

IS-ENES *climate4impact*

Providing and facilitating climate model
data access in Europe

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IS-ENES2 climate4impact.eu

- Dedicated to the climate impact community: based on 21 use cases from e.g, Deltares, Alterra, UvA.
- Dissemination of model results from both global and regional model experiments
- Extensive documentation for impact modelers: guidelines, warnings, do's and don'ts
- Facilitates interaction between climate modelers, companies and climate services
- Search, visualize and compute: from Petabyte to megabyte size reduction, drill down to the information needed, downscaling and indices

The screenshot shows the IS-ENES climate4impact portal. At the top left is the logo for 'is-enes INFRASTRUCTURE FOR THE EUROPEAN NETWORK FOR EARTH SYSTEM MODELLING'. To the right is the tagline 'Exploring climate model data'. In the top right corner, there are links for 'IS-ENES | Contact | Sign in'. Below the header is a navigation menu with items: Home, Data discovery, Downscaling, Documentation, Help, About us, Sign in, and a search bar. The main content area is titled 'IS-ENES climate4impact portal' and contains a welcome message, a description of the portal's purpose, and a grid of eight images representing different climate impact and adaptation themes: Agriculture/Forestry, Energy, Health, Infrastructure/Urban, Marine/Coastal, Nature/Biodiversity, Tourism, and Water Management. Below the grid is a note: 'Click on one of these images to go to a specific climate change impact and adaptation theme.' At the bottom left of the page is the European Union flag, and to its right is a text box stating: 'The IS-ENES project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration.'

Builds on and contributes to ESGF global infrastructure:



Infrastructure

Enes infrastructure

METAFOR

Search API

OpenID

ESG data nodes

Climate4impact infrastructure

MyProxy Server

PyWPS

Impactportal

Tomcat

Drupal

Impact data node (THREDDS)

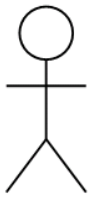
ADAGUC Viewer

ADAGUC Server

Postgre SQL

My SQL

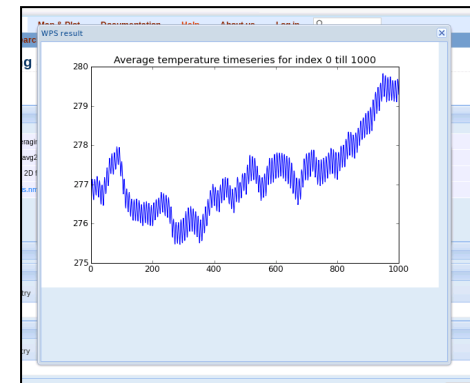
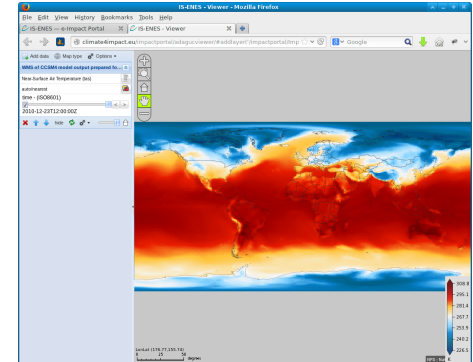
Apache HTTP



End user

Major Functionalities

- Extensive documentation for impact modelers
 - Guidelines, warnings, do's and don'ts
- Access to CMIP5/CORDEX data
 - 30 data nodes, ~3 Petabyte of data
- Search in a faceted way
 - Through models, variables, experiments, frequency, dates
- Visualize and download any **CMIP5/CORDEX** dataset
 - Visualize any gridded dataset offered via OPeNDAP
 - Using climate4impact WMS/WCS
- Login with ESGF OpenID Identifier



Extensive Documentation

The screenshot shows the IS-ENES e-Impact Portal website. The browser window title is "IS-ENES — e-Impact Portal - Mozilla Firefox". The address bar shows the URL "climate4impact.eu/impactportal/documentation/backgroundandtopics.jsp". The website header includes the "enes" logo (European Network for Earth System Modelling) and the text "ENES Portal Interface for the Climate Impact". A navigation menu contains "Home", "Data discovery", "Map & Plot", and "Documentation". Below the menu, there are tabs for "Guidance & use cases", "Background & topics", and "Glossary". The "Background & topics" section is active, displaying a list of topics with corresponding icons: "General concepts" (Earth globe), "Scenarios" (line graph), "Climate models" (grid map), and "Climate model data" (heat map). Each topic has a brief description. The "General concepts" description reads: "Some background information on the glo...". The "Scenarios" description reads: "How scenarios are created and used, an...". The "Climate models" description reads: "Information on global and regional climat...". The "Climate model data" description reads: "What comes out of a climate model and...".

