



Seasonal-to-decadal climate Prediction for the
improvement of European Climate Services



The SPECS experience: climate predictions on the ESGF

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I- The SPECS project:

Seasonal-to-decadal predictions specificities

Definition of conventions

Data management: from individual local formats to centralized data structure

II-SPECS portals and data dissemination

The Earth System Grid Federation portal

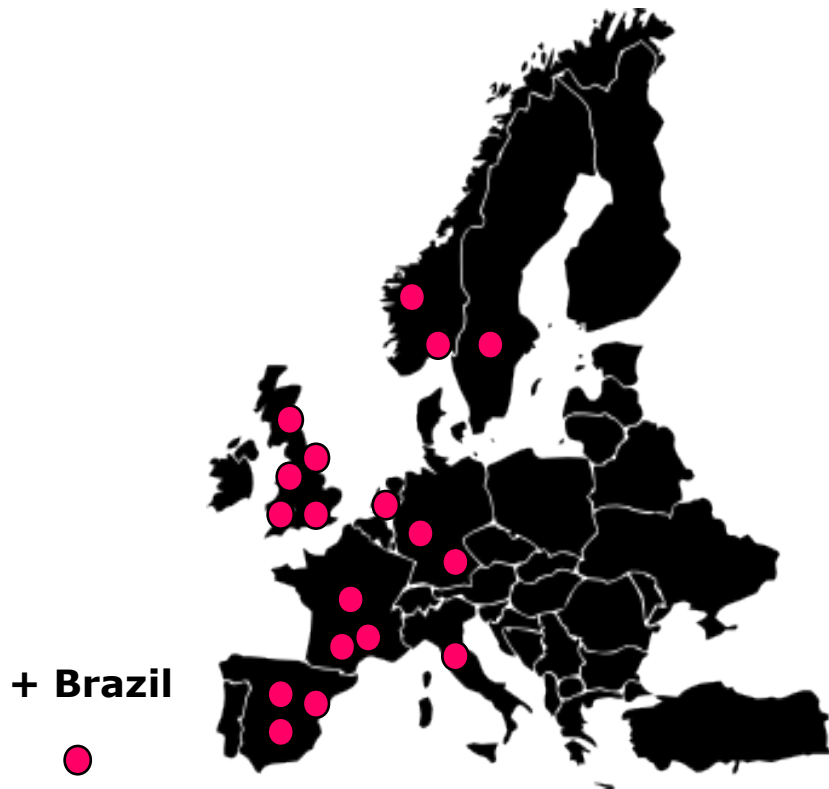
Downstream services: climate4impact, Santander ECOMS-UDG...

Climate predictions specificities

- Seasonal-to-decadal predictions left apart in the development of ESGF because caught between meteorological predictions and long term climate simulations
- Difficulty of joining 2 communities: climate and weather and making them agree on a **common set of variables**, frequencies and **experiments** as well as on a common **data format**
- CMIP5 + CHFP + ENSEMBLES conventions => SPECS

SPECS motivation

Seasonal-to-decadal climate Prediction for the improvement of European Climate Services



What: to produce quasi-operational and actionable local climate information

Why: need information with improved forecast quality, a focus on extreme climate events and enhanced communication and services for RCOFs, NHMSs and a wide range of public and private stakeholders

How: with a new generation of reliable European climate forecast systems, including initialised ESMs, efficient regionalisation tools and combination methods, and an enhanced dissemination and communication protocol

Where: over land, focus on Europe, Africa, South America

When: seasonal-to-decadal time scales over the longest possible observational period

20 partners, coordination IC3

Objective: Join 2 communities producing different types of data and publish them into a common framework to help data sharing and comparison

- Strong metadata and file format convention
- Netcdf4 CF compliant
- New global attributes compared to CMIP5: physics_description, initialization_description, associated_experiment
- Introduction of double time axis (handled by CDO from v1.6.4rc8)
- **Basis for CMIP6 decadal simulations + publishing of CHFP and NMME data rewritten in SPECS format**

