DARE

Delivering Agile Research Excellence on European E-Infrastructures

is-enes
INFRASTRUCTURE FOR THE EUROPEAN NETWORK FOR EARTH SYSTEM MODELLING

# Ease Access to Climate Simulations for Researchers: IS-ENES climate4impact


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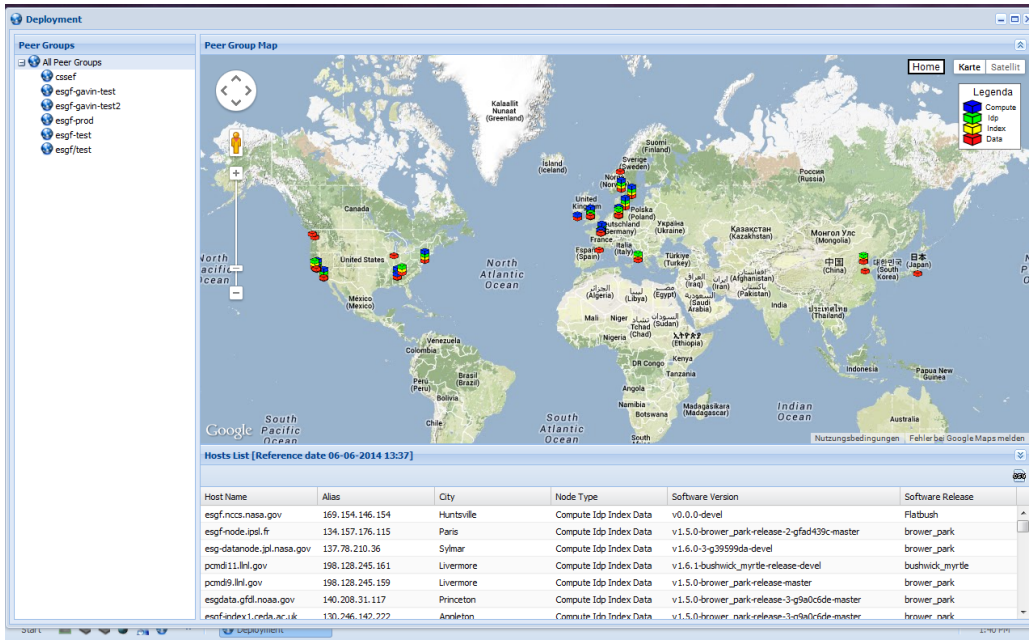
# Climate Data Distribution

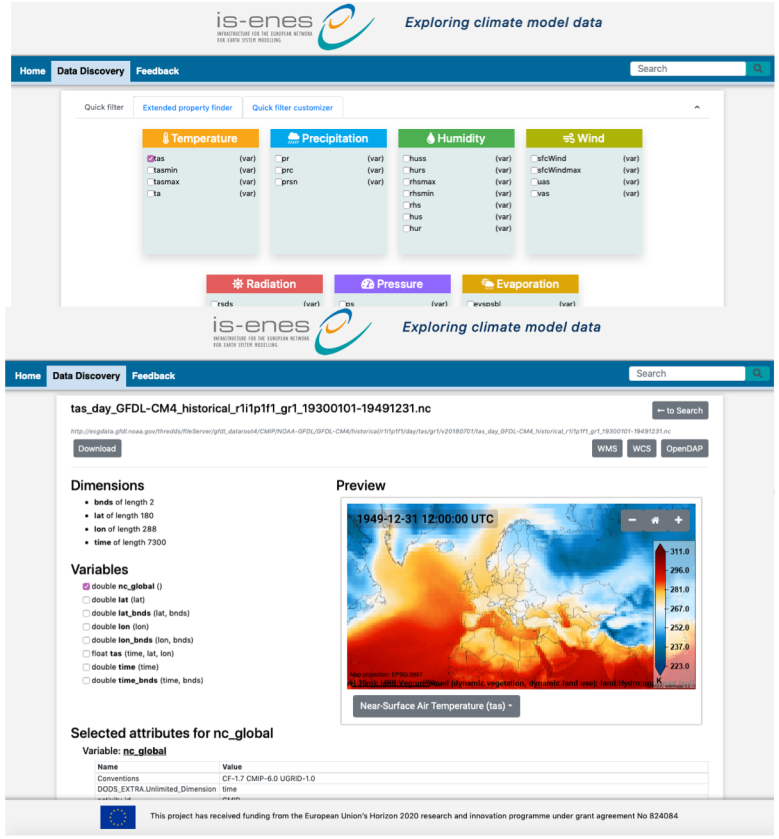
## ESGF Data Nodes 2019

- 31 worldwide
- 18 in Europe (17 institutions) (coordinated by IS-ENES)



