

# Open Data Cubes and related technology

## upcoming data revolution for sustainable development

Nils Hempelmann<sup>1,2</sup> et. al<sup>2</sup>

<sup>1</sup>GIZ - Regional Project Central Africa, COMIFAC

<sup>2</sup>FOSS4G Community (OpenDataCubes, birdhouse, PAVICS, etc...)

21. Juni 2018



# Content



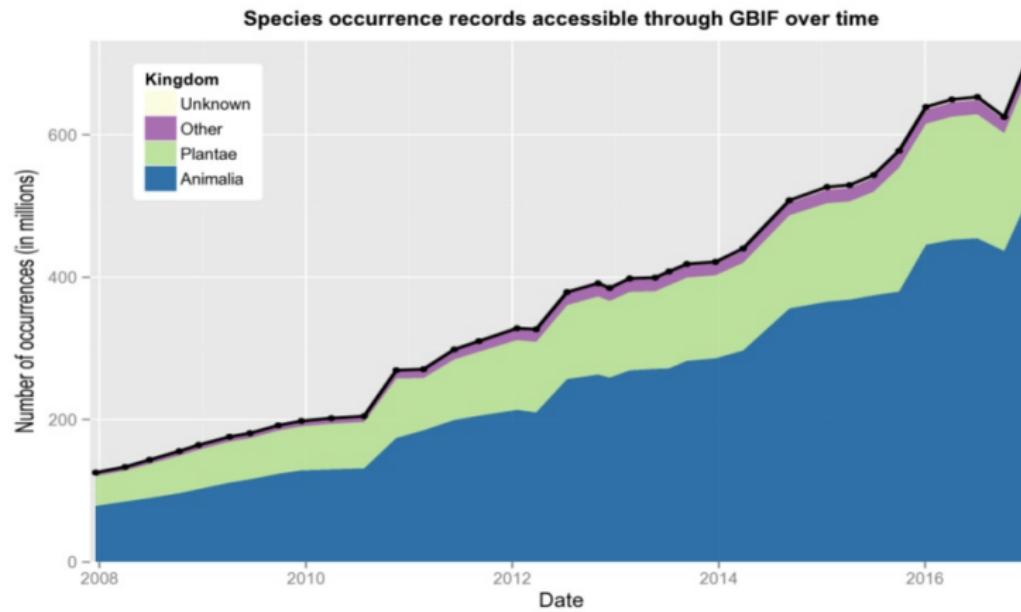
# Need of action



# Growing amount of available data

data availability

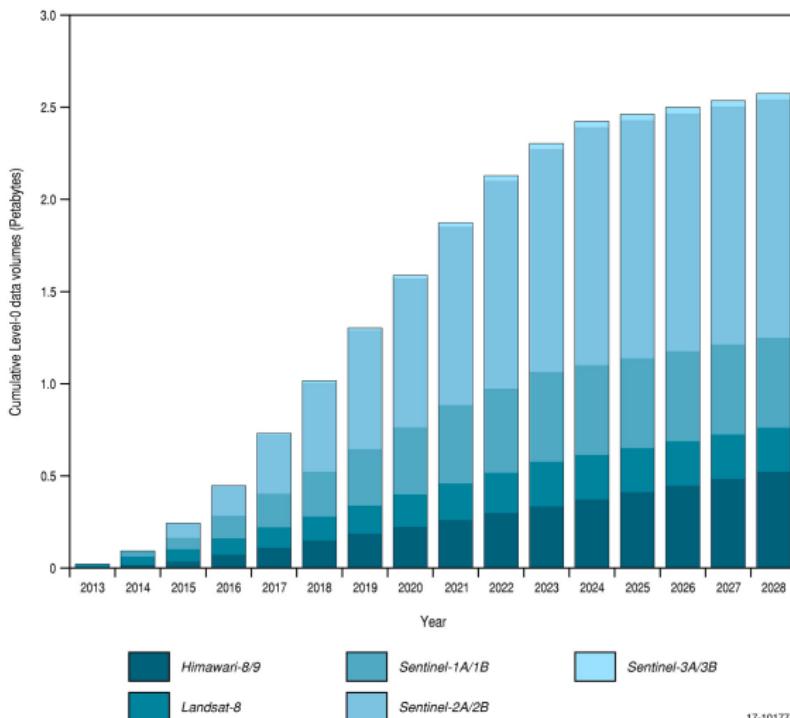
## DATA PUBLISHED THROUGH GBIF.ORG



[www.gbif.org/analytics/global](http://www.gbif.org/analytics/global)



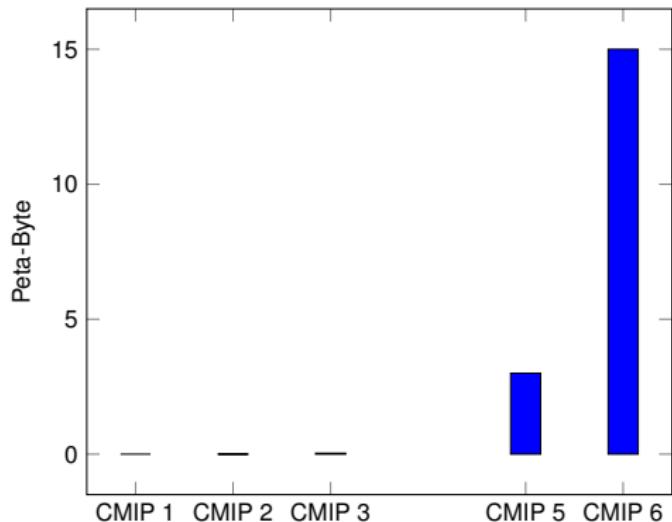
# Predicted EO-data availability for Australia



17-10177-1



# Global Climate Model Data Availability



**CMIP 1 :** 1 GB  
**CMIP 2 :** 500 GB  
**CMIP 3 :** 35 TB  
**CMIP 4 :** Not existing  
**CMIP 5 :** 3.5 PB (multi-model archive)  
**CMIP 6 :** currently 10-20 PB as "ESGF" Data (real existing 10time more)