<http://www.specs-fp7.eu/wiki/index.php/Data>

http://www.specs-fp7.eu/wiki/index.php/File:SPECS_standard_output.pdf

Directory tree:

<model_id>/<experiment_family>/<start_date>/<frequency>/<modeling_realm>/<variable_name>/<ensemble_member> /<version>/

Example: EC-

Earth2/*sealce*nit/S19910501/day/*sealce*/sic/r1i1p1/v20100323/

File name:

<variable_name>_<MIP_table>_<model_id>_<experiment_family>_<start_date>_<ensemble_member>[_<temporal subset>].nc

Example:sic_Oimon_EC-Earth2_*sealce*nit_S19910501_r1i1p1_199501-199502.nc

```
double leadtime(time) ;
  leadtime:units = "days" ;
  leadtime:long_name = "Time elapsed since
                        the start of the
forecast" ;
  leadtime:standard_name = "forecast_period" ;

reference_time=time-leadtime
```

```
double time(time) ;
  time:bounds = "time_bnds" ;
  time:units = "days since 1850-01-01" ;
  time:calendar = "noleap" ;
  time:axis = "T" ;
  time:long_name = "Verification time of the forecast" ;
  time:standard_name = "time" ;
```

CMOR formatting



- Rewriting of CMOR library to comply with the new conventions (included in the official CMOR2 library, work being done for upcoming CMOR3) :
- Double time axis, new file and directory name, global attributes
- Rewriting of files in whatever format they are (grib, PP, netcdf3/4) to NetCDF4-CF-SPECS compliant
- Centralization of data management to ensure quality control and easier formatting tools dissemination



**SMHI KNMI METEORFRANCE MPI
CERFACS IPSL IC3 ENEA ECMWF**

- ESGF: scientific data catalog enabling data download, data shared on several local nodes
- User friendly interface and several data download methods
- Organization by all DRS keywords
- Plotting facilities
- “Big data” problematics: bring the computing to the data - SPECS will contribute to the specific data analytics required to properly deal with climate predictions, which will be needed to work with, at least, the C3S seasonal predictions and the CMIP6 decadal hindcasts
- SPECS data mostly hosted in BADC (some others directly in local nodes: SMHI, BADC)

