

birdhouse

Backend Solutions

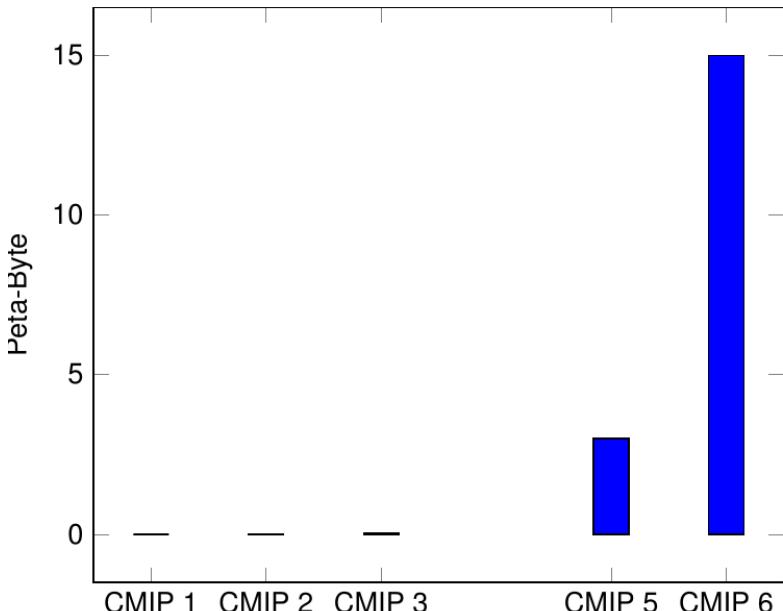
for climate related assesses and decisions

UN GIS Initiative - Workshop

Nils Hempelmann
Birdhouse Developer Group



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

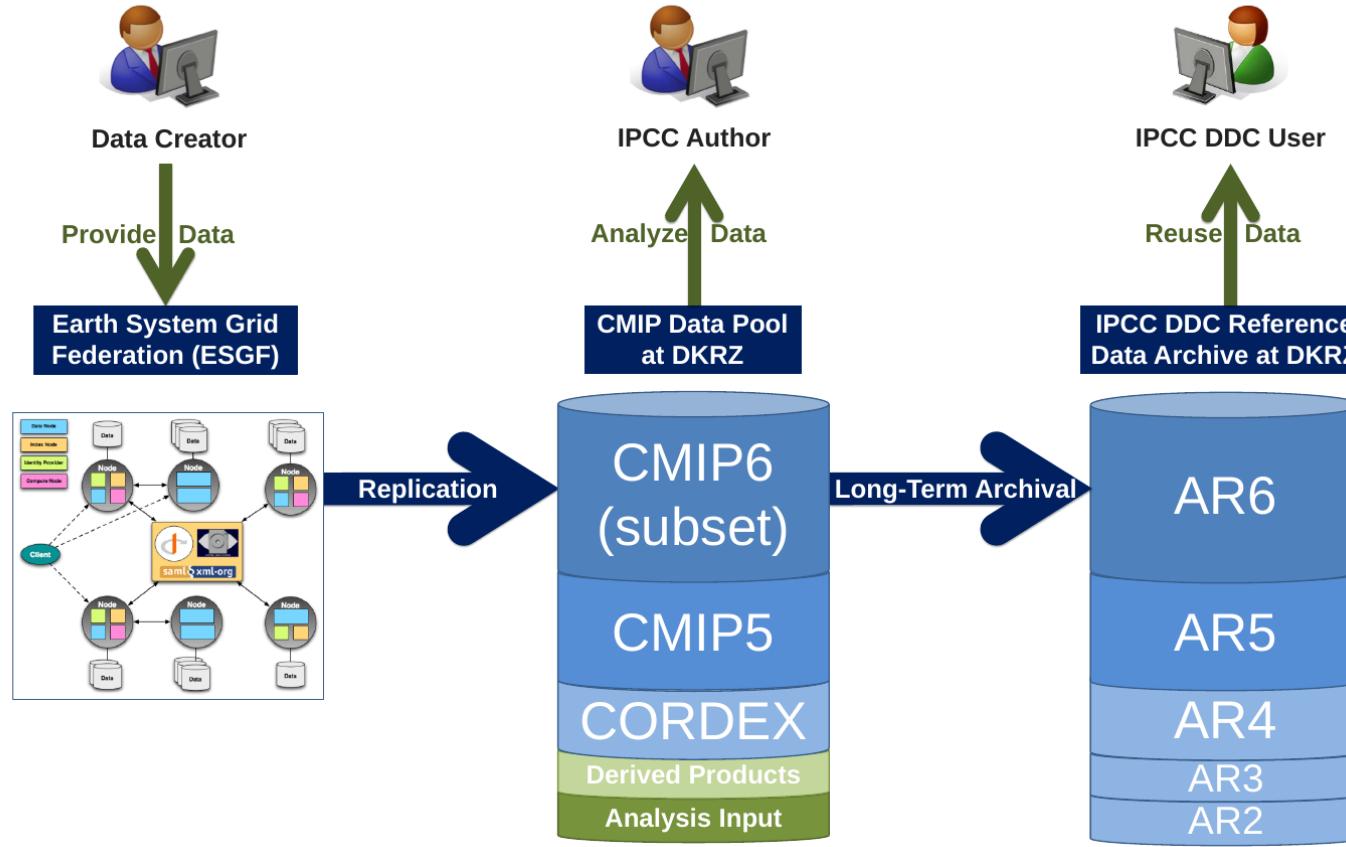
CMIP = Coupled Model Inter-comparison Project

