

birdhouse

Backend Solutions

for climate related assesses and decisions

UN GIS Initiative - Workshop

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et Birdhouse Developer Group



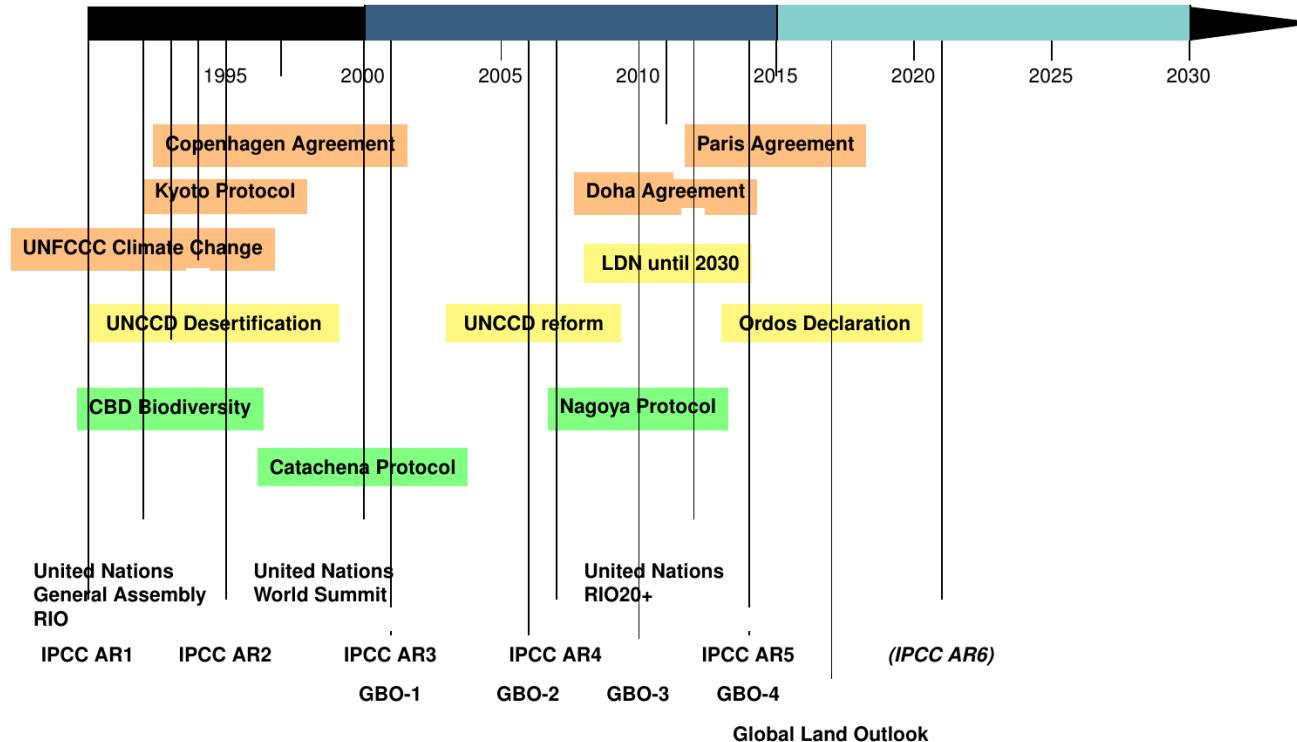
UN Conventions, COPs, Reports and Data

1990

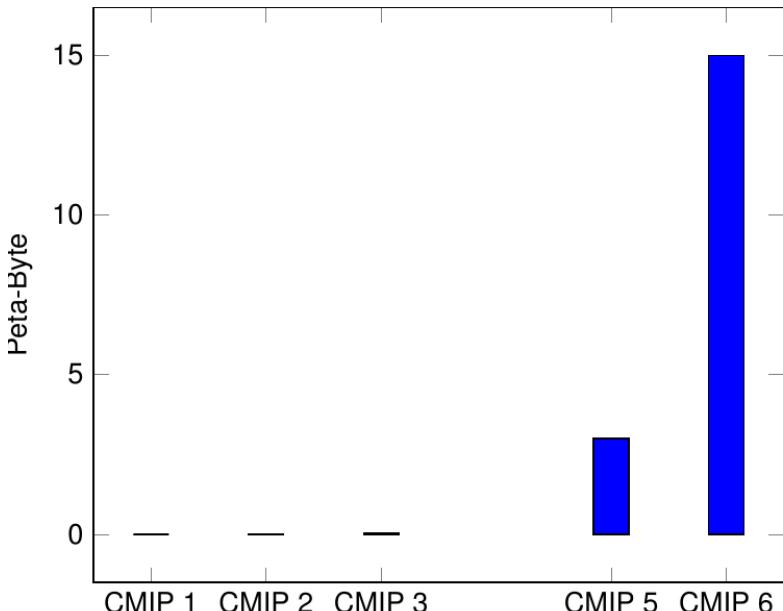
2030

Millenium Goals