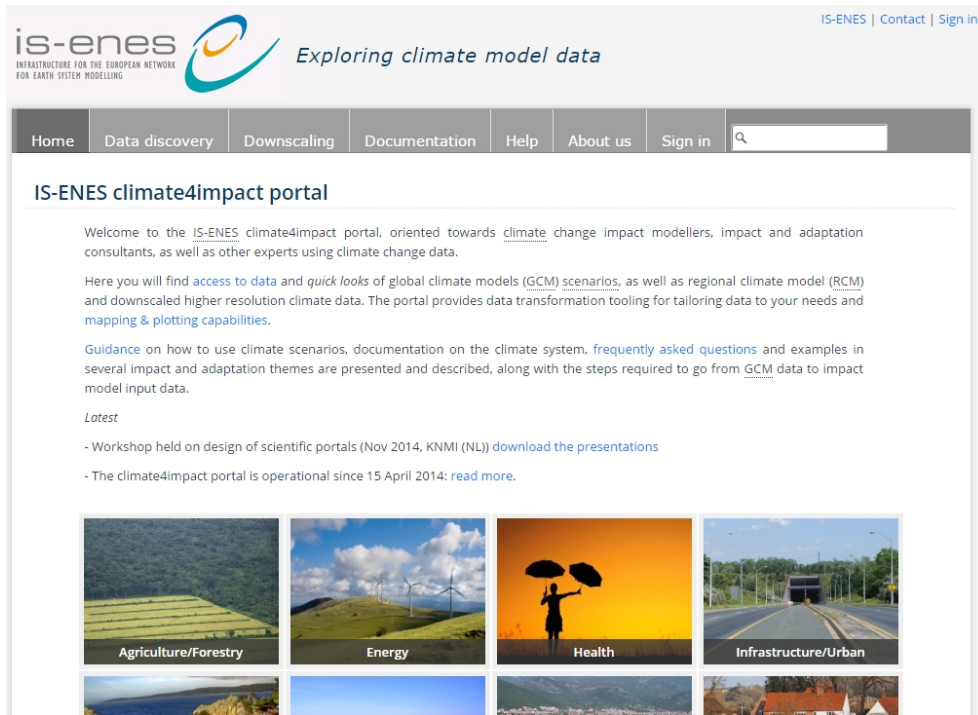


The screenshot shows the ESGF (Earth System Grid Federation) data node interface. The header includes the ESGF logo and the PCMDI logo. The navigation bar contains links for Home, Search, Tools, Login, and Help. The main content area is divided into several sections:

- Current Selections:** Shows a selected project: [\(x\) project.specs](#).
- Search Categories:** A sidebar menu with categories: Project (8162), Institute (8162), KNMI (2512), Model (8162), EC-EARTH2 (2512), IPSL-CM5A-LR (8162), SubModel, Instrument, Experiment Family (All (10674), Decadal (8162)), and Experiment (decadal (8162)).
- Search Bar:** A search input field with a search button. Below it, there are checkboxes for "Search All Sites", "Show All Replicas", and "Show All Versions".
- Search Results:** Shows search results for the query "project.specs". The results are displayed in a table with columns for "Results" and "Data Cart". The first result is:

specs.output.IPSL_IPSL-CM5A-LR.decadal.S19610101.day.atmos.day.ct.r11p1	
Data Node: esgf-data1.ceda.ac.uk	
Version: 20141013	
No description available.	
Further options: Add To Cart	

Downstream services Climate4impact



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IS-ENES climate4impact portal


Welcome to the IS-ENES climate4impact portal, oriented towards climate change impact modellers, impact and adaptation consultants, as well as other experts using climate change data.

Here you will find access to data and quick looks of global climate models (GCM) scenarios, as well as regional climate model (RCM) and downscaled higher resolution climate data. The portal provides data transformation tooling for tailoring data to your needs and mapping & plotting capabilities.


Guidance on how to use climate scenarios, documentation on the climate system, frequently asked questions and examples in several impact and adaptation themes are presented and described, along with the steps required to go from GCM data to impact model input data.

Latest


- Workshop held on design of scientific portals (Nov 2014, KNMI (NL)) [download the presentations](#)
- The climate4impact portal is operational since 15 April 2014: [read more](#).