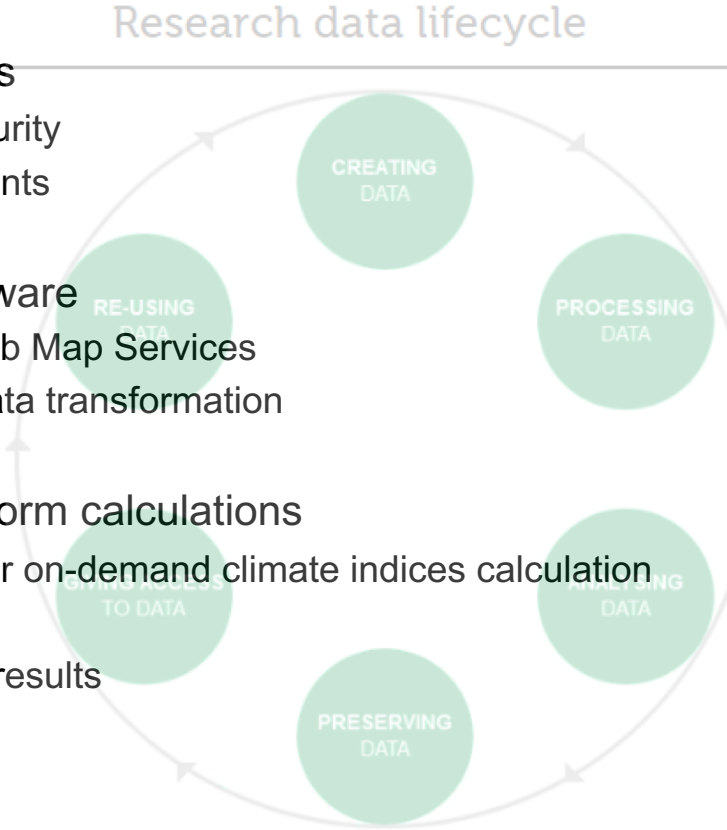

## IS-ENES CDI climate4impact

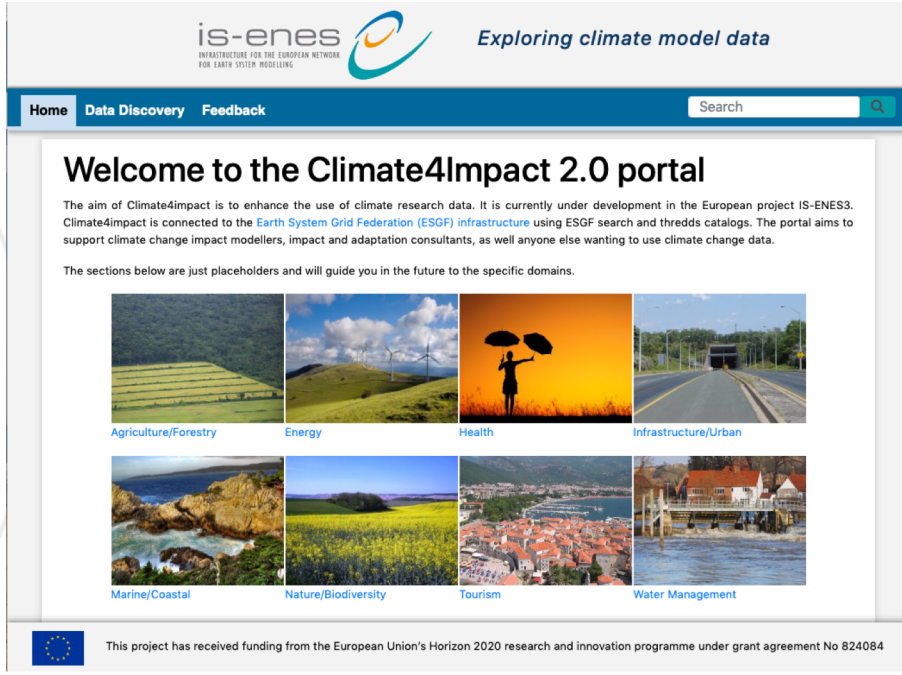
- Tailored for end-users
- Supports on-demand data processing



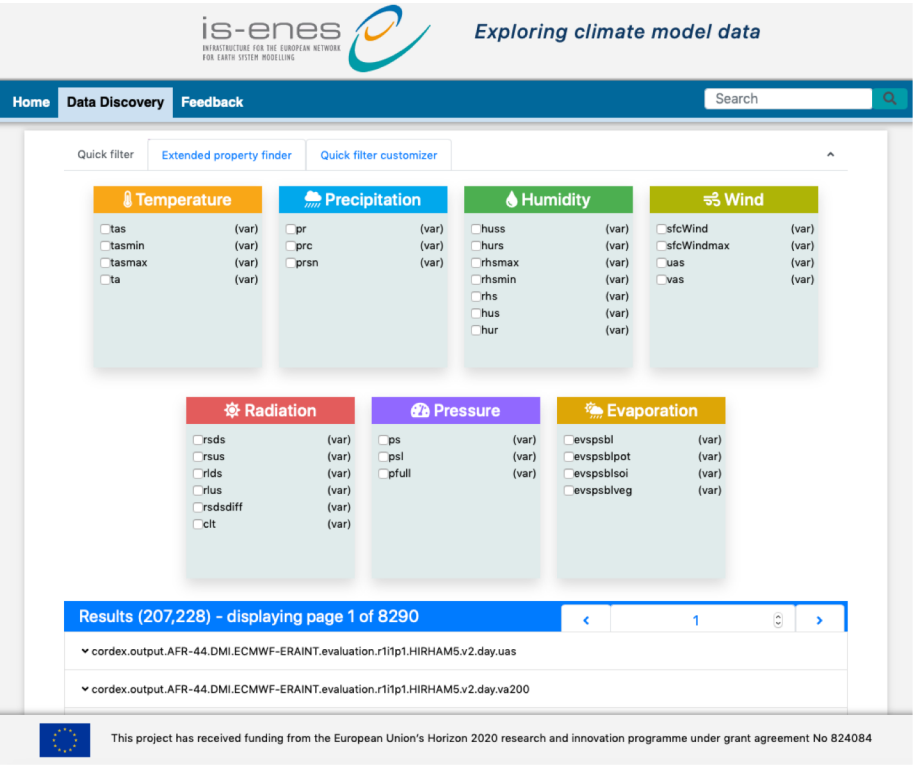
# What is the climate4impact portal?

