C3S future plans.
Data availability and possibilities of new CDS and ToolBox:
suitable for postprocessing daily indices?

Climate Change

Eduardo Penabad Ramos

(and dozens of colleagues at ECMWF / C3S)

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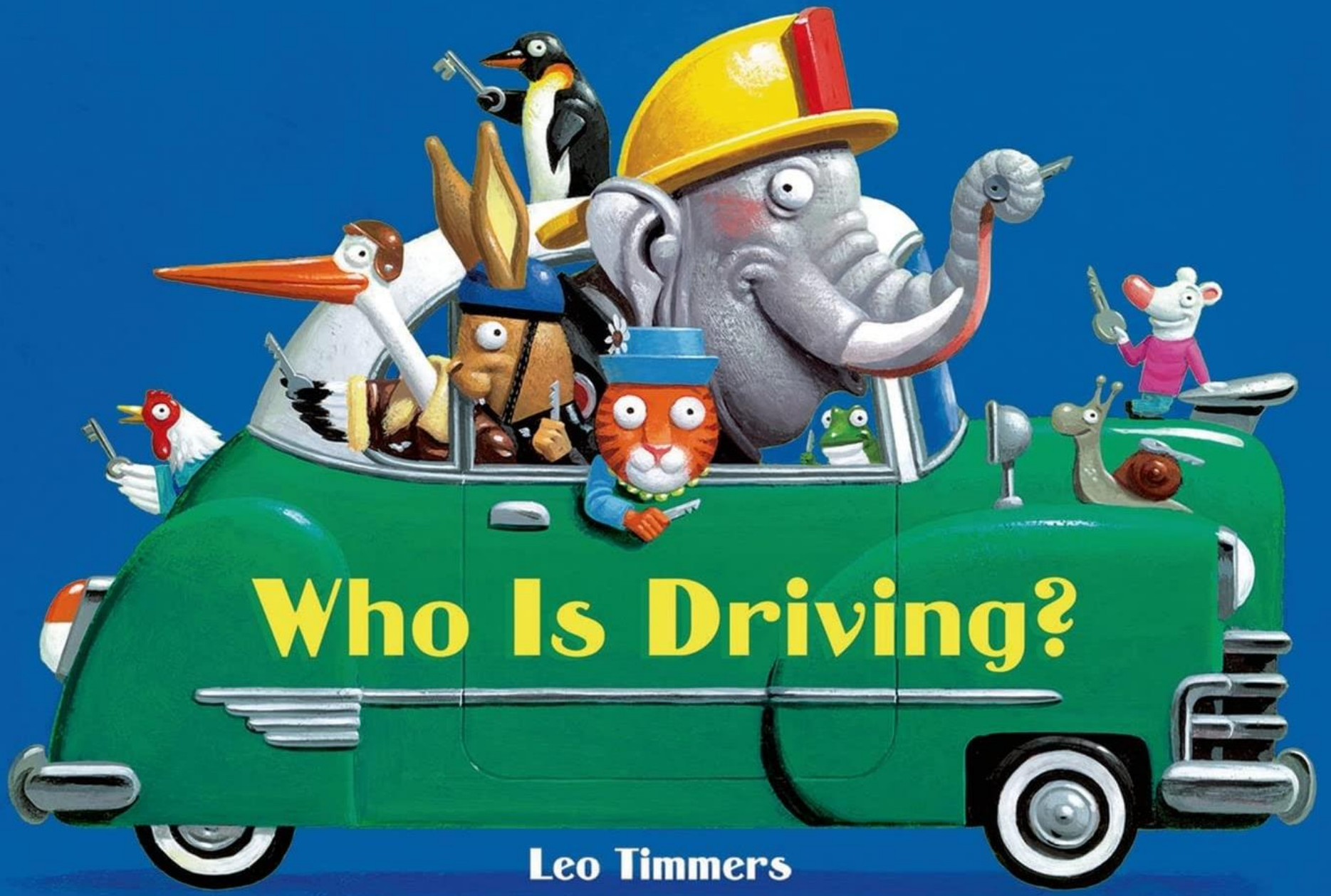
Who Is Driving?
Leo Timmers

