



Earth Observation Data Centre
for Water Resources Monitoring
An open and international cooperation

Status of the EODC services

EODC :: Collaboration for Earth Observation

Christian Briese & the EODC Team :: October 11th, 2016

Austrian Collaborative Ground Segment

■ Part 1: National Mirror ZAMG Data Hub Relay (in preparation)

<https://www.sentinel.zamg.ac.at/>



■ Part 2: EODC

- Global Sentinel archive
- Cloud computing
- Supercomputing

<https://www.eodc.eu/>



EODC Overview and Mission

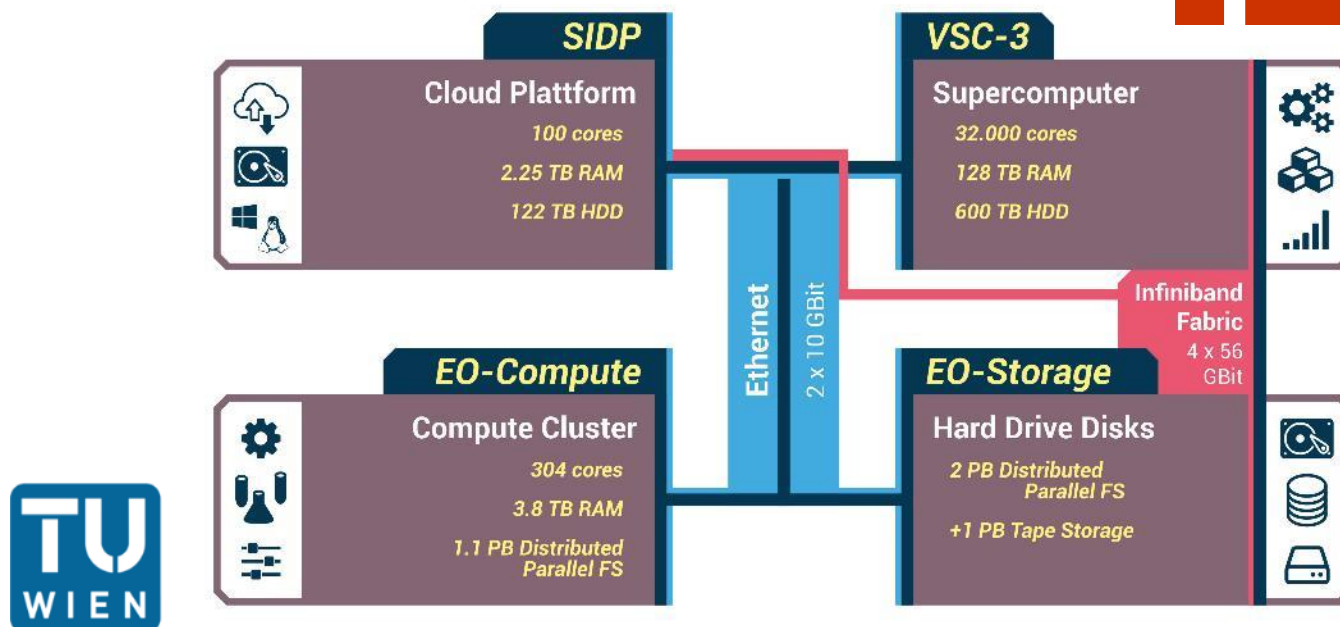
- EODC is a **public-private partnership** founded in 2014
- EODC serves as **community facilitator** for **collaboration between public and private partners** with the aim to
 - Establish, manage and operate a **joint IT infrastructure** offering **Big EO Data storage** and **high performance computing (HPC)**
 - **Provide data, processing chains and value-added products**
 - To offer a **virtual research, development and operation environment**
- **Connect Science and operations**
- EODC was initiated by Austria but **international partners are essential** for achieving its scientific and technical goals

EODC infrastructure



Austrian National
Copernicus Mirror

EODC's co-located IT components



EODC HPC Processing – VSC-3 and the planned VSC-4

- Hosted by Science Center of TU Wien
 - *Physically co-located with EODC SIDP and storage*
 - Direct InfiniBand interconnection
- Specifications:
 - > 2000 nodes
 - ➔ ca. 32.000 cores
 - > 600 Teraflops
 - ➔ #85 Top500 Nov/14



Austrian initiative on high performance computing



EODC data archive (status Sept. 12, 2016)

- Sentinel-1 (below products, global coverage)

- GRDH IW: 185.568 acqu.
- GRDM EW: 33.215 acqu.
- SLC: 9.028 acqu.

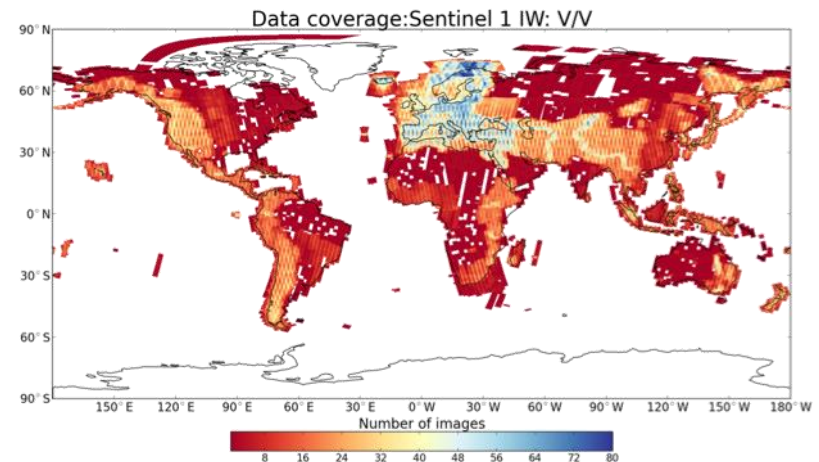
- Sentinel-2 (global cov.)

