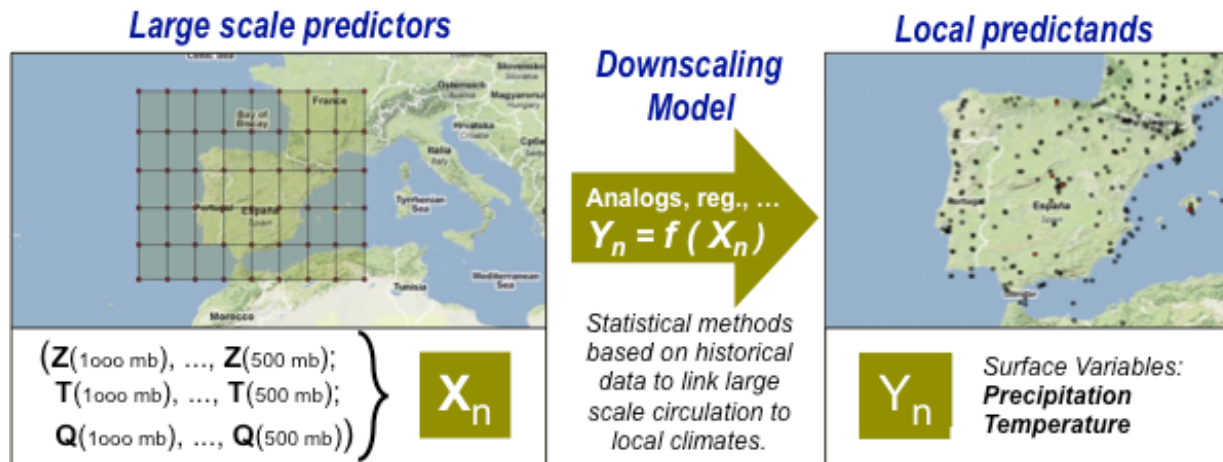


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Statistical Downscaling: A user friendly portal



Thanks to:

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 Jose Manuel Gutiérrez
 Sixto Herrera
 Daniel San Martín
 Max Tuni

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ENSEMBLES Downscaling Portal (version 2)

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

ENSEMBLES Project (2004-2009)

Develop an ensemble prediction system for climate change and linking the outputs to a range of applications.



- RCM simulations.
- **Statistical Downscaling.**
- **Gridded observations: E-OBS**

The statistical downscaling portal is a free tool for user-friendly downscaling.

<http://www.meteo.unican.es/ensembles>

Downscaling Portal

Contact:

Home News Terms of Use Registration Login

ENSEMBLES UC CSIC Downscaling Portal Santander MetGroup

ENSEMBLES Downscaling Portal (version 2)

One of the goals of the [ENSEMBLES project](#) is maximizing the exploitation of the results by linking the outputs of the ensemble prediction system (multi-model climate change global simulations) to a range of applications, including agriculture, health, food security, energy, water resources, and insurance, which use high resolution climate inputs to feed their models. The **downscaling portal** allows end-users to calibrate/downscale the coarse model outputs in the region of interest using historical observed records. The portal includes public observation datasets (e.g. GSOD) and allows uploading new historical data (including private datasets, not available for other users).

This Statistical Downscaling portal provides **user-friendly web access** to different statistical downscaling techniques and works transparently with the observations, reanalysis and global climate simulations (see the common list of [variables](#) available for all models in the portal), obtaining the resulting **outputs in simple formats (e.g., text files)**.

Large scale predictors

$(Z(1000 \text{ mb}), \dots, Z(500 \text{ mb});$
 $T(1000 \text{ mb}), \dots, T(500 \text{ mb});$
 $Q(1000 \text{ mb}), \dots, Q(500 \text{ mb}))$

X_n

Downscaling Model

Analogs, reg., ...

$Y_n = f(X_n)$

Local predictands

Y_n Surface Variables:
Precipitation
Temperature

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

Three steps are necessary to obtain high resolution forecasts in a region of interest:

1. Selecting the predictors,
2. Selecting the local stations and variable (predictand),
3. Running the desired downscaling jobs (local scenarios).

Downscaling Portal user guide:

Gutiérrez, J.M., San-Martín, D., Cofiño, A.S., Herrera, S., and Manzanas, B. (2011) User Guide of the ENSEMBLES Downscaling

Meteolab: an open-source Matlab toolbox

<http://www.meteo.unican.es/en/software/meteolab>



Currently, the **ENSEMBLES** datasets included in the portal contain only **Climate Change Scenarios** data. Data from seasonal experiments (multi-model simulations) will be included soon.