Sentinels
In Situ
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CLIMATE CHANGE
MARINE MONITORING
ATMOSPHERE MONITORING
LAND MONITORING
SECURITY
EMERGENCY MANAGEMENT

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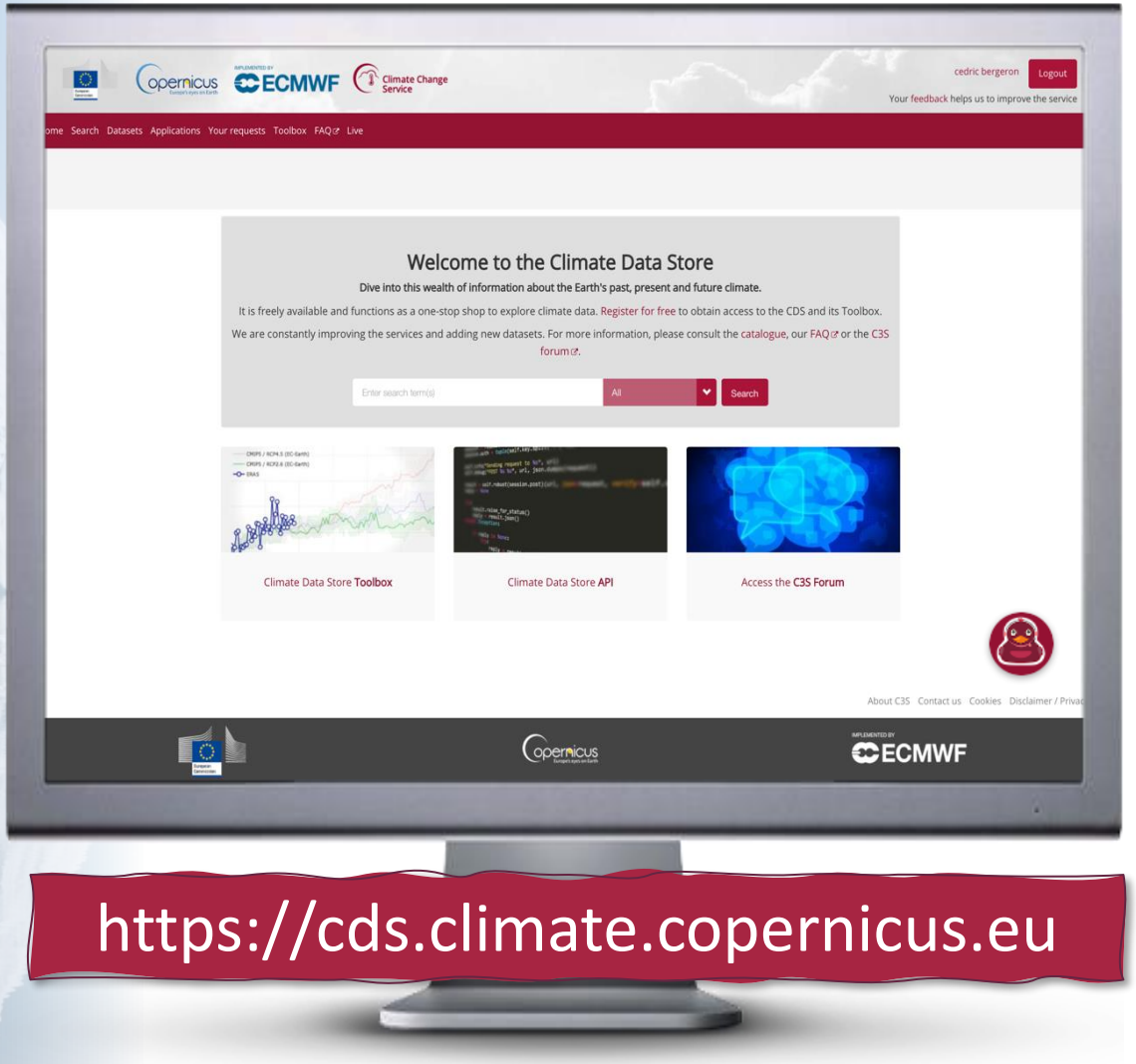
C3S backbone: the Climate Data Store (CDS)



https://cds.climate.copernicus.eu

- Data catalogue
- API
- Applications catalogue
- Toolbox
- User support

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C3S seasonal prediction: components

