Rook

Data Reduction Service for the Copernicus Climate Data Store

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Kick-off Meeting C3S2_380, 11 February 2022

Rook

Remote Operations On Klimadaten

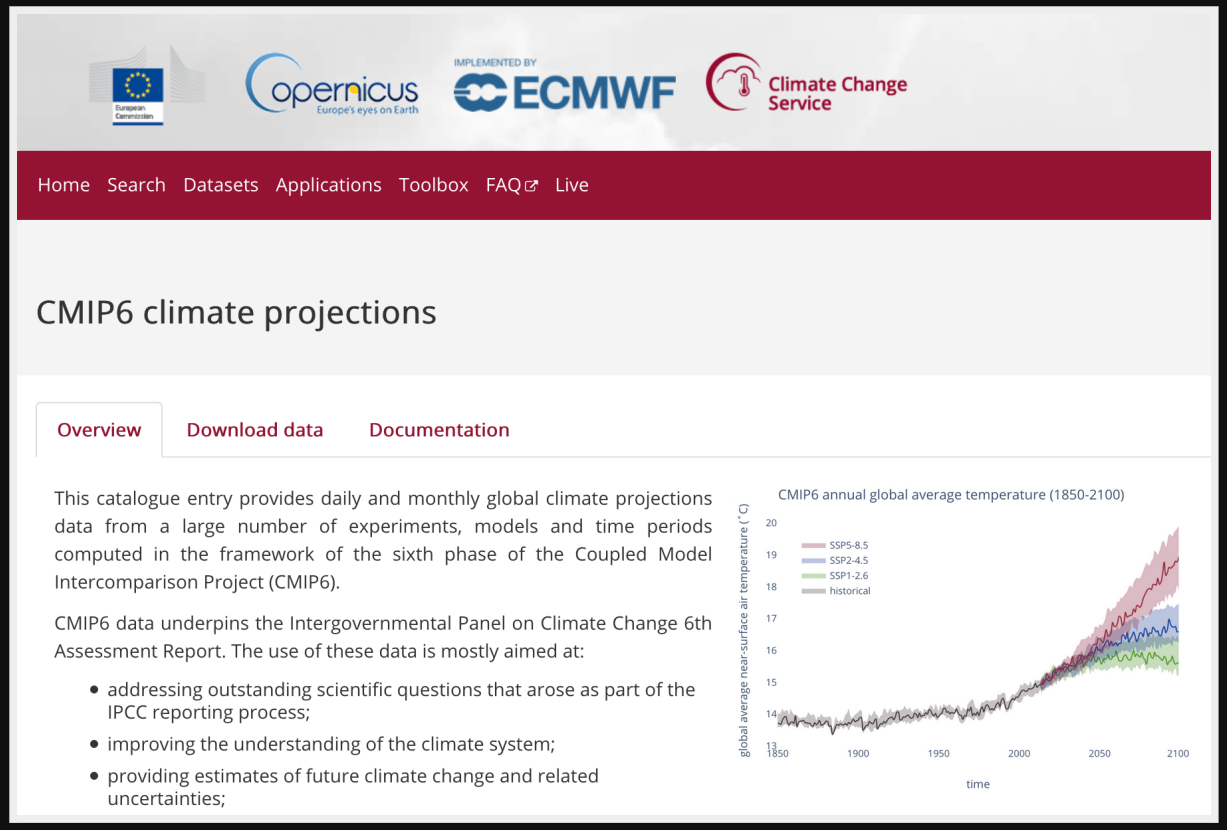
(The K is not a typo)