The screenshot shows a detailed conceptual sketch of the climate system, titled "Conceptual sketch of the climate system, it's spheres and some selected interactions." The diagram illustrates the interactions between various components of the climate system. At the top, "Changes in Solar Inputs" and "Changes in the Atmosphere: Composition, Circulation" are shown. The atmosphere contains "N₂, O₂, Ar, H₂O, CO₂, CH₄, N₂O, O₃, etc." and "Aerosols". "Volcanic Activity" is shown as a source of atmospheric changes. "Changes in the Hydrological Cycle" are shown with "Clouds" and "Precipitation". The "Biosphere" includes "Human Influences", "Terrestrial Radiation", and "Atmosphere-Biosphere Interaction". The "Hydrosphere: Ocean" includes "Sea Ice", "Ice-Ocean Coupling", "Heat Exchange", "Wind Stress", and "Precipitation Evaporation". The "Hydrosphere: Rivers & Lakes" is shown. The "Land Surface" includes "Glacier", "Ice Sheet", "Soil-Biosphere Interaction", and "Land-Atmosphere Interaction". "Changes in the Cryosphere: Snow, Frozen Ground, Sea Ice, Ice Sheets, Glaciers" are shown. "Changes in the Ocean: Circulation, Sea Level, Biogeochemistry" and "Changes in/on the Land Surface: Orography, Land Use, Vegetation, Ecosystems" are also shown. The diagram is a complex web of arrows indicating interactions between these spheres.

another to create **cycles**. For example, the hydrosphere is also the **hydrological cycle** because water flows from one sphere to the other, and is indeed an integral part of all the other spheres. Also, the **carbon cycle** is a key cycle in the global climate system because of the central role of carbon dioxide (CO₂) as a greenhouse gas.

As all spheres meet and interact at the surface of the Earth the surface **energy balance** is a key determinant of the climate, from the very local scale to the global scale.

Conceptual sketch of the climate system, it's spheres and some selected interactions.
Image source: [IPCC AR4, WG1, FAQ 1.2 2007](#)

Because of these cycles and web of interactions that hook into each other the global climate system is a complex one and responds in a highly non-linear way to changes and forcing factors. The response time or **characteristic time-scale** of the components of the system varies widely, from days – weeks for the global atmosphere to thousands of years

Applied Use Cases

Guidance & use cases

Background & topics

Glossary

Publica

Guidance and Use cases » Use Cases » FEWS/NHI hydrological framework

FEWS/NHI hydrological framework

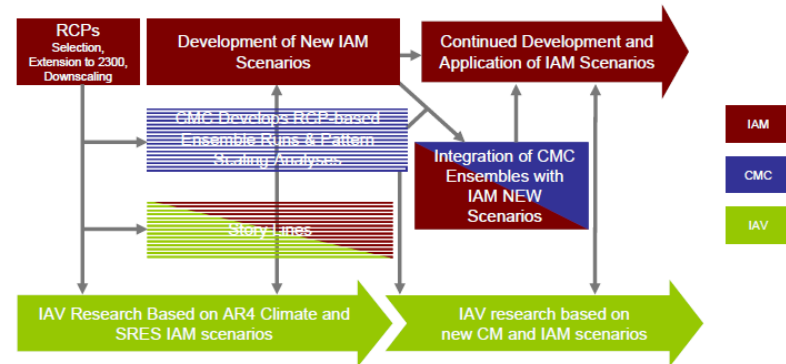
Use of climate model data in FEWS/NHI hydrological framework

