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Copernicus

European Commission

Accessing EFAS Hydrological Data

EFAS Annual Meeting 2023

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COPERNICUS EMERGENCY MANAGEMENT SERVICE

Workshop Format

Introduction to EFAS hydrological data *(5 mins)*

In-depth: what data are on offer? *(15 mins)*

Exploration: Accessing EFAS data from the Climate Data Store (CDS) *(15 mins)*

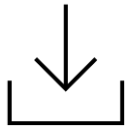
Wrap-up *(5 mins)*

Introduction

EFAS hydrological data is accessed from 3 main places:

1. **EFAS-IS**

1. **Copernicus Climate Data Store (CDS)**



1. **FTP**

1. EFAS-IS

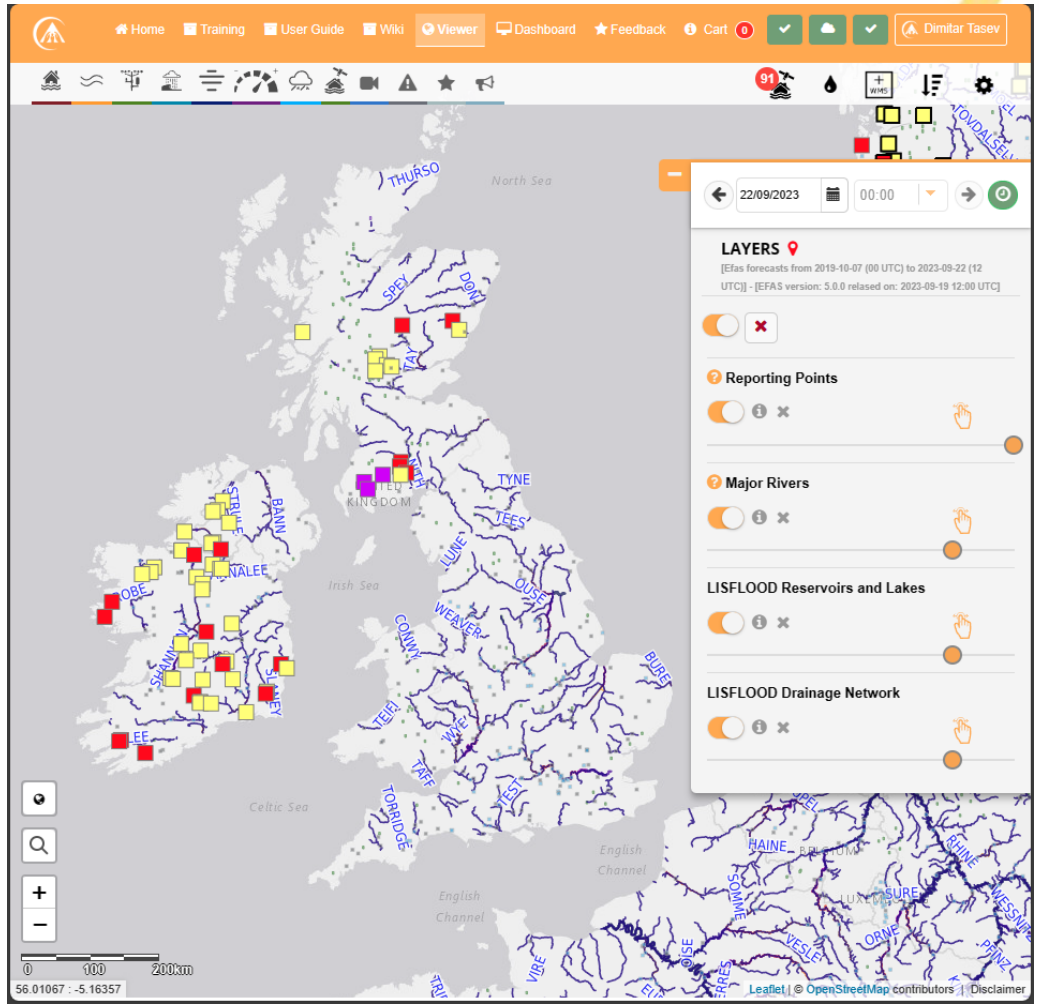
The *first data source* also powers the map viewer we all use …

All *map layer data* is sent via a *web map service* (WMS).