- Platform for researchers to explore climate data and perform analysis
- Connects to ESGF web services
  - Search, Catalog Support, Security
  - Several projects and experiments
- Visualization via ADAGUC Software
  - Visualization system using Web Map Services
  - Web Coverage Services for data transformation
- Analysis using (Py)WPS to perform calculations
  - icclim open-source software for on-demand climate indices calculation
  - Data sub-selection
  - Personal store for processing results
- In production
  - Deployed in the cloud
  - Is one of the official CMIP6 dissemination portals

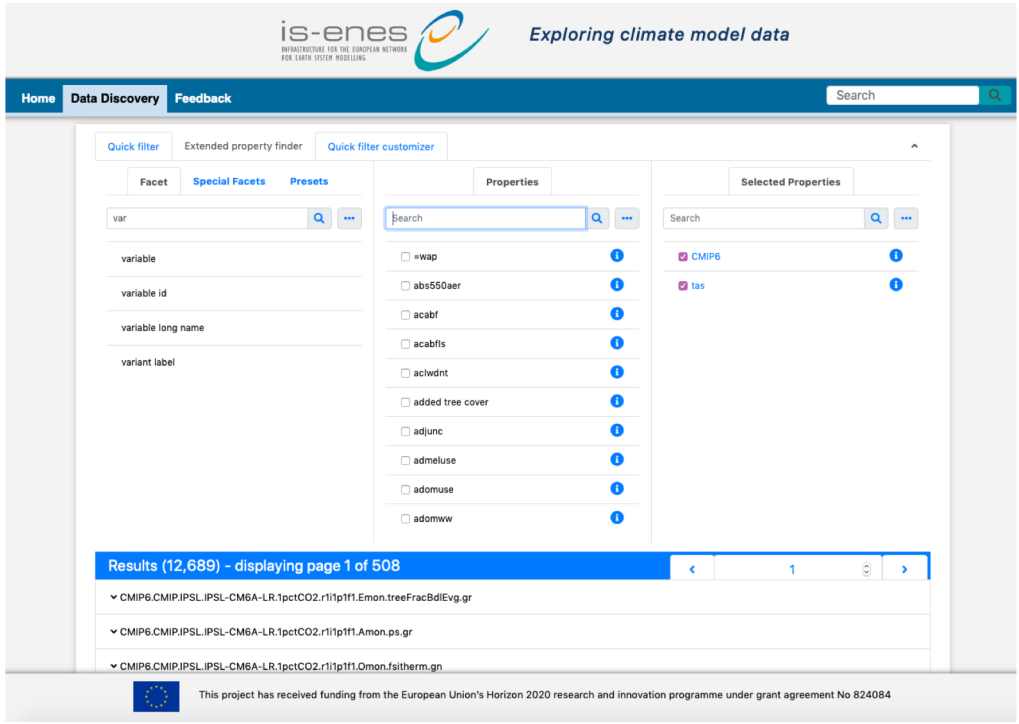


# Web based faceted search

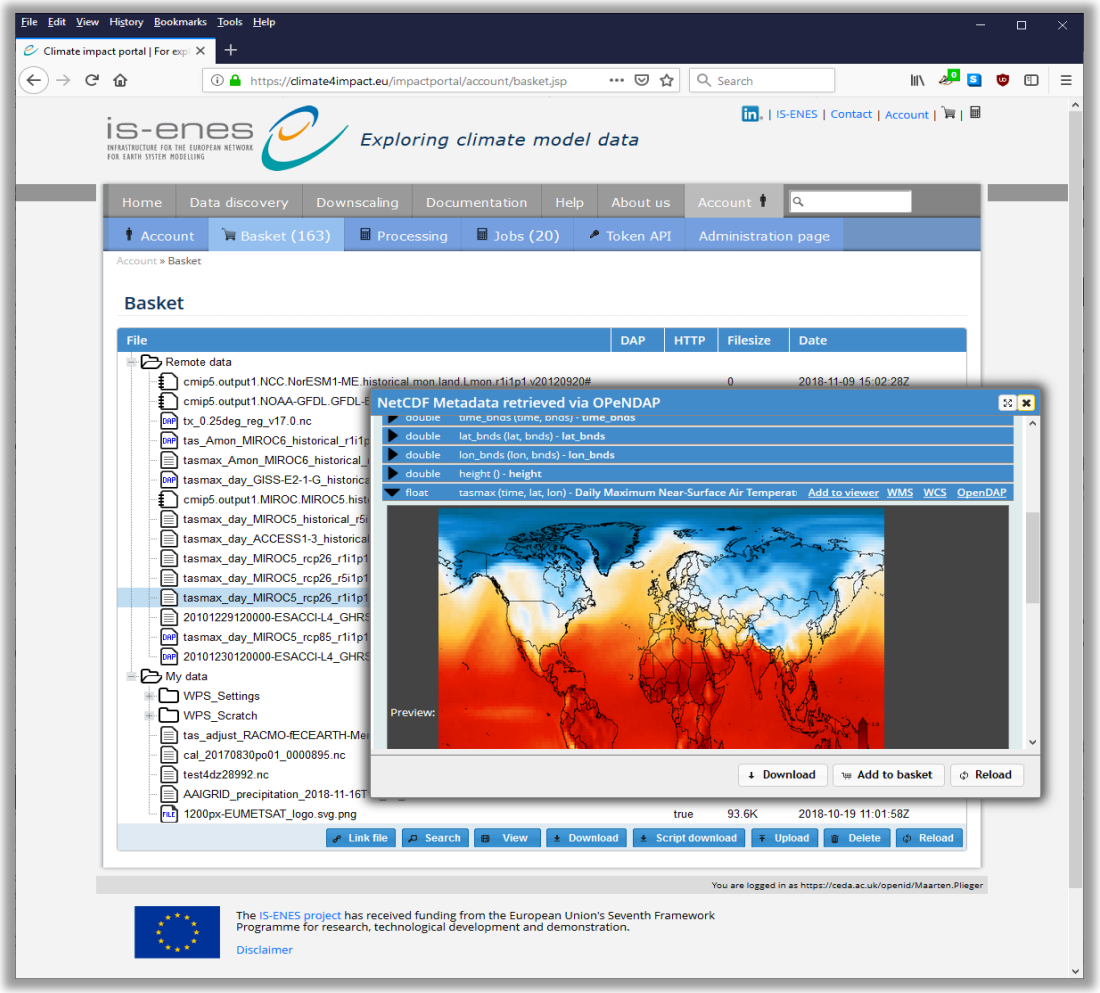



- Drill down search results
- Tooltips for acronyms
- Quick select menus, configurable
- ES-DOC integration
- Preview of data
- Save Search Parameters
- Export search list to CSV