IPCC = Intergovernmental Panel of Climate Change

ESGF = Earth System Grid Federation

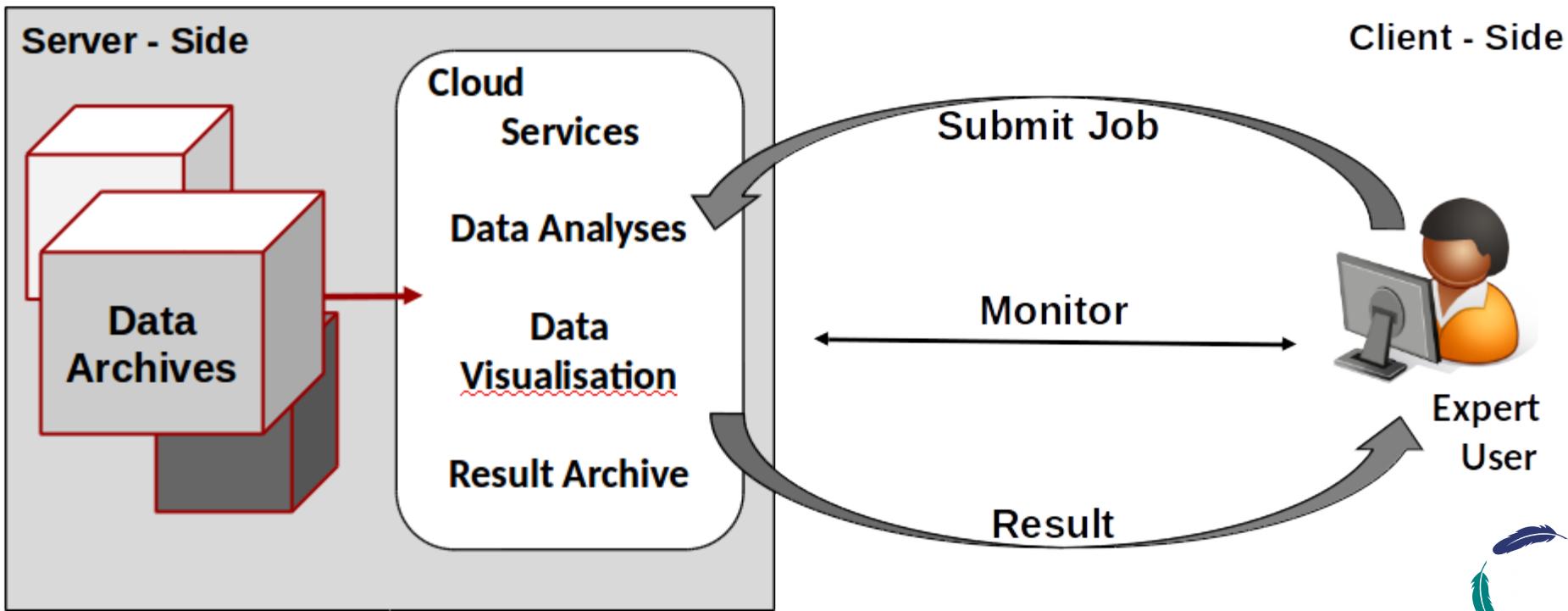


IPCC Data Distribution Center for AR6



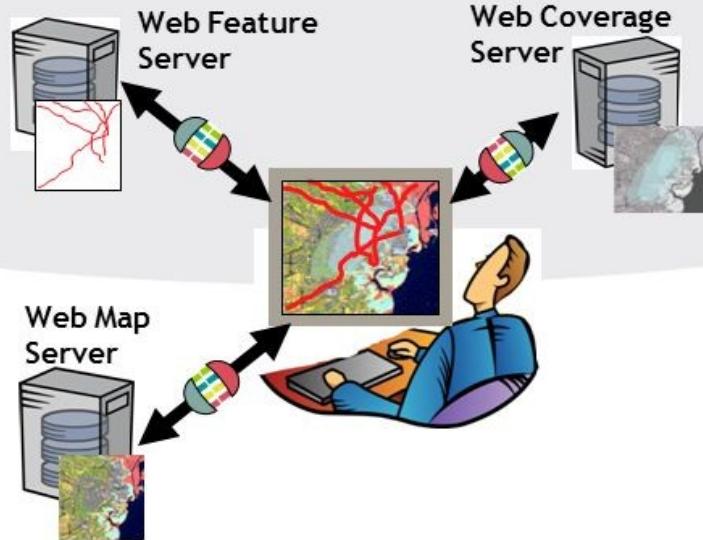
high performance environment

(*low internet bandwidth*)



Open Geospatial Consortium