This WMS can be accessed by other tools

- **e.g. GIS Software – QGIS**
- **Other map viewers**

The second data source is the *product files themselves* – the shapefiles, GeoJSON etc



CDS and FTP

2. Copernicus Climate Data Store (CDS)

- 5 different catalogue entries
- Several variables
- Auxiliary data page

Register now!

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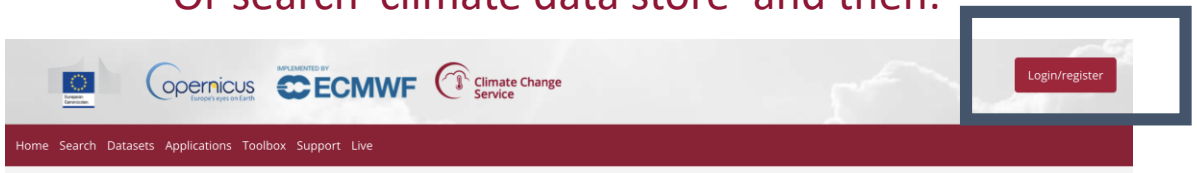
3. FTP

- By request

Or search ‘climate data store’ and then:



Don’t have a Google account? It’s a good time to sign up!

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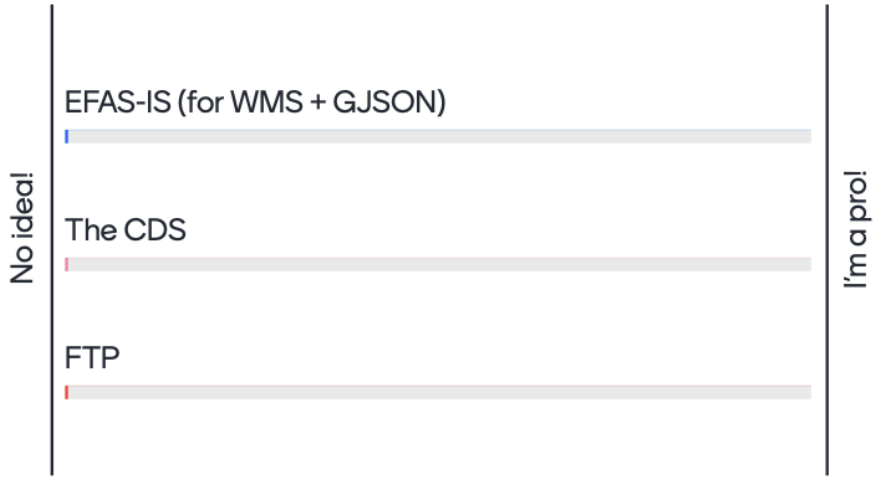
Quick question..

Join at **menti.com** use code **1200 7464**

Mentimeter

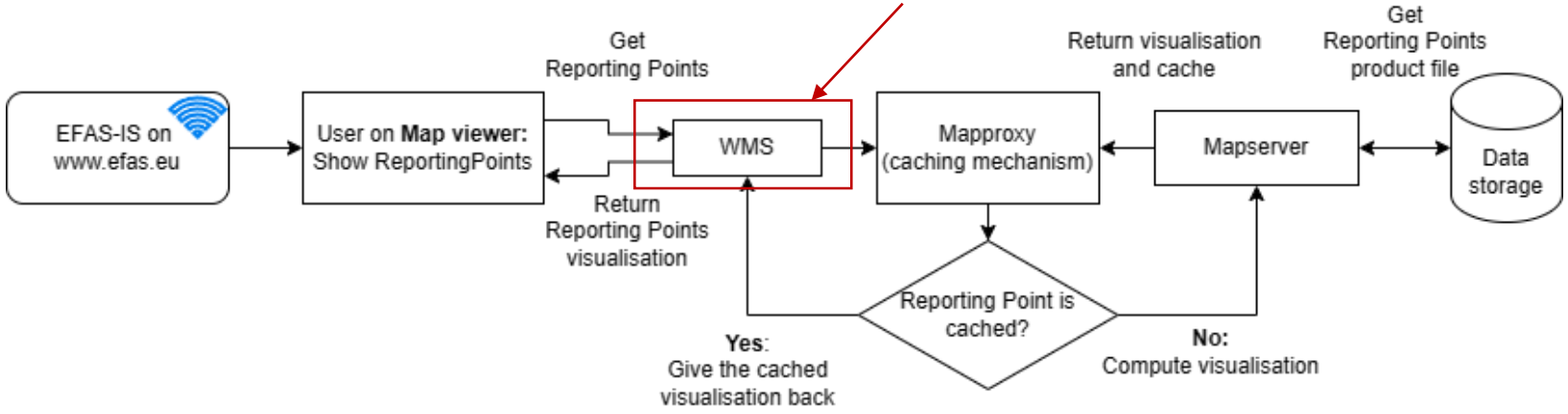
How comfortable are you accessing EFAS hydrological data via:



EFAS-IS: Web map service (WMS)

The WMS is the backbone of the EFAS-IS map viewer.

A lot happens each time a layer is loaded …

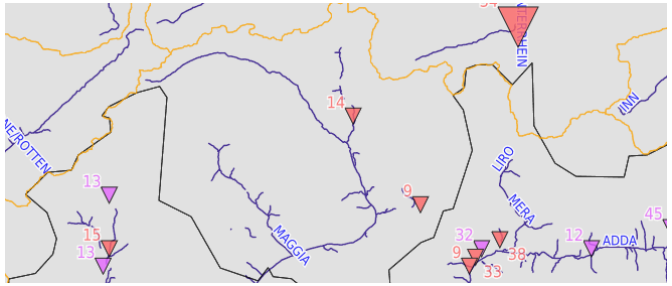


But you don’t need to worry about it.

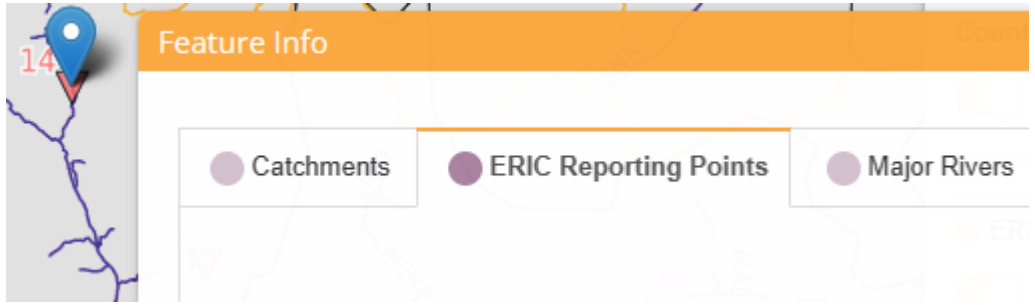
EFAS-IS: Web map service (WMS)

What data is available?

- Visualisation of all layers that are available on EFAS-IS (with GetMap)



- Feature information (with GetFeatureInfo)



EFAS-IS: Web map service (WMS)

Pros:

- Provides access to the layers from anywhere
- Gives you the layer data with pre-set style by EFAS
- It’s ready to be shown in other tools, e.g. QGIS
- We can provide additional features and information in the point information, such as plots, tables and other.

Cons:

- Style cannot be changed
- Layer attribute metadata is not included

EFAS-IS: QGIS WMS recording

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EFAS-IS: Web map service (WMS)

For technical information: talk to *Dimitar* (me!)

