



Helping Europe respond to the impact of climate change

## CLIPC : Demonstrating the MyCLIPC toolkit for viewing and processing climate impact indicators

Peter Thijsse (MARIS), Wim Som de Cerff (KNMI), et al. – 11 October 2016



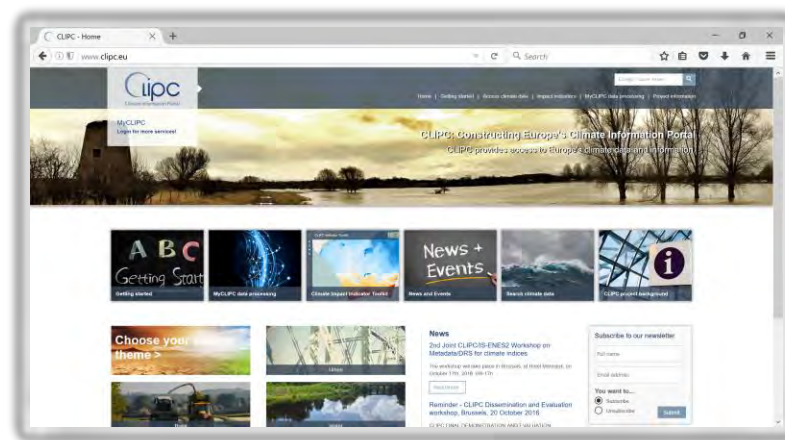
## Outline

1. Introduction to CLIPC
2. Exploring with the MyCLIPC Impact Indicator Toolkit (background & screens)
3. Underlying dataset catalogue, processing services, and techniques



## 1. What is CLIPC?

- The CLimate Information Portal for Copernicus project aims to develop:
  - A portal to access climate data and information
  - Tools and services for working with them
- One of the FP7 precursor projects for EU C3S – Copernicus Climate Change Service (comparable to CMEMS)

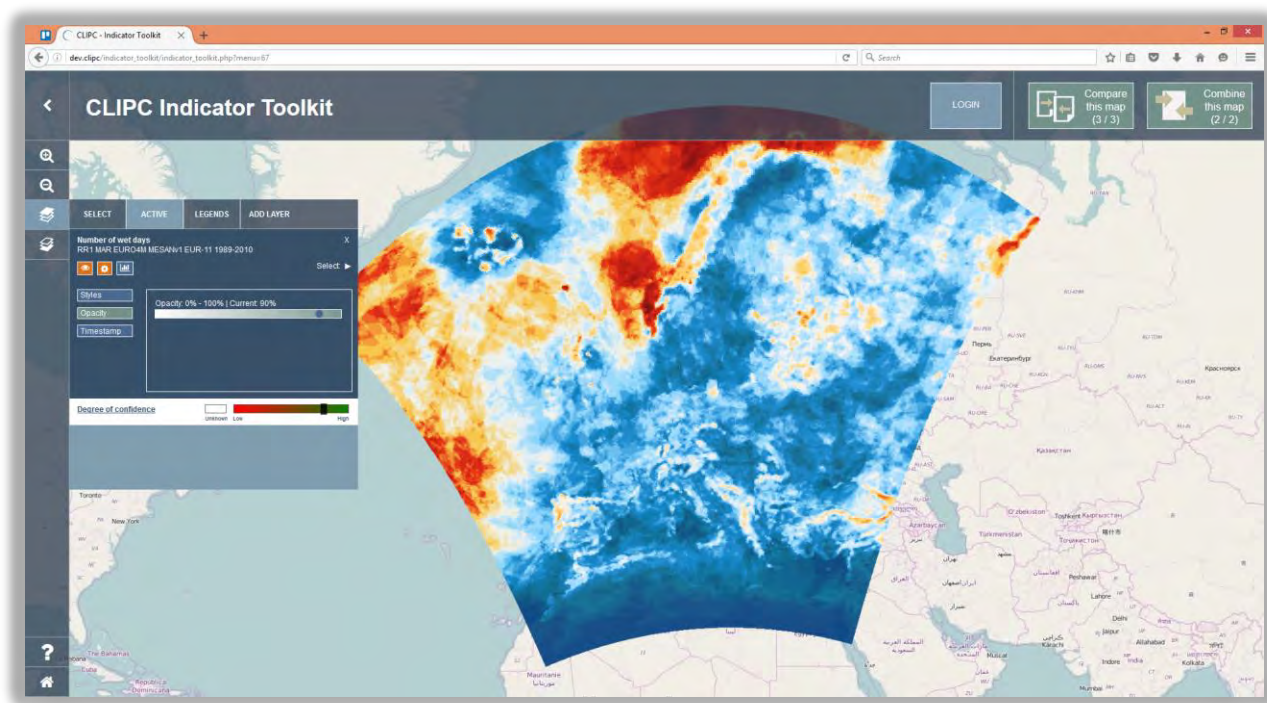


## 1. What is CLIPC?

- Aimed at climate scientists, (socio-economic) impact researchers, boundary workers. NOT End-users / decision makers
- Data: Climate observations and projections data and impact indicators
- Standards: Use existing standards, but also expand existing vocabularies and data and metadata standards
- Re-use existing concepts, components and services as much as possible but also innovate



## 2. Exploring with the indicator toolkit

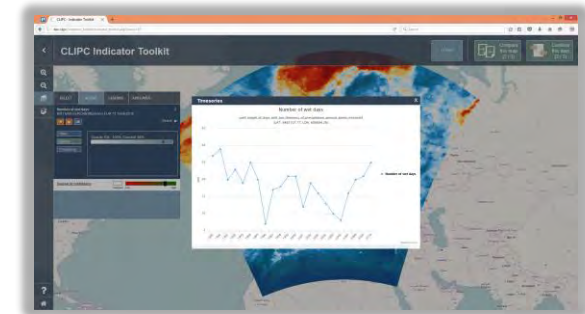


## Approach for the toolkit

CLIPC discussions have focused on a virtual user “Jake Smart” as a boundary worker.

“What should he need to create an advice?”