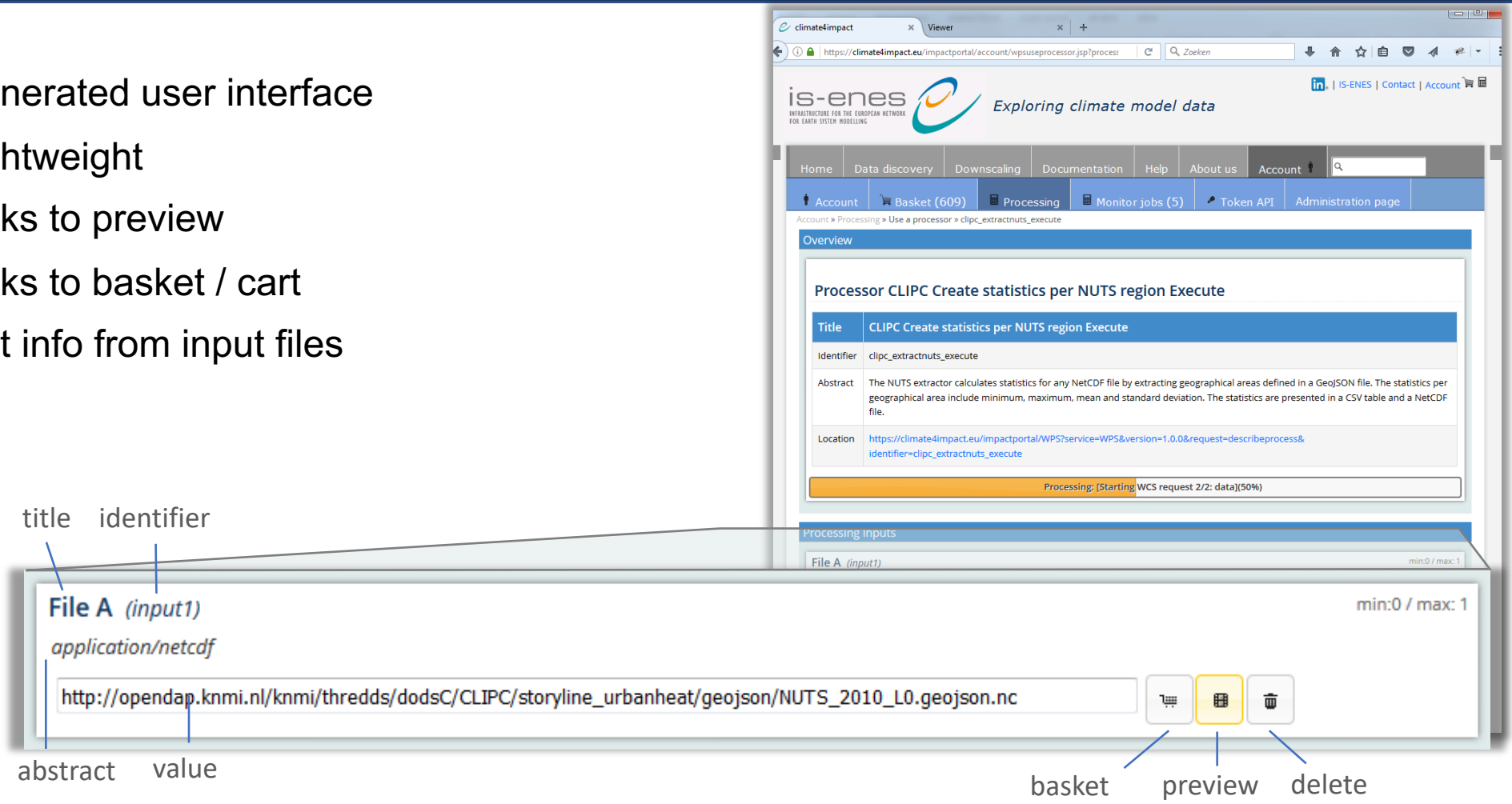
# Personal User Space

- By default the basket contains:
  - "Remote data" for links
  - "My data" for your own data
- Script based download allows to select and download multiple files
- The basket allows for uploading your own files
  - Can be used in processing or visualization
  - NetCDF, CSV, GeoJSON, PNG
- Share your data located in your basket with others

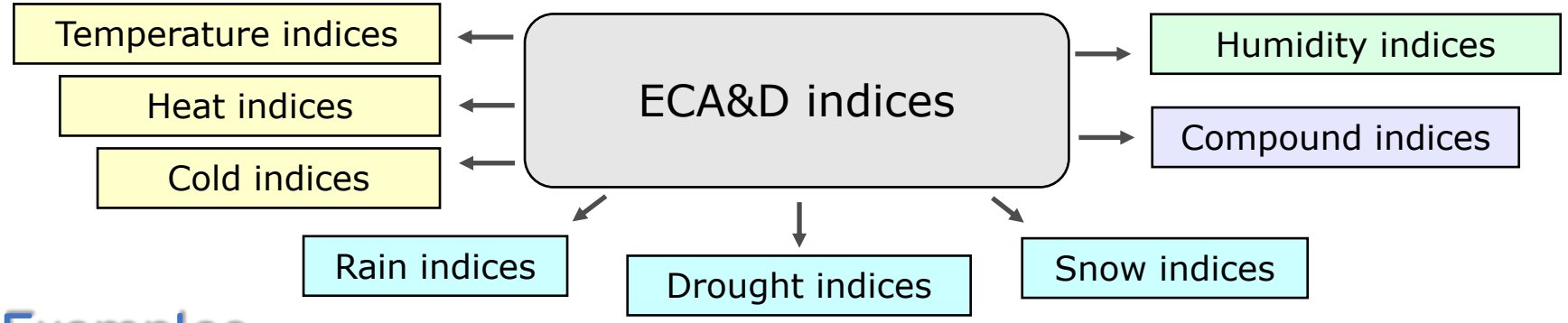


# Web processing interface for data analysis

- Generated user interface
- Lightweight
- Links to preview
- Links to basket / cart
- Get info from input files



# Climate Indices using icclim




## Examples

- 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, started in September 2013
  - 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
- Some percentile-based indices (TG10p, TX10p, TN90p, etc) using bootstrap method

icclim source code and documentation is available via **https://github.com/cerfacs-globc/icclim**