Goal: In this use case, climate model data is selected and downloaded from the

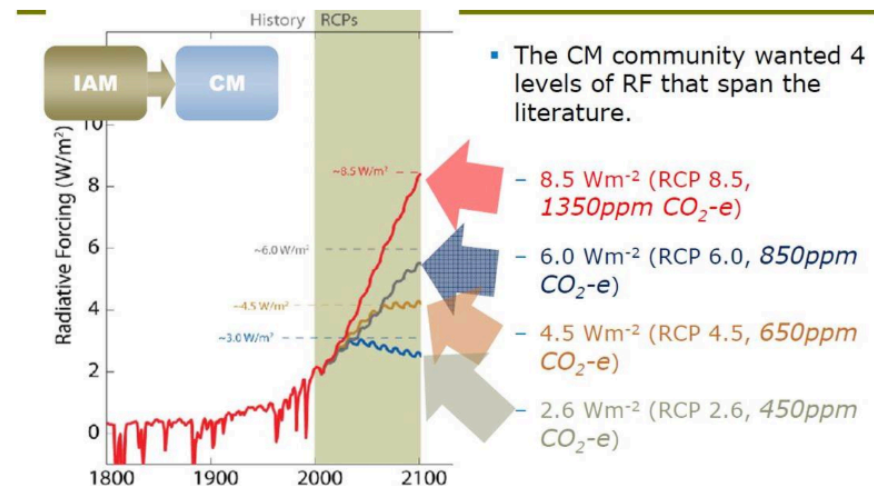
Delivery of climate model data from different runs to the FEWS/NHI system. The originally Flood Early Warning System, is a operational forecasting system to model data and models in a real time environment. Delft FEWS retrieves and prepares hydrological and meteorological data for the models. FEWS is able to handle many protocols and data formats, like FTP, Grib and netCDF. Internally an XML model for hydrographical data and netCDF for binary data.

One of the models running operationally under FEWS is the National Hydrology Instrument (NHI). The NHI is a model which provides insight into the actual and forecasted states of the surface, ground and soil water in the Netherlands to support decision making during periods of droughts. NHI is driven by measured and forecasted precipitation and evaporation (ECMWF-DET and -EPS). The tool also gives insight into actual and forecasted water demands. To predict future hydrology in the Netherlands, the NHI can be used in combination with climate model data. The NHI model can run on daily gridded data.

[read more on FEWS/NHI on the Deltares site](#)



Presently, four RCPs have been defined, named after the radiative forcing that eventually will be reached: RCP2.6, RCP4.5, RCP6 and RCP8.5. They work both forwards towards climate modelling and backwards to analyse what future world development is needed to achieve a certain level of anthropogenic influence on the climate. This allows development of mitigation scenarios. It is these names that you will come across mostly when looking for future climate data.



Glossary & FAQ

Glossary

Vocabolary for climate4impact site

A C E G I M O P R S T V

Click one of the letters above to advance the page to terms beginning with that letter.

A

ADAGUC

ADAGUC - Atmospheric data access for the geospatial user community. [Read more on the ADAGUC Website.](#)

AOGCM

Coupled Atmosphere-Ocean GCMs

C

CMIP5

Coupled Model Intercomparison Project - Phase 5

E

E-obs

E-OBS is a daily gridded observational dataset for precipitation, temperature and sea level pressure in Europe based on ECA&D information. The full dataset covers the period 1950-01-01 until 2011-12-31. It has originally been developed as part of the ENSEMBLESproject (EU-FP6) and is now maintained and elaborated as part of theEURO4Mproject (EU-FP7).

Earth System Models

The scientific knowledge has now progressed to the level where global climate models are being replaced by Earth System Models signifying that the models now embrace more components and processes than the physical atmosphere-ocean components

FAQ

The Frequently asked questions (FAQ's) are distinguished into different categories:

Climate Change

- [What is Climate? \(WMO\)](#)
- [What is the Climate System? \(WMO\)](#)
- [What is Climate Variability? \(WMO\)](#)
- [What is Climate Change? \(WMO\)](#)
- [Climate Change General Issues provided by the IPCC \(pdf, 7.2 MB\)](#)

Climate Impact Science

- [Why is climate change important?](#)
- [Are extreme events like heat waves, droughts or floods expected to change as the Earth's climate change?](#)
- [Since when is there concern for climate change and to what extent?](#)
- [What are the current problems in modeling climate change?](#)

Internal Variability

- [Climate variations and internal variability - why is it important?](#)
- [What is the difference between Climate Variability and Climate Change? \(WMO\)](#)

Scenarios

- [Which SRES scenario to use?](#)
- [Why use ensembles?](#)
- [I am only interested in the period up to 2020/2030, what to do?](#)
- [What is the difference between the words scenario, projection, prediction and \(weather\) forecast?](#)