SDGs



Growing Amount of Data (Example Climate Model data)



CMIP 1	1 GB	IPCC AR 1 1990
CMIP 2	500 GB	IPCC AR 2 1995
CMIP 3	35 TB	IPCC AR 3 2001
	Not existing	IPCC AR 4 2007
CMIP 5	3,5 PB	IPCC AR 5 2014
CMIP 6	10-20 PB (in ESGF)	IPCC AR 6 12-16 April 2021

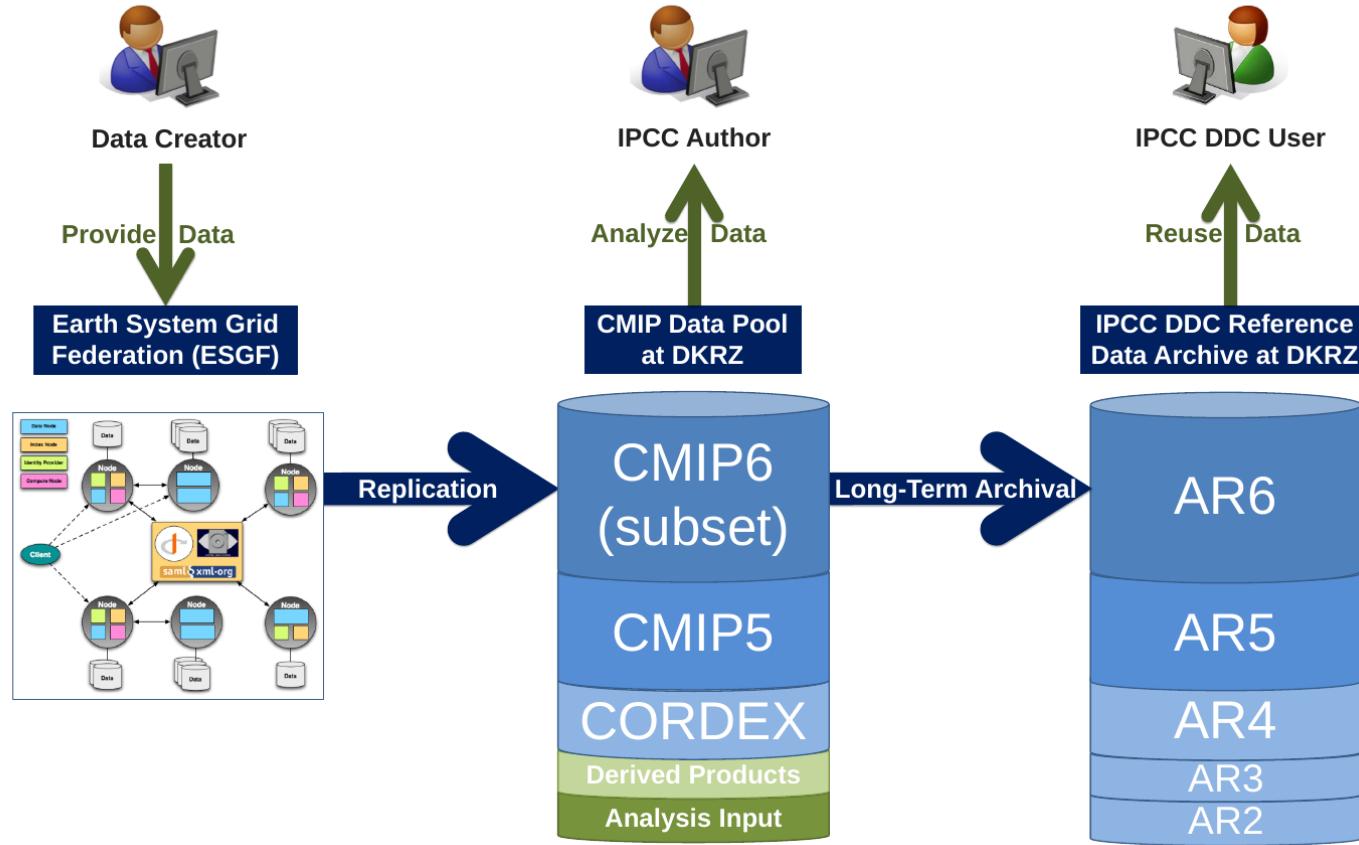
CMIP = Coupled Model Inter-comparison Project

