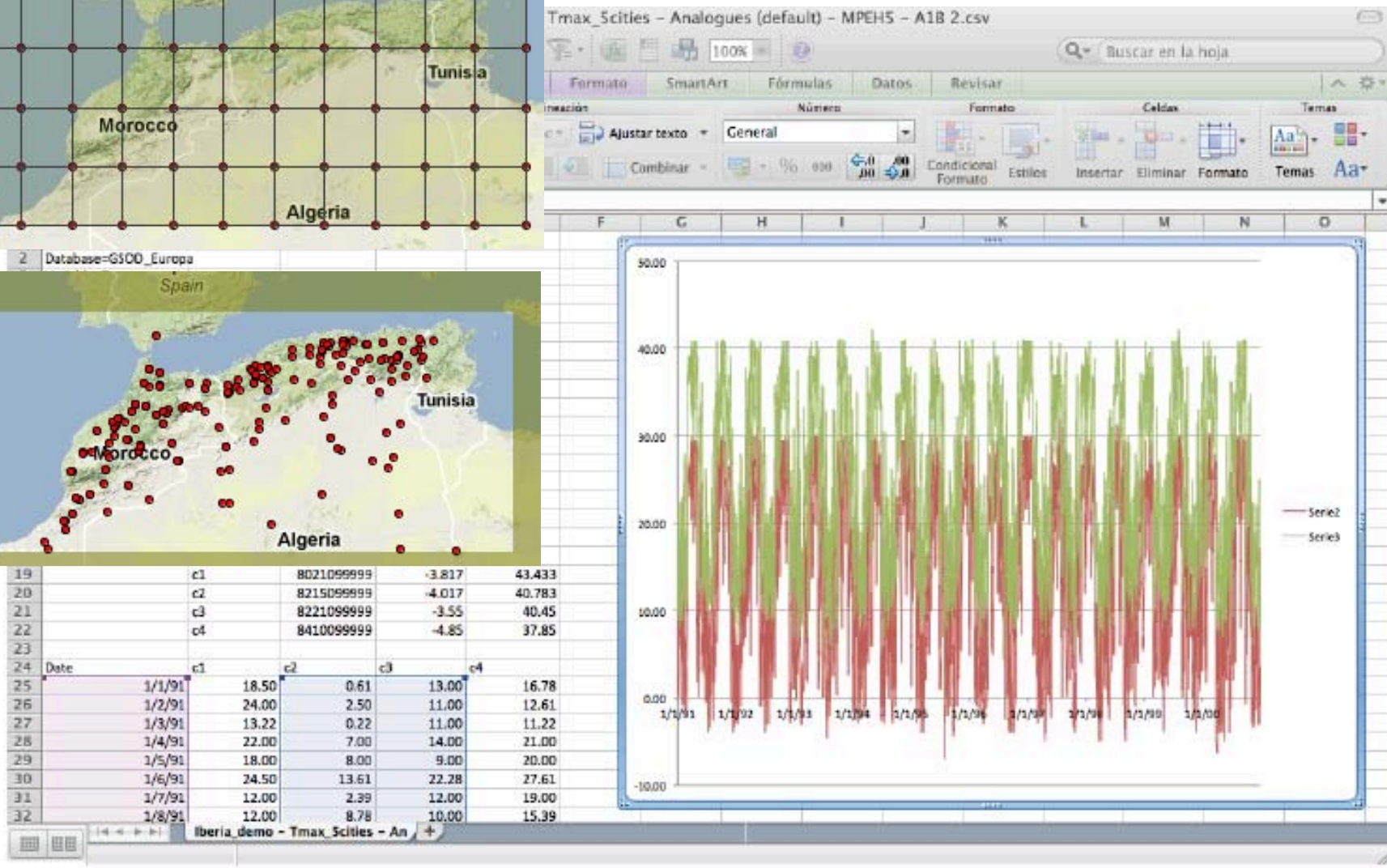
SD Portal: PRODUCTION

Once the method is defined and validated it can be used to downscale GCM models for future scenarios (e.g. A1B), decade by decade.