*An xarray/dask fork has been done and is now at an alpha stage.*

# Example: Calculating summer days (SU) 1/3

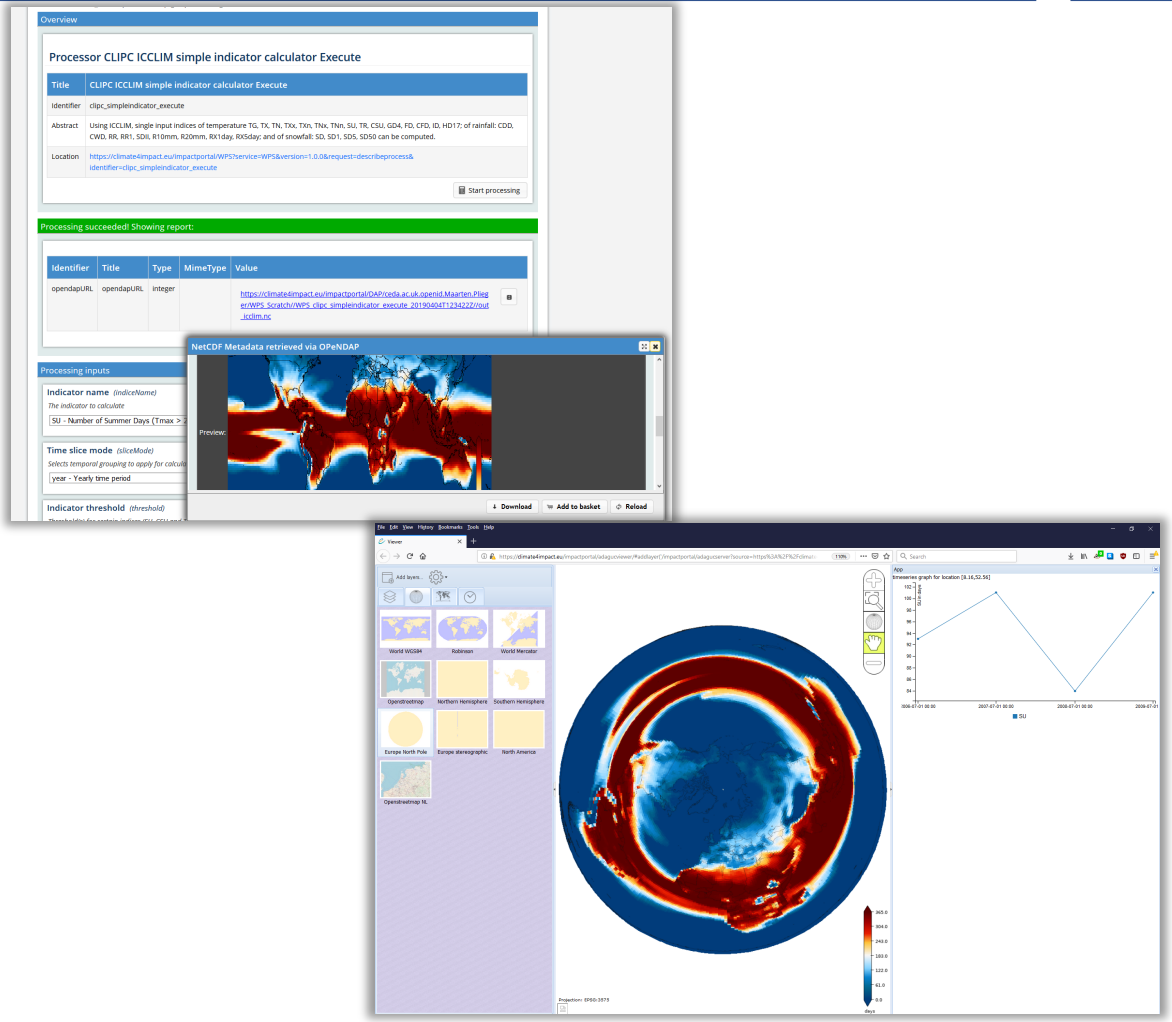
- Calculate number of days where maximum temperature is above 25 degrees per European country, based on experiment RCP 2.6 and climate model MIROC5

- Sign in
- Go to Search and select:
  1. Project: CMIP5
  2. Parameter: tasmax
  3. Time frequency: daily
  4. Experiment: rcp26
  5. Model: MIROC5,
  6. Ensemble: r1i1p1
  7. Select the latest version

- Select a file from the dataset and add it to your basket

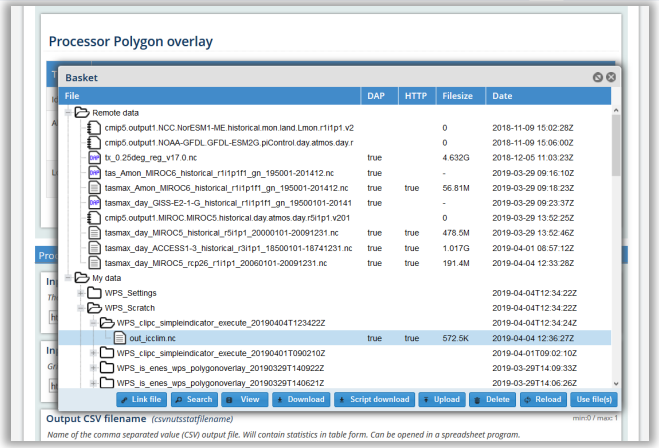