IPCC = Intergovernmental Panel of Climate Change

ESGF = Earth System Grid Federation

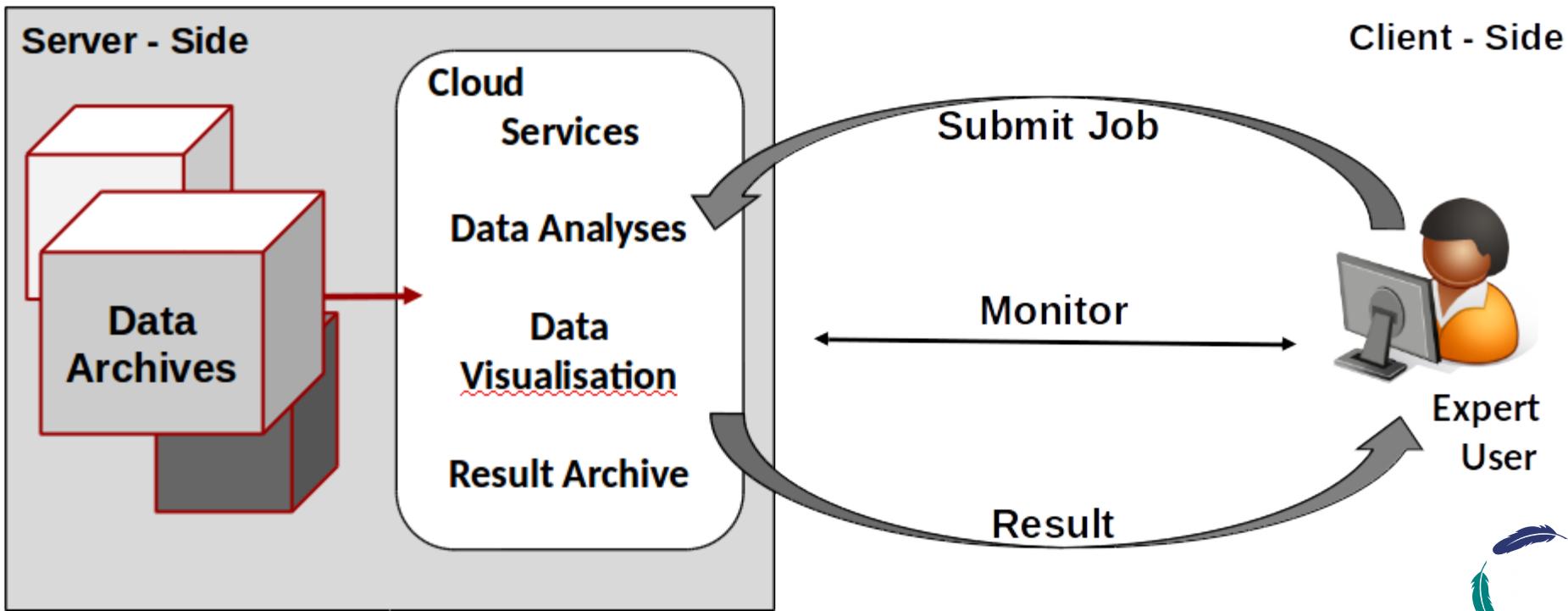


IPCC Data Distribution Center for AR6

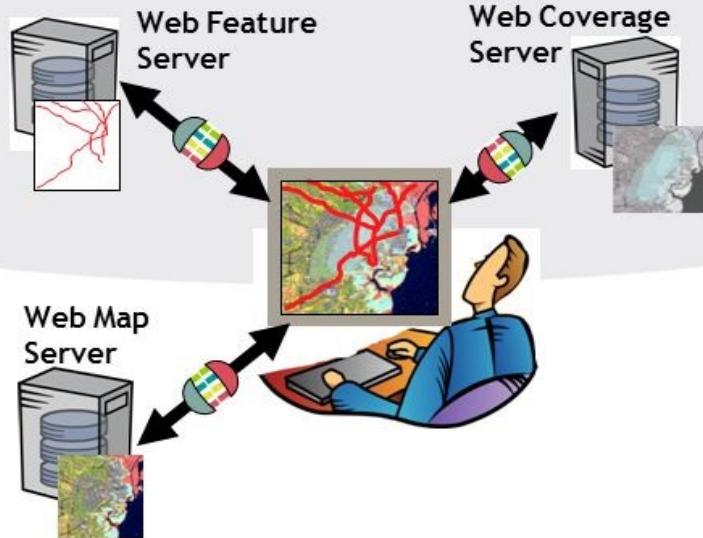


high performance environment

(*low internet bandwidth*)



The geospatial web is enabled by OGC standards:



- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalogue (CSW)
- Geography Markup Language (GML)
- KML
- Others...

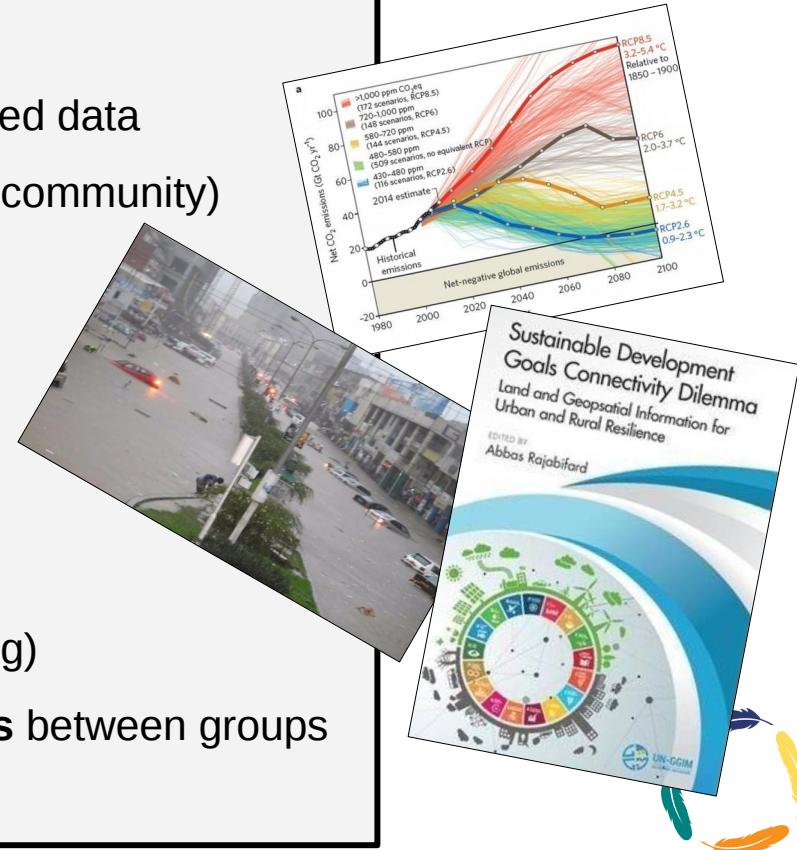
Relevant to geospatial applications: Critical Infrastructure, Emergency Management, Weather, Climate, Homeland Security, Defense & Intelligence, Oceans Science, etc