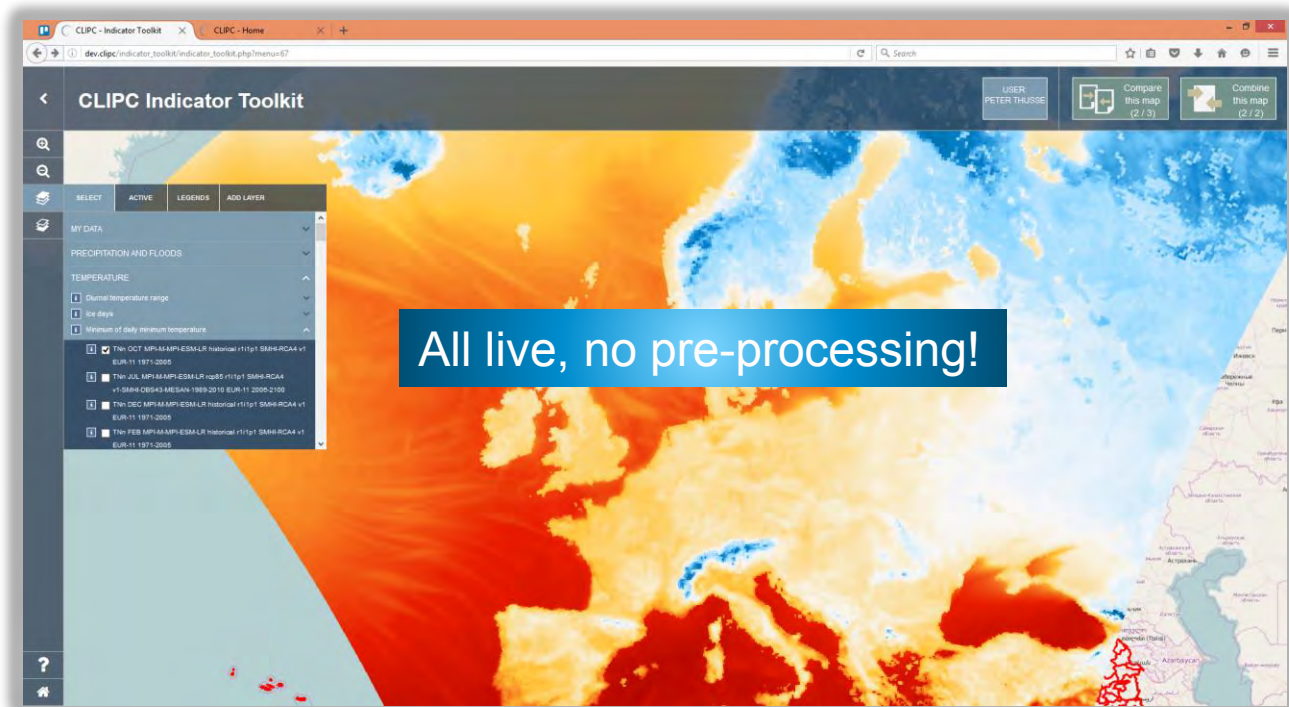
- Explore the datasets (time series, histogram, etc)
- The possibility to view set of indicators per theme: Thematic approach
- Function “compare”: compare indicators visually and via metadata.
- Function “combine”: Combine 2 indicators into a third via calculation/algorithm selection
- All integrated in one user interface



## Basic software for toolkit developments

- OpenLayers 3 / JavaScript / Php
- KNMI Adaguc visualization server. Visualises **NETCDF CF** data from an OpenDAP server.
- Processing runs via KNMI's Climate4Impact WPS services.