The geospatial web is enabled by OGC standards:



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

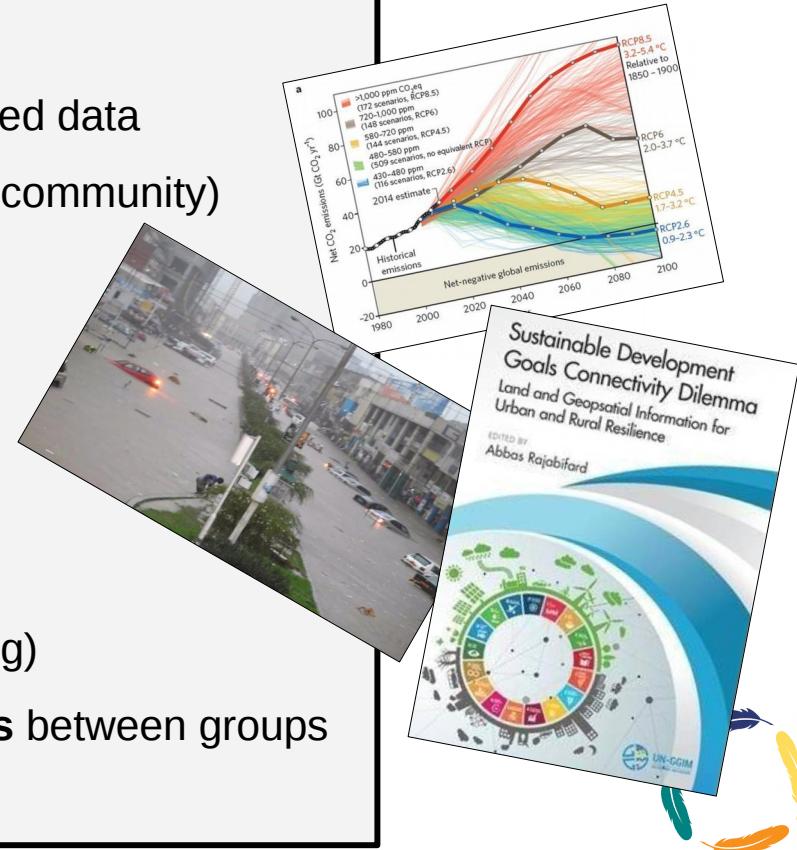
Relevant to geospatial applications: Critical Infrastructure, Emergency Management, Weather, Climate, Homeland Security, Defense & Intelligence, Oceans Science, etc