Comprehensive Search Interface

IS-ENES — e-Impact Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

IS-ENES — e-Impact Portal

climate4impact.eu/impactportal/data/basicsearch.jsp

Search Advanced Search Catalogs Add catalogs Transformations

Search

Variable Pressure Temperature Precipitation Evaporation Wind Humidity +

Time frequency 3 hourly 6 hourly daily monthly +

Time frame +

Experiment piControl amip rcp26 rcp45 rcp60 rcp85 +

Project Found 2 project(s) for variable=tas, experiment=amip, -

No.	Name	Description
1	<input type="checkbox"/> CMIP5	CMIP5
2	<input type="checkbox"/> EUCLIPSE	EUCLIPSE

Models Found 30 model(s) for variable=tas, experiment=amip, +

Search datasets

Found 611 datasets. (see esgf query) -

No.	Name	Size	catalog	OPENDAP	HTTP	
1	<input checked="" type="checkbox"/> cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r1i1p1.v20120607	250G	browse	-	-	-
2	<input checked="" type="checkbox"/> cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r2i1p1.v20120611	250G	browse	-	-	-
3	<input checked="" type="checkbox"/> cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r3i1p1.v20120611	250G	browse	-	-	-
4	<input checked="" type="checkbox"/> cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r4i1p1.v20120612	250G	browse	-	-	-
5	<input checked="" type="checkbox"/> cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r5i1p1.v20120612	250G	browse	-	-	-
6	<input checked="" type="checkbox"/> cmin5.output1.NCAR.CCSM4.amip.dav.atmos.dav.r1i1n1.v20130703	168G	browse	-	-	-

climate4impact.eu/impactportal/data/catalogbrowser.jsp?catalog=http://t...120611.xml#cmip5.output1.NCAR.CCSM4.amip.3hr.atmos.3hr.r3i1p1.v20120611

Browse Files and Explore MetaData

The screenshot shows a web browser window titled "IS-ENES — e-Impact Portal - Mozilla Firefox". The address bar contains the URL: climate4impact.eu/impactportal/data/datasetviewer.jsp?dataset=http%3A%2F%2Ftds.ucar.edu/thredds/dodsC/datazone/cmip5_data/cmip5/output1/NCAR/CCSM4/amiip/day/atmos/day/r2i1p1/v20120710/tas/tas_day_CCSM4_amiip_r2i1p1_19790101-20101231.nc#fromhttpurl. The page header includes the "enes" logo (EUROPEAN NETWORK FOR EARTH SYSTEM MODELLING) and the text "ENES Portal Interface for the Climate Impact Communities". A navigation menu contains links for Home, Data discovery, Map & Plot, Documentation, Help, About us, and Log in. Below this is a secondary menu with Search, Advanced Search, Catalogs, Add catalogs, and Transformations. The main content area is titled "NetCDF metadata viewer" and displays the following dataset information:

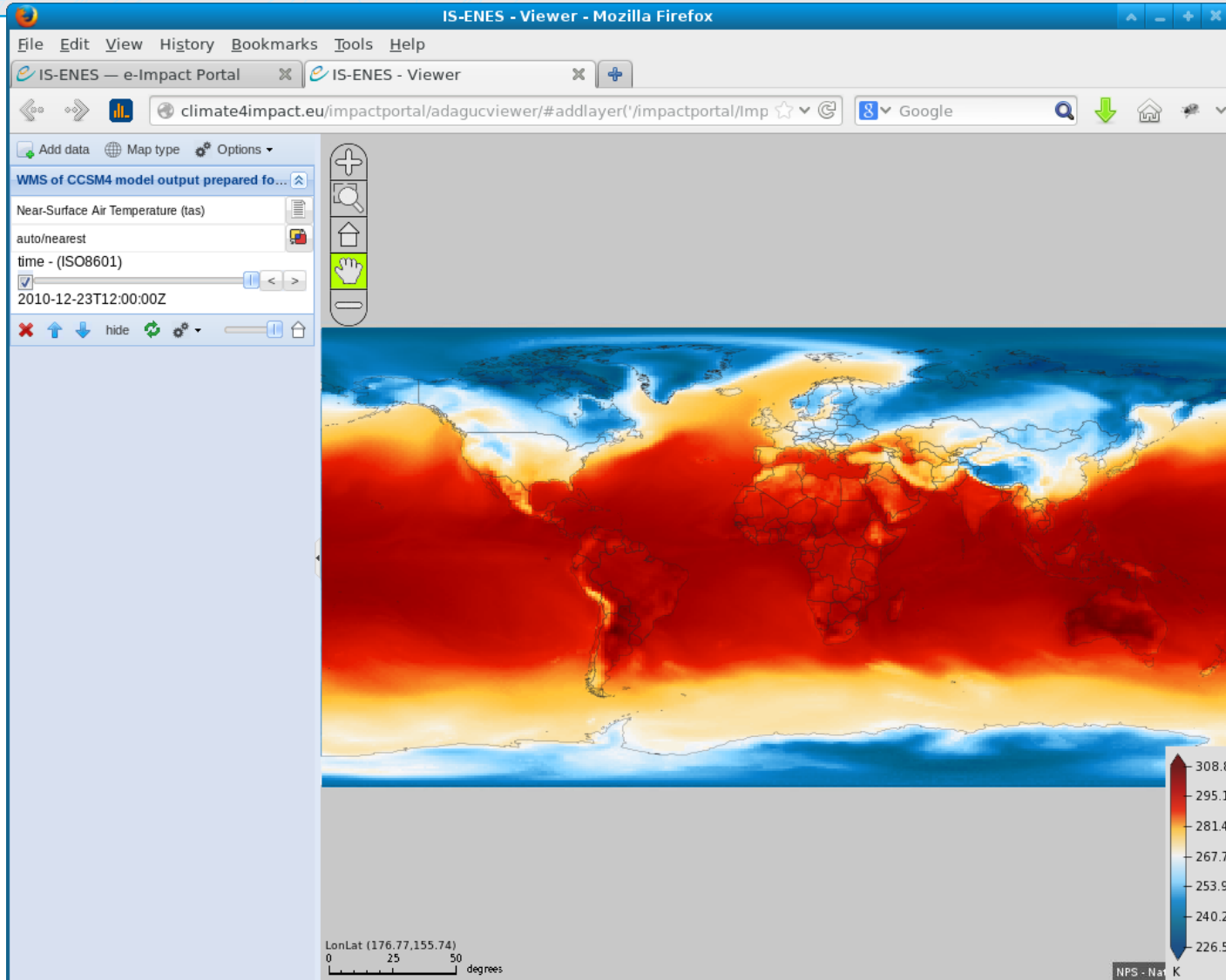
Dataset http://tds.ucar.edu/thredds/dodsC/datazone/cmip5_data/cmip5/output1/NCAR/CCSM4/amiip/day/atmos/day/r2i1p1/v20120710/tas/tas_day_CCSM4_amiip_r2i1p1_19790101-20101231.nc#fromhttpurl

NetCDF header metadata

nc_global - <i>Global attributes</i> - ()
time - <i>time</i> - (time) dimension of length 11680.
lat - <i>latitude</i> - (lat) dimension of length 192.
lon - <i>longitude</i> - (lon) dimension of length 288.
height - <i>height</i> - ()
tas - <i>Near-Surface Air Temperature</i> - (time, lat, lon) - visualize