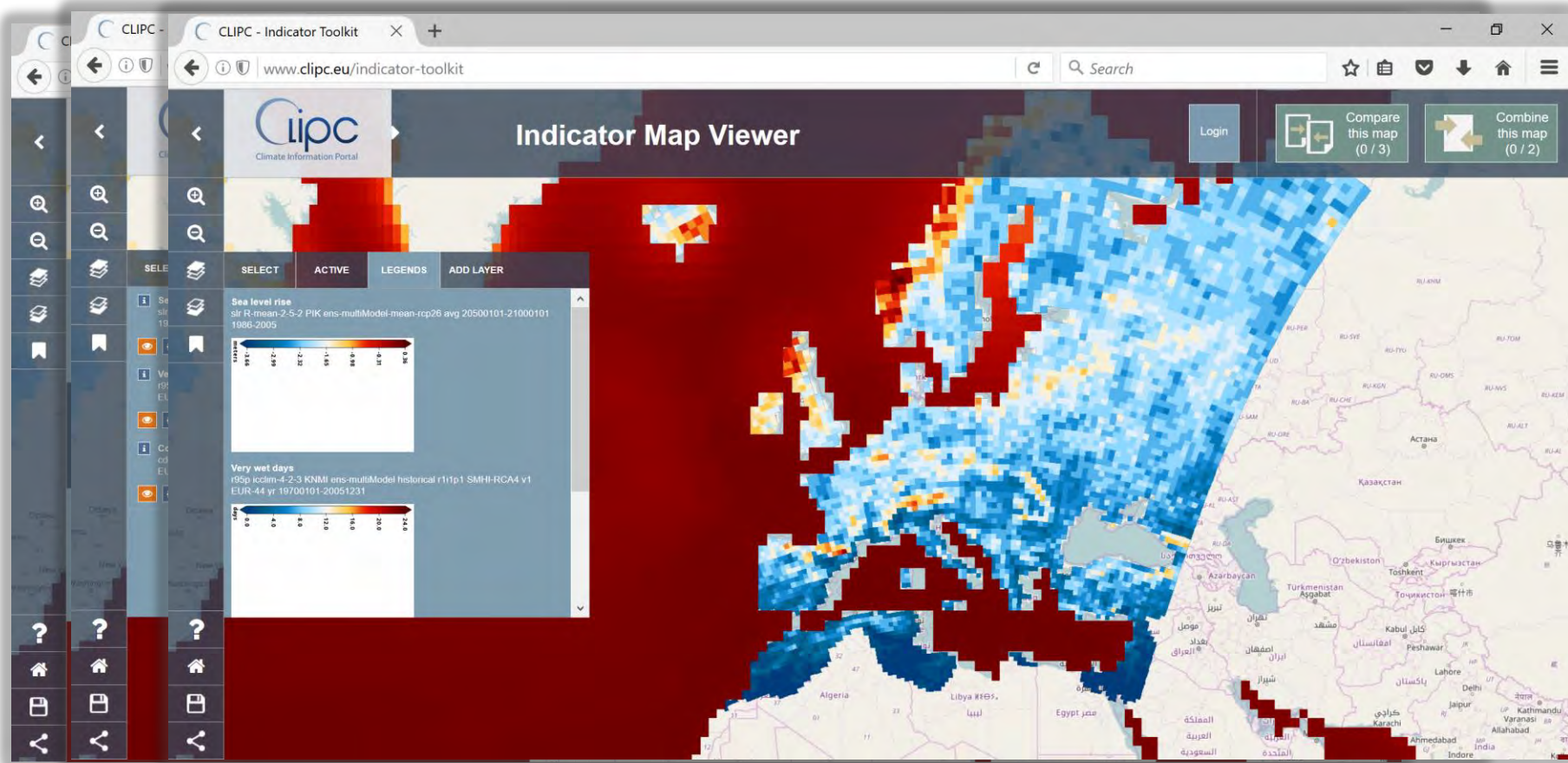
## Features of the indicator toolkit



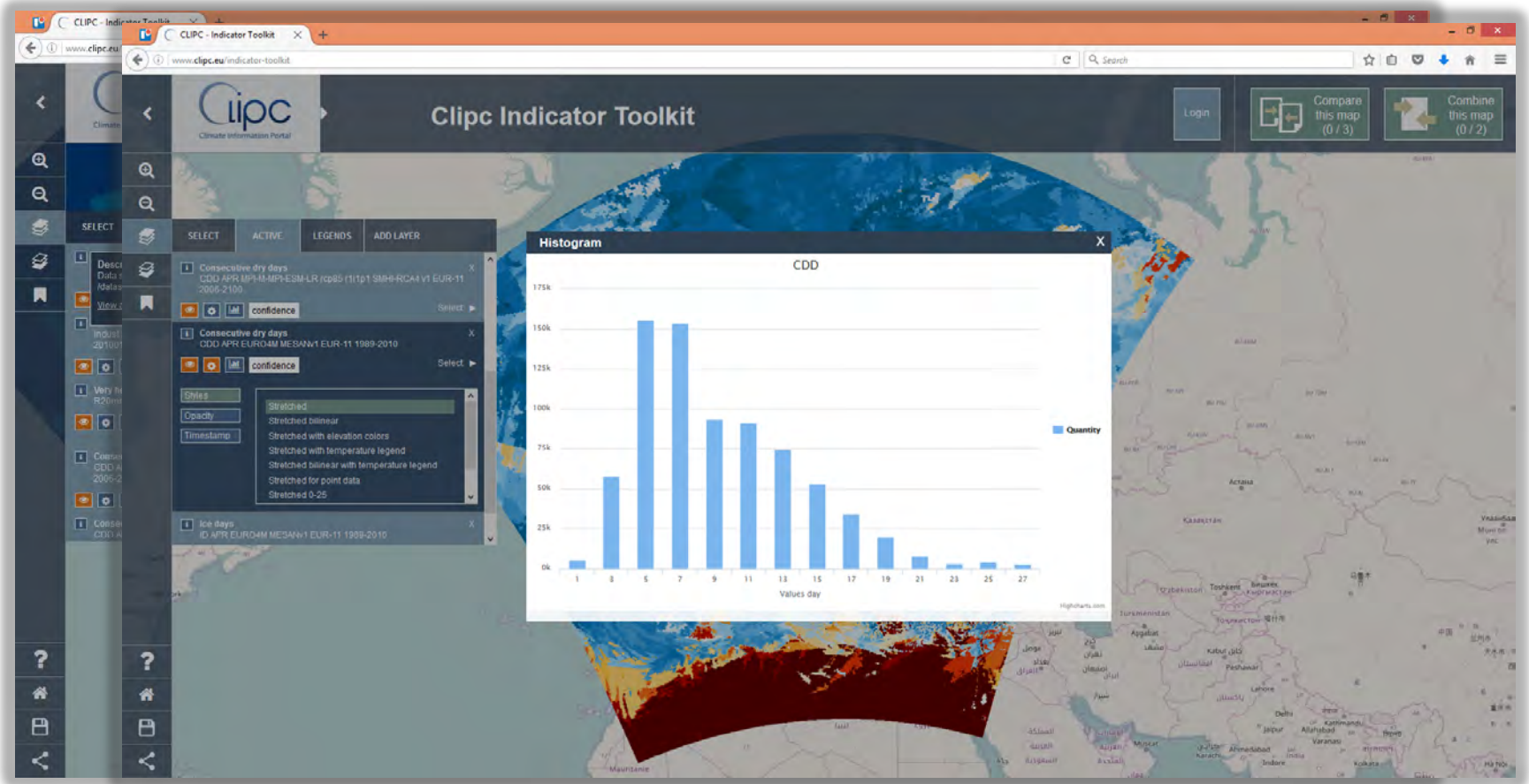
[Try yourself via  
http://www.clipc.eu/indicator\\_toolkit/indicator\\_toolkit.php](http://www.clipc.eu/indicator_toolkit/indicator_toolkit.php)