A data reduction service

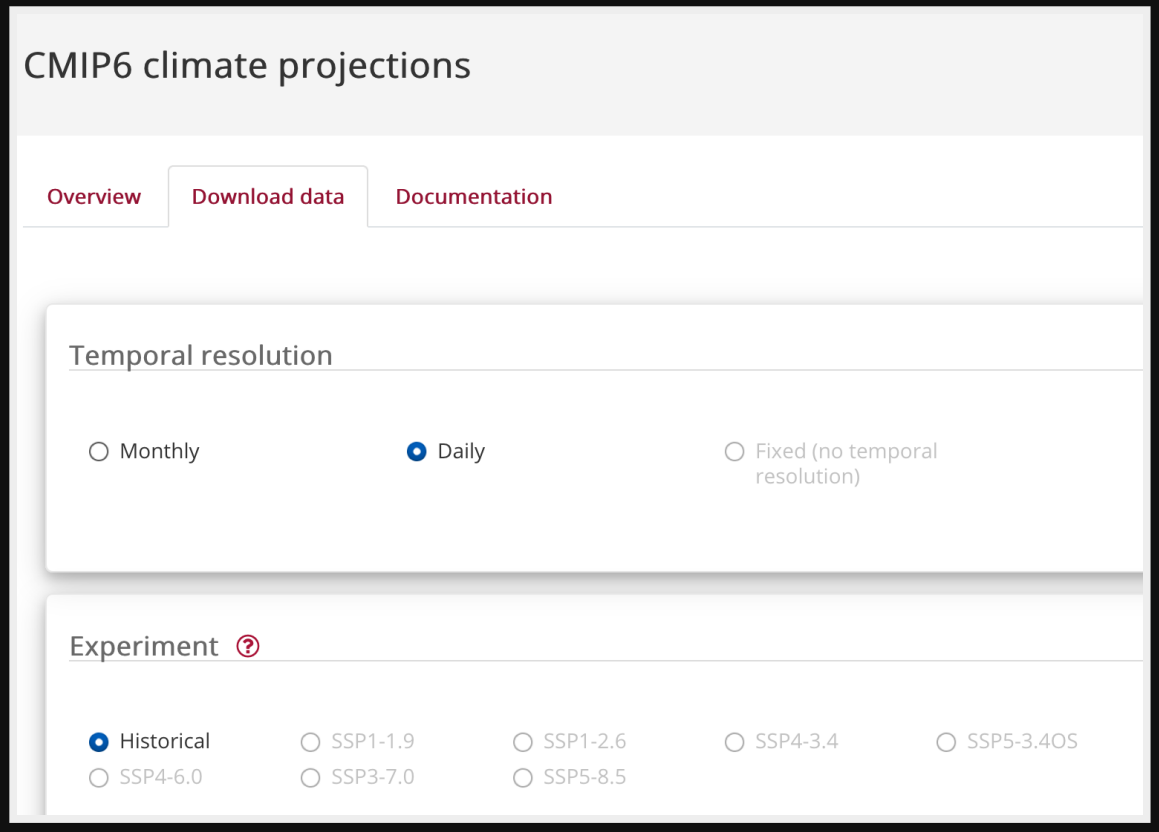
https://rook-wps.readthedocs.io/en/latest/