Observations:

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

Reanalysis (global coverage):

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

GCM scenarios (global coverage):

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



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Downscaling Portal: Follow-on Activities

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

Impacts in forest **fires**

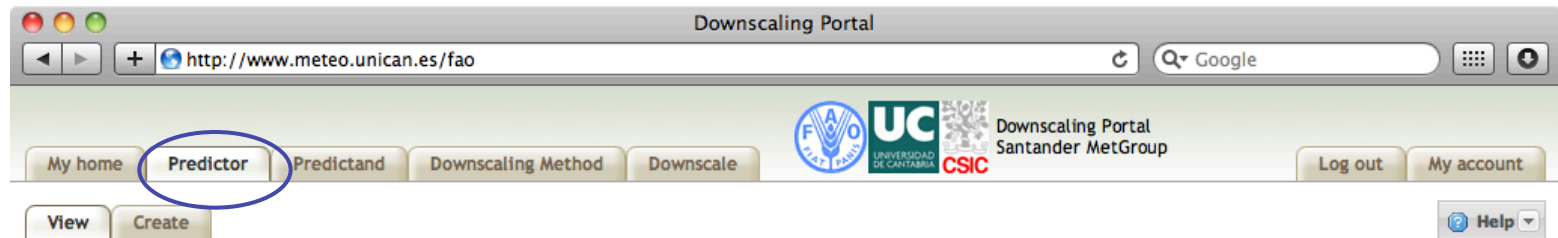
Impacts in **health**

Impacts in tourism, energy, and natural hazards

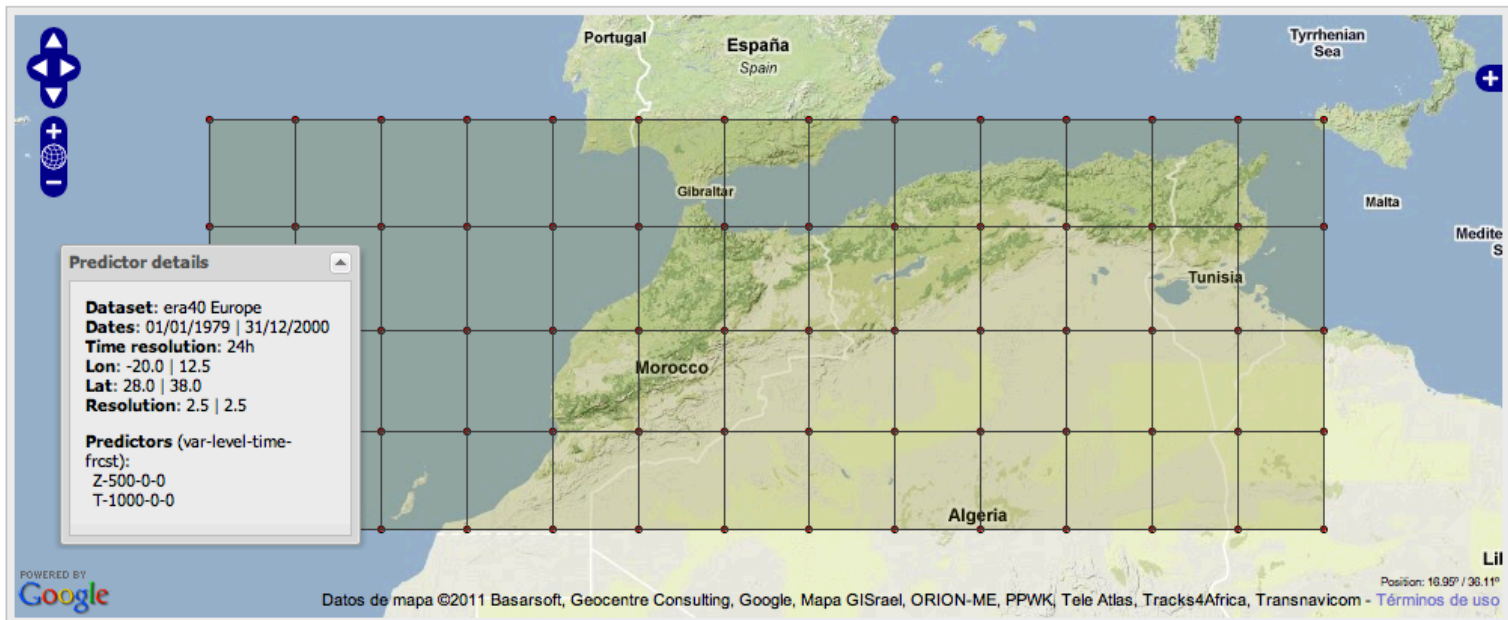
Appropriate **metadata** for GCMs and downscaling.