- L1C: 70.858 acqu.

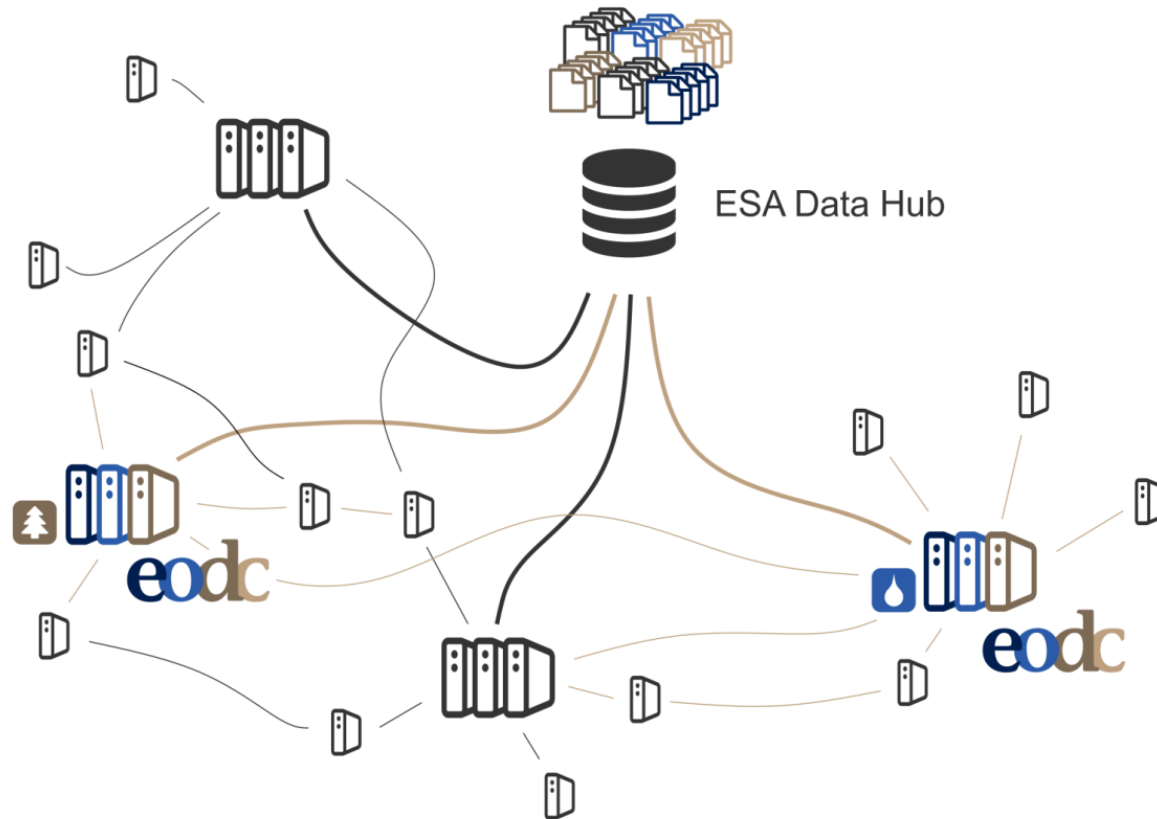
- Landsat – 8

<https://www.eodc.eu/sentinel-1-coverage-maps/>

```
werner — centos@eodc2:/eodc/pub/copernicus.eu — ssh eodc — 80x24
[centos@eodc2 eodc]$ cd pub
[centos@eodc2 pub]$ ls
copernicus.eu  envisat
[centos@eodc2 pub]$ cd copernicus.eu/
[centos@eodc2 copernicus.eu]$ ls
sla_csar_grdh_ew  sla_csar_slc_ew  sla_csar_slc_s2  sla_csar_slc_s5
sla_csar_grdh_iw  sla_csar_slc_iw  sla_csar_slc_s3  sla_csar_slc_s6
sla_csar_grdm_ew  sla_csar_slc_s1  sla_csar_slc_s4  s2a_prd_msilic
[centos@eodc2 copernicus.eu]$ du -h --max-depth=1
355T  ./s2a_prd_msilic
17G   ./sla_csar_slc_s2
29G   ./sla_csar_slc_ew
34T   ./sla_csar_slc_iw
22G   ./sla_csar_slc_s3
6,1T  ./sla_csar_grdm_ew
17G   ./sla_csar_slc_s4
141T  ./sla_csar_grdh_iw
3,8G  ./sla_csar_slc_s5
2,1T  ./sla_csar_grdh_ew
28G   ./sla_csar_slc_s1
11G   ./sla_csar_slc_s6
512   ./snapshots
538T  .
[centos@eodc2 copernicus.eu]$
```