Climate Data Store

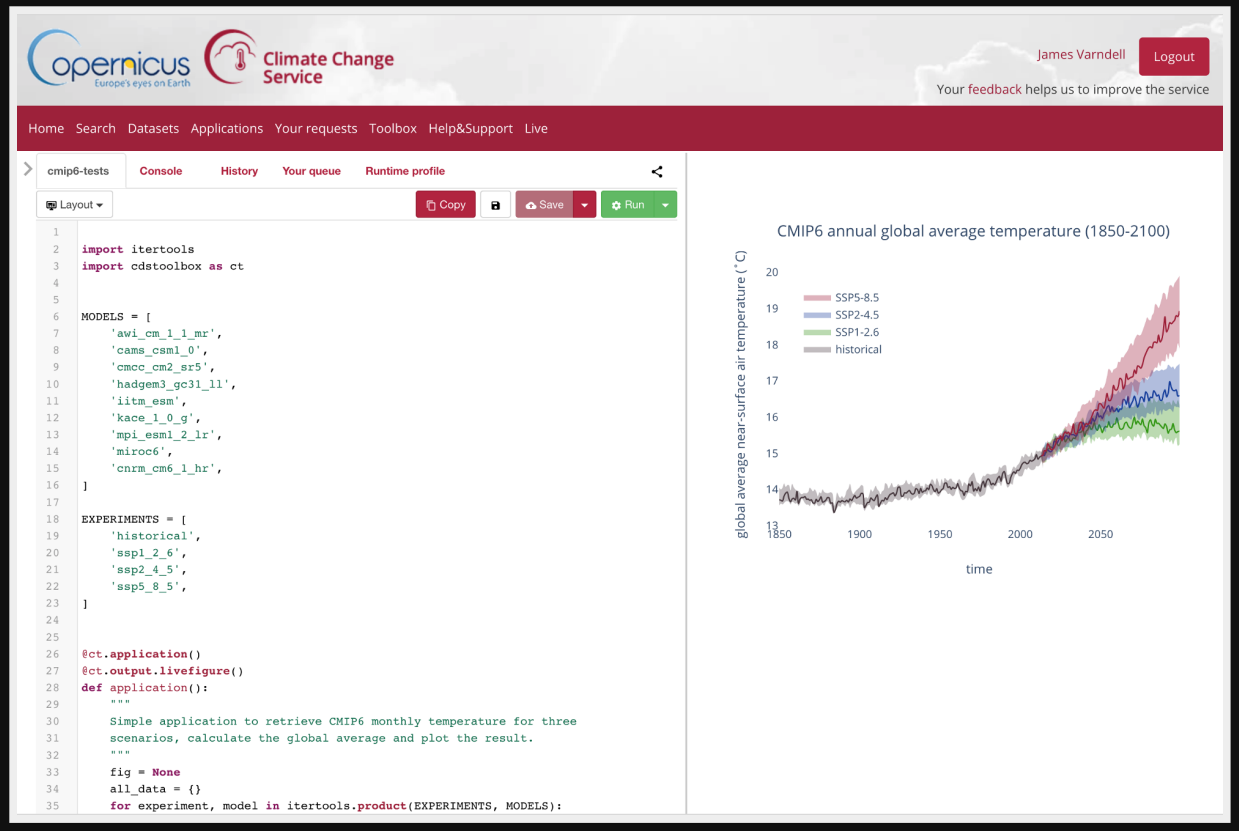
CMIP6 data in CDS is provided using Rook.