DATA PRODUCTS

cds.climate.copernicus.eu

- Datasets available in the Climate Data Store
  - Atmosphere
    - daily and subdaily data (6h, 12h, 24h)
    - monthly statistics (mean, max, min, standard deviation)
    - bias corrected data (monthly anomalies)
  - Ocean monthly means
- Multi-system retrospective forecasts and real-time forecasts, the latter published on 6th (ECMWF) and 10th day of month (the rest)

DWD, NOAA, 気象庁 Japan Meteorological Agency, ECMWF, Met Office, METEO FRANCE, Canada, cmcc, Coming soon

CDS API

```
import cdsapi

c = cdsapi.Client()

c.retrieve(
    'seasonal-monthly-single-levels',
    {
        'format':'grib',
        'originating_centre':'meteo_france',
        'variable':'total_precipitation',
        'product_type':[
            'ensemble_mean','hindcast_climate_mean'
        ],
        'year':'2018',
        'month':'09',
        'leadtime_month':['1','2','3','4','5','6'] },
    'cds_seasonal_output.grib')
```

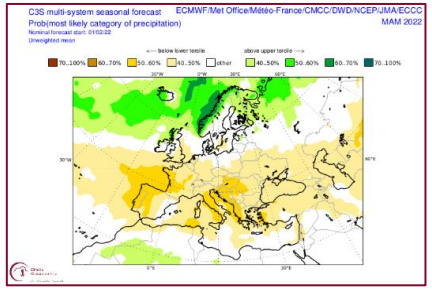
Python workflows

jupyter

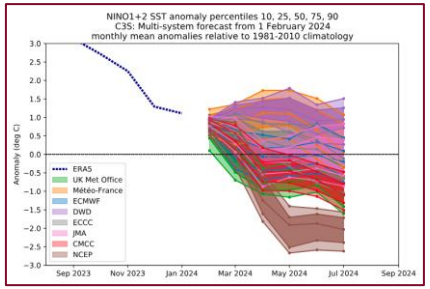
GRAPHICAL PRODUCTS

climate.copernicus.eu/charts/packages/c3s_seasonal/

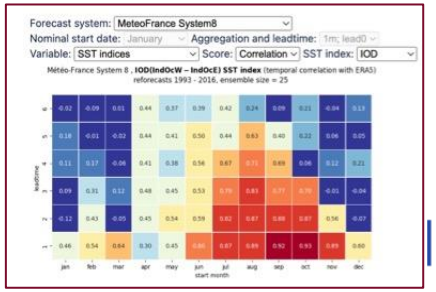
Products for individual contributing systems and multi-system combination



Total precipitation
Near-surface temperature and wind
Mean sea-level pressure
Sea surface temperature
Sea ice concentration
Geopotential height at 500 hPa
Temperature at 850 hPa



Sea surface temperature NINO regions
Sea surface temperature Indian Ocean
Zonal mean wind at 10hPa



Temporal correlation
Relative Operating Characteristic (ROC) score
Ranked Probability Score (RPS)

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C3S seasonal prediction: plans

DATA PRODUCTS

cds.climate.copernicus.eu

- New forecast systems:
  - ECCC – July 2024
  - CMCC – November 2024
  - DWD – *January 2025**
  - MF – *March 2025**
  - ECMWF – *mid 2025**
  - UKMO – *late 2025 / early 2026**
- Soil moisture data: imminent release (GRIB2)
- Longer (multi-year) forecasts (?)

GRAPHICAL PRODUCTS

climate.copernicus.eu/charts/packages/c3s_seasonal/

- Sea-ice: area index and verification

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- Jupyter Notebooks (e.g. NAO)
- Deliver data from plots:
  - Web interface?
  - Data catalogue?