- For example: software used, infrastructure etc

For more details and instructions on usage please check out the EFAS Data Access Wiki page:

https://confluence.ecmwf.int/display/CEMS/CEMS-Flood+Web+Map+Service+%28WMS%29+-+General+Information

EFAS-IS: Layer product files

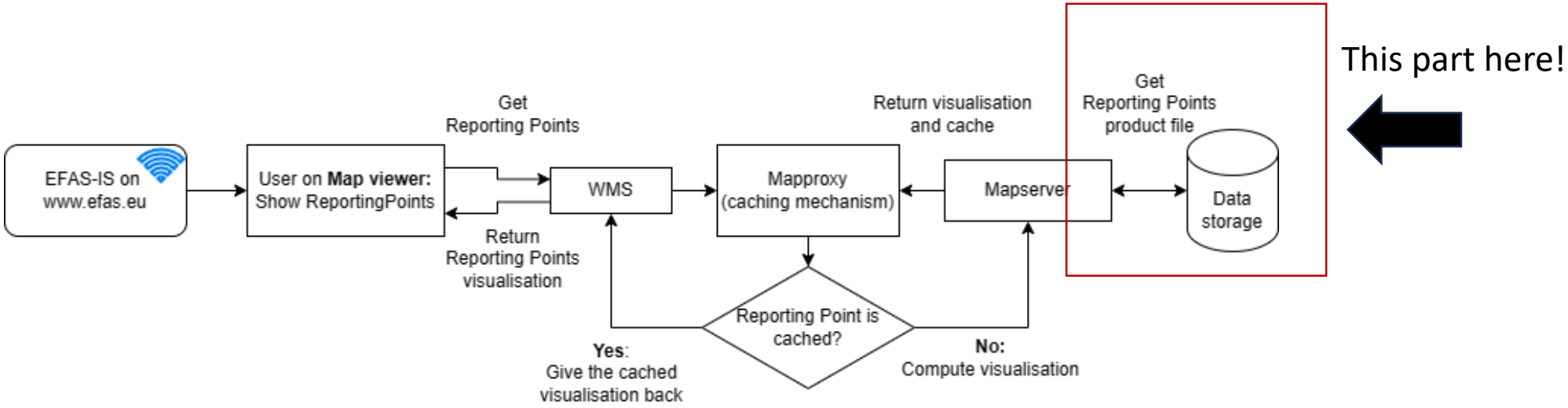
The *Layer product files* are the actual files that are used to create the visualisation for a layer.

There is a *layer product file* for most layers on EFAS.

These come in different formats: Shapefile, GeoJSON, Raster (PNG, GeoTIFF), and others

EFAS-IS: Layer product files

The *Layer product files* are the *actual files* that are used to create the visualisation for a layer.



This part here!

EFAS-IS: Layer product files

Pros:

- No style is applied to the product data file
- All metadata is included
- Can be inserted directly into some other tools, e.g. QGIS

Cons:

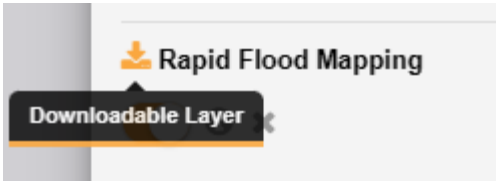
- Visualisation outside of GIS software is harder
- The user needs to manually define styles and visualise the product
- Additional information in the point information (feature info) will require extra work to create or retrieve, e.g. plots, tables.

EFAS-IS: Layer product file use

EFAS-IS: Layer product files

What is available?