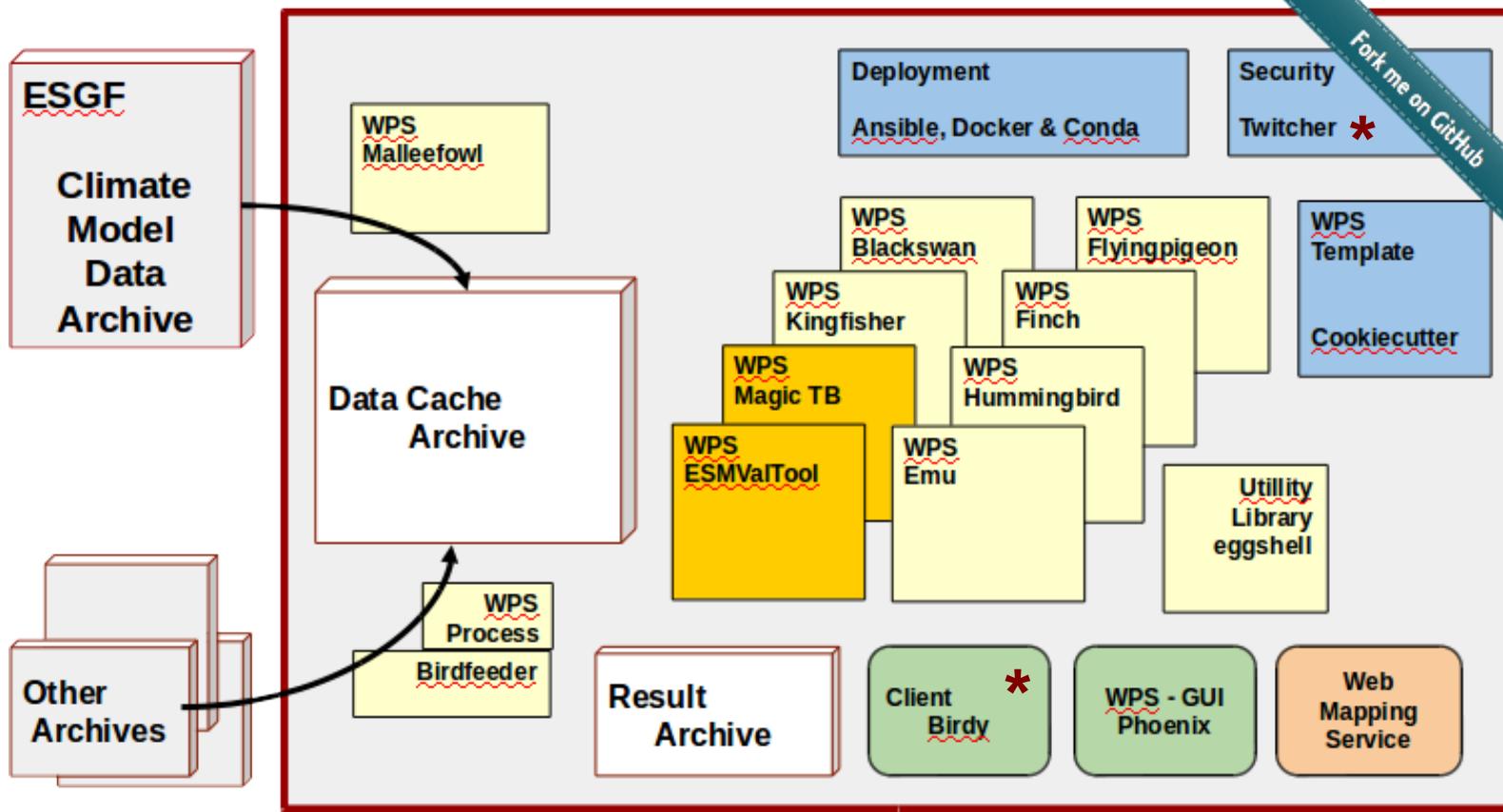
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