# Example: Calculating summer days (SU) 2/3

- Go to Processing and select: icclim simple indicator calculations
- Select SU, Summer days. Leave the threshold to 25 degrees Celsius
- Select the file from your basket and click “Start processing”
- Visualize the output

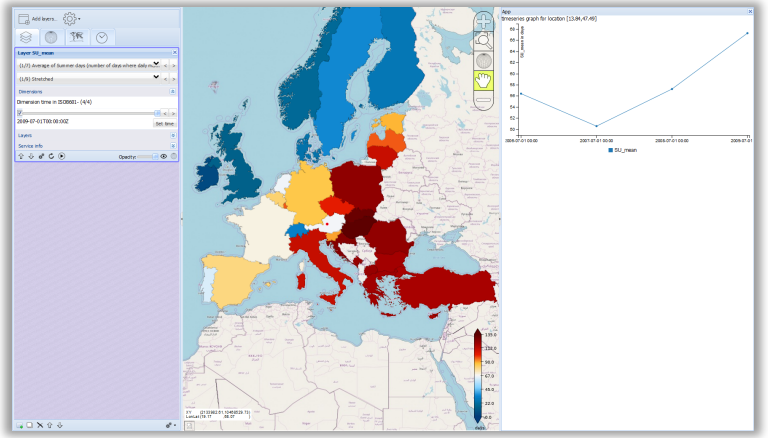


# Example: Calculating summer days (SU) 3/3

- Go to Processing and select Polygon overlay
- For “Input File B - Gridded data”, choose the latest result with SU from your basket. This is the most recent folder under WPS_Scratch
- As variable select “SU”, as time range select “*”
- Click “Start processing”