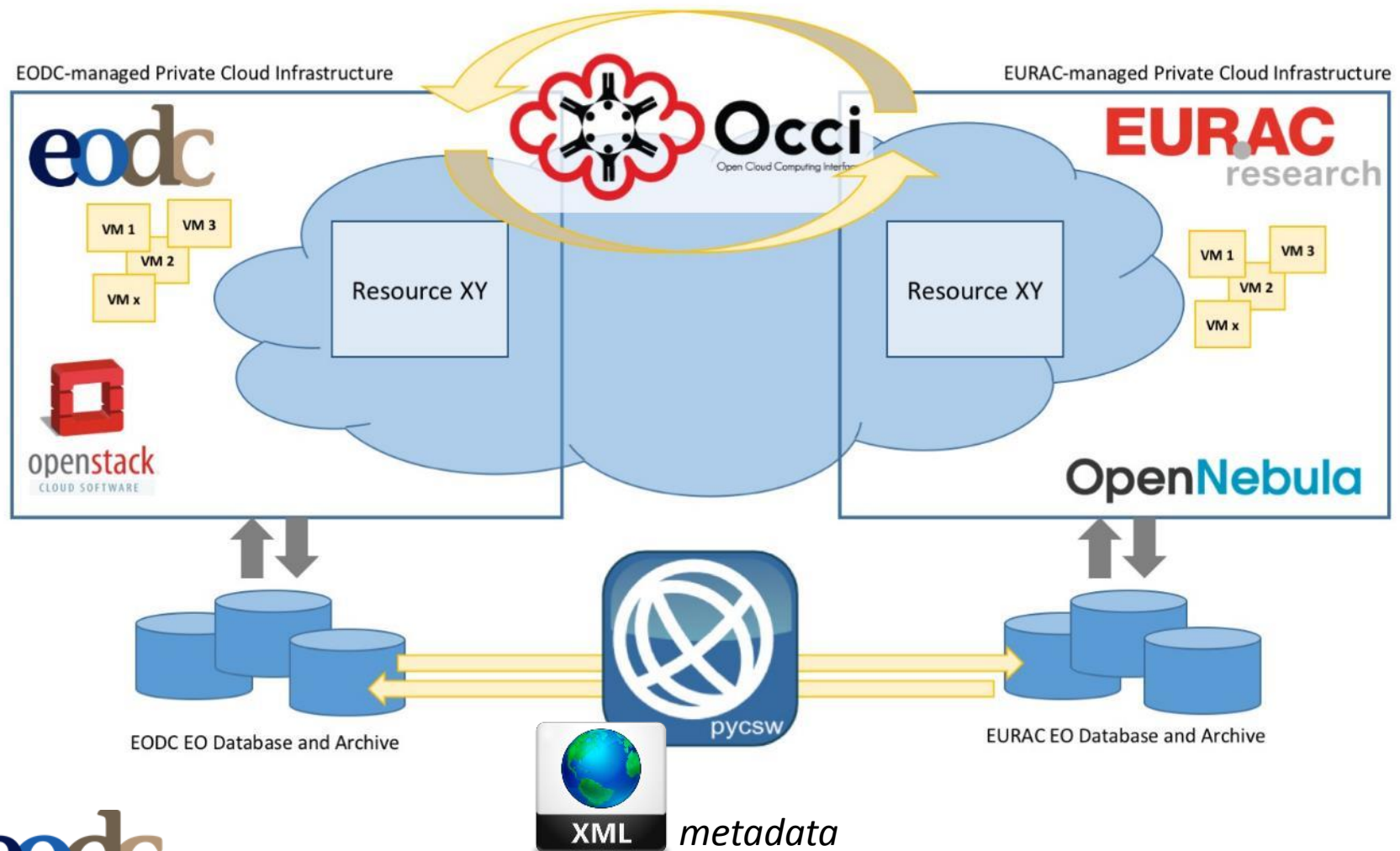


EODC's planned role the EO Ground Segment

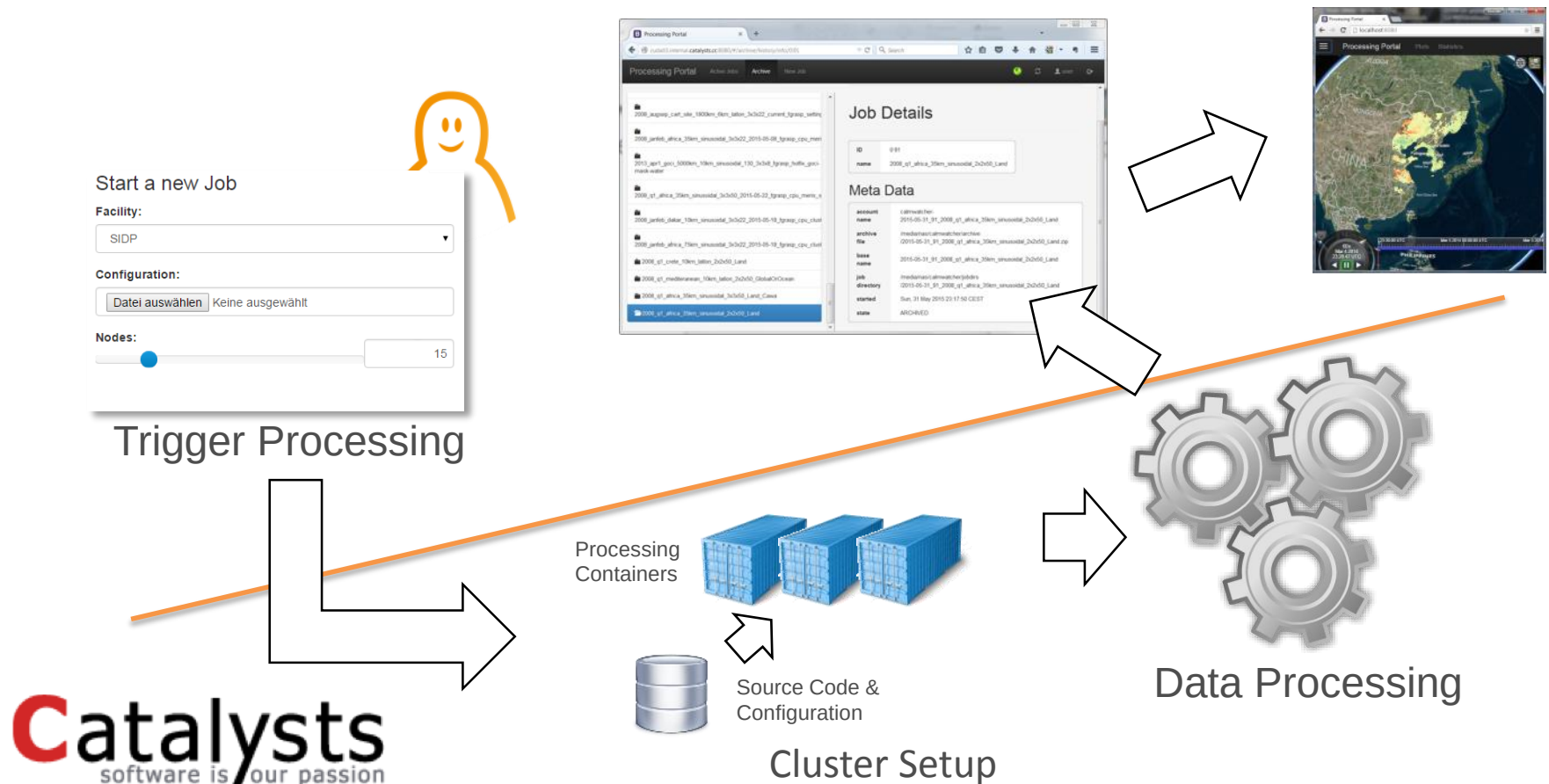


EODC works towards a federation of data centres

Federation of infrastructures and data



Processing framework and Compute cluster



- submit, track, monitor processing jobs
- manage job queues, interact with scheduler / cluster

Processing framework and Compute cluster



Processing Service Portal

SSO, communicates with IdP, processing chain configuration, parameter settings, connects to code repository, product delivery

Processing Service Cluster Controller(s)

scheduling, distribution of compute jobs
SLURM

Compute Cluster 1

Compute Cluster 2

Compute Cluster X

e.g. EO-Compute, VSC, SIDP
Production
(Python, R, Matlab / Octave, etc.)

Geo-server 1

Geo-server 2

Geo-server X

Delivery (WMS, WCS)

Services: S-1 image store

- EODC to host image store
 - currently in setup
- Pre-computed S-1 images for digital download
 - Europe, full-coverage
 - monthly backscatter products, composites, different polarizations
 - fully georeferenced
 - images provided by TU Wien

Services: S-2 L2A on-demand processor

- **Sentinel-2 metadata catalogue for EODC archive exploration**

- It allows queries for product, granules and image information