Osservare per prevedere, prevedere per prevenire

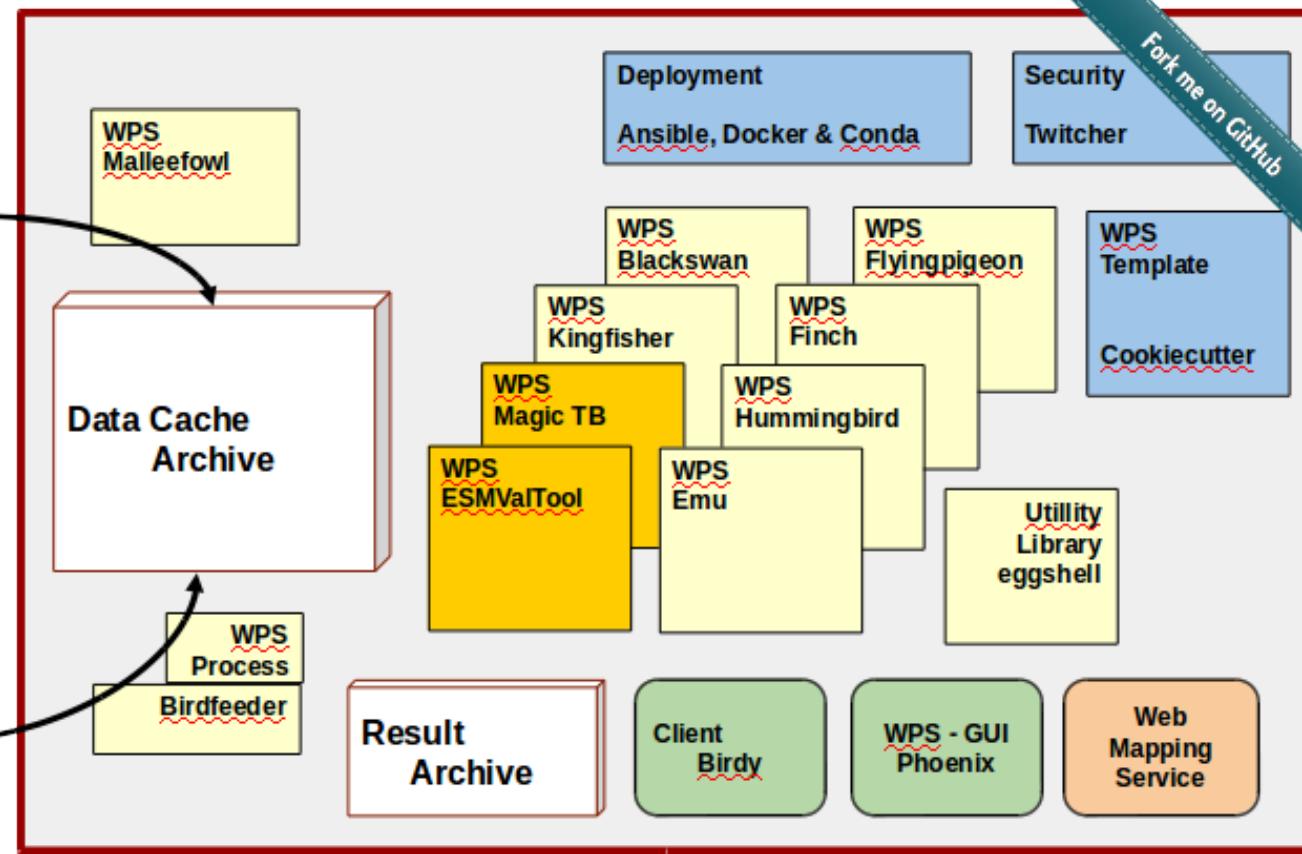
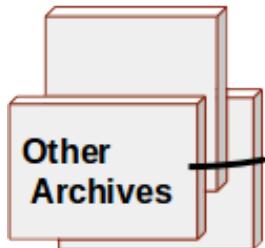
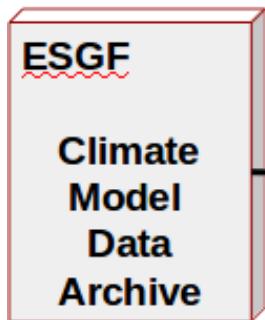