\*\*\*\*\*

IPCC 1 : 1990  
IPCC 2 : 1995  
IPCC 3 : 2001  
IPCC 4 : 2007  
IPCC 5 : 2014  
IPCC 6 : -> ~ 2019

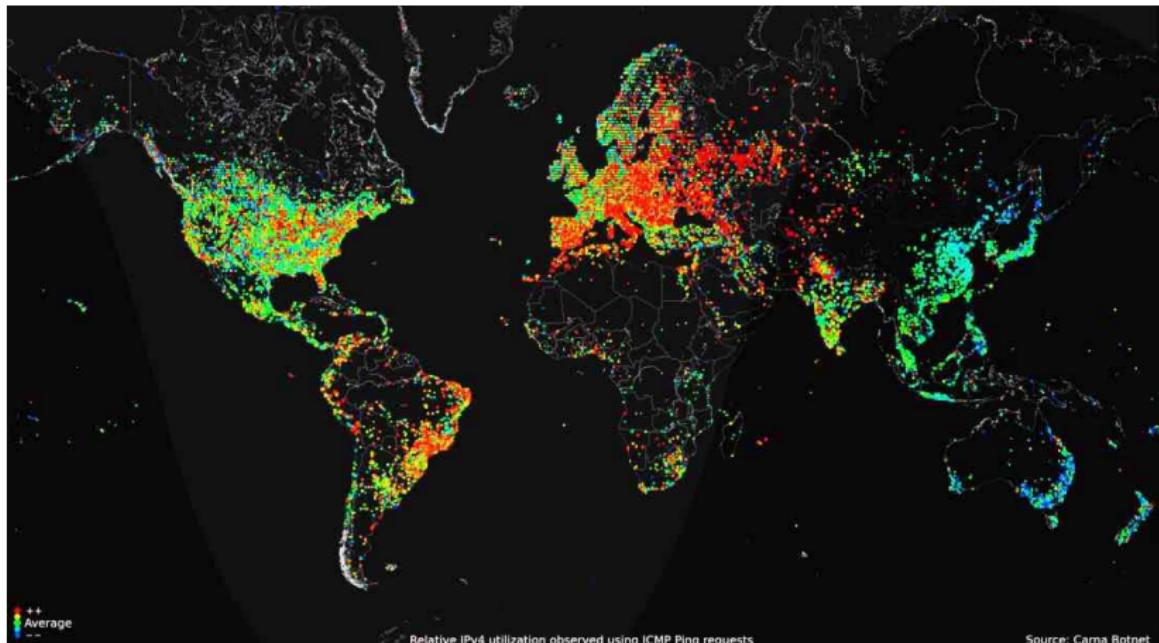
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Global Land Outlook : 2017  
(Report UNCCD)

CMIP = Coupled Model Inter-comparison Project  
IPCC = Intergovernmental Panel of Climate Change