Climate Data Store - Download data



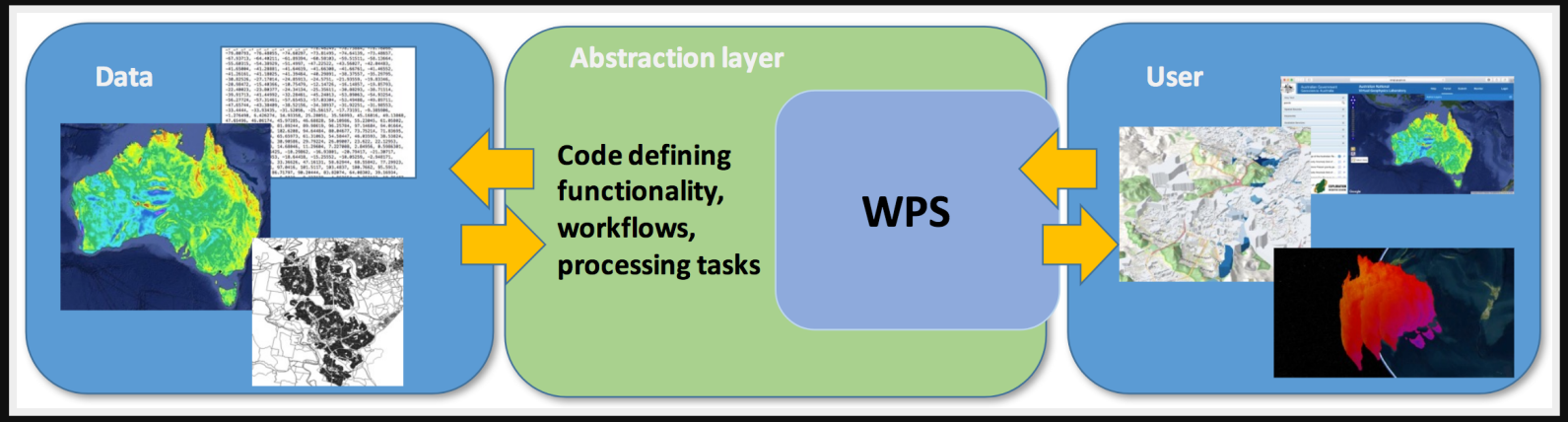
Climate Data Store - Toolbox



Climate Data Store - Rook

- Climate data, CMIP6, is accessed remotely
- Whole files are downloaded via data nodes
- Using Rook: download only a subset of the data
- Example: Temperature, 1990, Africa

Web Processing Service



Call a function remotely

Rook - WPS

- An OGC Web Processing Service
- Using PyWPS - GeoPython
- Providing climate data operators as a service
- Used for data reduction: Temperature, 1990, Africa

Rook - Operators

- Subsetting - time, area, level
- Subsetting - time components:
  - year:2016,2017|month:jan,feb,mar
- Averaging - over dimensions (time, ...)
- Regridding (still a pain!)
- ... can be extended

Rook - Clisops

- The Python library implementing these operators
- Using xarray - low level library
- Joint effort together with Ouranos, Canada
  https://clisops.readthedocs.io/en/latest/

Rooki

- Python WPS client - interactive or as library
- Using OWSLib - GeoPython
- Joint effort with Ouranos, Canada
- https://rooki.readthedocs.io/en/latest/