Advantage of Server-Side Services

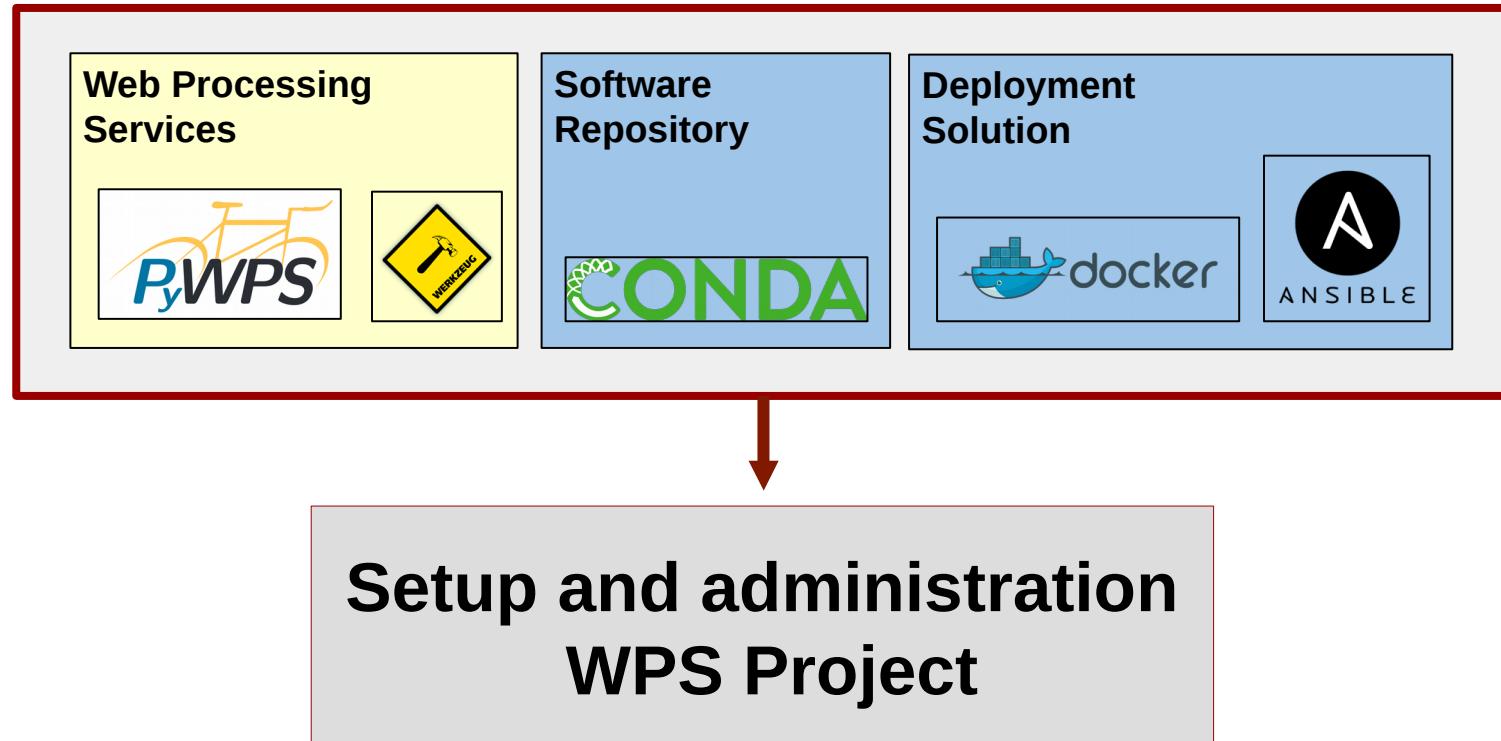
- Avoiding of double work
- Decrease difficulties for accessing raw / processed data
- Improved quality (continuous testing by the user community)
- Increased visibility of Developers/Researchers
- Sharing:
 - methods
 - compute resources
 - storage space
 - result data
- Standardized way of producing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