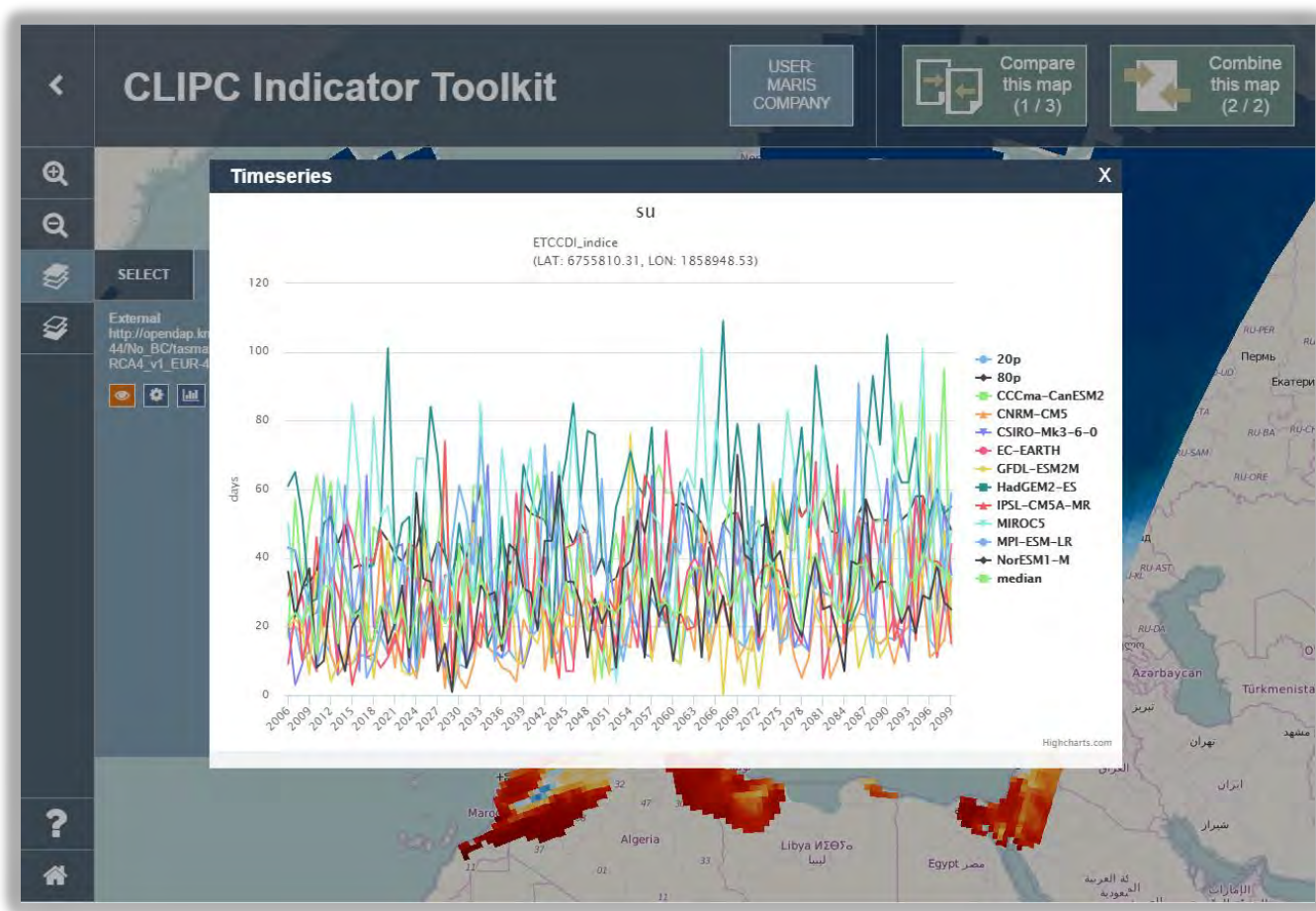
## Select and view indicator datasets



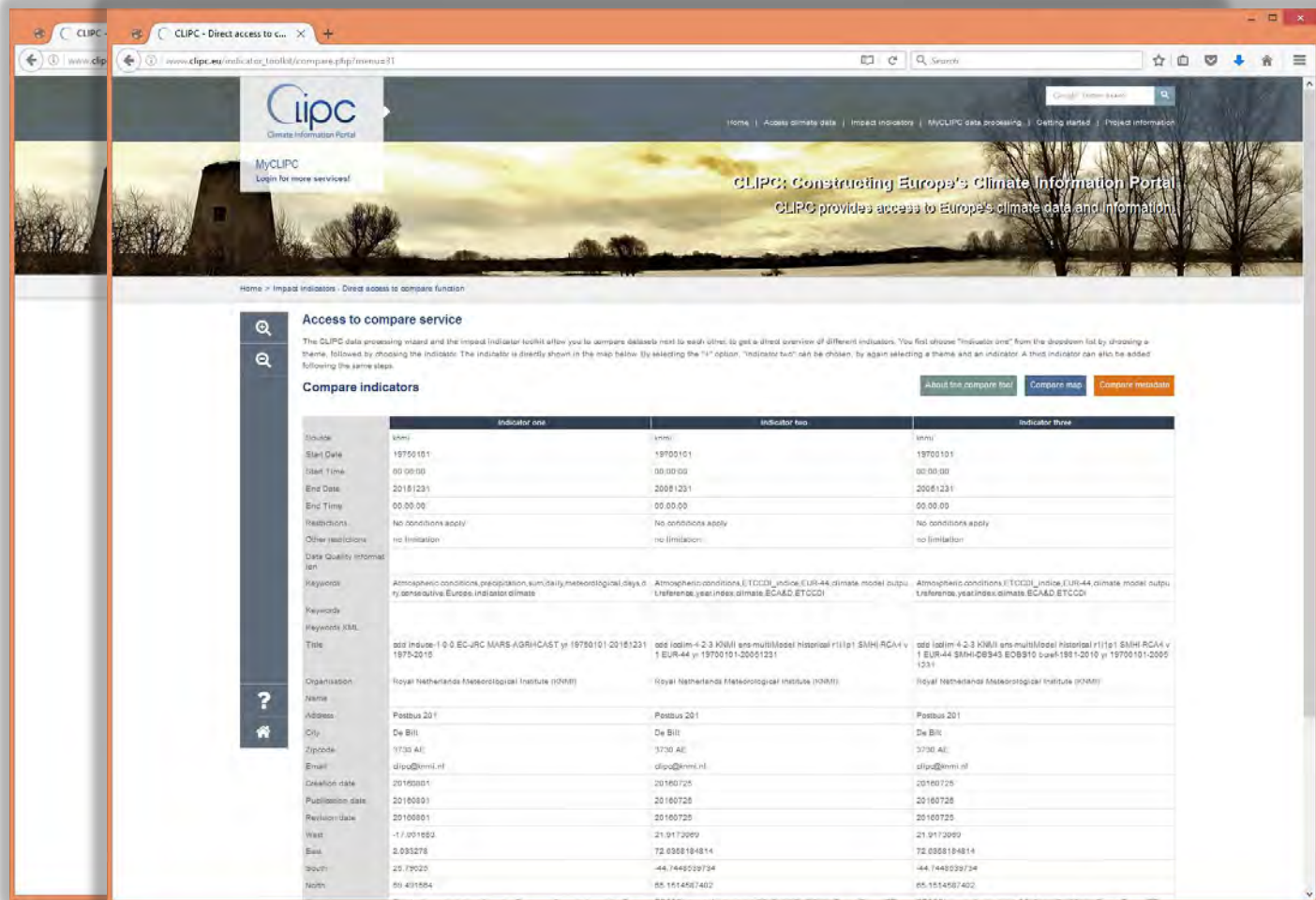
## Check metadata, timestamp, histogram



## View timeseries - Ensembles



## Compare indicator datasets (maps and metadata)



CLIPC - Direct access to CLIPC - www.clipc.eu/indicator\_toolkit/compare.php?menu=31

CLIPC  
Climate Information Portal

MyCLIPC  
Login for more services!

CLIPC: Constructing Europe's Climate Information Portal  
CLIPC provides access to Europe's climate data and information.

Home > Impact Indicators > Direct access to compare function

**Access to compare service**

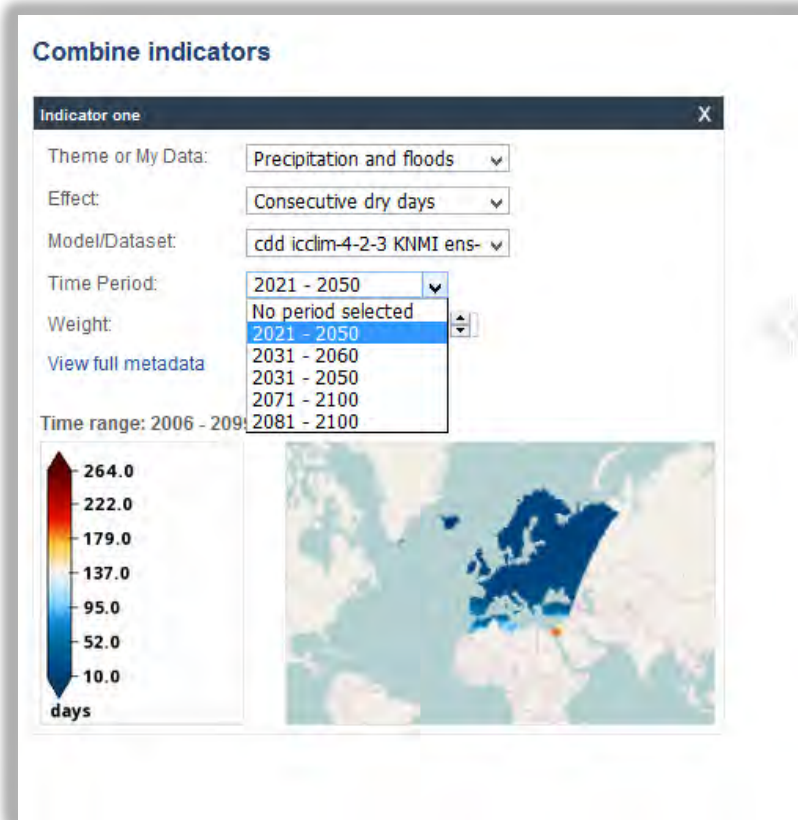
The CLIPC data processing wizard and the impact indicator toolkit allow you to compare datasets next to each other, to get a direct overview of different indicators. You first choose "indicators one" from the dropdown list by choosing a theme, followed by choosing the indicator. The indicator is directly shown in the map below. By selecting the "1" option, "indicator two" can be chosen. By again selecting a theme and an indicator, a third indicator can also be added following the same steps.