- uses actual geometry of Sentinel images, as well as actual cloud cover within requested AoI
- updated hourly



- **On-demand processing of Level 2A**

- Bottom-Of-Atmosphere, atmospherically corrected, Sentinel-2 data (globally).
- exploits the ESA Sen2Cor algorithm (currently version 2.2.1).
- Aerosol Optical Thickness, Water Vapor, Scene Classification Maps and Quality Indicators.
- Products are available in JPEG 2000 format, at three different spatial resolutions (60, 20 and 10 m).



<http://s2.boku.eodc.eu>

Services: S-2 L2A on-demand processor

- Value-added information such as: **RGB colour composites, Leaf Area Index, Albedo, fAPAR, etc.**
 - More products related to land and vegetation will be available in the future
- Data access is possible via **dedicated APIs**
 - A set of functions are already available and documented at the service webpage.
- A **dedicated R package** is under development to allow easy access to data



Services: S-2 L2A on-demand processor

Products Granules Images QI data Angles Regions of interest Jobs Wiki ▾ Status francesco.vuolo@boku.ac.at 1181 / 1000 Log out

Find

Show 10 ▾ entries

Date range

07/01/2016
-
07/31/2016

UTM tile

Clouds Coverage

from to
0 50

Coordinates (WGS-84)

21.83 ▾
34.15 ▾

GeoJSON:

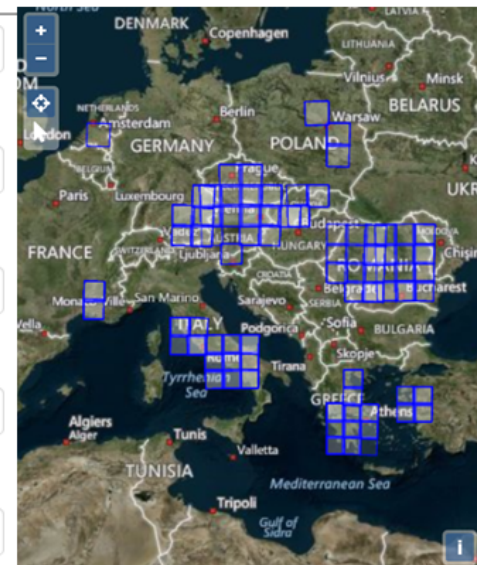
Atmospherically corrected

sen2cor >= 2.2 ▾

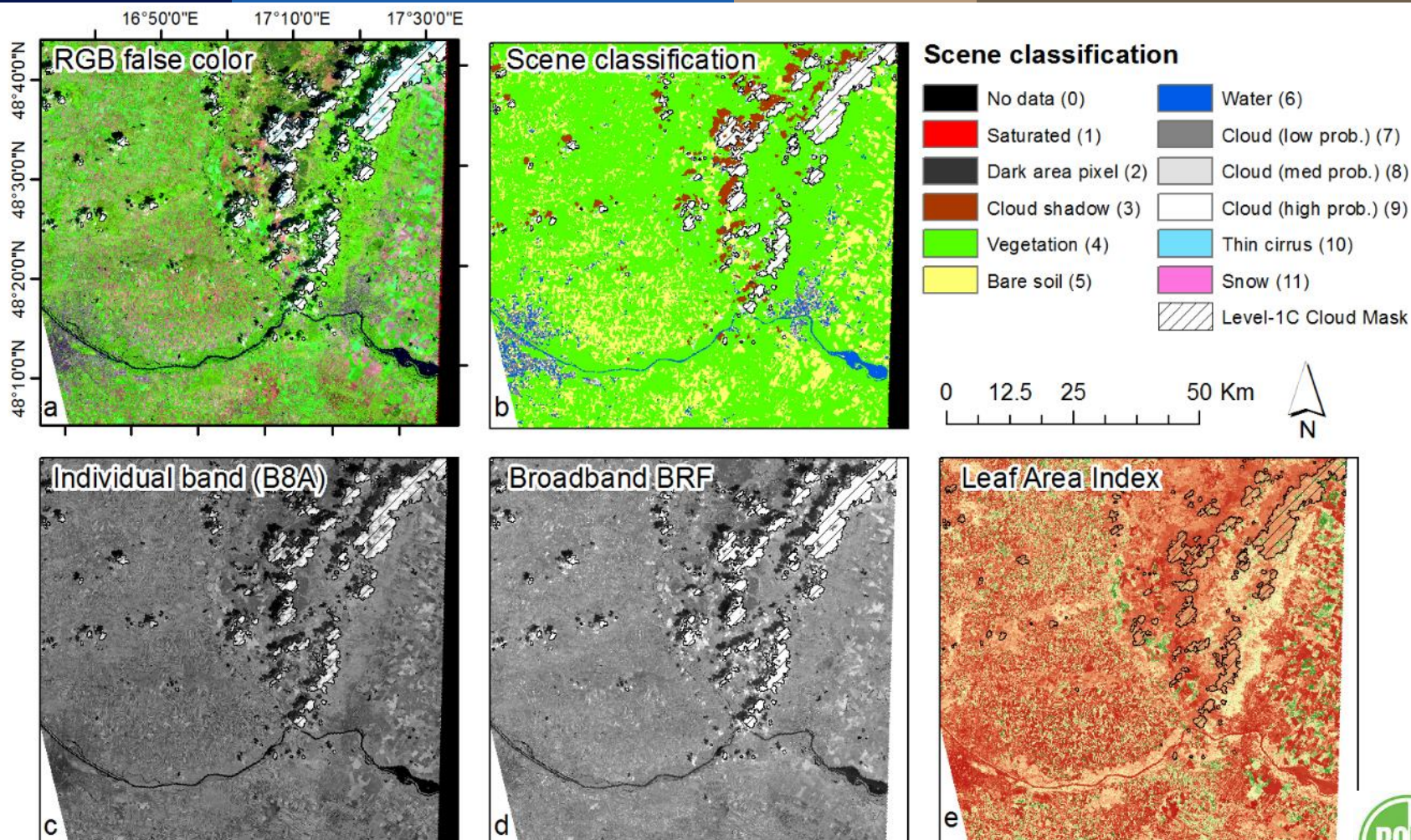
date ▾	processDate ▾	utm ▾	cloudCov ▾	atmCorr ▾	jobsCount ▾	go to ▾
2016-07-26 09:38:59	2016-07-26	34SEH	1	2.2	5	
2016-07-26 09:30:38	2016-07-26	34UEB	47	2.2	5	
2016-07-26 09:30:38	2016-07-26	34TGS	4	2.2	3	
2016-07-26 09:30:38	2016-07-26	34UEC	47	2.2	5	
2016-07-26 09:30:38	2016-07-26	34TGQ	0	2.2	3	