birdhouse Ecosystem



Server Side: Deployment

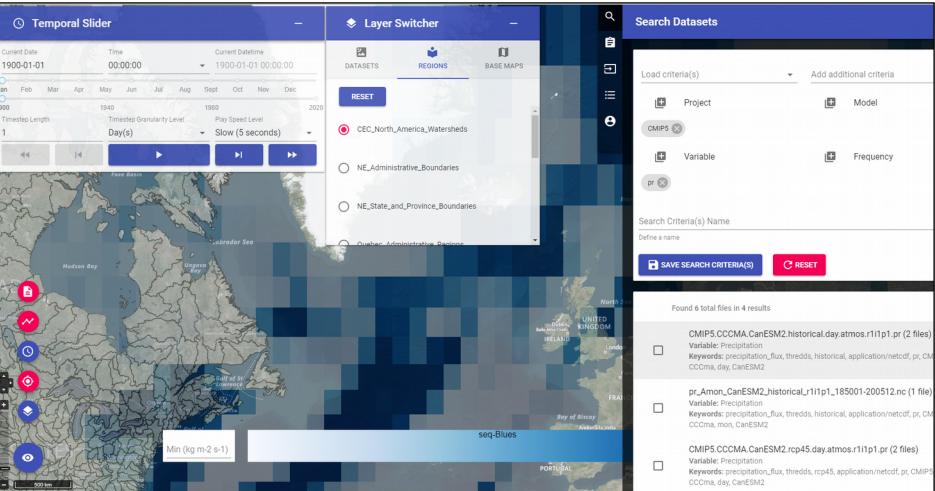


Client Side: User friendly :-)

Authentication with OAuth or OpenID

Token authentication

```
[n hempel@lsce3199 ~]$ export WPS_SERVICE=http://birdhouse.lsce.fr
[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)
(visualisation, sdm, segetalflora, indices_single, subset_countries, eobs_to_cordex, ensembleRobustness)
Just testing a nice script
Species distribution model: Species distribution model
Species biodiversity of species: Species biodiversity of species
11 or EUR-44: This process calculates climate indices based on one single variable.
This process takes either only the given variables from input netCDF files.
downloads EOBS data in adapted CORDEX format.
Calculates the robustness as the ratio of noise to signal in an ensemble of timeseries
Calculation of climate indice (single variable): Subsets netCDF files.
Subset netCDF files.
eobs_to_cordex: EOBS to CORDEX.
ensembleRobustness: Calculation of the robustness of an ensemble:
Days with analog pressure pattern: Days with analog pressure pattern
Download Resources: Search for day with analog pressure pattern
This process downloads resources (limited to 50GB) to the local file system
and returns a textile with appropriate paths
```



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

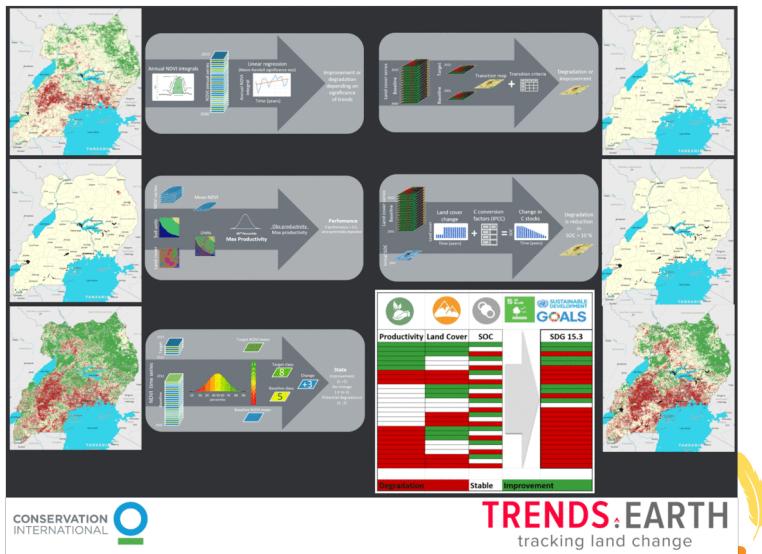
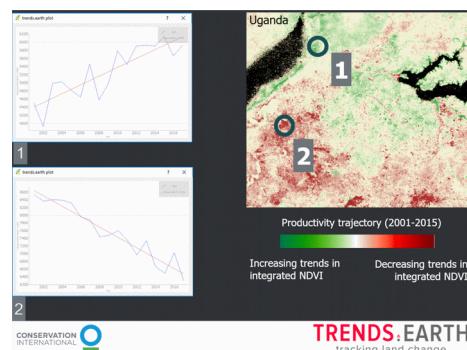
Trends.Earth

