

# Rook

A Web Processing Service for the Copernicus  
Climate Data Store

Ag Stephens, CEDA

Climate Projection Workshop, 6 May 2021



# Rook





Remote Operations On Klimadaten

(The K is not a typo)

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

# Climate Data Store

CMIP6 is now live in CDS ... using rook



Home Search Datasets Applications Toolbox FAQ Live

## CMIP6 climate projections

Overview

Download data

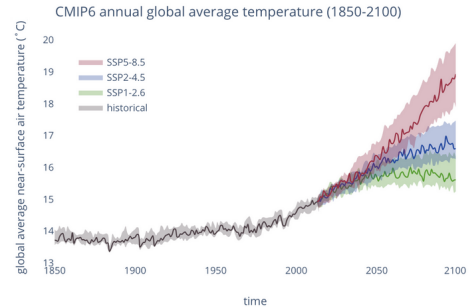
Documentation

This catalogue entry provides daily and monthly global climate projections data from a large number of experiments, models and time periods computed in the framework of the sixth phase of the Coupled Model Intercomparison Project (CMIP6).

CMIP6 data underpins the Intergovernmental Panel on Climate Change 6th Assessment Report. The use of these data is mostly aimed at:

- addressing outstanding scientific questions that arose as part of the IPCC reporting process;
- improving the understanding of the climate system;
- providing estimates of future climate change and related uncertainties;

CMIP6 annual global average temperature (1850-2100)



Year	Historical (°C)	SSP5-8.5 (°C)	SSP2-4.5 (°C)	SSP1-2.6 (°C)
1850	13.8	-	-	-
1900	14.0	-	-	-
1950	14.2	-	-	-
2000	14.5	14.5	14.5	14.5
2050	-	17.5	16.5	15.5
2100	-	19.5	17.5	16.5

# Climate Data Store - Download data

CMIP6 climate projections

Overview

Download data

Documentation

Temporal resolution

☐ Monthly

☒ Daily

☐ Fixed (no temporal resolution)

Experiment ?