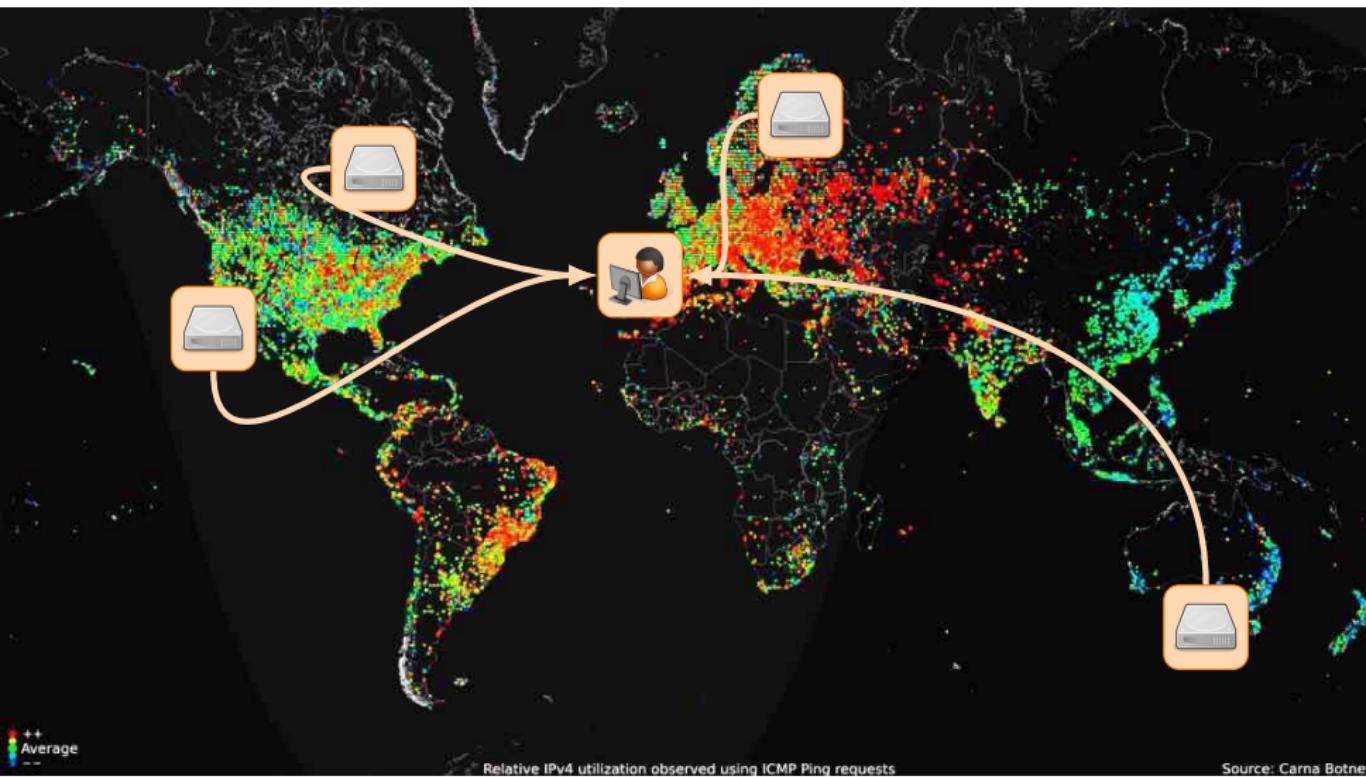


## Global internet speed (access to information)

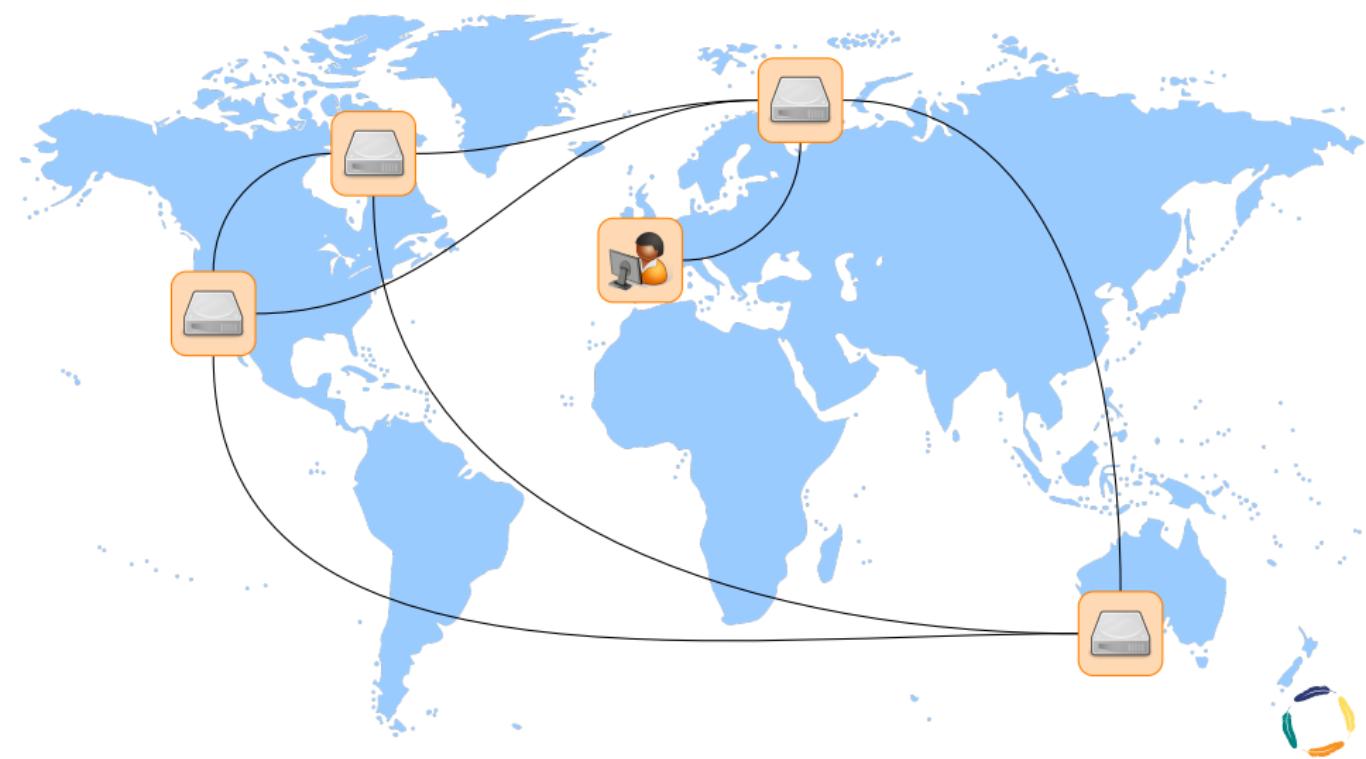


Global Internet Speed ([fossbytes.com](http://fossbytes.com))

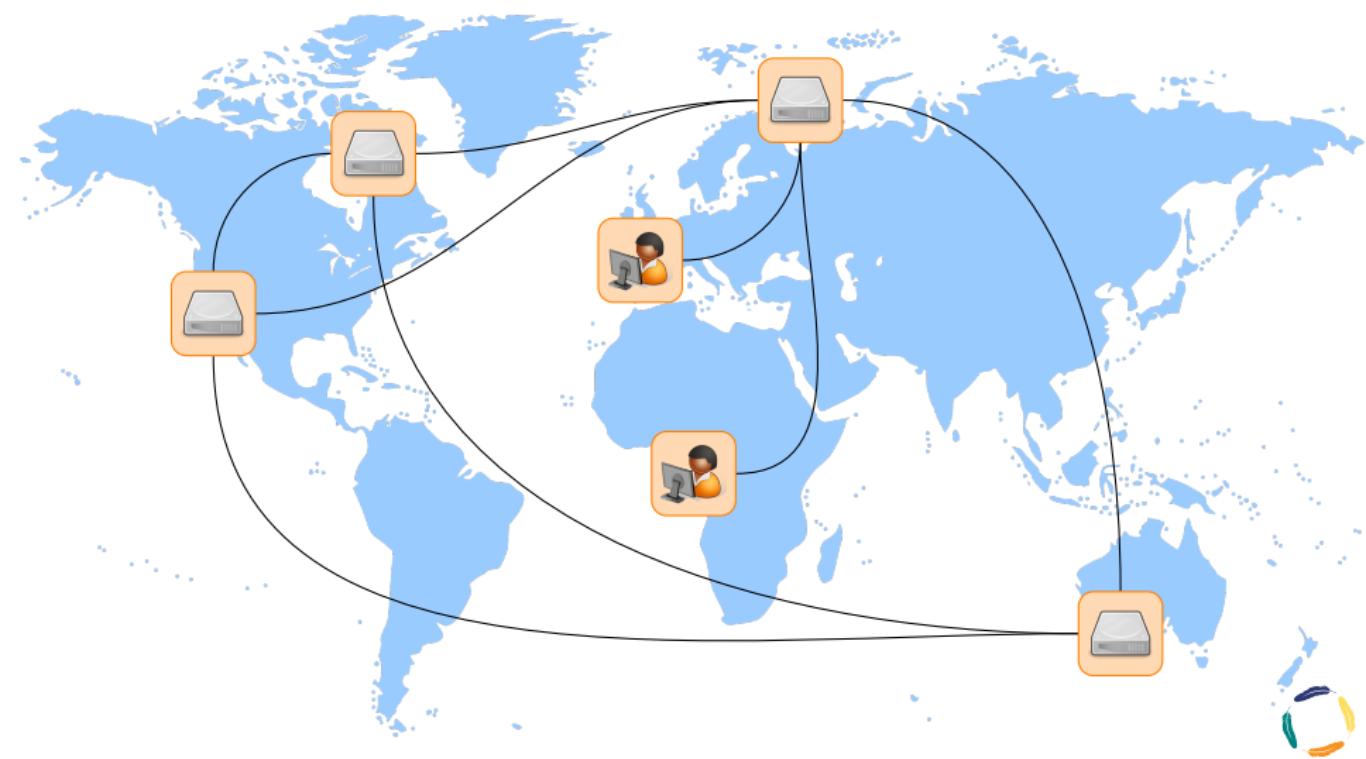
# The Big Data Problem - Download and Process at home