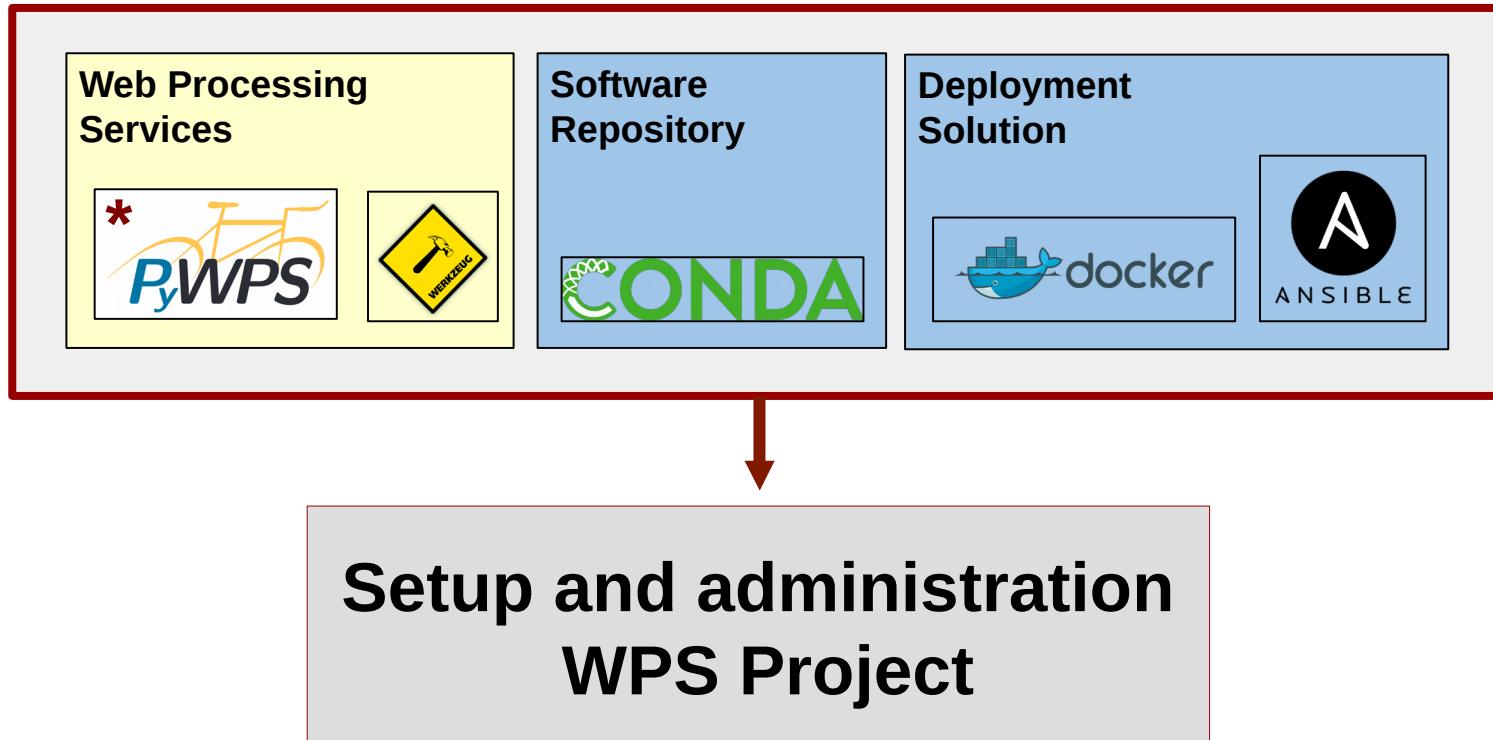


