

Rook

A Web Processing Service for the Copernicus
Climate Data Store

OGC Member Meeting, 25 March 2021



Rook is a Bird



... but that is another story

Rook

Remote Operations On Klimadaten

(The K is not a typo)





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

What?

... wait

Two days ago

CMIP6 is now live!



Home Search Datasets Applications Toolbox FAQ Live

CMIP6 climate projections

Overview

Download data

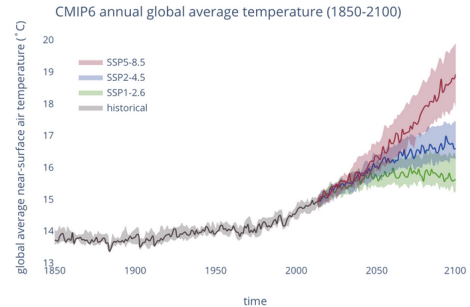
Documentation

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	13.9	-	-	-
1950	14.0	-	-	-
2000	14.1	14.1	14.1	14.1
2050	-	16.5	15.5	15.0
2100	-	19.5	17.5	16.0

Climate Data Store - Download data

CMIP6 climate projections

Overview

Download data

Documentation

Temporal resolution

☐ Monthly

☒ Daily

☐ Fixed (no temporal resolution)

Experiment ?

☒ Historical

☐ SSP1-1.9

☐ SSP1-2.6

☐ SSP4-3.4





☐ SSP5-3.4OS

☐ SSP4-6.0

☐ SSP3-7.0

☐ SSP5-8.5

Climate Data Store - Toolbox



Carsten Ehbrecht [Logout](#)

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Toolbox Editor ⓘ

Applications Data Documentation

Search for app or example

your workspace ⓘ

No applications

examples

00 Hello World

01 Retrieve data

02 Plot map

03 Extract time series and plot graph

11 Calculate time mean and standard deviation

12 Calculate climatologies

21 Calculate regional mean and anomalies

31 Calculate trends

41 Calculate GDD

02 Plot map

Layout ▾

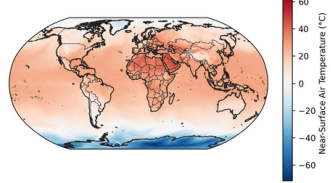
Copy

Run

```
1 import cdstoolbox as ct
2
3
4 variables = {
5     'Near-Surface Air Temperature': '2m_temperature',
6     'Eastward Near-Surface Wind': '10m_u_component_of_wind',
7     'Northward Near-Surface Wind': '10m_v_component_of_wind',
8     'Sea Level Pressure': 'mean_sea_level_pressure',
9     'Sea Surface Temperature': 'sea_surface_temperature',
10 }
11
12
13 @ct.application(title='Plot Map')
14 @ct.input.dropdown('variable', label='Variable',
15 values=variables.keys())
16 @ct.output.figure()
17 def plot_map(variable):
18     """
```

Plot Map

Near-surface air temperature



Variable

Near-Surface Air Temperature ▾

But

The climate data is accessed remotely

Remote data access

- Remote data pool for CMIP6, CMIP5, CORDEX
- Load-balanced data servers at three sites (CEDA, IPSL, DKRZ)
- THREDDS Data Server ... but using only file access (not OpenDAP)

Climate data is big

- A single dataset may have several Gigabytes
- But you just want a month for a specific area

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 - time, area, level
- Regridding (a pain!)

Rook - Clisops

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

Rooki

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

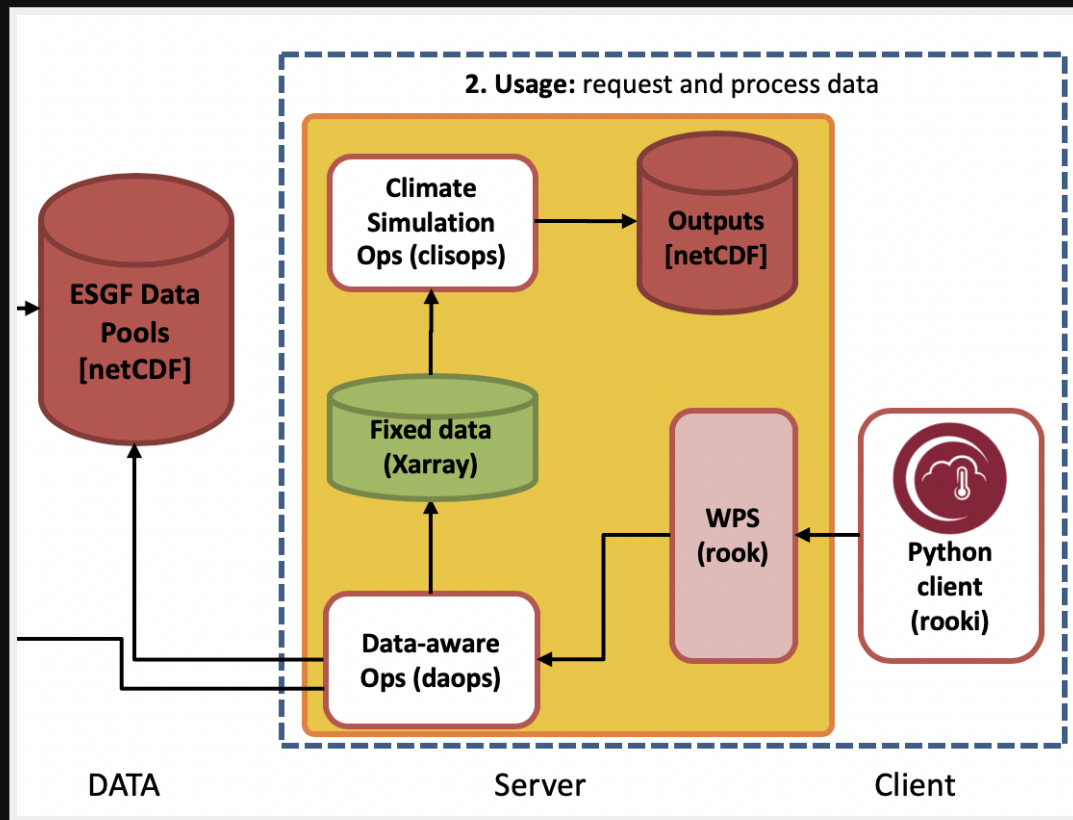
```
In [ ]: resp = rooki.subset(
    collection='c3s-cmip6.CMIP.IPSL.IPSL-CM6A-LR.historical.r1i1p1f1.Amon.rlds.gr.v20180803',
    time='1860-01-01/1980-12-30',
    area='0.,49.,10.,65'
)
resp.ok
```

Rooki - Library

- Python WPS client - interactive or as library
- Using OWSLib - GeoPython
- Joined effort with Ouranos (birdy)
- <https://rooki.readthedocs.io/en/latest/>

All together

TODO: replace



Projects

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

Thanks

Questions?