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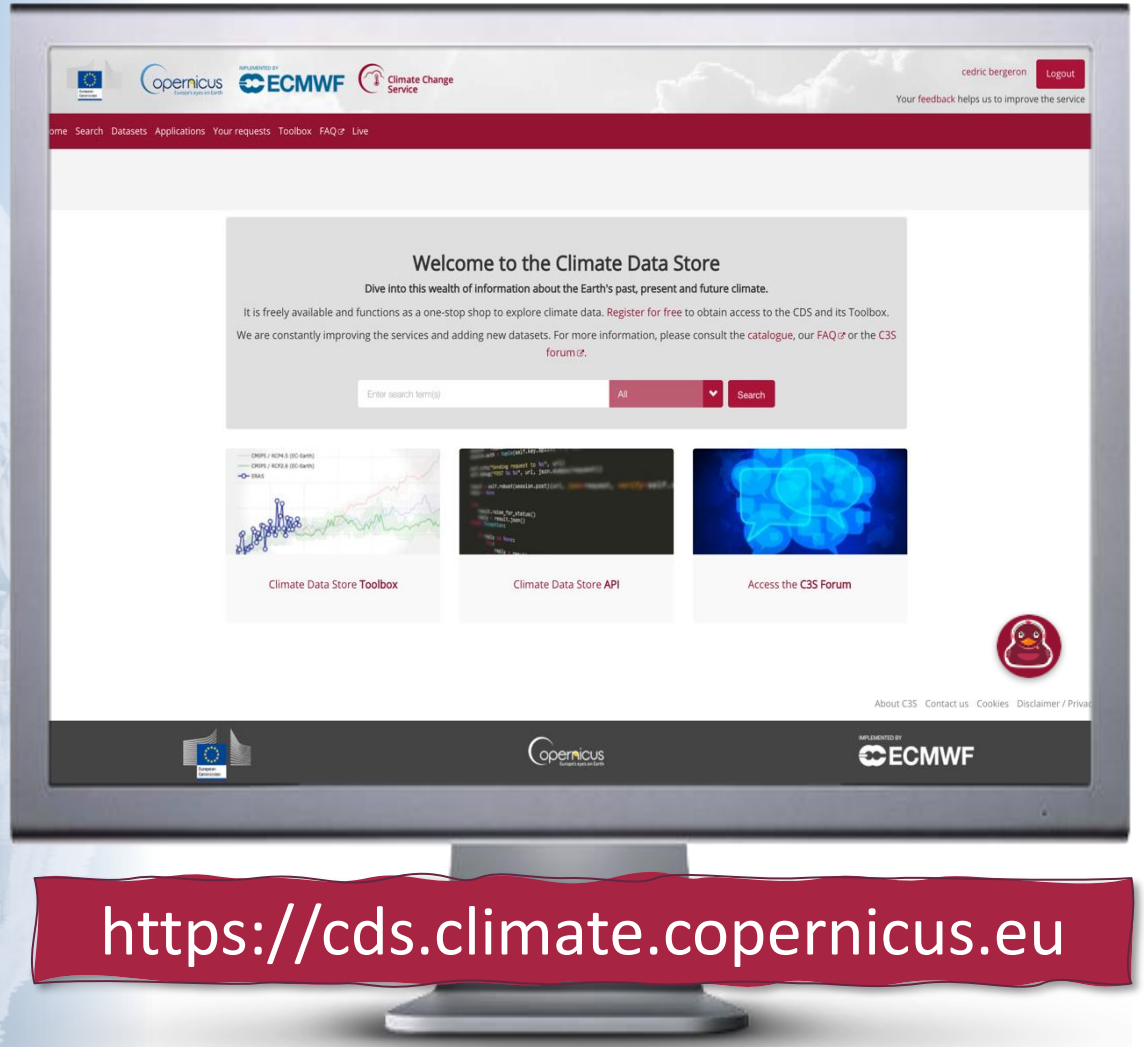
C3S backbone: the Climate Data Store (CDS)



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PROGRAMME OF THE EUROPEAN UNION