**Compare indicators** [About this compare tool](#) [Compare map](#) [Compare metadata](#)

	indicator one	indicator two	indicator three
Include	km2	km2	km2
Start Date	19750101	19700101	19700101
Start Time	00:00:00	00:00:00	00:00:00
End Date	20181231	20081231	20081231
End Time	00:00:00	00:00:00	00:00:00
Restrictions	No conditions apply	No conditions apply	No conditions apply
Other restrictions	no limitation	no limitation	no limitation
Data Quality Information			
Keywords	Atmospheric conditions, precipitation, sum, daily, meteorological, days, 8, ry, conservative, Europe, indicator, climate	Atmospheric conditions, ETCCDI_index, EUR-44, climate, model, output, reference, year, index, climate, EC-MD, ETCCDI	Atmospheric conditions, ETCCDI_index, EUR-44, climate, model, output, reference, year, index, climate, EC-MD, ETCCDI
Keywords XML			
Keywords XML			
Title	atm induse-1 0 0 EC-JRC MARS-AGRACAST yr 19750101 20181231 1975-2018	atm indim-4 2 3 KNMI sms multilabel historical r11p1 SMH RCA4 v 1 EUR-44 19700101-20081231	atm indim-4 2 3 KNMI sms multilabel historical r11p1 SMH RCA4 v 1 EUR-44 19700101-20081231
Organisation	Royal Netherlands Meteorological Institute (KNMI)	Royal Netherlands Meteorological Institute (KNMI)	Royal Netherlands Meteorological Institute (KNMI)
Name			
Address	Postbus 201	Postbus 201	Postbus 201
City	De Bilt	De Bilt	De Bilt
Zipcode	3730 AE	3730 AE	3730 AE
Email	clipc@knmi.nl	clipc@knmi.nl	clipc@knmi.nl
Creation date	20160801	20160725	20160725
Publication date	20160801	20160728	20160728
Revision date	20160801	20160725	20160725
West	-1.001682	21.9172099	21.9172099
East	2.093278	72.090818414	72.090818414
South	25.17920	-44.7449239734	-44.7449239734
North	66.431984	65.1514587402	65.1514587402

## Combine indicators – create time period averages

Calculating averages over 20/30 years on the fly



## Combine indicators – subtract = difference map

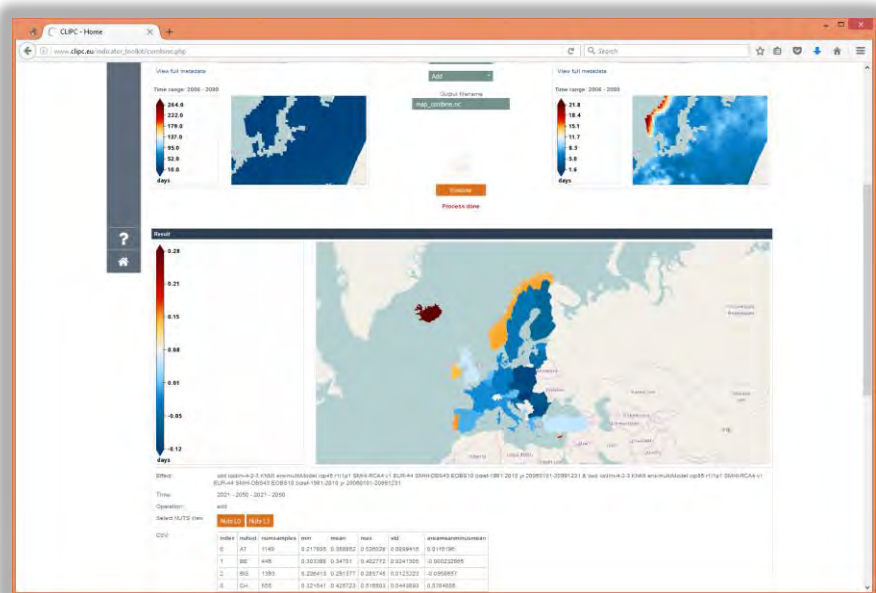
The screenshot displays the CLIPC web interface for combining indicators. The browser address bar shows [www.clipc.eu/indicator\\_toolkit/combine.php](http://www.clipc.eu/indicator_toolkit/combine.php). The main content area is titled "Combine indicators" and features two "Indicator one" and "Indicator two" panels. Both panels are configured with "Temperature" as the theme, "Annual mean of maximum" as the effect, and "tx iclim-4-2-3 KNMI ens-" as the model/dataset. The time period is set to "1971 - 2000" and the weight is "1". Each panel includes a "View full metadata" link and a "Time range: 1970 - 2005" label. Below the panels are two small maps showing the spatial distribution of the indicators. In the center, a dropdown menu is set to "Subtract", and the "Output filename" is "map\_combine.nc". An "Execute" button is visible below the operation selection. At the bottom, a "Result" panel shows a difference map of Europe with a color scale ranging from -0.1 K (blue) to 2.8 K (red). The result panel also includes a "Time range: 1970 - 2005" label and a "SOURCE:" label. The interface includes a sidebar with navigation icons (Home, Help) and a top navigation bar with a search function.

## Combine indicators – add = Impact dataset

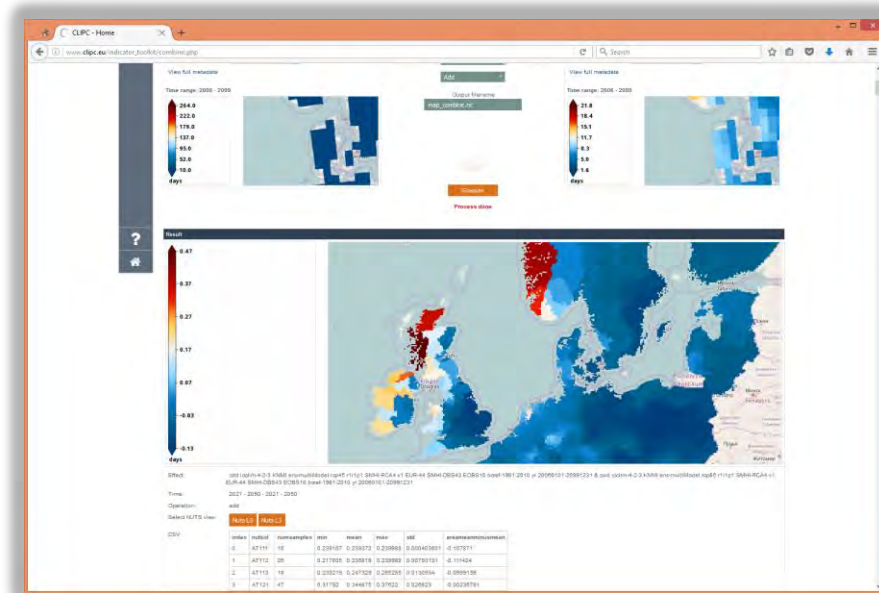
The screenshot displays the CLIPC web interface for combining indicators. It features two configuration panels for 'Indicator one' and 'Indicator two', both set to 'Precipitation and floods' with effects of 'Consecutive dry days' and 'Consecutive wet days' respectively. The central area contains 'Min/Max' and 'Add' buttons, and an 'Execute' button. The 'Result' section shows a map of Europe with a color scale from 20.0 to 266.0 days, indicating the combined impact. The source information at the bottom reads: 'Effect: cdd icclim-4-2-3 KNMI ens-multiModel rcp45 r11p1 SMHI-RCA4 v1 EUR-44 SMHI-OBS43 EOBS10 boref-1981-2010 yr 20000101-20991231 & owd icclim-4-2-3 KNMI ens-multiModel rcp85 r11p1 SMHI-RCA4 v1 EUR-44 SMHI-OBS43 EOBS10 boref-1981-2010 yr 20000101-20991231' and 'Time: 2021 - 2050 - 2021 - 2050'.