Advantage of Server-Side Services

- Avoiding of double work
- Decrease difficulties for accessing raw / processed data
- Improved quality (continuous testing by the user community)
- Increased visibility of Developers/Researchers
- Sharing:
 - methods
 - compute resources
 - storage space
 - result data
- Standardized way of producing results (Monitoring)
- Enable multidisciplinary projects with synergies between groups
- low cost







Client Side: User friendly :-)

Authentication with OAuth or OpenID

Token authentication

```
[n hempel@lsce3199 ~]$ export WPS_SERVICE=http://birdhouse-lsce3199:8080/wps
[n hempel@lsce3199 ~]$ birdy -h
usage: birdy [-options] <command> [<args>]

Flyingpigeon: Processes for climate data, indices and extrem events

optional arguments:
-h, --help      show this help message and exit
--debug        enable debug mode

command:
List of available commands (wps processes)
Run "birdy <command> -h" to get additional help.

visualisation    Visualisation of netcdf files:
sdm             Species distribution model
segetalflora   Segetal Flora

indices_single   Calculation of climate indice (single variable):
subset_indices  Subset netCDF files.
eobs_to_cordex  EOBS to CORDEX.

ensembleRobustness Calculation of the robustness of an ensemble:
analogos       Days with analog pressure pattern:
fetch          Download Resources:
```