- **Currently Rapid Flood Mapping product can be downloaded**



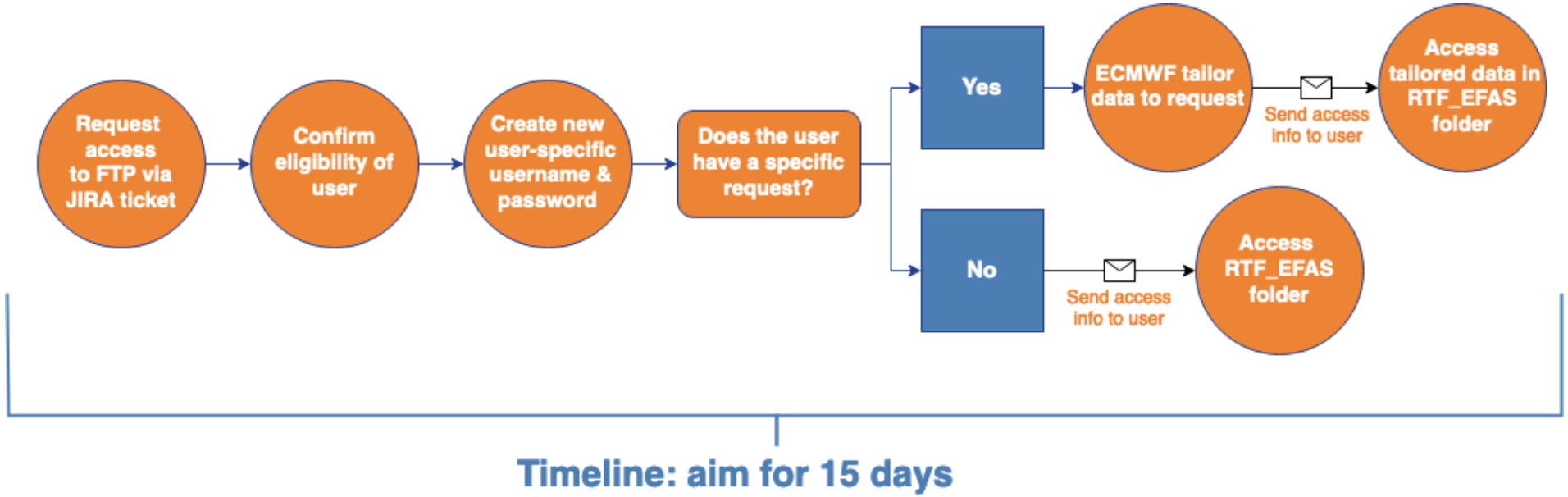
- **We can extend this to more layers**
- **We can provide a better user interface for downloading complex layers**

  that contain additional information, such as images in their features

- **We** *NEED your input* **on whether you are interested in this**

FTP

- Task in the suite to provide data via FTP
- Process of requesting access to FTP data:



FTP - what data is available?

- **Forecast data forced by the 3 meteo. forcings – ECMWF / DWD / COSMO-LEPS**
- **Variables**

Precipitation	**River discharge in the last 6 hours**	**Snow depth water equivalent**
Soil moisture (3 levels)	**Soil depth (3 levels)**	

- **GRIB only**
- **Want to request access via FTP?**

  Raise a request with the ECMWF support portal: https://www.ecmwf.int/en/support

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Copernicus Climate Data Store (CDS)

Several functionalities:

1. **Dataset catalogue**

   Accessing & downloading data

2. **Applications**

   Exploring the data interactively

3. **Toolbox**

   Online workspace to create applications in python & run them remotely

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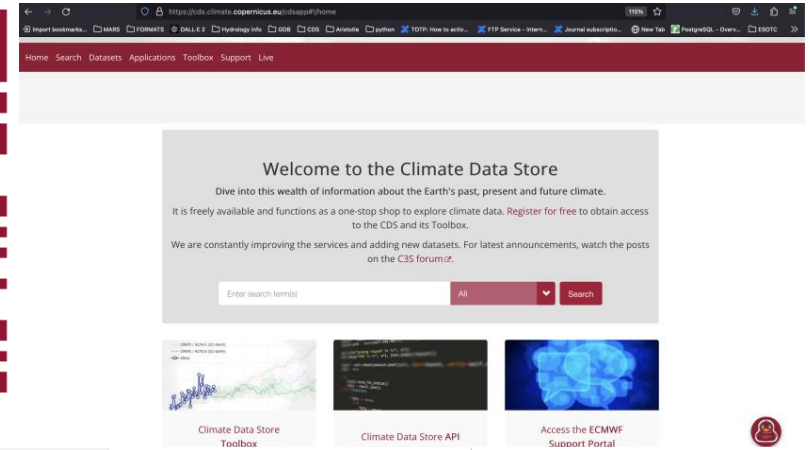