Combine indicators – average the result over areas  
(NUTS = EU Admin regions)

NUTS 0 (Countries)



NUTS 3 (Departments)





## Re-use your output

The screenshot displays the CLIPC web interface. At the top, there is a navigation menu with links: Home, Access climate data, Impact indicators, MyCLIPC data processing, Getting started, and Project information. The main header features the CLIPC logo and the text "CLIPC: Constructing Europe's Climate Information Portal" and "CLIPC provides access to Europe's climate data and information". Below the header, there is a "Combine indicators" tool. This tool consists of two configuration panels, "Indicator one" and "Indicator two".

**Indicator one configuration:**

- Theme or My Data: My Data
- Model/Dataset: WPS\_Scratch/WPS\_knmi\_al
- Select Dataset: WPS\_Scratch/WPS\_clpc\_extractnits\_execute\_20161007T082838Z/dipc\_nutstat.nc, WPS\_Scratch/WPS\_clpc\_extractnits\_execute\_20161007T082730Z/dipc\_nutstat.nc, WPS\_Scratch/WPS\_clpc\_advanced\_combine\_20161007T0758/kschm2.nc
- Time Period: 2006 - 2009
- Weight: 1
- View full metadata: WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_WEIGHT2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_WEIGHT1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_NORM2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_NORM1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_WCS2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0758/COPY\_WCS1.nc, WPS\_Scratch/WPS\_wps\_timeavg\_20161007T075945Z/out\_icclm.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/imap\_combine.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_NORM2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WEIGHT2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WEIGHT1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_NORM1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WCS2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WCS1.nc, WPS\_Scratch/WPS\_clpc\_extractnits\_execute\_20161007T0958Z/dipc\_nutstat.nc
- Color scale: days, ranging from 0.20 to 1.03.

**Indicator two configuration:**

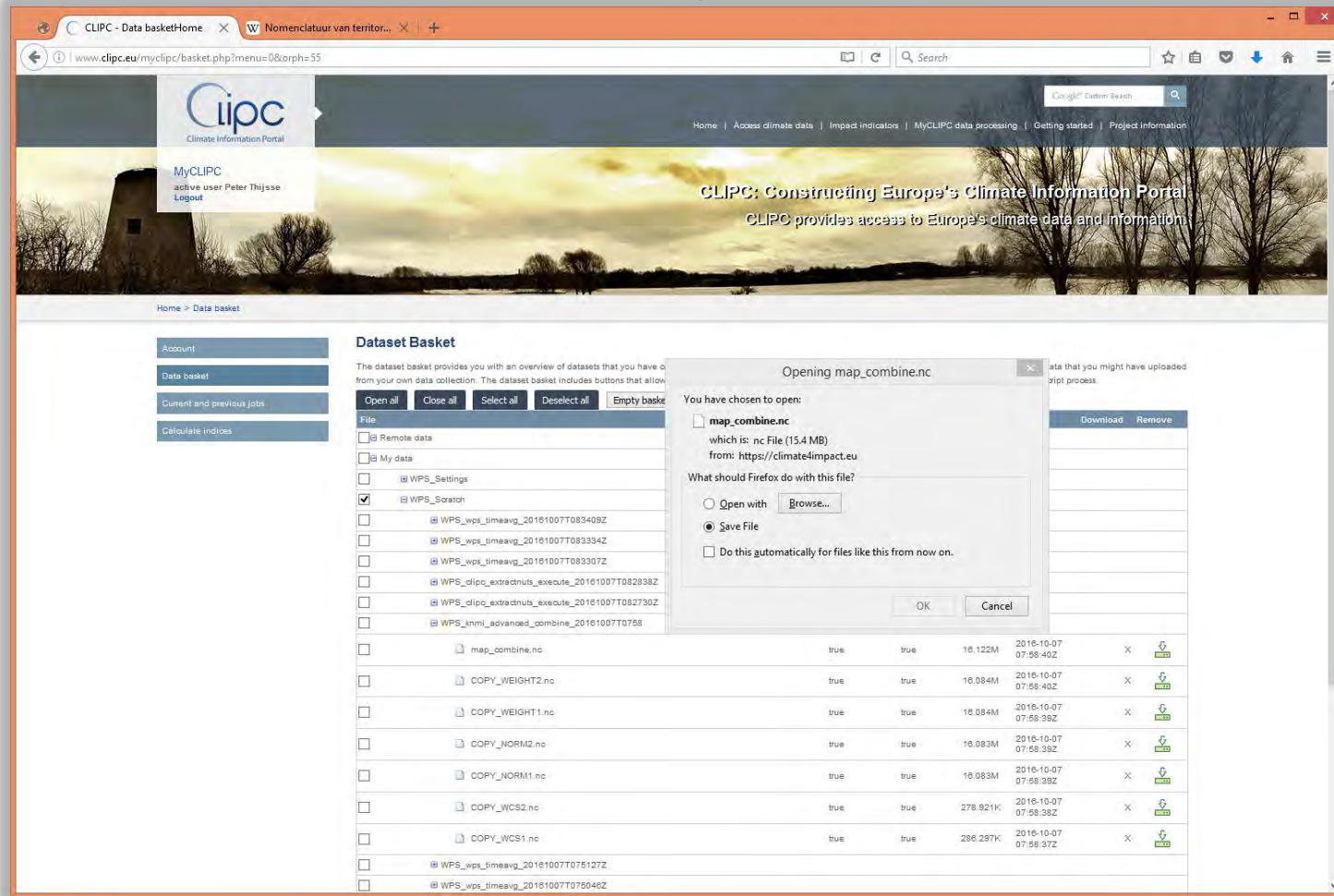
- Theme or My Data: Precipitation and floods
- Effect: Select Indicator
- Model/Dataset: Select Dataset
- Time Period: 2021 - 2050
- Weight: 1
- View full metadata: WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/imap\_combine.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_NORM2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WEIGHT2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WEIGHT1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_NORM1.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WCS2.nc, WPS\_Scratch/WPS\_knmi\_advanced\_combine\_20161007T0732/COPY\_WCS1.nc, WPS\_Scratch/WPS\_clpc\_extractnits\_execute\_20161007T0958Z/dipc\_nutstat.nc
- Color scale: km2, ranging from 0.0 to 100.0.
- Map: A map of Europe showing precipitation and floods.

**Result:**

- Color scale: ranging from 0.27 to 0.47.
- Map: A map of Europe showing the result of the combination of the two indicators.

A message "Process has failed..." is displayed below the indicator configuration panels.

## Or download from your “basket”



The screenshot shows the CLIPC Data Basket interface. On the left, there is a navigation menu with options: Account, Data basket, Current and previous jobs, and Calculate indices. The main area is titled "Dataset Basket" and contains a list of datasets. A modal dialog box is open over the "map\_combine.nc" dataset, asking the user to choose how to handle the file. The dialog options are:

- Open with [Browse...](#)
- Save File
- Do this automatically for files like this from now on.