Showing 1 to 10 of 244 entries

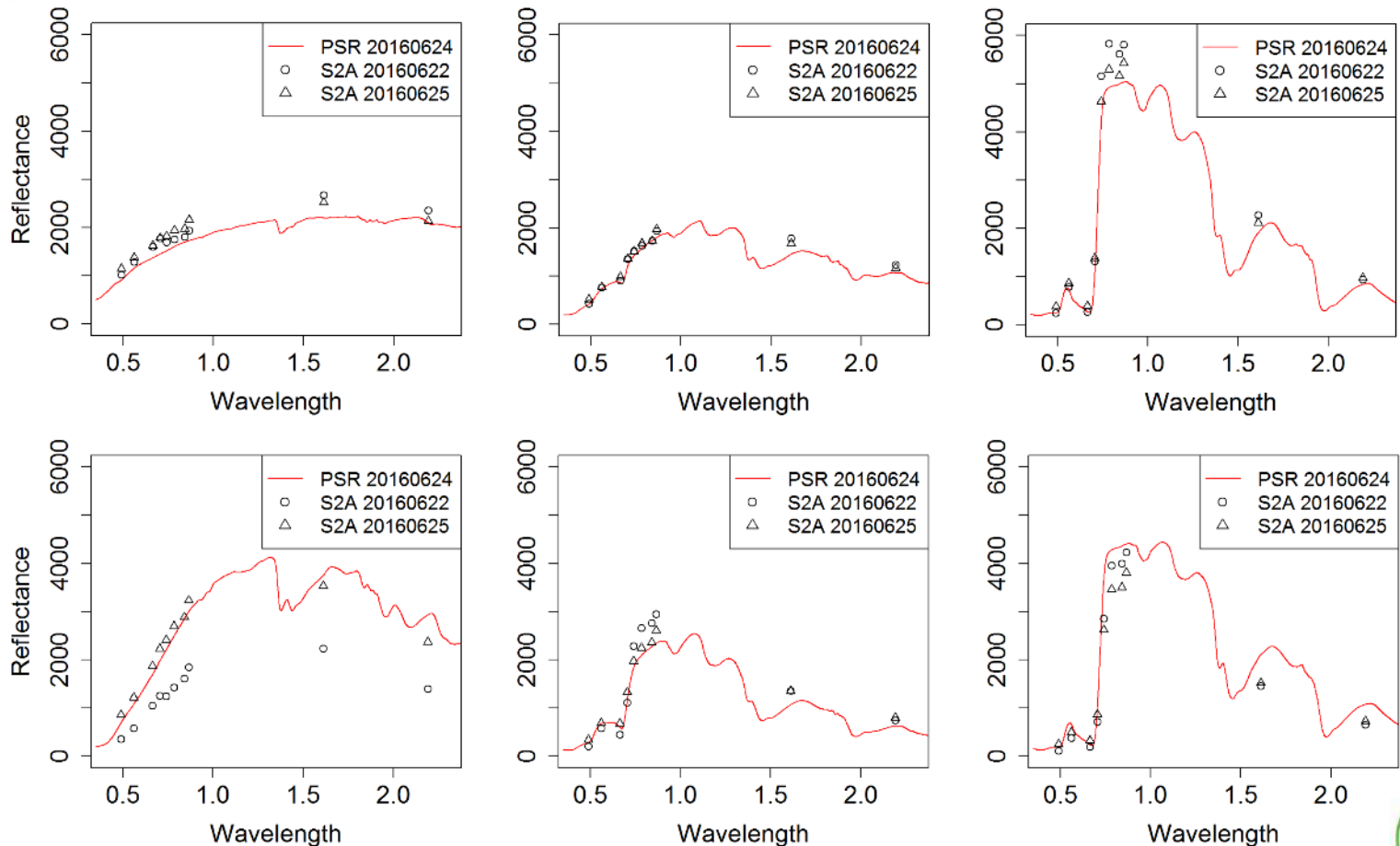
Previous 1 2 3 4 5 ... 25 Next



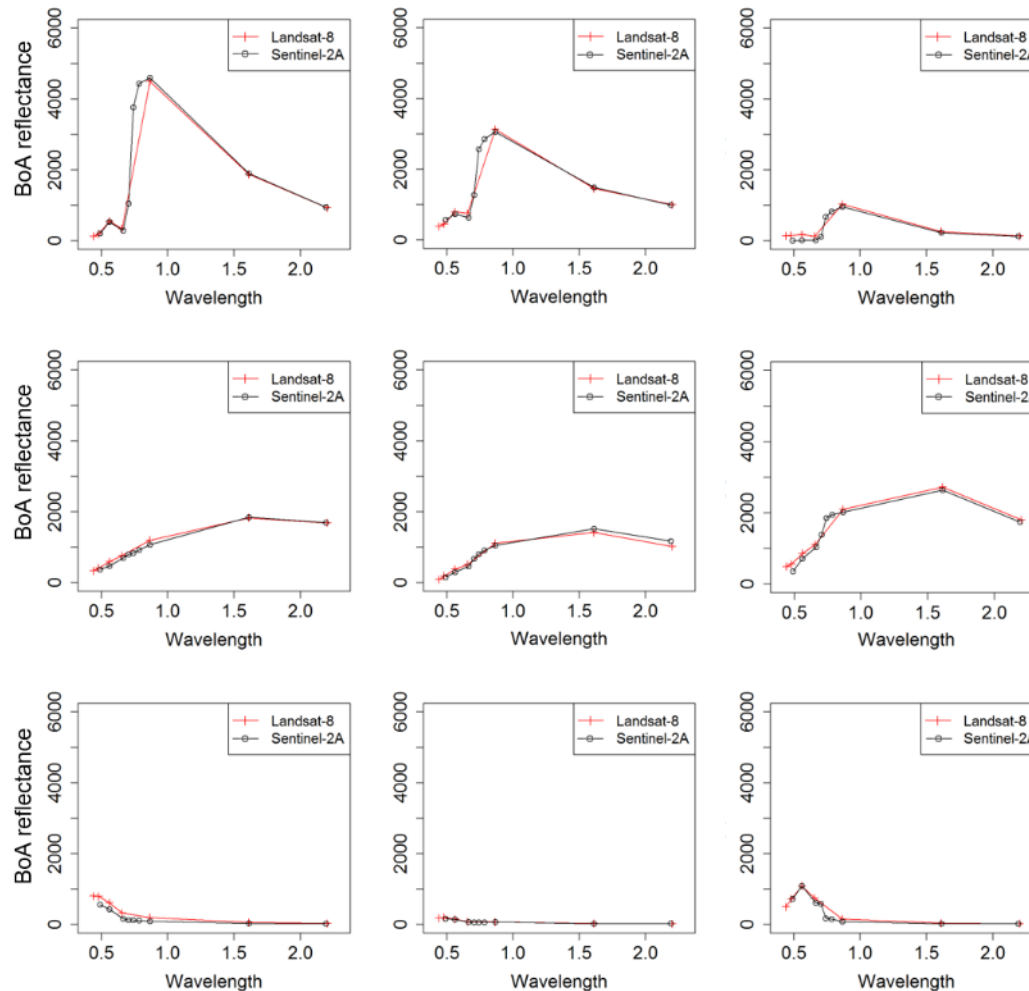
Example of products



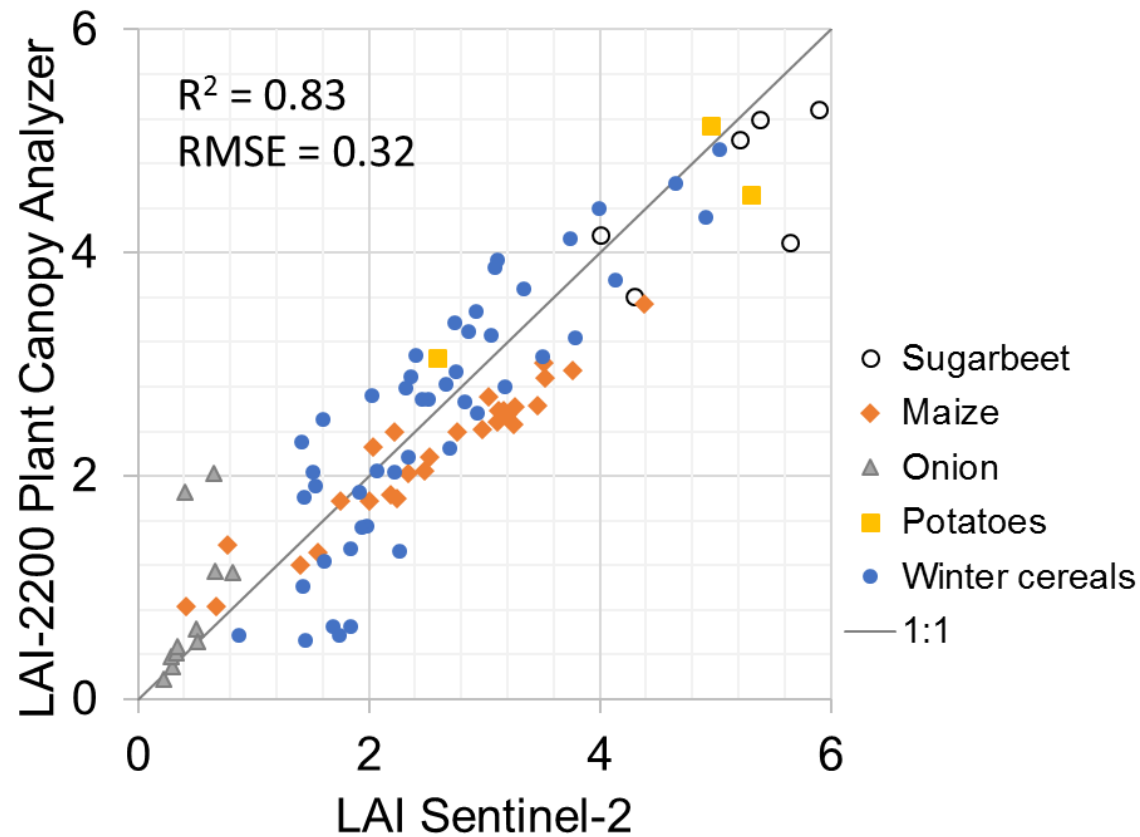
Surface reflectance: comparison with in-situ measurements



Surface reflectance: Landsat-8 vs Sentinel-2



Leaf area index



APIs and documentation

R

```
library(jsonlite)
login = URLEncode('putYourLoginHere', TRUE)
pswd = URLEncode('putYourPasswordHere', TRUE)

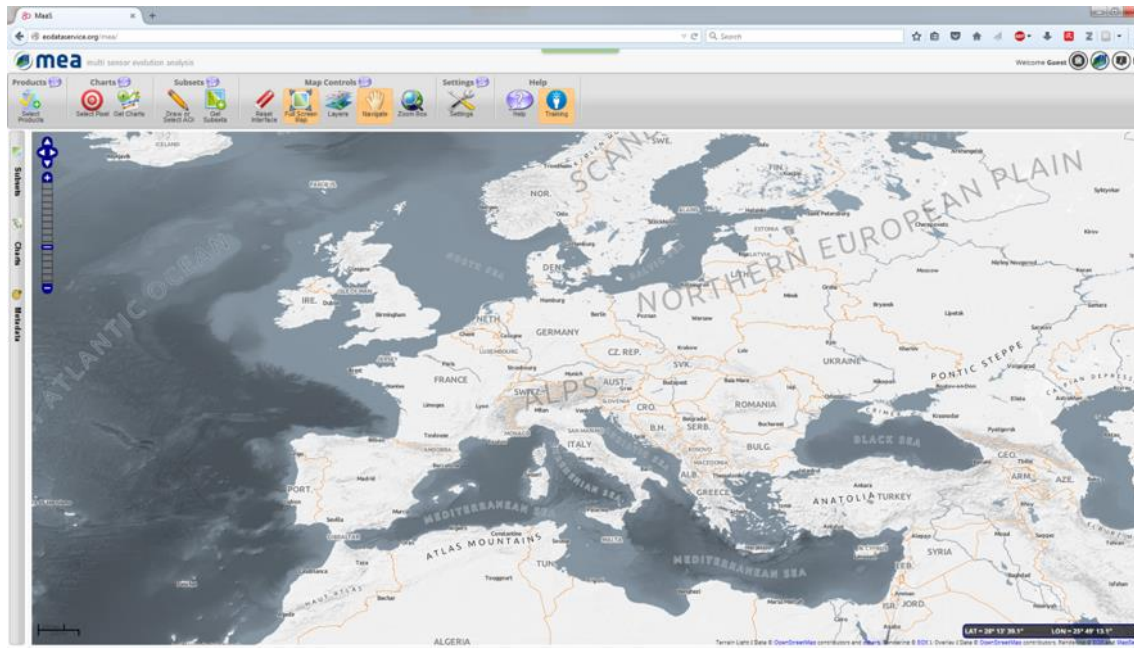
# find some granules
granules = fromJSON(sprintf('http://%s:%s@s2.boku.eodc.eu/granule?atmCorr=1&geometry={"type":"Point","coordinates":
[16.5,48.5]}' , login, pswd))
head(granules)

# find some images
images = fromJSON(sprintf('http://%s:%s@s2.boku.eodc.eu/image?atmCorr=1&band=B02&geometry={"type":"Point","coordina
tes":[16.5,48.5]}' , login, pswd))
head(images)

# download images
if(any(is.na(images$url))){
  warning('You lack permissions to download all images. Some will be skipped.')
}
images = images[!is.na(images$url), ]
for(i in seq_along(images$imageId)){
  download.file(images$url[i], paste0(images$imageId[i], '.jp2'), mode = 'wb', quiet = TRUE)
}
```