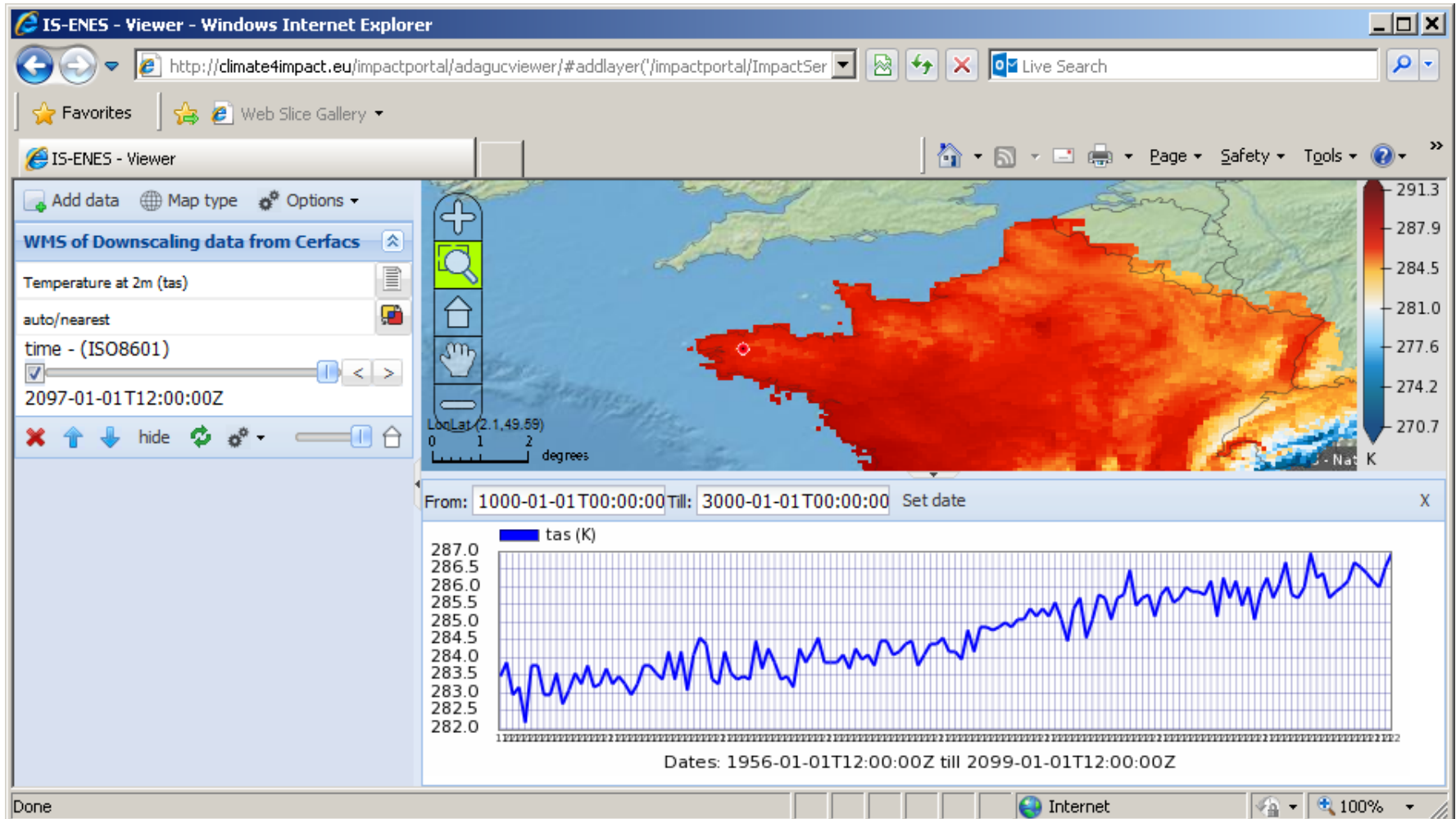
On the right side, there is a "Dataset Viewer" section with the text: "The datasetviewer displays metadata from remote OpenDAP resources. Variables can be visualised by clicking on the "view data" link." Below this text is an "edit" link.

Fast Maps Viewer



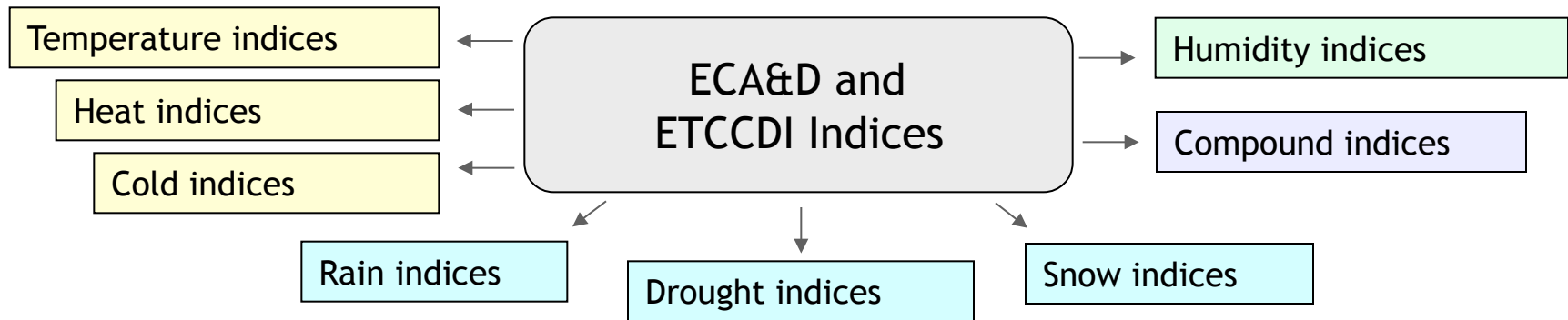
Also with Time Series using WPS/WMS

Easily integrate any existing dataset (OpenDAP, CF-convention)