**Results**: Summer days per European country for MIROC5 / RCP26 !



# What can be improved?

- **Currently C4I handles ESGF data on file level**
  - X Fragmentation of files is a barrier for many users and hurts user experience
  - ➔ Hide file structure, work with datasets and search patterns
  - ➔ Especially important, because now C4I is one of the official data distribution endpoints

- **Currently the Processing services are on the same machine as the portal**
  - X Currently not scalable and processing load effects the portal
  - ➔ Make use of distributed Web Processing Services using delegation

Currently in Progress!! (next slides)

- **Currently the frontend uses old technologies (JSP, Jquery, ExtJS)**
  - X Difficult to maintain, and it is difficult to re-use results from other work
  - ➔ Migrate to ReactJS (Based on work done in the project C3S-Magic)
  - ➔ Good moment to re-design the user interface in collaboration with users.

Currently in Progress too!!

- **Currently the viewer is running in a separate tab**
  - By using ReactJS, it is easier to make use of an embedded viewer (adaguc-webmapjs)

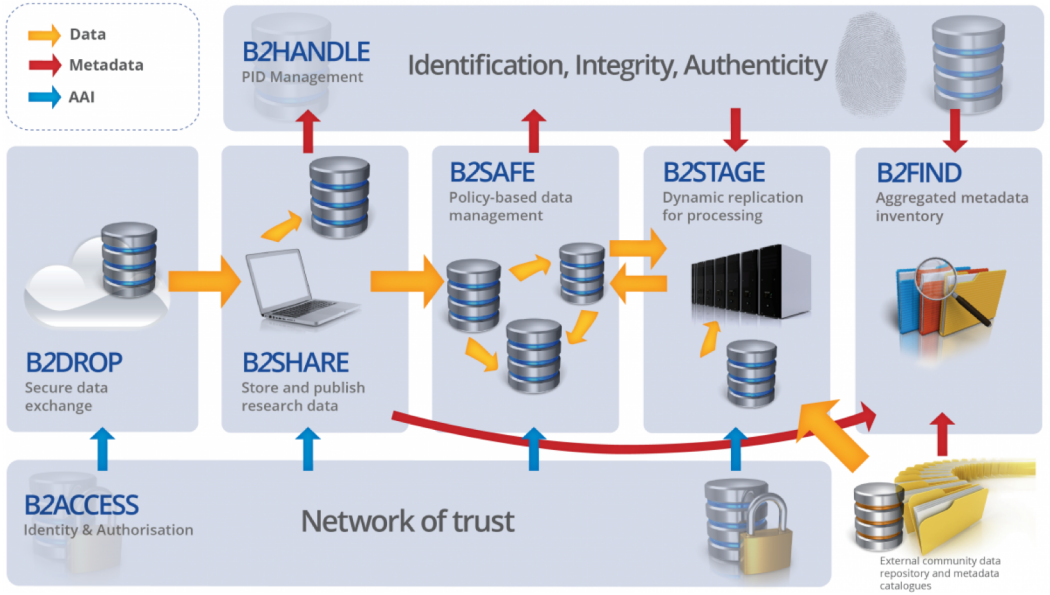
- **Currently provenance tracking is limited to a few processes**
  - Enhance usage of W3C PROV-DM standard and WPS_PROV toolkit

- We are looking for users who are willing to help to improve the platform!

# European Landscape & Components
# EUDAT & EOSC

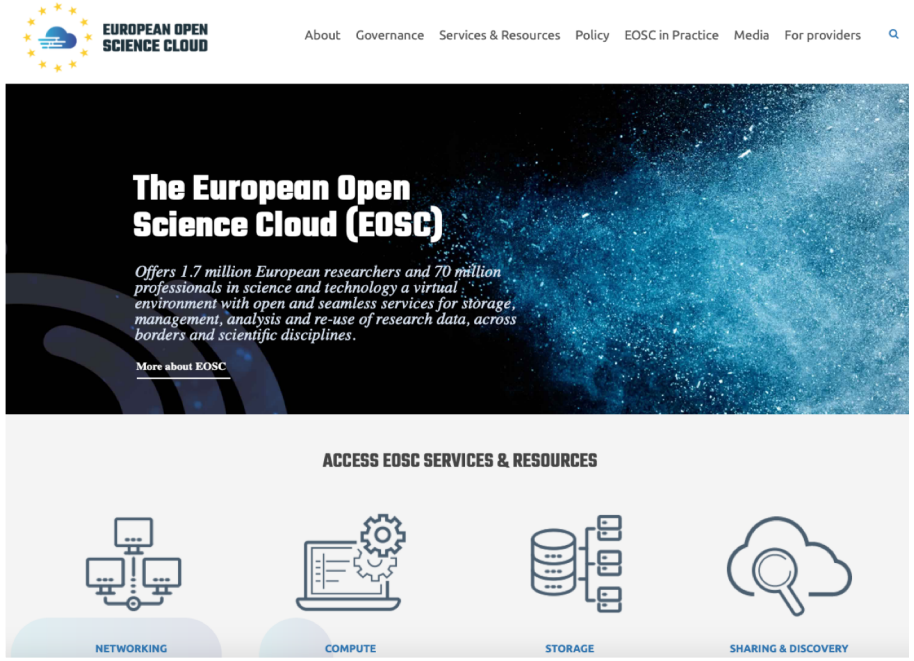
## EUDAT CDI B2 Service Suite

- Integrated B2 Services
- B2ACCESS: Common AAI
- B2DROP: Secure Data Exchange
- Interface between EUDAT B2 Services and Communities infrastructures, such as Climate