Rooki - Notebook

Online Notebooks

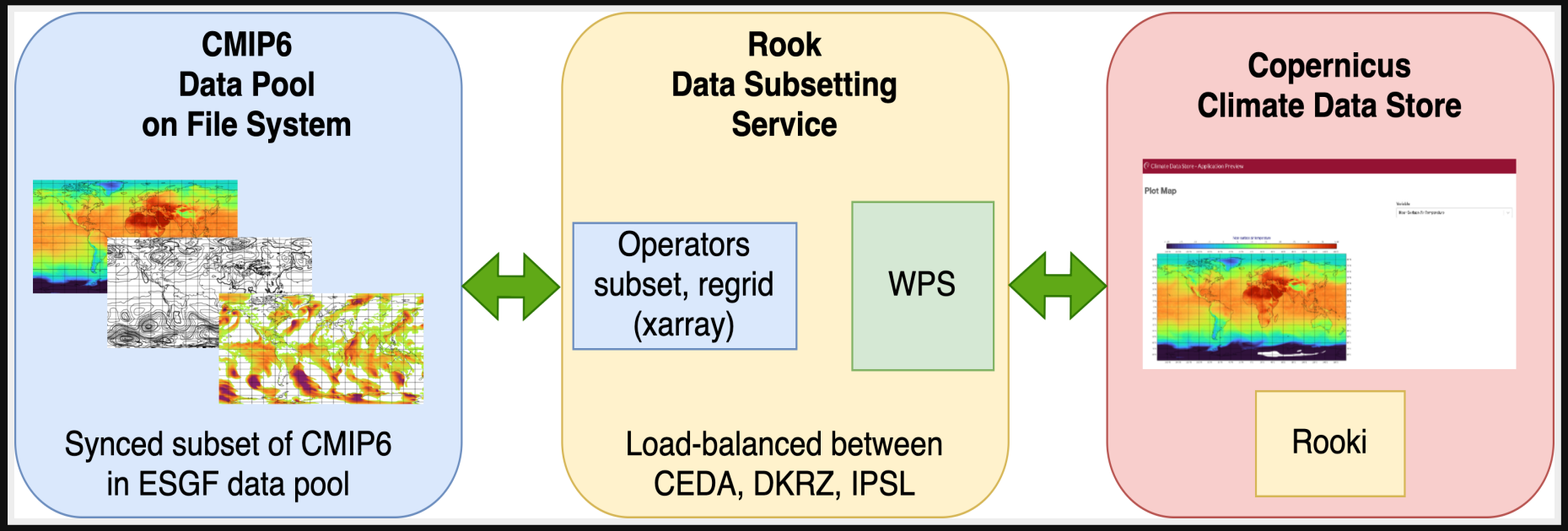
Deployment - Birdhouse Tools

- Rook generated from a Cookiecutter template
- Ansible playbook to roll out on cluster with Slurm scheduler
- Joint effort with Ouranos, Canada

Availability

- Data pool is replicated to three sites
- Load-balanced access to Rook WPS and data nodes

All together

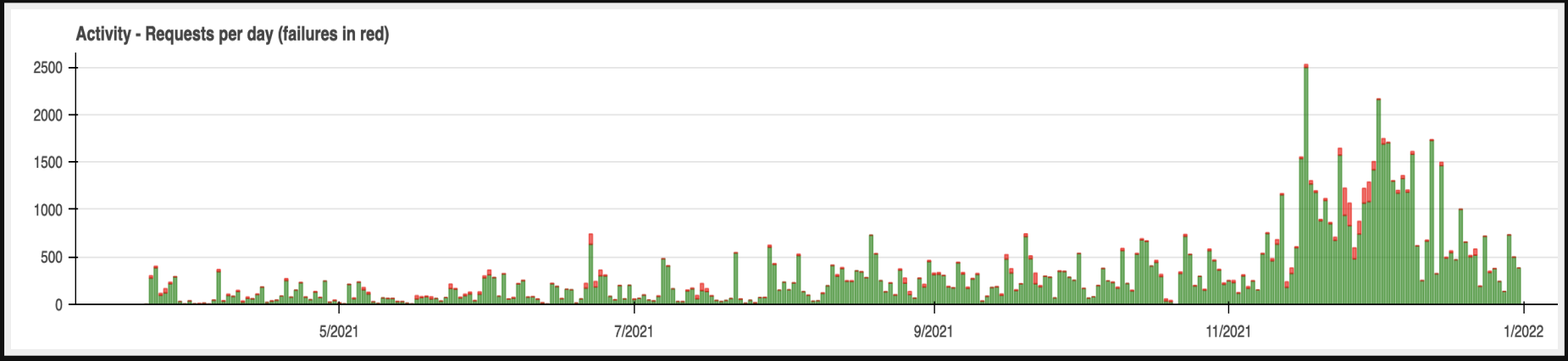


Status - in Production

- Deployed at CEDA, DKRZ and IPSL
- Used for CMIP6
- Subset (time, area, level) operator
- Whole CMIP6 files are downloaded from data nodes

Status - Activity in 2021

200 requests per day ... up to 2500



Online dashboard

Status: Data

- CMIP6: used since March 2021
- CMIP6-decadal: ready for integration with CDS
- CORDEX: ready for integration with CDS
- CMIP5: ready for integration with CDS

Status: Operators

- Subset: used since March 2021
- Subset with time components: available
- Average: ready for integration with CDS
- Regridding: initial version will be available soon

Next in C3S2_380

- Integrate data in CDS
  - CMIP6-decadal, CORDEX, CMIP5
- Updates of existing data pool
- Averaging and Regridding
- New *Concat* operator for CMIP6-decadal
  - `avg(concat(sub(ens1), sub(ens2)))`
- Improve deployment and monitoring
- ???

Issues

- CEDA is not part of C3S2_380
  - CEDA is still online ... backup mode
- With only two sides, the service is less stable
- CEDA is the main driver of the developments

Projects

- Copernicus C3S: https://climate.copernicus.eu/
- Roocs: https://roocs.github.io/
- Birdhouse: http://bird-house.github.io/
- GeoPython: https://geopython.github.io/

Thanks

Questions?