The dataset list below the dialog shows the following items:

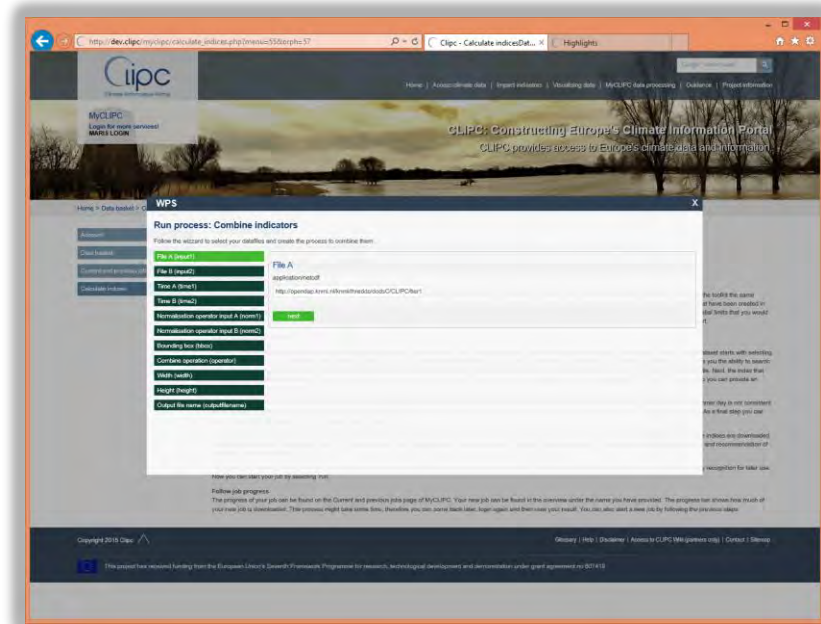
File Name	Size	Date	Download	Remove
map_combine.nc	16,122M	2016-10-07 07:58:40Z	X	
COPY_WEIGHT2.nc	16,084M	2016-10-07 07:58:40Z	X	
COPY_WEIGHT1.nc	16,084M	2016-10-07 07:58:38Z	X	
COPY_NORM2.nc	16,083M	2016-10-07 07:58:38Z	X	
COPY_NORM1.nc	16,083M	2016-10-07 07:58:38Z	X	
COPY_WCS2.nc	278,921K	2016-10-07 07:58:38Z	X	
COPY_WCS1.nc	286,297K	2016-10-07 07:56:37Z	X	

## 3. Underlying dataset catalogue, processing services, and techniques



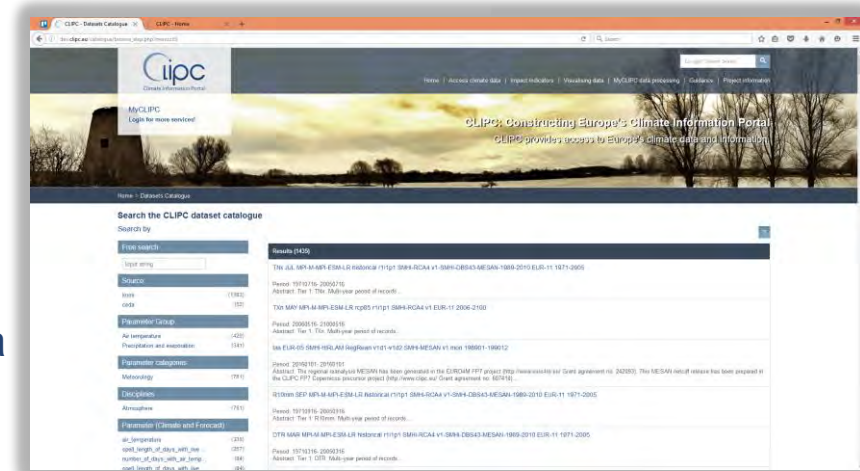
## Wizard access to MyCLIPC processing services

- Processing datasets/indicators yourself, in the toolkit and via “wizards” on top of WPS’s
- Users login before being able to use the tools. This provides the user their own “working environment” and allows to save datasets, view job progress, etc.
- Results can be used, previewed, saved and shared.



## Dataset catalogue

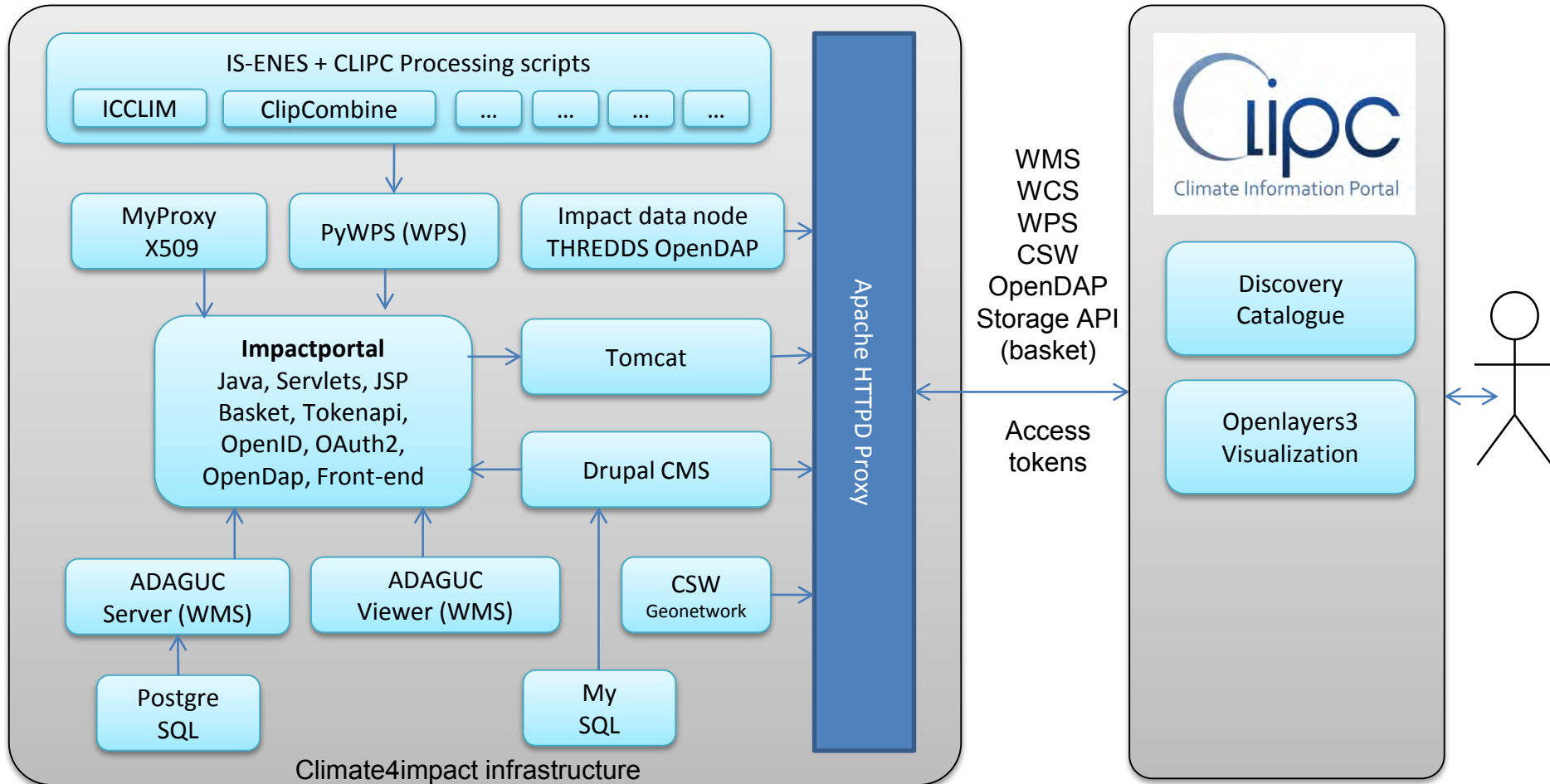
- Dataset catalogue:
  - Overview of CLIPC validated climate datasets (ESGF – STFC server) and climate impact indicators (KNMI server)
  - First goal: Harvesting daily latest status and is input data for the toolkit
  - Second goal: Harmonising the metadata (ISO19139) as much as possible. The catalogue offers search and view of the datasets metadata.