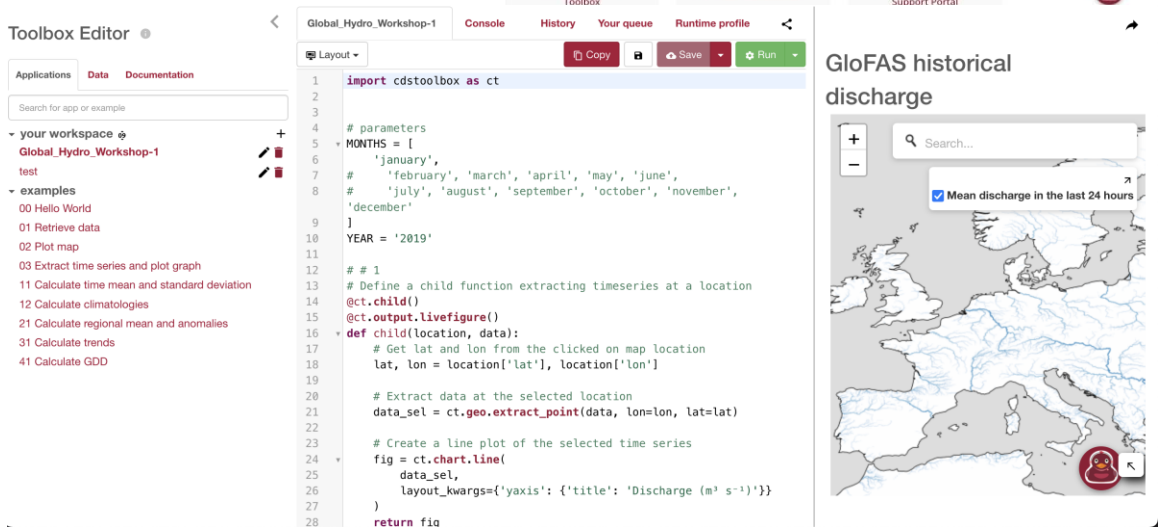

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CDS – what data are available?

5 datasets available:

- **Forecasts**
  - **Medium-range**
  - **Seasonal**
- **Reforecasts**
  - **Medium-range**
  - **Seasonal**
- **Historical (reanalysis dataset)**

research, local skill assessment and post-processing

used to derive the hydrological climatology and for verification

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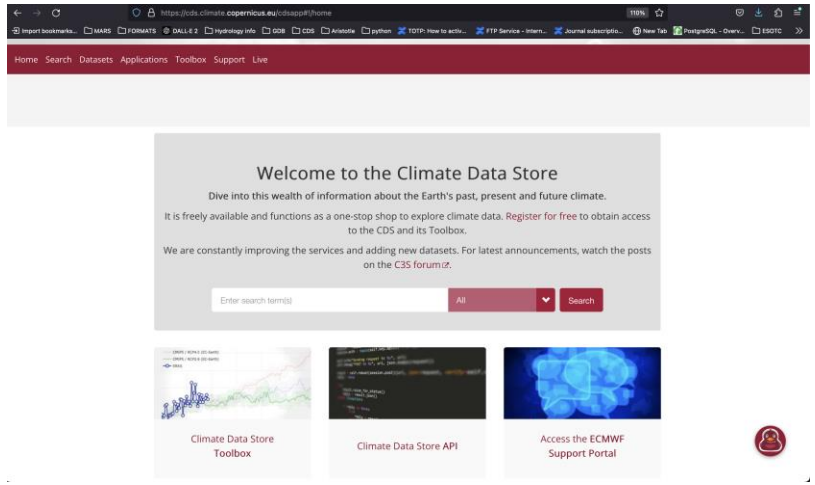


CDS – data available

3 main variables:

- River discharge in the last 6 hours
- Volumetric soil moisture (at 3 soil depths)
- Snow depth water equivalent (at 3 soil depths)

Time invariant variables, to help interpretation:

- Upstream area
- Elevation
- Field capacity (3 levels)
- Soil depth (3 levels)
- Wilting point (3 levels)

Also available on the auxiliary data page – Local Drain Direction (LDD)

Auxiliary data page

CDS – Forecasts

Medium range

- Forced with data from 3 different meteo centres:

  ECMWF / DWD / COSMO-LEPS
- Control forecasts / perturbed / high res
- Lead times between 5 – 15 days
- 6-hour timestep
- Forecasts produced twice a day (as we all know!)
- Data available: October 2018 – present (v2 to v5!)