TRENDS.EARTH
tracking land change
from Conservation International

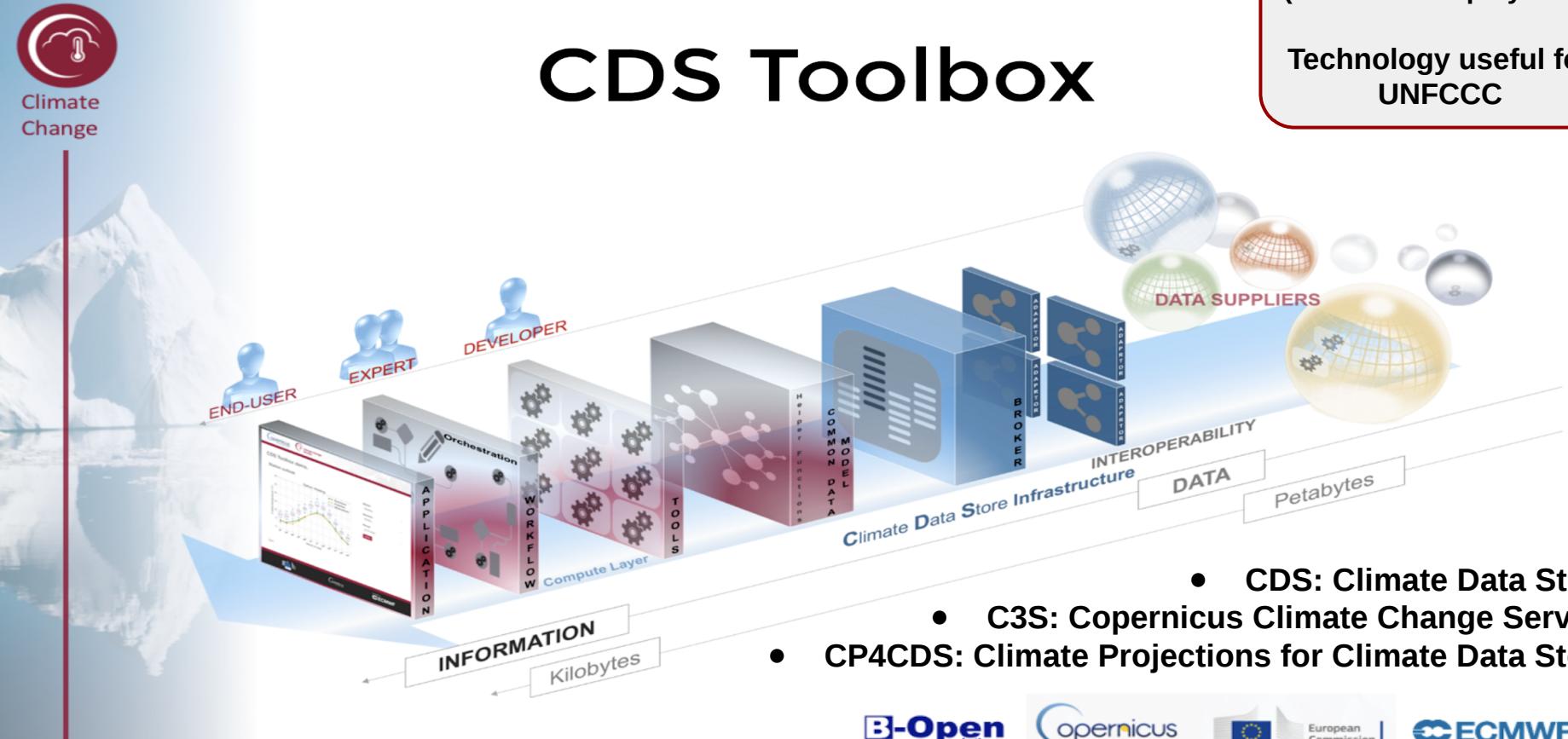
QGIS

+
Google Earth Engine

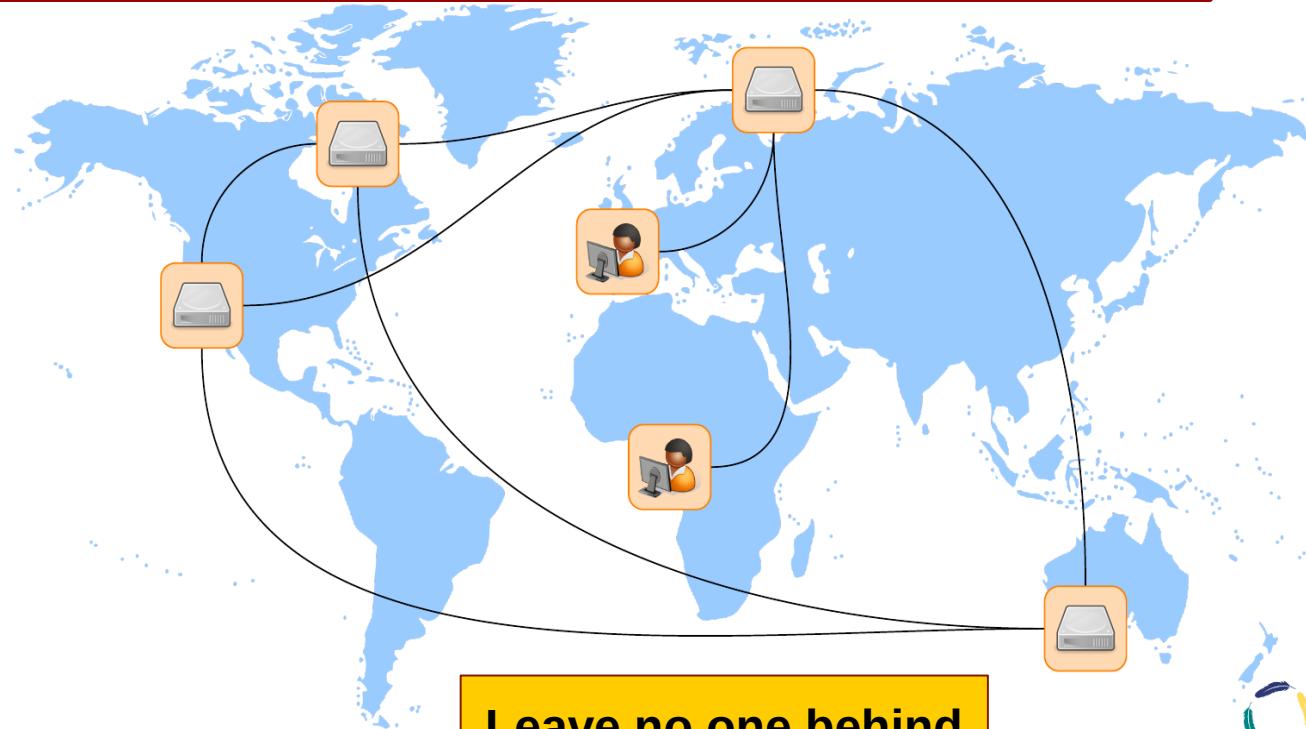
▲TRENDS.EARTH allows the user to compute each of these subindicators in a spatially explicit way generating raster maps which are then integrated into a final SDG 15.3.1 indicator map and produces a table result reporting areas potentially improved and degraded for the area of analysis.



CDS Toolbox



Harnessing backend GIS for Sustainable Development → UN GIS Initiative



Leave no one behind



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**