☒ Historical

☐ SSP4-6.0

☐ SSP1-1.9

☐ SSP3-7.0

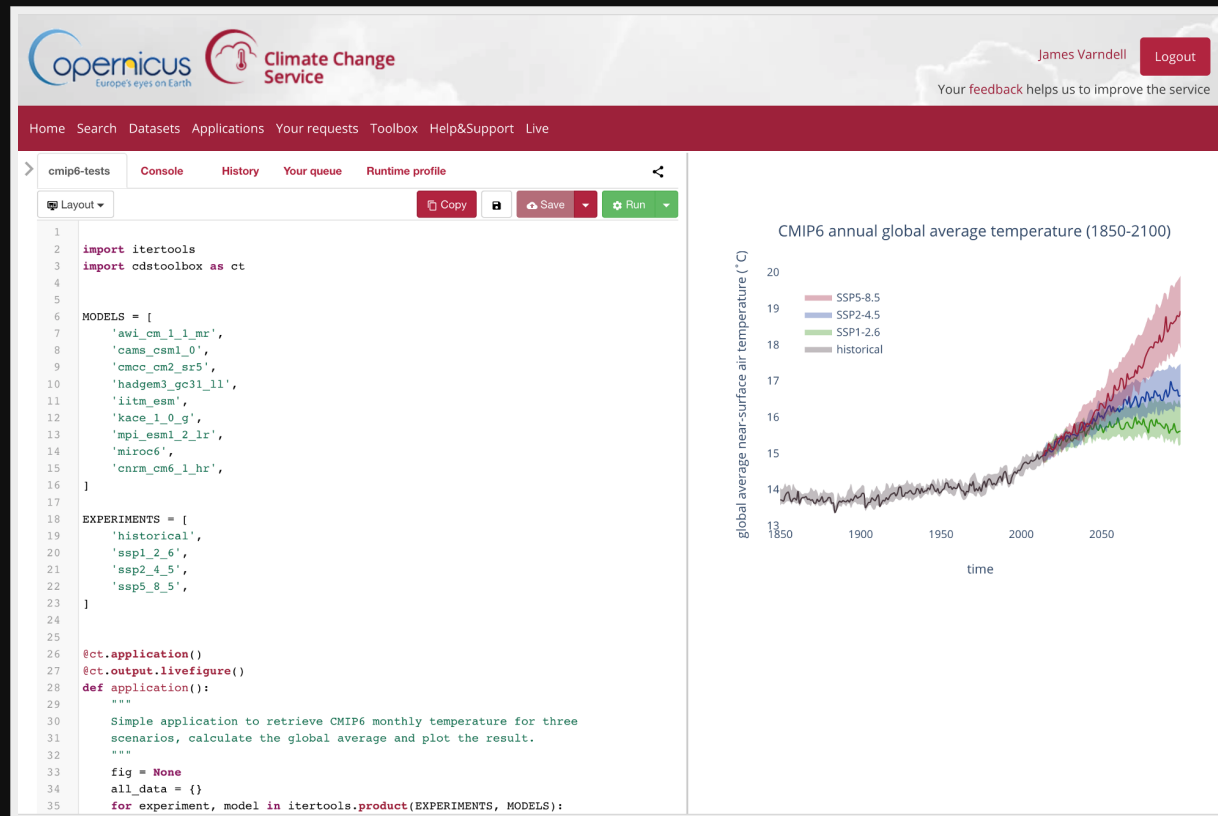
☐ SSP1-2.6

☐ SSP5-8.5

☐ SSP4-3.4

☐ SSP5-3.4OS

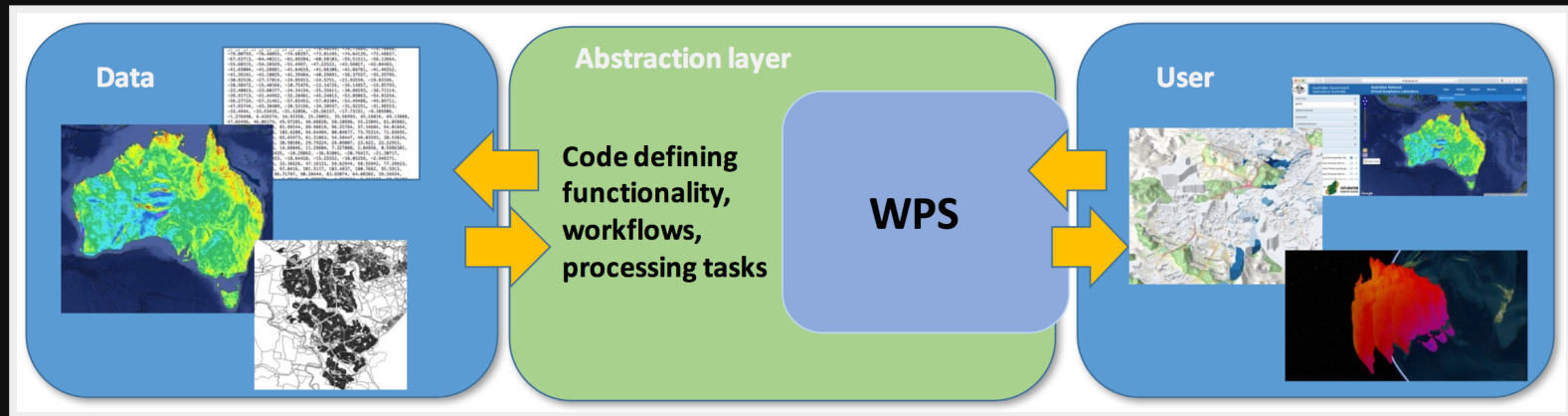
# Climate Data Store - Toolbox



# Climate Data Store - Rook

- The climate data is accessed remotely
- 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
- Averaging - over dimensions (time, ...)
- Regridding (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

 jupyter  
nbviewer

JUPYTERFAQ</>

rooki / notebooks / demo

## Run subset by area operation

Rooki calls climate data operations on the **rook** processing service.

```
In [ ]: import os
os.environ['ROOK_URL'] = 'http://rook.dkrz.de/wps'

from rooki import rooki
```

parameters of subset operation

```
In [ ]: rooki.subset?
```

run subset by area

```
In [ ]: resp = rooki.subset(
    collection='c3s-cmip6.CMIP.IPSL.IPSL-CM6A-LR.historical.r1i1p1f1.Amon.rlds.gr.v20180803',
    time='1860-01-01/1980-12-30',
    area='0.,49.,10.,65'
)
resp.ok
```