Agriculture/Forestry



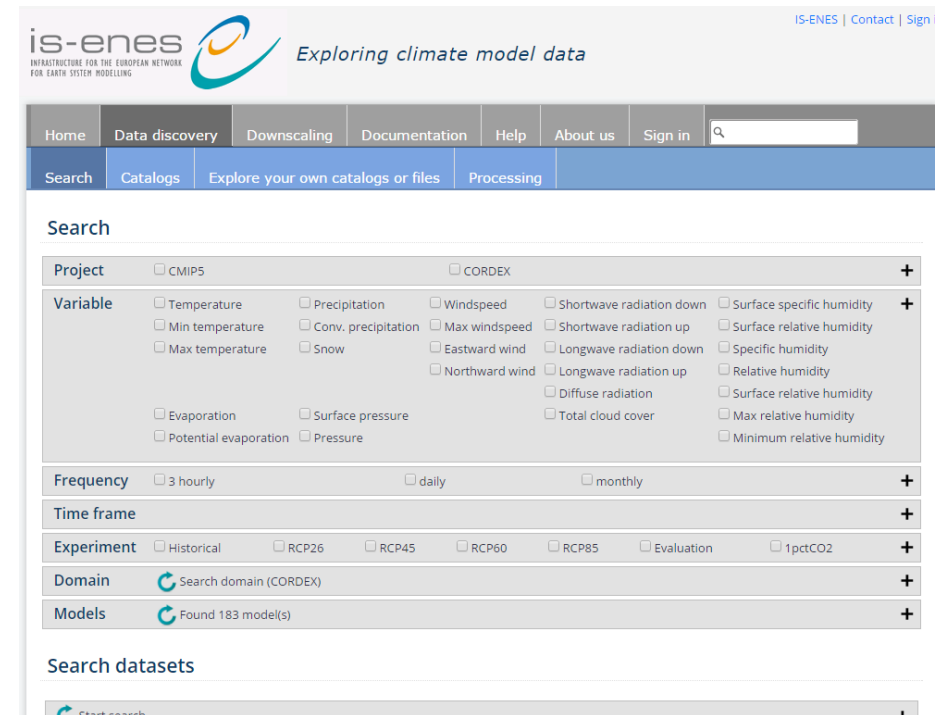
Energy



Health



Infrastructure/Urban



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Search Catalogs Explore your own catalogs or files Processing

Search

Project CMIP5 CORDEX +

Variable

<input type="checkbox"/> Temperature	<input type="checkbox"/> Precipitation	<input type="checkbox"/> Windspeed	<input type="checkbox"/> Shortwave radiation down	<input type="checkbox"/> Surface specific humidity
<input type="checkbox"/> Min temperature	<input type="checkbox"/> Conv. precipitation	<input type="checkbox"/> Max windspeed	<input type="checkbox"/> Shortwave radiation up	<input type="checkbox"/> Surface relative humidity
<input type="checkbox"/> Max temperature	<input type="checkbox"/> Snow	<input type="checkbox"/> Eastward wind	<input type="checkbox"/> Longwave radiation down	<input type="checkbox"/> Specific humidity
		<input type="checkbox"/> Northward wind	<input type="checkbox"/> Longwave radiation up	<input type="checkbox"/> Relative humidity
<input type="checkbox"/> Evaporation	<input type="checkbox"/> Surface pressure		<input type="checkbox"/> Diffuse radiation	<input type="checkbox"/> Surface relative humidity
<input type="checkbox"/> Potential evaporation	<input type="checkbox"/> Pressure		<input type="checkbox"/> Total cloud cover	<input type="checkbox"/> Max relative humidity
				<input type="checkbox"/> Minimum relative humidity

Frequency 3 hourly daily monthly +

Time frame +

Experiment Historical RCP26 RCP45 RCP60 RCP85 Evaluation 1pctCO2 +

Domain Search domain (CORDEX) +

Models Found 183 model(s) +

Search datasets

[Start search](#)

<http://climate4impact.eu/impactportal/general/index.jsp>

Possibility to publish your own THREDDS catalogues

<https://meteo.unican.es/trac/wiki/EcomsUdg>

(A. Cofiño - University of Cantabria, Santander, Spain)

- Serves SPECS ESGF data and other locally stored datasets (UK MetOffice S4, NCEP CFS...)
- R package providing access to heterogeneous datasets for plotting and downscaling
- The aim of ECOMS UDG is to gather different data sources with **different terms of use** in a single data server, so that users can access all the data and metadata they typically need (seasonal forecasts, reanalysis and observations) in a homogeneous and simple way, **without worrying about the inherent complexities of data** access, download and post-processing of the variables stored in massive archive systems at different institutions.

- Need to take into account current conventions when defining what we want to publish
- Preparing the data for analysis
- Experience got from SPECS into using climate predictions in downstream services with their specificities (simulation drift, double time axis, multiple start dates,...)

Conclusions

- Important metadata, even if requiring work from data providers, helps scientists and end users/stake holders understand the data
- Growing need for plotting and online/close to the data diagnostics (time series, monthly means, simple diagnostics...)
- Need to properly address problems like multiple start dates, inherent drift to climate predictions, large ensemble sizes, ...



Thanks for your attention
Questions?