On-demand Calculations

Climate indices calculation in climate4impact: **icclim**



- Intra-period extreme temperature range [°C] - **ETR**
- Warm days (days with mean temperature > 90th percentile of daily mean temperature) - **TG90p**
- Summer days (days with max temperature > 25 °C) - **SU**
- ...

- Python code developed at Cerfacs since September 2013 (Natalia Tatarinova)
 - Generic and modular approach, can be reused in other environments
 - C functions called for optimization
- I/O interface is structured for optimal performance, with wrapper functions
- Automatic dynamic chunking for large requests

User Interface

<http://climate4impact.eu/impactportal/WPS?>

[service=WPS&version=1.0.0&request=describeprocess&identifier=indice_ICCLIM_SU](http://climate4impact.eu/impactportal/WPS?service=WPS&version=1.0.0&request=describeprocess&identifier=indice_ICCLIM_SU)

The screenshot displays the Climate4Impact portal interface in a Mozilla Firefox browser. The page title is "IS-ENES — Climate4Impact portal - Mozilla Firefox". The browser address bar shows the URL: climate4impact.eu/impactportal/account/wpsuseprocessor.jsp?processo. The page header includes the "is-enes" logo with the tagline "Exploring climate model data" and navigation links for "IS-ENES | Contact | Account".

The main navigation menu includes: Home, Data discovery, Downscaling, Documentation, Help, About us, and Account. Below this, there are buttons for "Account", "Basket (12)", "Processing", and "Monitor jobs (18)".

The breadcrumb trail reads: Account » Processing » Use a processor » indice_ICCLIM_SU.

Use a processor

Processing details and options

Title:	Calculate number of summer days
Identifier:	indice_ICCLIM_SU
Abstract:	Number of summer days based on tasmax. The number of summer days is where daily maximum temperature is above 25 degrees Celsius.
Location:	/impactportal/WPS?service=WPS&version=1.0.0&request=describeprocess&identifier=indice_ICCLIM_SU

[Start processing](#)

Options

Threshold, can be a comma separated list, e.g. 20,21,22,23,24,25.
25

Maximum temperature variable
tasmax

Slice mode (temporal grouping to apply for calculations)
year

Input file(s)
Please select a file from the basket

Output file name
SU.nc

Processing Jobs (asynchronous)

IS-ENES | [Contact](#) | [Login](#)



ENES Portal Interface for
the Climate Impact Communities

Home | Data discovery | Map & Plot | Documentation | Help | About us | Account | (9) |

Account | Basket (9) | Jobs (7)

Processing jobs

Jobs for: <https://pcmdi9.llnl.gov/esgf-idp/openid/maartenplieger>

Started on:	WPS Identifier	Unique Id	Progress	View	X
2013-08-08 10:29:00Z	timeseries_avg2D	pywps-137595774038.xml	ready	view	X
2013-08-09 08:25:52Z	timeseries_avg2D	pywps-137603675248.xml	ready	view	X
2013-08-09 08:26:26Z	timeseries_avg2D	pywps-137603678625.xml	ready	view	X
2013-08-09 08:27:16Z	timeseries_avg2D	pywps-137603683692.xml	ready	view	X
2013-08-09 11:35:50Z	timeseries_avg2D	pywps-137604815013.xml	ready	view	X
2013-08-09 11:39:17Z	ensemble_dtdp	pywps-137604835705.xml	ready	view	X
2013-08-09 12:14:13Z	timeseries_avg2D	pywps-137605045340.xml	48 %	view	X

Time for questions & comments!



<https://verc.enes.org/ISENES2>

<http://climate4impact.eu/>

<http://icclim.readthedocs.org/>

<https://github.com/tatarinova/icclim>

Thanks Merci Danke Grazie