# The Big Data Problem - Process in federated Networks



# Big opportunity less/least developed countries



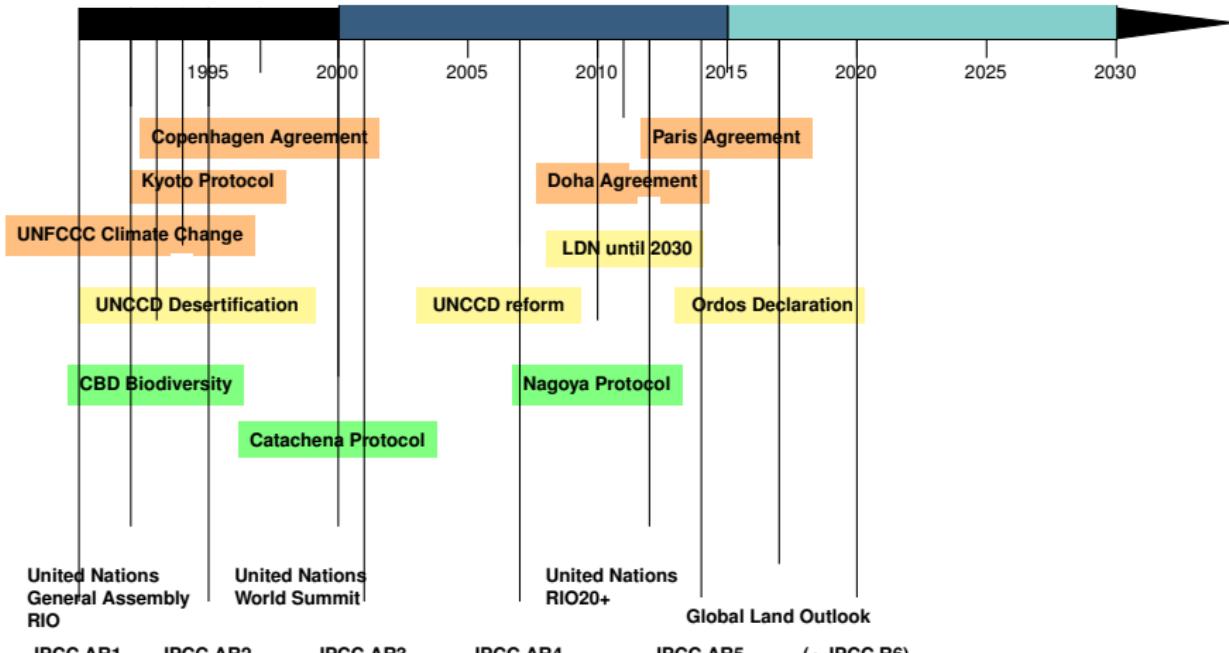
# Political discourse

1990

2030

Millenium Goals

SDGs



# Cherry Picking aspects of the Paris Agreement (COP21)

## **Article 6 Paragraph 2 :**

'Parties shall, where engaging on a voluntary basis in cooperative approaches ...'

## **Article 6 Paragraph 8. :**

'Parties recognize the importance of integrated, holistic and balanced non-market approaches being available to Parties to assist in the implementation of their nationally determined contributions,...'

## **Article 7 Paragraph 7 :**

Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, ...'

## **Article 10 Paragraph 1 :**

'Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions.

## **Article 10 paragraph 2 :**

'Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognizing existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer.'



## Shift of principles for knowledge management

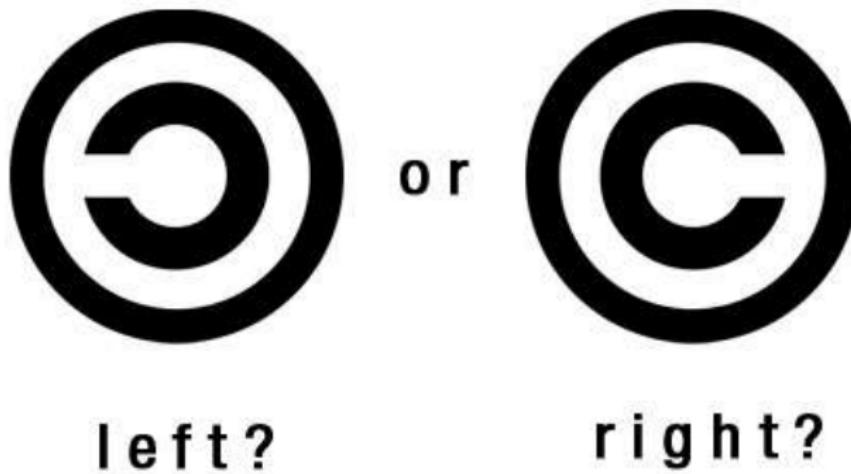
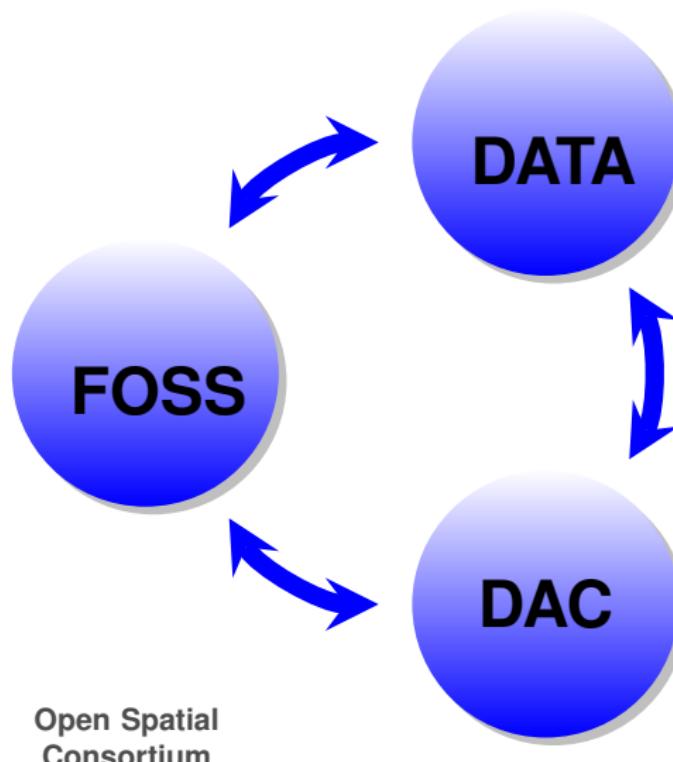