Hosting of a public service

- Multi-Sensor Evolution Analysis MEA
(WCS and WCPS services) developed by MEEEO) and
hosted at EODC's SIDP



rasdaman
raster data manager

MEEEO
Multi-Earth Observation
Evolution Analysis

esa eodc

<http://eodatacube.eu/>

EODC: international partnership

■ 15 Cooperation Partners from 8 countries

Principle Cooperation Partners (9)



Vienna University of Technology
Karlsplatz 13, 1040 Vienna, Austria
<http://www.tuwien.ac.at>
Contact: Vizirektor Prof. Dr. Johannes Fröhlich



Zentralanstalt für Meteorologie und
Geodynamik – ZAMG
Hohe Warte 38, 1090 Vienna, Austria
<http://www.zamg.ac.at>
Contact: Dr. Michael Staudinger



GeoVille Information Systems GmbH
Sparkassenplatz 2, 3rd Floor, 6020
Innsbruck, Austria
<http://www.geoville.com>
Contact: Dr. Christian Hoffmann



Catalysts GmbH
Gruberstraße 19, 4232 Hagenberg, Austria
<http://www.catalysts.cc>
Contact: Dipl.-Ing. Christian Federspiel



Universität für Bodenkultur Wien
Gregor-Mendel-Straße 33, A-1180 Wien, Austria
<http://www.boku.ac.at>
Contact: Prof. Dr. Clement Atzberger



Global Change Research Centre Academy of
Sciences of the Czech Republic
Mendel Zemedelska 1, 613 00, Brno, Czech
Republic
<http://www.czechglobe.cz/en/>
Contact: Dr. Mirek Trnka



EURAC research
Institute for Applied Remote Sensing,
Viale Druso 1, I-39100 Bolzano, Italy
<http://www.eurac.edu>
Contact: Dr. Claudia Notarnicola



MEOO S.r.l.
Viale Volano 195/A Int. 2
I-44123 Ferrara, Italy
<http://www.meo.it>
Contact: Simone Mantovani



VITO NV
Flanders' research and technology organisation on
cleantech and sustainable development,
Boeretang 200, 2400 Mol, Belgium
<http://www.vito.be>
Contact: Dr. Bart Deronde



AW Software und Technologie GmbH
Mariahilfer Straße 47/3/1, 1060 Vienna, Austria
<http://www.awst.at>
Contact: Dr. Alexander Boresch



JOANNEUM RESEARCH
FORSCHUNGSGESELLSCHAFT MBH
Leonhardstraße 59, 8010 Graz, Austria
<http://www.joanneum.at>
Contact: Prof. Dr. Mathias Schardt



Finnish Geospatial Research Institute in
the National Land Survey of Finland
Geodeetinrinne 2, FI-02430, Masala, Finland
<http://www.fgi.fi>
Contact: Eetu Puttonen



VanderSat
Huygensstraat 34, 2201 DK Noordwijk, the
Netherlands
<http://www.vandersat.com/>
Contact: Dr. Richard de Jeu



Monash University
Faculty of Engineering, 23 College Walk,
Clayton, Victoria 3800, Australia
<http://www.monash.edu>
Contact: Dr. Chris Rudiger



University of Zurich
Remote Sensing Laboratories,
Winterthurerstrasse 190, CH – 8057 Zurich,
Switzerland
<http://www.geo.uzh.ch/en/units/rs/>
Contact: David Small



EODC Forum 2016

31. May and 1. June 2016



- 92 participants
- 40 organisations
- 8 countries



A service offered by
the City of Vienna



<https://www.eodc.eu/another-successful-eodc-forum/>



Christian Briebe :: EuroSDR :: "Preparations for the Sentinel-2 in Europe" :: October 11th, 2016

EODC to host Copernicus Hackathon

DEVPOST Jobs NYC Hackathons Log in [Sign up](#)



Home Participants Rules Submissions Updates Discussions

Create valuable applications by using the Earth observation data

REGISTER HERE TO ATTEND ON 4 & 5 of November: <https://www.eventbrite.de/e/copernicus-earth-observation-data-hackathon-tickets-27433362927>

Copernicus is a **European system for monitoring the Earth** (www.copernicus.eu) . It collects data from multiple sources: earth observation satellites and in situ sensors such as ground stations, air-borne and sea-borne sensors. Data is related to following fields:

- Atmosphere Monitoring
- Marine Environment Monitoring
- Land Monitoring
- Climate Change
- Emergency Management
- Security

Register for this hackathon

Register to receive important hackathon updates, find teammates, and submit your entry.

Submissions open soon
Nov 4 – 5, 2016
[view all dates](#)

 **INITs**
[Maria-Jacobi G. 1, 1030 Wien, Austria](#)

Invite others to compete
  

Summary

- EODC acts as community facilitator
- The EODC network represents a new model of collaboration in earth observation, it strives to
 - Develop and operate shared resources
 - Connect Science with Operations
 - Share Know-How between different organisationsto the benefit of its cooperation partners and service users
- EODC would like to support the European Commission and ESA to work towards a federated European infrastructure
- **Goal:** international visible and sustainable role for the EODC network

Contact: <https://www.eodc.eu/>, office@eodc.eu, +43 699 1668 7510