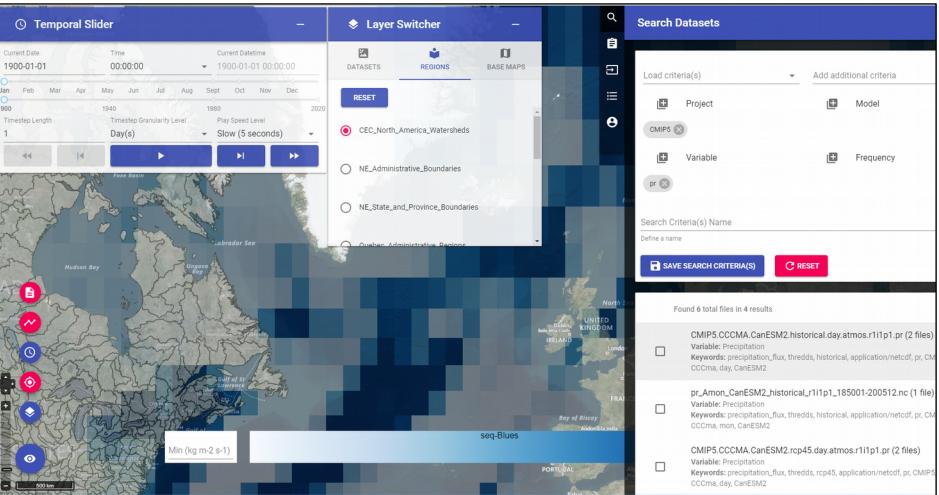
```
from owslib.wps import WebProcessingService
wps = WebProcessingService(url="http://127.0.0.1:8080/wps", verbose=False)

execute = wps.execute(
    identifier="niceprocess",
    inputs=[("parameter_1", "argument"),
            ("parameter_2", "42"),
            # ("parameter_3", "0.987"), # use the default value
            ("file_identifier", "https://thredds/fileServer1/test/file1.nc"),
            ("file_identifier", "https://thredds/fileServer1/test/file2.nc"),
            ("file_identifier", "https://thredds/fileServer2/test/file3.nc"),
            output=[("output", True)])
```

```
# time for a coffee
```

```
for o in execute.processOutputs:
    print o.reference
```

```
https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_graphic-697dee76-d722-93ae-9789bf75cf44.png
https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_netCDF-697dee76-d722-93ae-9789bf75cf44.nc
https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_text-697dee76-d722-93ae-9789bf75cf44.txt
```



Tutorials

Land degradation neutrality (UNCCD SDG 15.3.1)

Productivity

Land Cover

Soil Carbon

SDG Indicator 15.3.1:
Proportion of land degraded over total land area

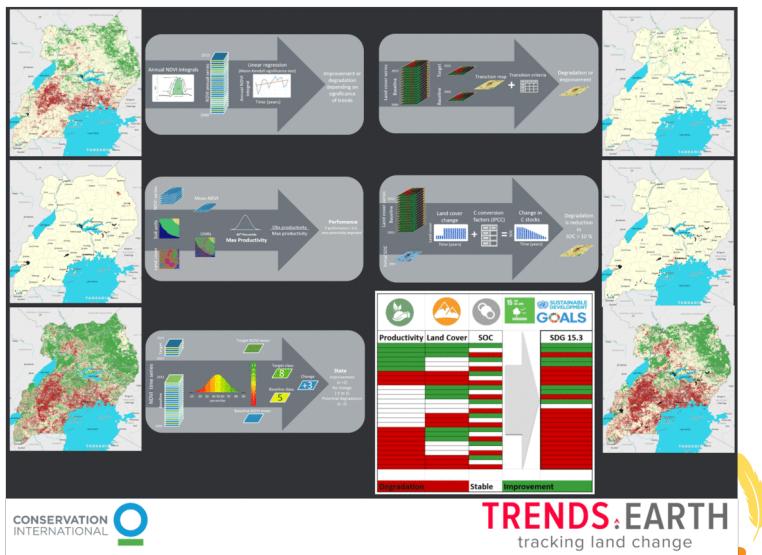
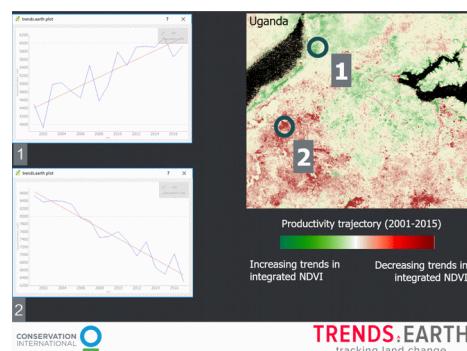
Trends.Earth