FIGURE – copyleft



# Organizations Landscape



# High Performance Computation for Sustainable Development



FIGURE – High Performance Computer



FIGURE – Sustainable Development Goals

Further reading :

Cyber-structures for sustainable development  
The IT Landscape for Climate Services

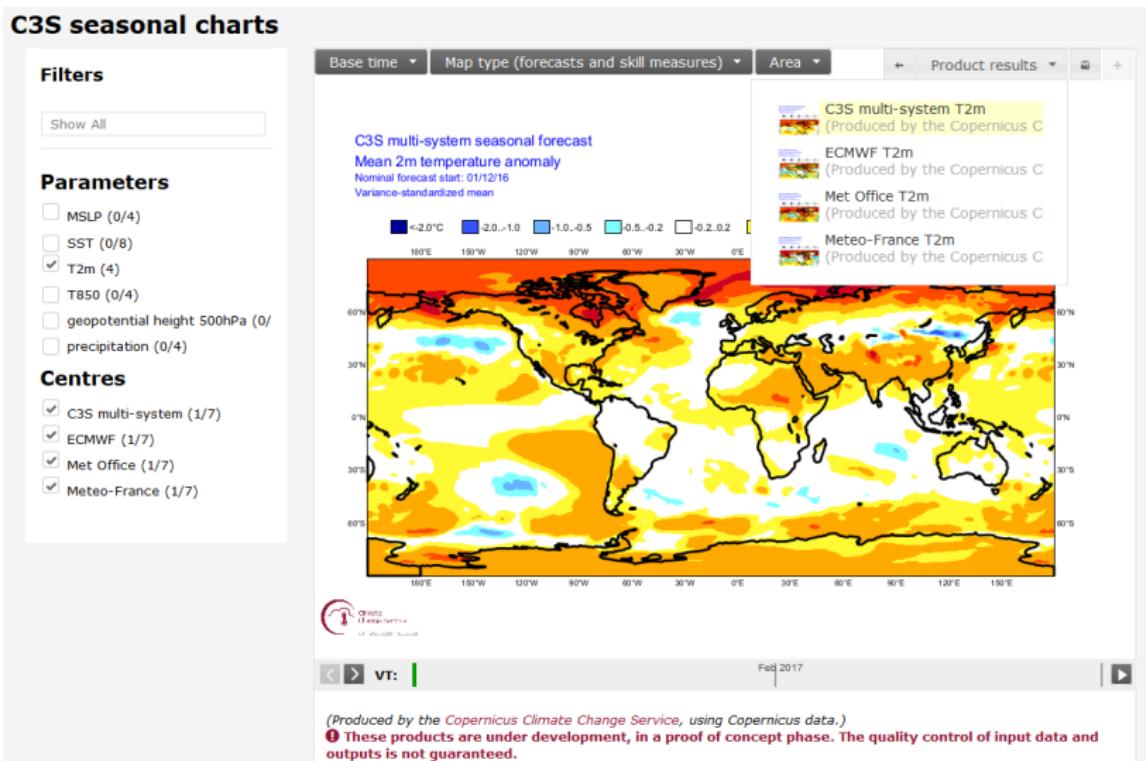


## Examples 2

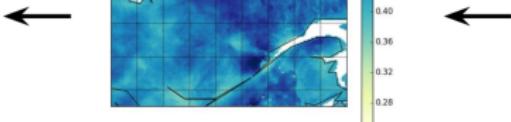
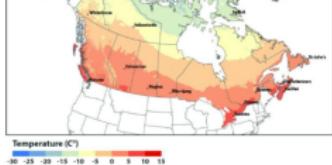


# COPERNICUS C3S

## C3S seasonal charts



Copernicus Climate Change Service



<https://www.researchgate.net/project/PAVICS>

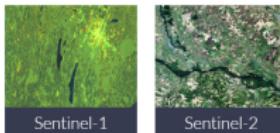


The screenshot shows the official website for the Copernicus Data and Exploitation Platform - Deutschland (CODE-DE). At the top, there are language options "DEUTSCH" and "ENGLISH". On the right, there are links for "REGISTRIEREN" and "ANMELDEN". Below the header, there's a "MARKETPLACE" link. The main feature is the large "CODE-DE" logo with a stylized geometric pattern. Below the logo, the text "COPERNICUS DATA AND EXPLOITATION PLATFORM - DEUTSCHLAND" is displayed. To the right of the logo are links for "ÜBER CODE-DE", "AKTUELLES", "HILFE", and a search icon.

Die Copernicus Data and Exploitation Platform – Deutschland (CODE-DE) ist der Nationale Copernicus Zugang für die Satellitendaten der Sentinel-Satellitenreihe und die Informationsprodukte der Copernicus Dienste.