Integration with impact tools:
crop + hydrology + economy

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



Predictor: Tmax_Config2



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*).

The screenshot shows the 'Downscaling Portal' web interface. The browser address bar displays 'http://www.meteo.unican.es/fao'. The navigation menu includes 'My home', 'Predictor', 'Predictand' (highlighted with a blue circle), 'Downscaling Method', and 'Downscale'. Log in options 'Log out' and 'My account' are visible. Below the menu, the 'Zone' is set to 'Tmax_Config2' and the 'Predictand' is set to 'Tmax'. The main content area features a map of Morocco and the Iberian Peninsula with several red dots indicating station locations. A 'Predictand details' popup shows 'Database: FAO_Morocco', 'Variable: Tmax', and 'Points: 10 (+ info)'. A 'Stations Info' popup displays a table of station data for Tmax.

Name	Height	Longitude	Latitude
TANGER	15	-5,9	35,72
AL-HOUCEIMA	12	-3,85	35,18
KENITRA	5	-6,6	34,3
IFRANE	1.664	-5,17	33,5
KHOURIBGA	785	-6,9	32,88
SAFI	34	-9,21	32,32
RACHIDIA	1.037	-4,4	31,93
MARRAKECH	464	-8,03	31,62
AGADIR INZG	23	-9,57	30,38
TAN-TAN	45	-10,93	28,17

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

- **Analogs**
- **Regression + GLMs**
 - From CPs
 - From grid-points
- **Neural Network**
- **K-means weather types**
- Weather generators

and defining a particular configuration:

- Number of analogs
- Number of CPs.
- etc.

My home Predictor Predictand **Downscaling Method** Downscale

View Create

Predictor: Iberia_demo Predictand: Tmax_Scities

Weather typing Transfer functions Weather-generator

Analogues Weather types

Downscaling method properties

Number of analogues 1

Inference method Mean

Description: This is the default method of the statistical downscaling portal

Downscaling method name: default

Create new Method

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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 reanalysis data.

The screenshot shows the 'Downscaling Portal' web interface. The main content area displays details for station 'TAN-TAN'. A blue circle highlights the 'Validation' section, which includes a 'PDF report' link and an 'XLS' link. A light blue arrow points from this circle to a larger window titled 'Station TAN-TAN details'.

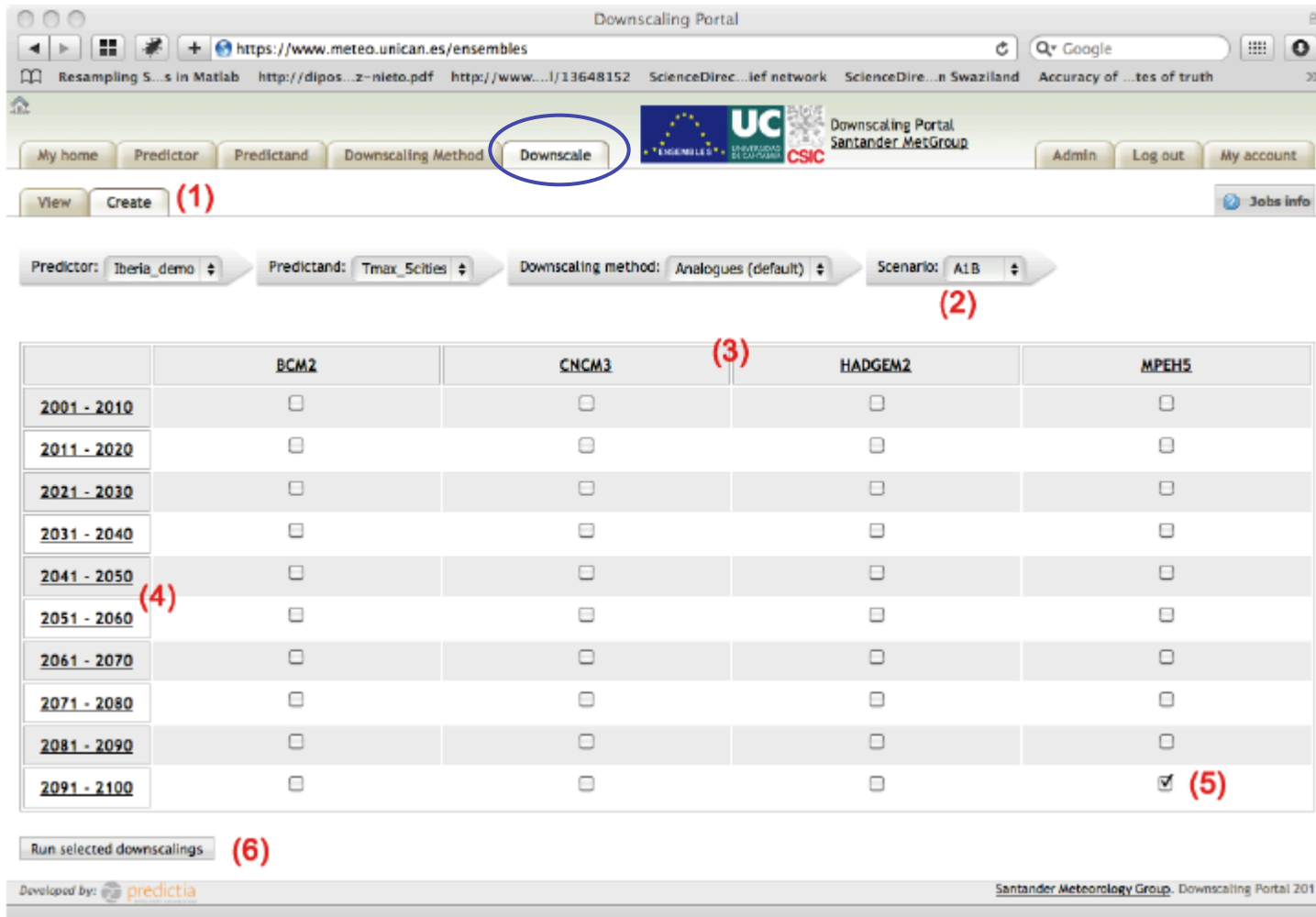
The 'Station TAN-TAN details' window contains four plots:

- Top Left:** Scatter plot of Predicted vs Observed values. RMSE/std: 0.578.
- Top Right:** Probability Density plot comparing Observed (black line) and Predicted (red line) distributions. PRS10: 0.927, pKS10: 0.527.
- Bottom Left:** Scatter plot of Predicted10 vs Observed10 values. RMSE10/std10: 0.359.
- Bottom Right:** Scatter plot of Predicted-Percentiles10 vs Observed-Percentiles10 values.

The main interface also shows a table of accuracy metrics for various stations:

Station	Pearson	MAE	RMSE
TANGER	0.99	0.57	0.74
AL-HOUCEIMA	0.98	0.57	0.87
KENITRA	0.98	0.61	0.78
IFRANE	0.99	0.68	0.85
SAFI	0.97	0.74	0.95
MARRAKECH	0.99	0.78	0.98
KHOURIBGA	0.99	0.80	1.03
RACHIDIA	0.99	0.75	0.97
TAN-TAN	0.99	0.77	0.99

Once the method is defined and validated it can be used to downscale GCM models for future scenarios decade by decade.



The screenshot shows the 'Downscaling Portal' web interface. The browser address bar displays 'https://www.meteo.unican.es/ensembles'. The navigation menu includes 'My home', 'Predictor', 'Predictand', 'Downscaling Method', and 'Downscale' (circled in blue). The 'Downscale' button is labeled with a red '(1)'. Below the navigation menu, there are dropdown menus for 'Predictor: Iberia_demo', 'Predictand: Tmax_Scities', 'Downscaling method: Analogues (default)', and 'Scenario: A1B' (labeled with a red '(2)').

The main content area displays a table of GCM models for future scenarios. The table has columns for 'BCM2', 'CNRM3', 'HADGEM2', and 'MPEH5'. The rows represent time periods from 2001-2010 to 2091-2100. The '2091 - 2100' row has a checked checkbox in the 'MPEH5' column, labeled with a red '(5)'. The table is labeled with a red '(3)' above the 'CNRM3' column.

At the bottom of the table, there is a button labeled 'Run selected downscalings' with a red '(6)' next to it. The footer of the page includes 'Developed by: predictia' and 'Santander Meteorology Group, Downscaling Portal 2011'.