# Deployment - Birdhouse Tools

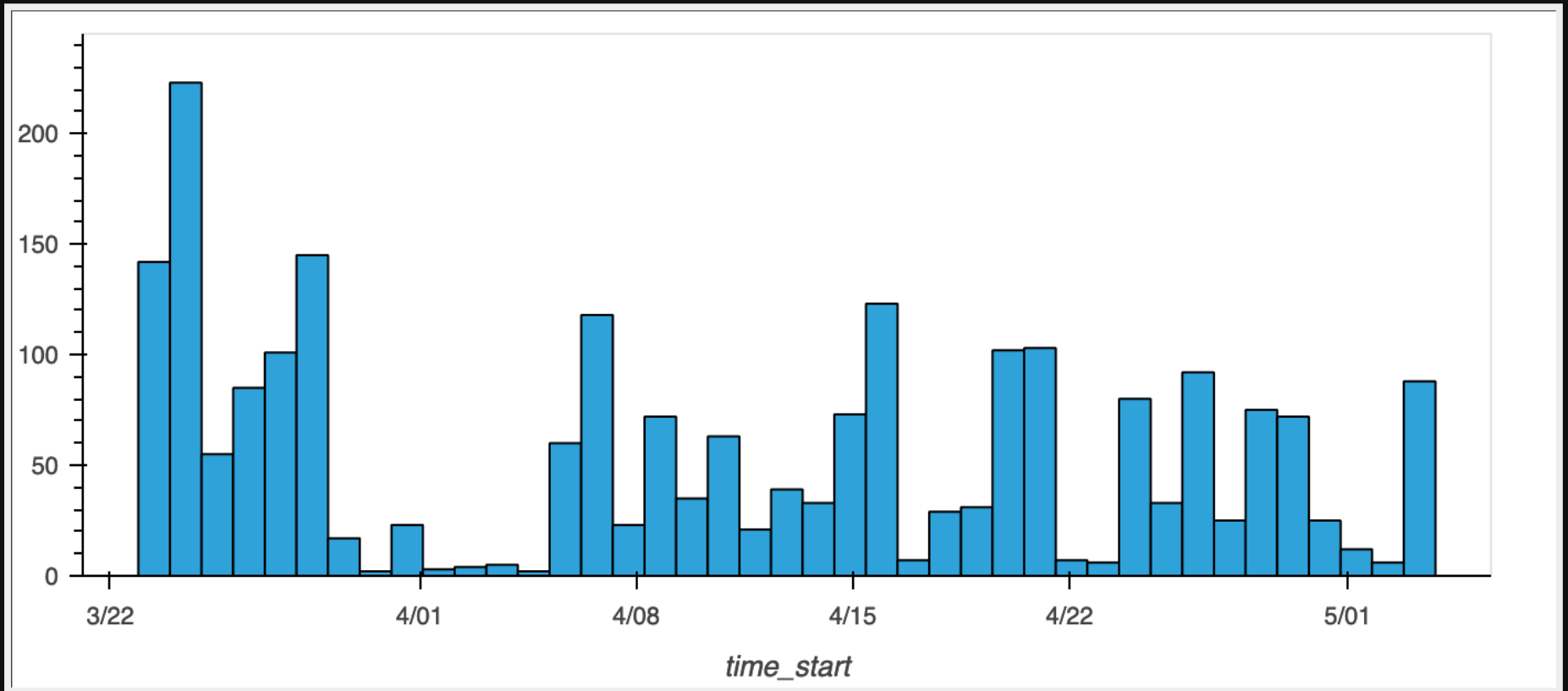
- Rook generated from a Cookiecutter template
- Ansible playbook to roll out on cluster with Slurm scheduler
- Joint effort with Ouranos, Canada

# Availability

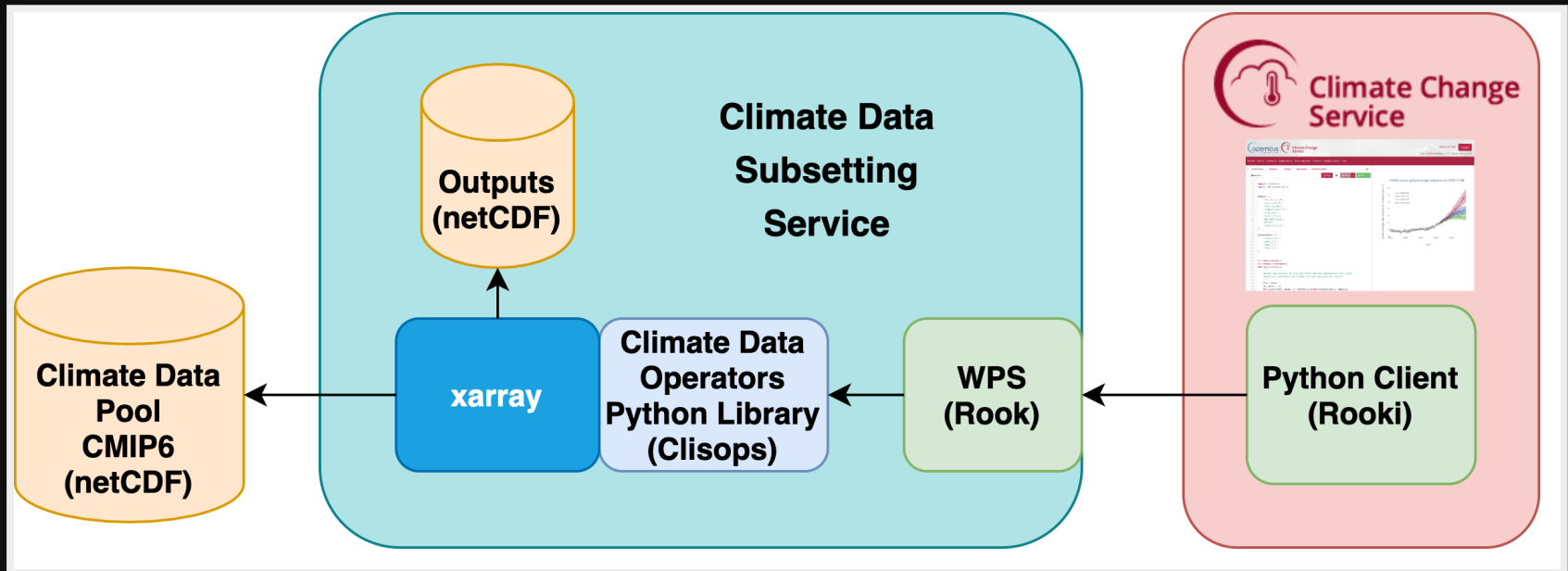
- Data pool is replicated at three sites
- Load-balanced access to rook

# Rook - Requests

200 per day ... can serve much more



# All together





# 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?