[weiterlesen >](#)

## Ausgewählte Inhalte



## Aktuelles

31. Januar 2017 - 9:15  
Improved Availability of Sentinel 2 Data on CODE-DE

23. Januar 2017 - 7:15  
User Tools für CODE-DE auf github veröffentlicht

11. Januar 2017 - 15:15  
Datenverfügbarkeit von Sentinel 2 auf CODE-DE

[code-de.org](http://code-de.org)



# TEP ESA

The screenshot shows the homepage of the TEP - Thematic Exploitation Platforms (TEPs) website. The URL is https://tep.eo.esa.int/home. The page features a header with the title 'TEP Communities' and a navigation bar with various icons. Below the header, there are six cards, each representing a thematic community:

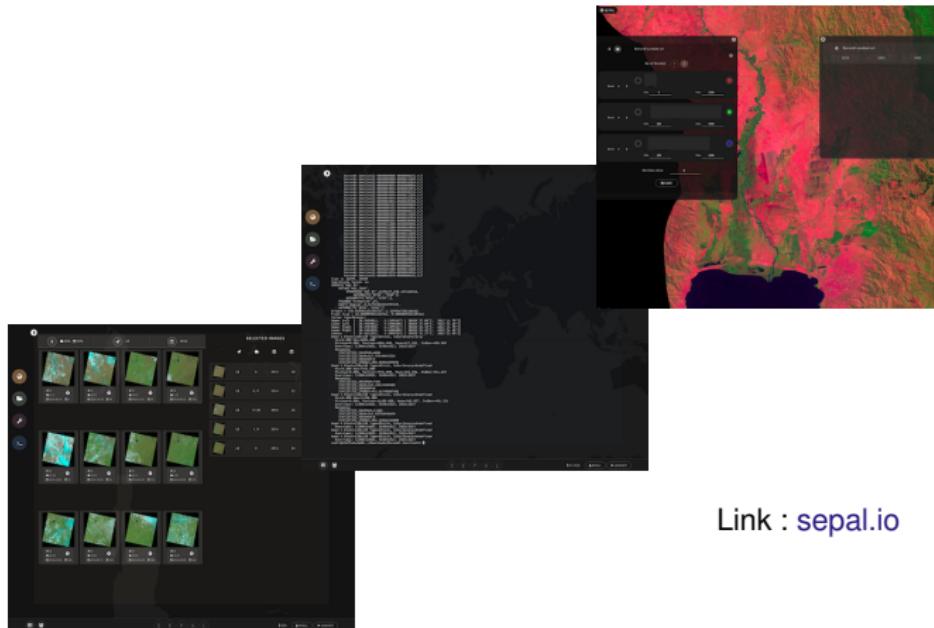
- geohazards**: Represented by an orange square icon containing a white wavy line.
- coastal**: Represented by a blue square icon containing a white ship.
- forestry**: Represented by a green square icon containing a white tree.
- hydrology**: Represented by a blue square icon containing a white water drop.
- polar**: Represented by a blue square icon containing a white polar bear.
- urban**: Represented by a red square icon containing a white bar chart.

Below these cards is a section titled 'TEP Blog' which displays a horizontal scrollable banner of blog posts. The footer of the page includes the 'tep' logo and a small circular icon.

## ESA Thematic Exploitation Platforms (TEPs)

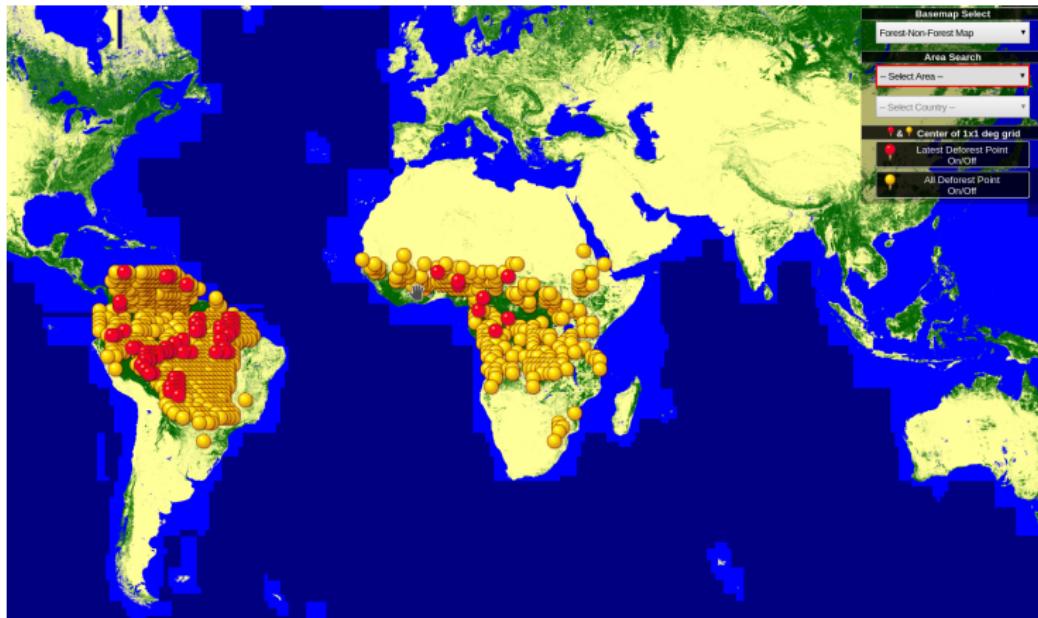


# REDD+ cloud computing tool



Link : [sepal.io](https://sepal.io)