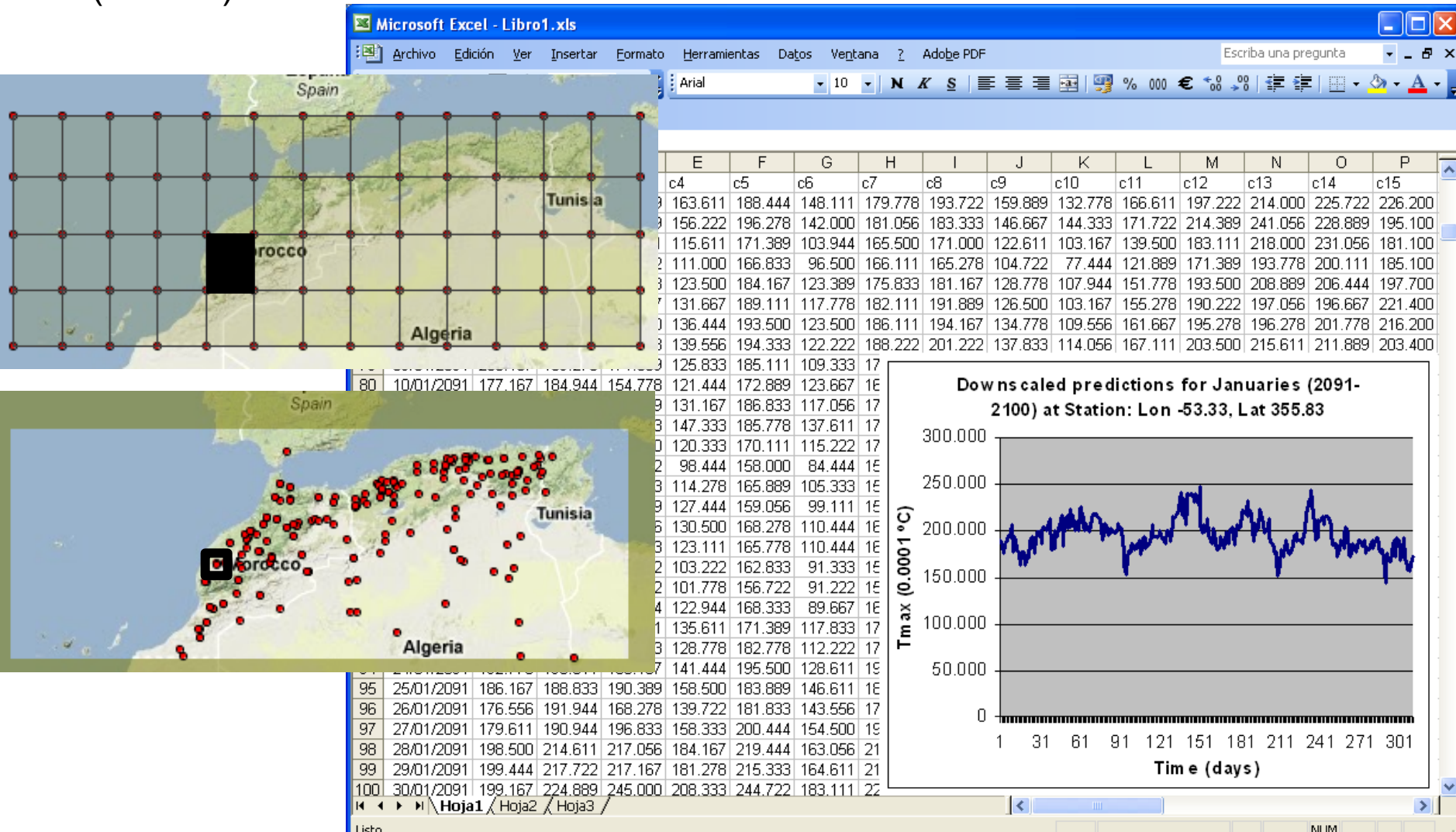
	BCM2	CNRM3	HADGEM2	MPEH5
2001 - 2010	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2011 - 2020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2021 - 2030	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2031 - 2040	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2041 - 2050	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2051 - 2060	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2061 - 2070	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2071 - 2080	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2081 - 2090	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2091 - 2100	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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SD Portal: Friendly Output

The resulting daily locally projected simulations can be downloaded as Excel (or ascii) files.



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.**

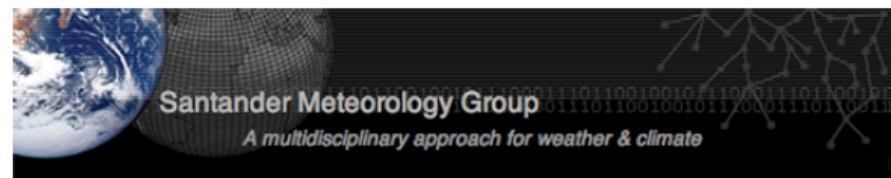
User tutorials, indications and recommendations for downscaling are provided and referred to, e.g. in the ENSEMBLES web site.

User Guide of the ENSEMBLES Downscaling Portal (version 2)

Technical Notes

Santander Meteorology Group (CSIC-UC)

SMG:2.2011



User Guide of the ENSEMBLES Downscaling Portal (version 2)

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