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IMPLEMENTED BY ECMWF

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CDS plans

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CDS plans

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New CDS*

*not all of them from day 1

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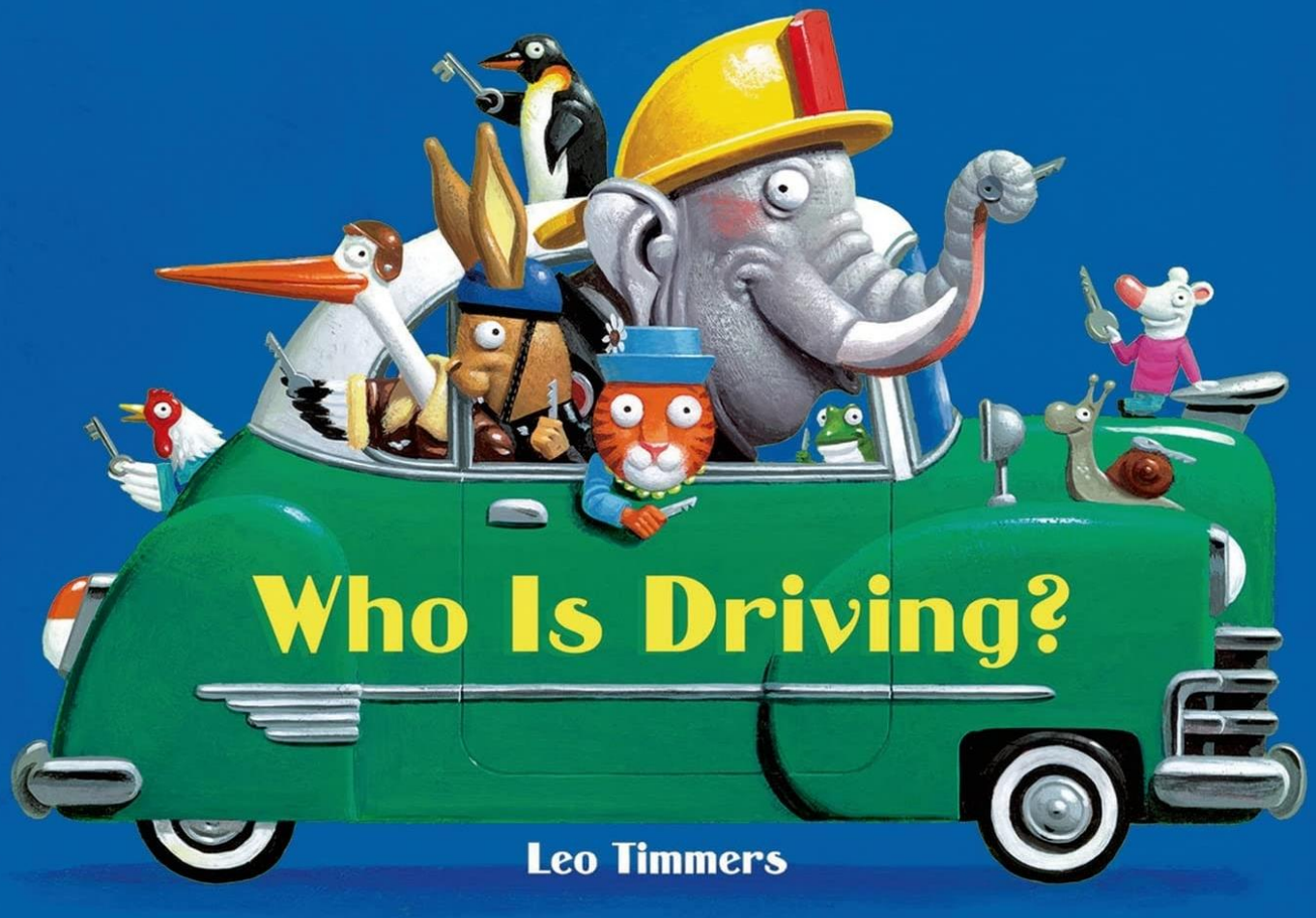
CDS plans: Toolbox alternatives

*not all of them from day 1

- Data reduction post-processing on retrieval
  - Both API and form
  - Initially very dataset-dependent (e.g. ERA5 daily statistics app)
  - Potential for evolution
- JupyterHub
  - Jupyter Notebook based workflows (python)
  - Remote resources (close-r to the data)
  - Use policy still under discussion:
    - general users: maybe
    - specific users (C3S contractors, ECMWF MS, …): yes
- earthkit
  - Data retrievals, plotting, processing (aggregation, climatologies, …)
  - Already out there (beta status)



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C3S is a user-driven service

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