Seasonal

- Forced with SEAS5 from ECMWF
- Ensemble
- Lead time of 215 days
- Daily timestep
- Produced each month
- Data available: November 2020 – present (v4 to v5)

CDS – Reforecasts

Medium range

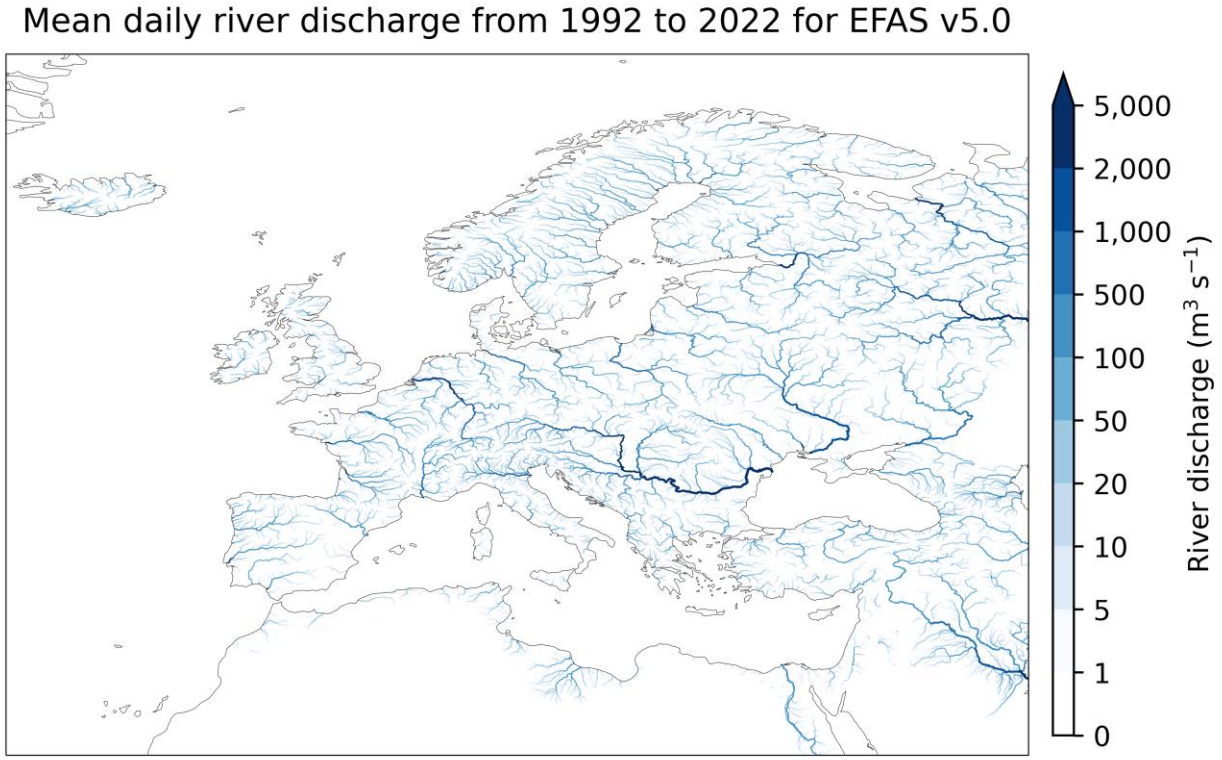
- Forcing data from ECMWF
- Control + ensemble reforecasts
- Lead time of 46 days
- 6-hour timestep
- Temporal coverage variable by version

Seasonal

- Forcing data from ECMWF
- Ensemble
- Lead time of 215 days
- Daily timestep
- Temporal coverage variable by version