SD Portal: Global vs. Local



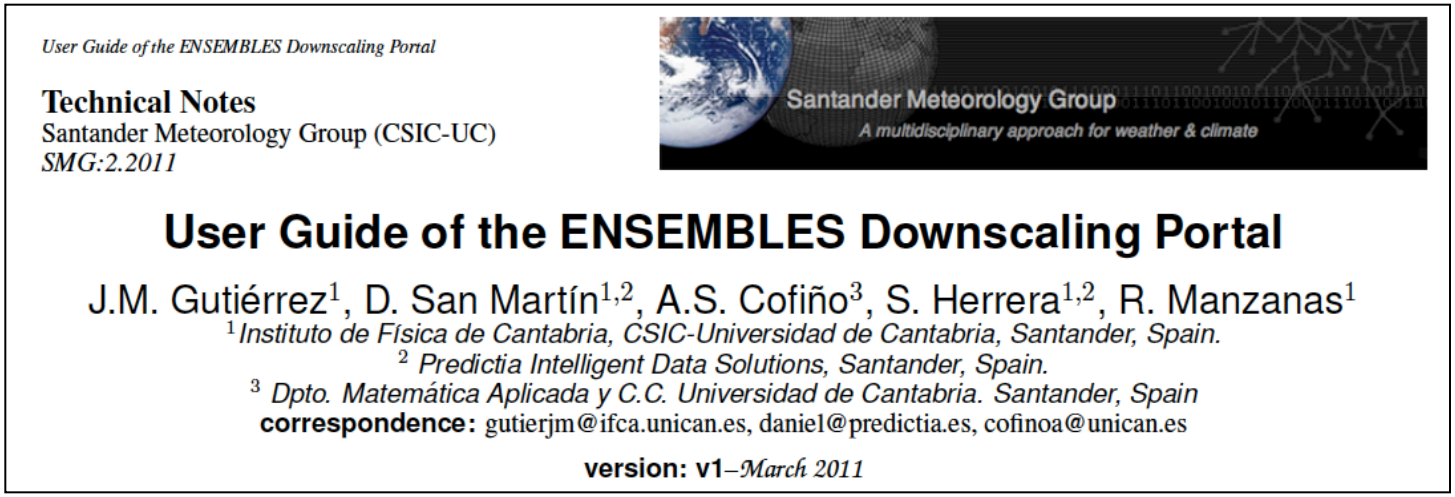


2	Database=GSOD_Europa				
19		c1	8021099999	-3.817	43.433
20		c2	8215099999	-4.017	40.783
21		c3	8221099999	-3.55	40.45
22		c4	8410099999	-4.85	37.85
23					
24	Date	c1	c2	c3	c4
25	1/1/91	18.50	0.61	13.00	16.78
26	1/2/91	24.00	2.50	11.00	12.61
27	1/3/91	13.22	0.22	11.00	11.22
28	1/4/91	22.00	7.00	14.00	21.00
29	1/5/91	18.00	8.00	9.00	20.00
30	1/6/91	24.50	13.61	22.28	27.61
31	1/7/91	12.00	2.39	12.00	19.00
32	1/8/91	12.00	8.78	10.00	15.39

Recommendations and Support for End-Users

These portals **should not be used as a black-box tool (particularly the downscaling portal)** to avoid wrong applications and errors. Some background knowledge is required and the limitations should be known (e.g. the different assumptions of the statistical downscaling methodology). **The users are requested to collaborate with downscaling experts. In some cases of mutual interest we provide support and/or training.**

User tutorials and indications and **recommendations for downscaling** are provided and referred to, e.g. in the ENSEMBLES web site.



User Guide of the ENSEMBLES Downscaling Portal

Technical Notes
Santander Meteorology Group (CSIC-UC)
SMG:2.2011

Santander Meteorology Group
A multidisciplinary approach for weather & climate

User Guide of the ENSEMBLES Downscaling Portal

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version: v1–*March 2011*

Future work and conclusions

- **AR5 datasets** to be integrated: how to do it? ESGF Service?
- **OPeNDAP** connections to the different datasets could be included, **but performance issues** has to been overcome
- New developments regarding **RCM calibration** (with the available observations) and **MOS-like statistical downscaling** to be used in the **CORDEX initiative**.
- Integration of **METAFOR services for GCM and downscaling metadata**.
- Migration of **new downscaling techniques and calibration** is and active on-going work.
- **Improvement** on **visualization and management** of **downscaled data** is required.
- The portal is **open to any user**, but **limits on resource** usage are imposed.