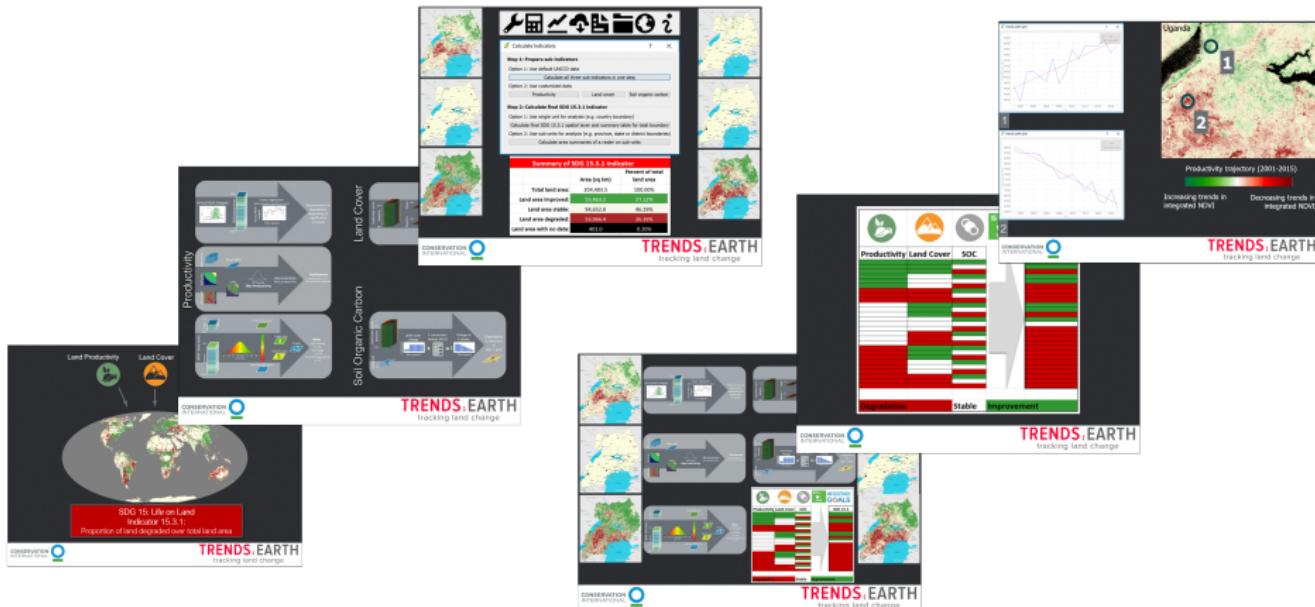




## JICA-JAXA Forest Early Warning System in the Tropics



# Trends.earth QGIS plugin (UNCCD LDN → SDG 13.5.1)



link to Documentation Trends.Earth  
link to Tutorial Trends.Earth



./images/Sims\_SamoaODC\_23May2018.pdf



## Exmples 3

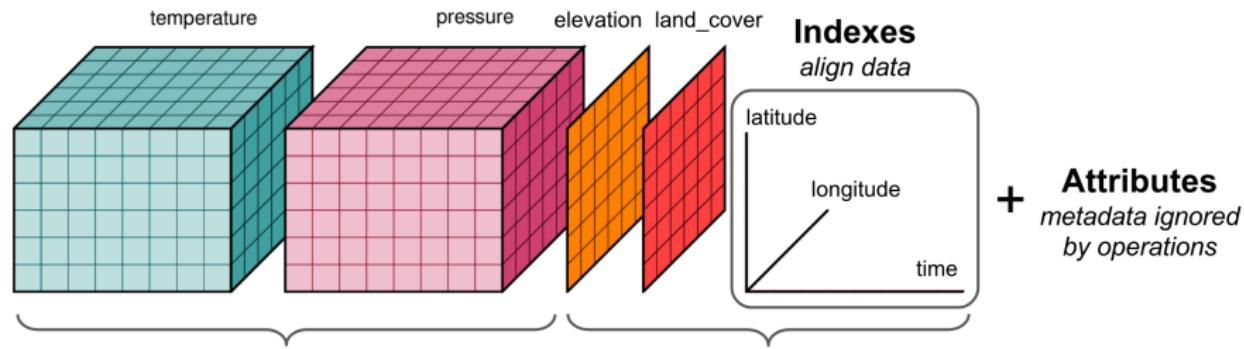


# Open Data Cubes (OCD)

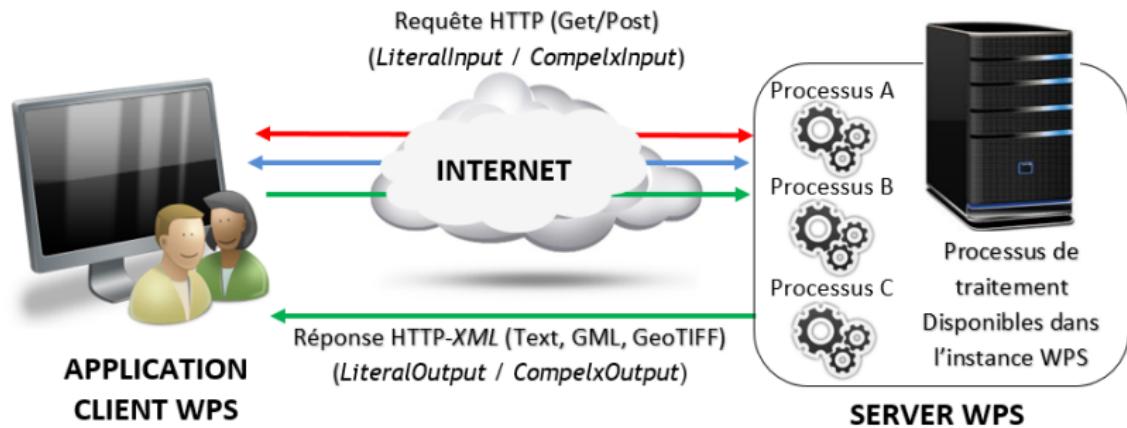
./images/Sims\_SamoaODC\_23May2018.pdf



# Network Common Data Format (netCDF)



# Web Processing Services

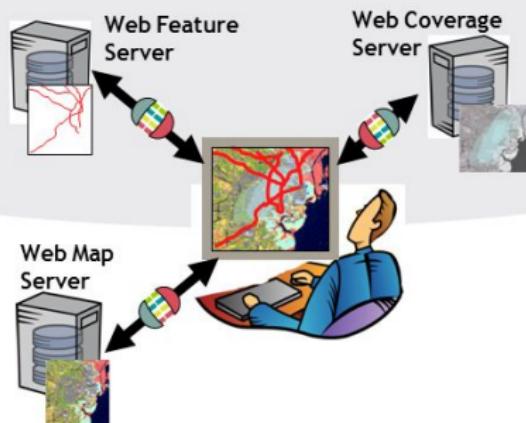


- Légende :
- Le client envoie une requête **GetCapabilities** et le serveur répond (Liste des processus A, B, C)
  - Le client sélectionne un traitement processus C, une requête **DescribeProcess** est envoyée et le serveur répond (Entrées & sorties du processus C)
  - L'utilisateur choisit les entrées nécessaires et lance le traitement, une requête **Execute** est envoyée et le serveur répond par un document XML initial.