TRENDS.EARTH
tracking land change
from Conservation International

QGIS

+
Google Earth Engine

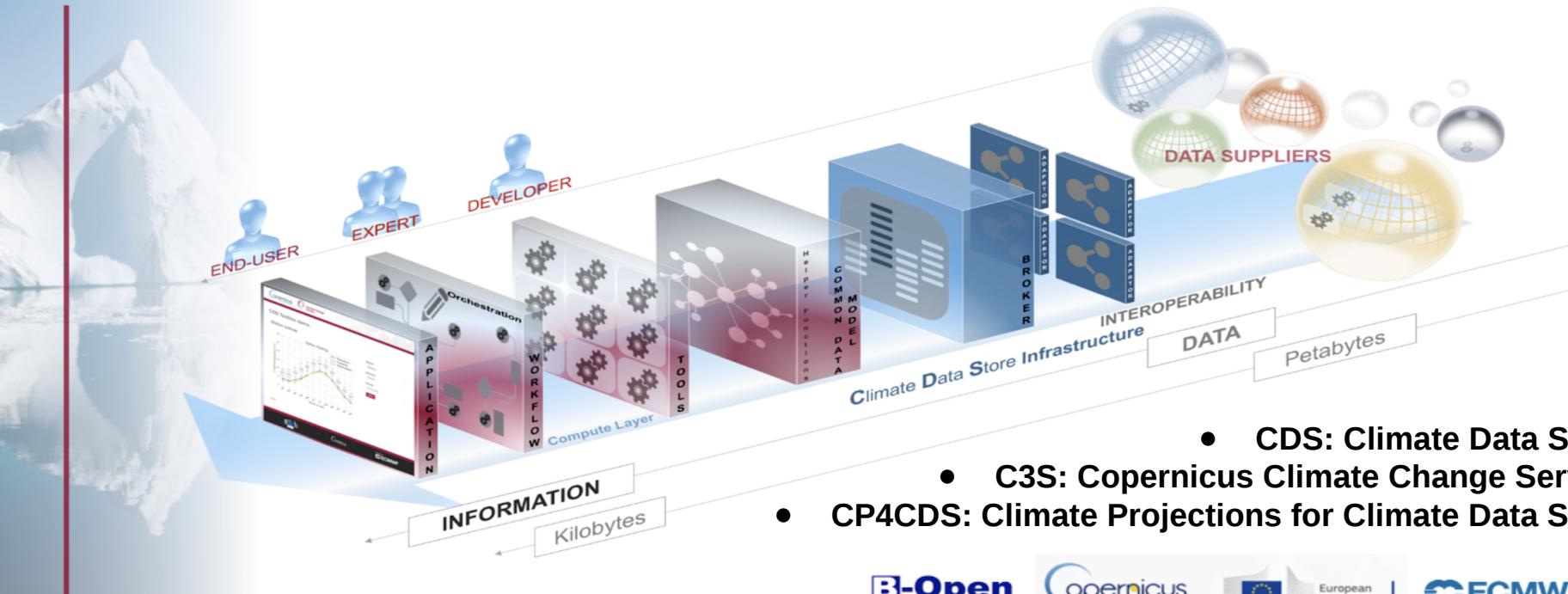
▲TRENDS.EARTH allows the user to compute each of these subindicators in a spatially explicit way generating raster maps which are then integrated into a final SDG 15.3.1 indicator map and produces a table result reporting areas potentially improved and degraded for the area of analysis.





CDS Toolbox

Technology useful for
UNFCCC



Harnessing backend GIS for Sustainable Development → UN GIS Initiative



Outlook (birdhouse)

- **Canada**
 - Govt of Canada: Canadian Center for Climate Services (CCCS)
 - Pan-Canadian federated cyber-infrastructure
 - Earth Observation support
- **EU COPERNICUS**
 - C3S with CP4CDS ready for production .
 - extended for CORDEX (regional model data) in 2019/2020
 - extended for CMIP6 ... ?
 - Extended functionality (polygon subset etc.)
- **International:**
 - Web Processing Services on **ESGF Nodes**