## C4I and CLIPC Architecture

KNMI

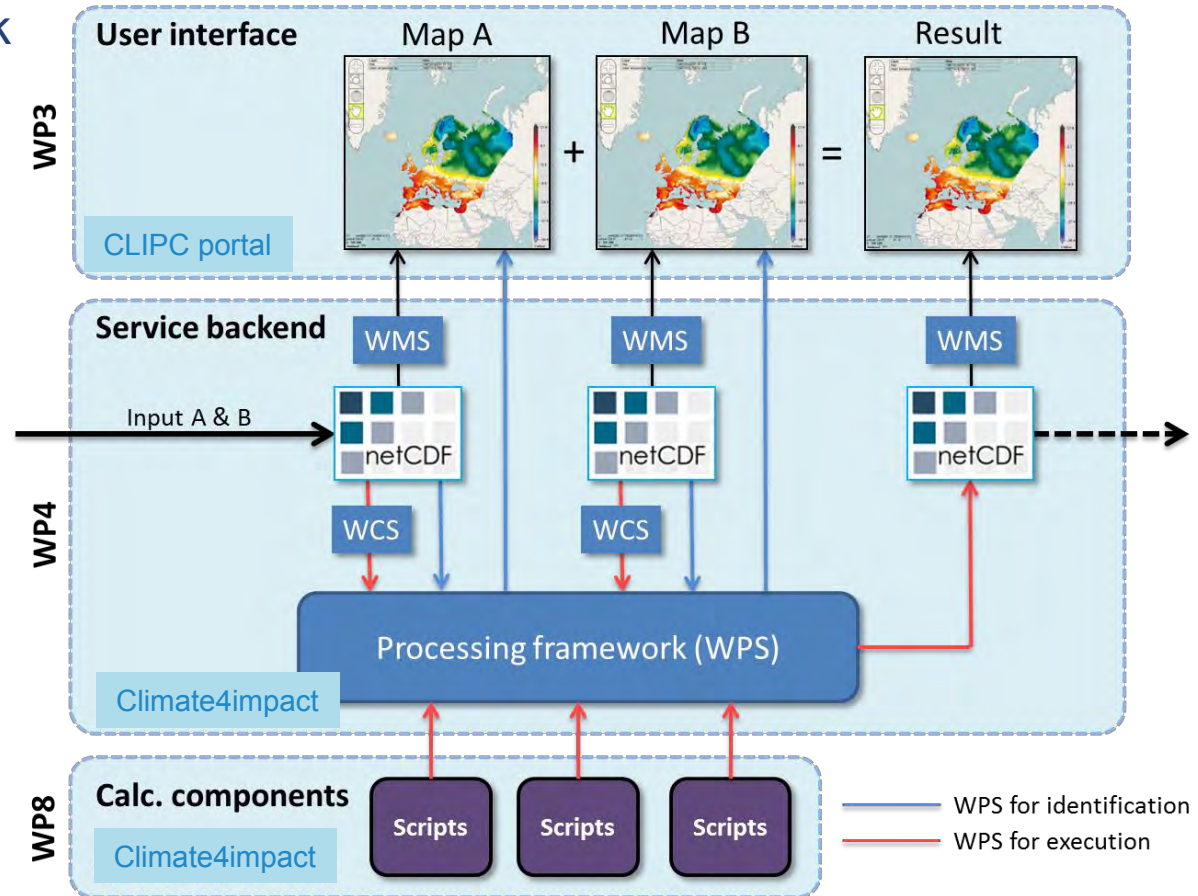
MARIS



## Toolkit integration and indicator processing

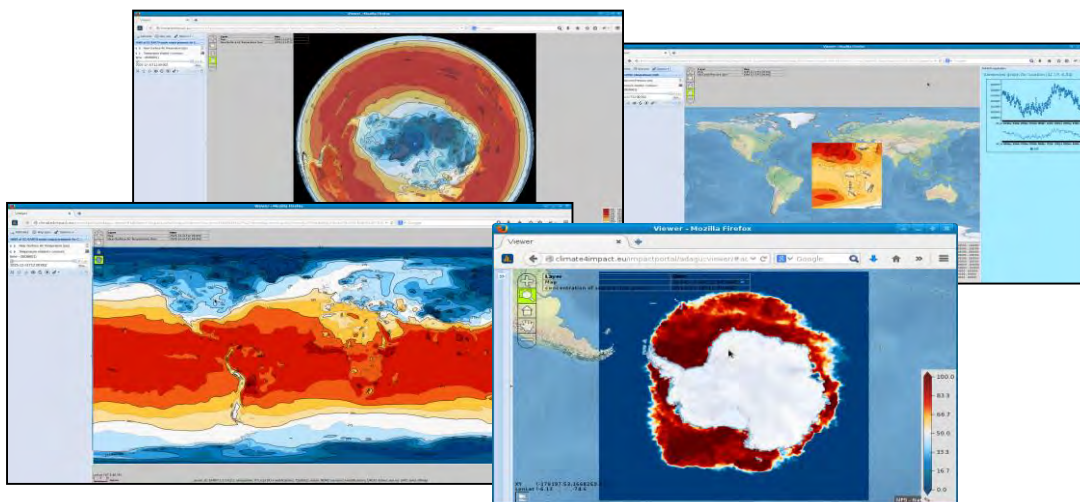
### Implementation Framework

- Normalization functions:
  - Linear
  - Standard deviation
  - Min/max
- Calculations supported:
  - Add
  - Subtract
  - Multiply
  - Divide
- Easy extendable with new calculations
- Next: combining NUTS and Raster data
- Integrated in portal (see demo)



## Use of open standards and Open Source software:

- Data access over OPeNDAP → THREDDS
- Online analysis using WPS → PyWPS and ICCLIM
- Online visualization using WMS → ADAGUC
- Subsetting using WCS → ADAGUC
- Metadata using CSW → Geonetwork
- Single Sign On → OpenId, OAuth2, delegation using MyProxy X509, Access Tokens





## Final message

- Lots of parallels with opportunities in marine domain (SeaDataCloud, CMEMS, EMODNet)
- Standardisation of datasets and metadata is key
- Focus on the user, offer matching services, and technically there is a massive potential