## OGC Web Services (OWS)

The geospatial web is enabled by OGC standards:

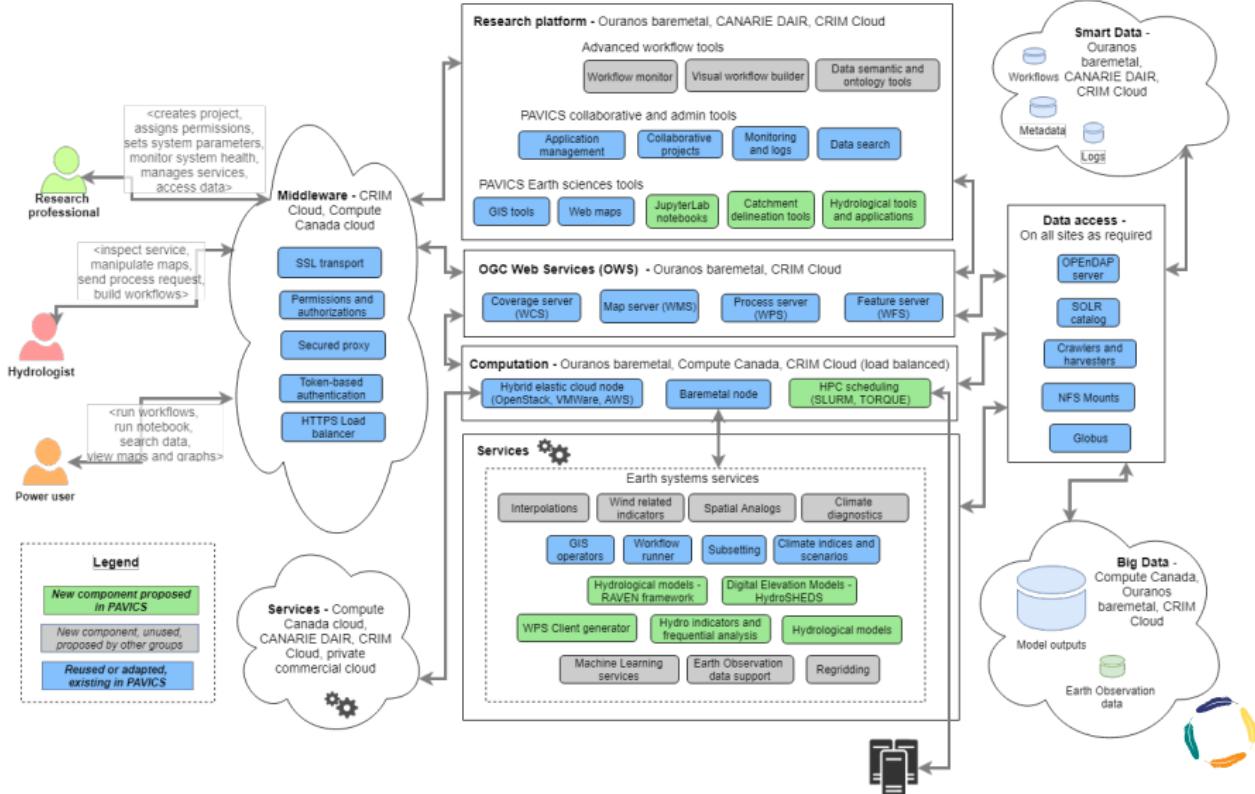


- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalogue (CSW)
- Geography Markup Language (GML)
- KML
- Others...

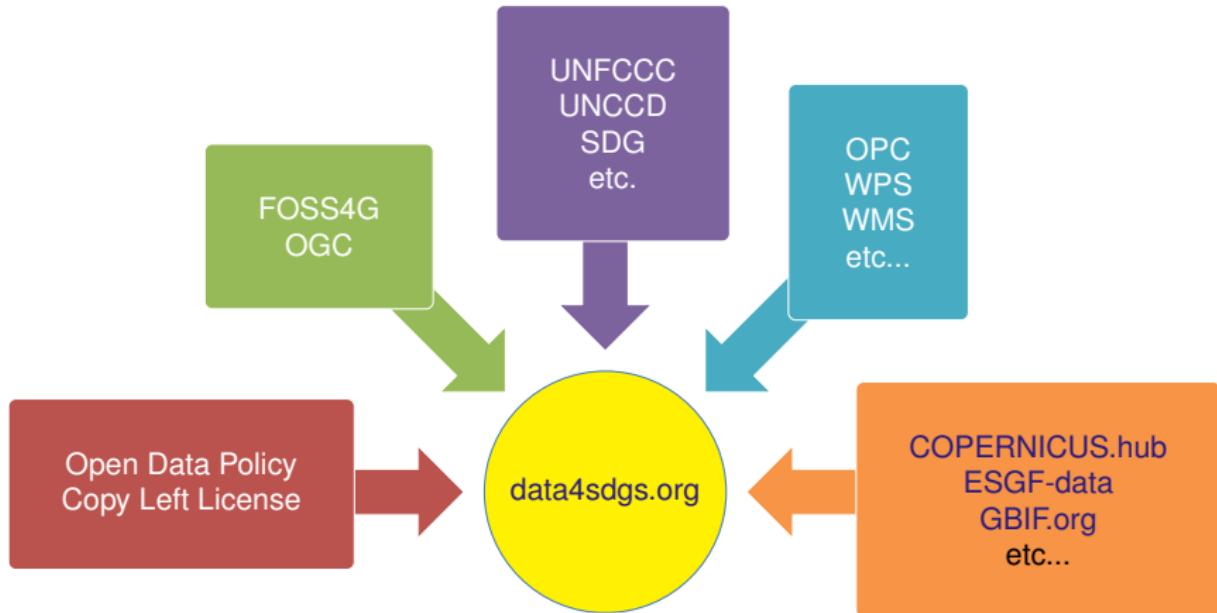
Relevant to geospatial applications: Critical Infrastructure, Emergency Management, Weather, Climate, Homeland Security, Defense & Intelligence, Oceans Science, etc



# Birdhouse-PAVICS framework



# Ingredients of the recipe for data for SDGs



## Technical Aspects 4



# DEMO

Platform Visualisation Climate Services

African Regional Data Cubes

WPS Workshop

REDD+ sepal.io/