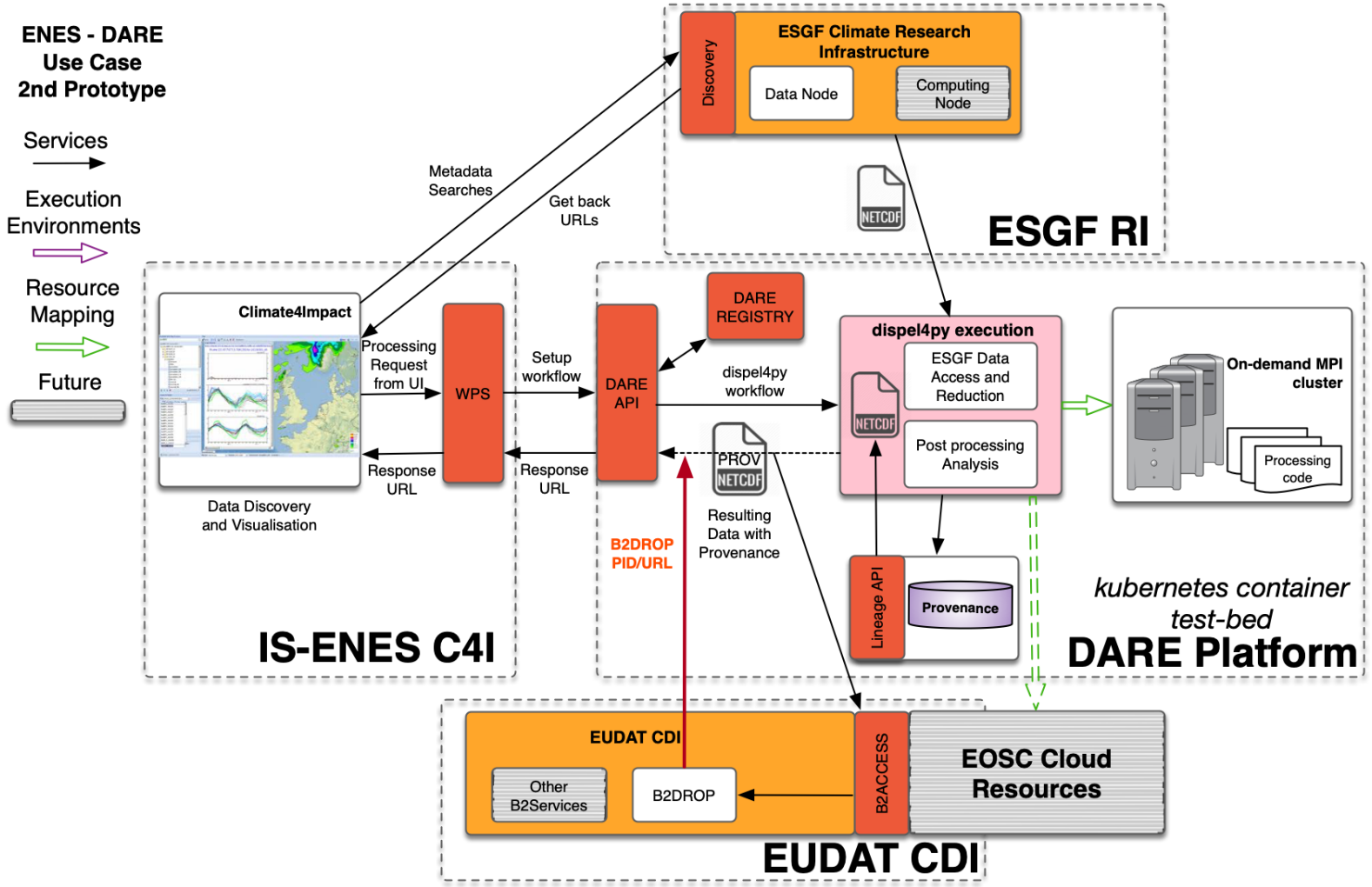



## European Open Science Cloud (EOSC)

- Marketplace of Services
  - Compute
  - Storage
  - Sharing, etc.



# DARE IS-ENES
# Processing Delegation: Prototype Version



# Summary

- C4I can provide Climate change impact researchers a better access to climate data
  - Handle very large datasets
  - Remote Data Processing with Provenance Information
  - Guidance and Help
- C4I is an official access point for new (CMIP6) climate scenarios
- A new C4I 2.0 is in active development
- Hiding e-infrastructures heterogeneity accelerate C4I developments
  - EUDAT and EOSC will provide needed services in the backend
  - The DARE Platform and its API will ease the use of different e-infrastructure and cloud services

# Questions & Comments! ☺

https://climate4impact.eu


For questions, suggestions, feedback and help, please contact

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**On Behalf of the climate4impact Team**


**Gateways Poster 6A** this evening for further discussions on this topic!