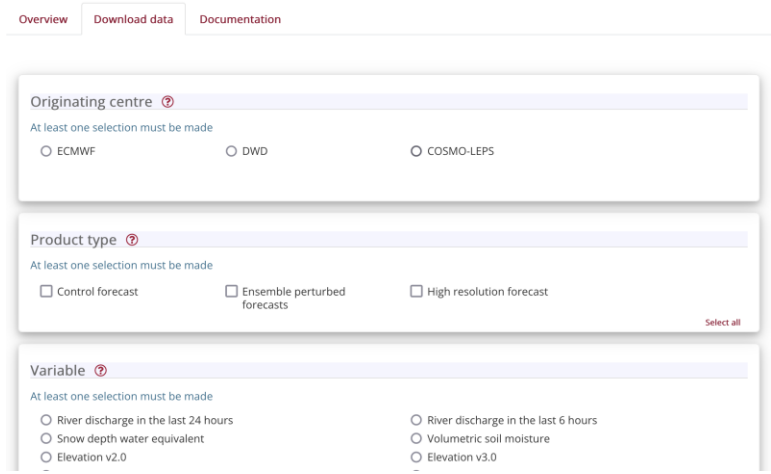
CDS – Historical

- **Forced with gridded obs of temp + precip**
- **6-hour timestep**
- **Variable temporal coverage, but v5 from 1992 – NRT**



CDS – Accessing the data

1. Through the interactive download form



Pros:

- ✓ **'Help' buttons to understand the options**
- ✓ **Great if you're not used to using an API**
- ✓ **Generates API / toolbox request**
- ✓ **Can visually see the constraints of selecting certain options**

Cons:

- x **Doesn't provide programmatic access**
- x **Can be a bit clunky / quite a bit of clicking!**

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CDS documentation

CDS – Accessing the data

Guidance on installing/using API on:

1. Windows

2. Mac

1. API

Pros:

- ✓ **Programmatic access to the data**
- ✓ **Great if you're used to using APIs**
- ✓ **REST-based so can be wrapped in any programming language**

Cons:

- x **Easy to get the request syntax wrong**
- x **Can't see the data constraints**

CDS – More Information

Create a CDS account:

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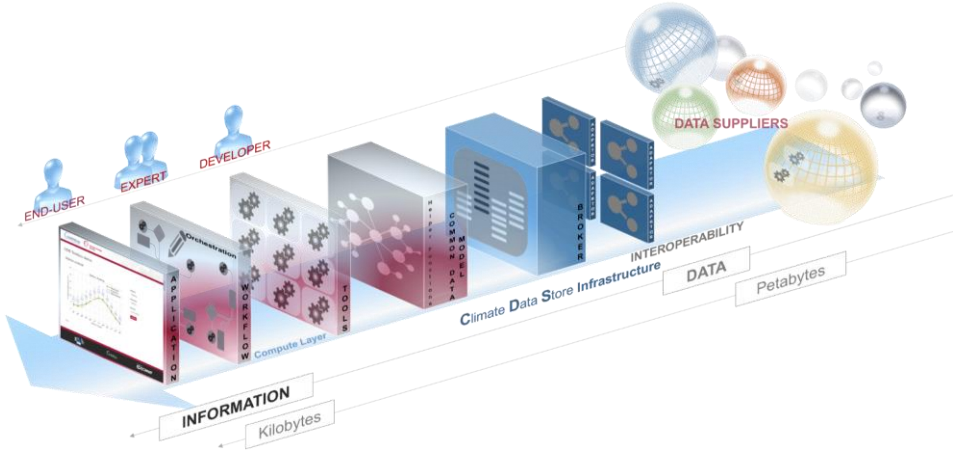
It’s not working! Why?

Common error messages for CDS requests

More information about the CDS infrastructure

https://climate.copernicus.eu/climate-data-store



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EXPLORATION: ACCESSING EFAS DATA FROM THE CDS

Case study using Google Colab

Let's use Google Colab to look at the recent flooding in Slovenia

Google Colab:

- ✓ **Easy to use*, no programming knowledge required!**
- ✓ **Hosted Jupyter notebook service**
- ✓ **Provides free access to computing resources**

** You do need a google account, or to run the .ipynb locally!*

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https://colab.research.google.com/drive/1NLn6dZGs4C3ZKaMC_FrRWyeJ6Ytjfz-X?usp=sharing

OR:

https://tinyurl.com/mt2trh3u

Wrap Up

- Lots of types of data available, in different ways
- Pro + cons to each
- Help and more information is readily available

And finally..


Join at menti.com use code 1200 7464
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What can we improve on for next time?
Needs improvement!
Time management
Workshop content
Facilitation
Workshop materials
It was great!
Results are hidden