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

EODC - Collaboration for Earth Observation

EO Infrastruktur für die Erstellung globaler Modelle

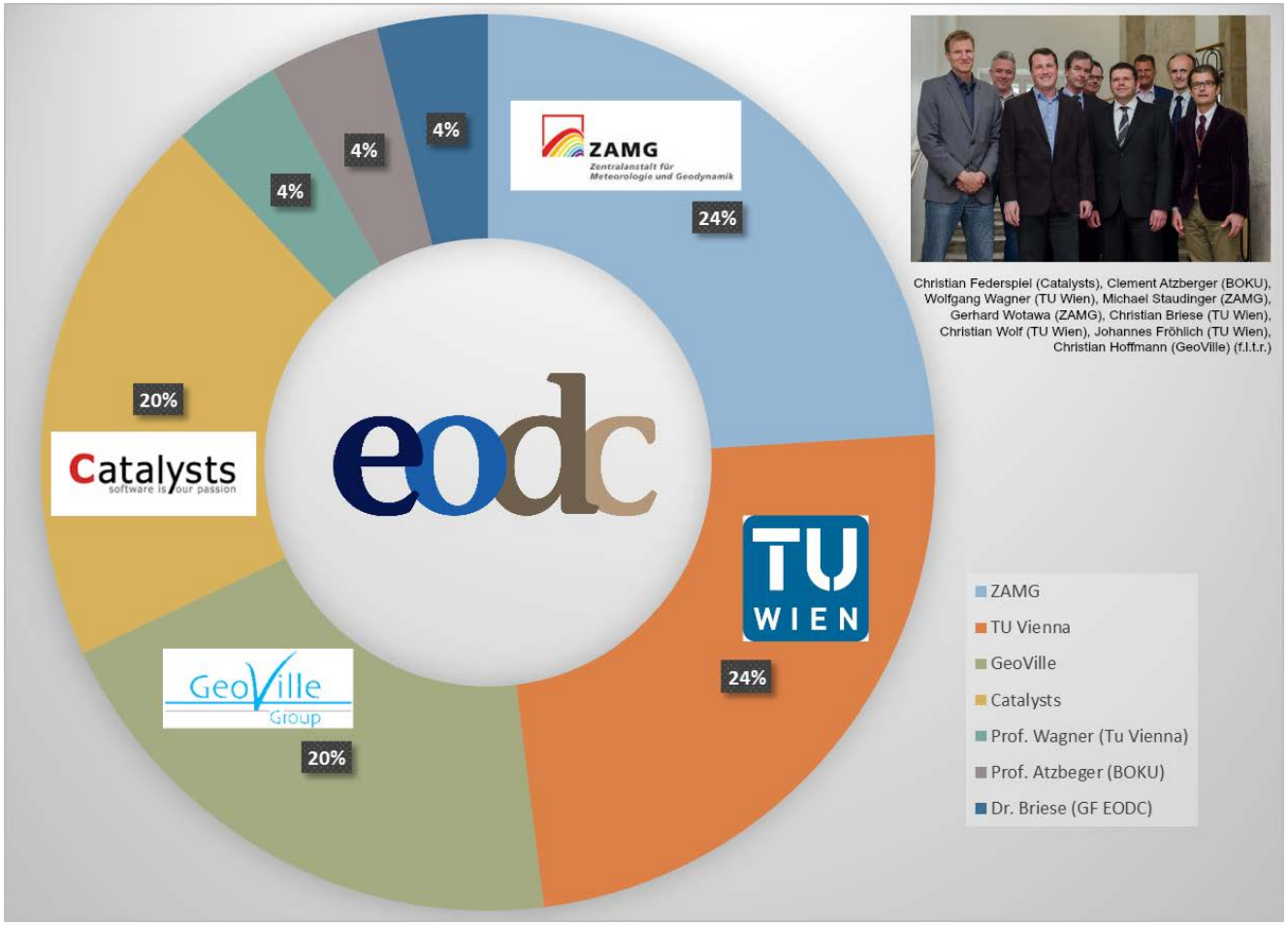
(Sentinel-1, Sentinel-2 und Sentinel-3)

Christian Briese & the EODC Team

EODC Overview and Mission

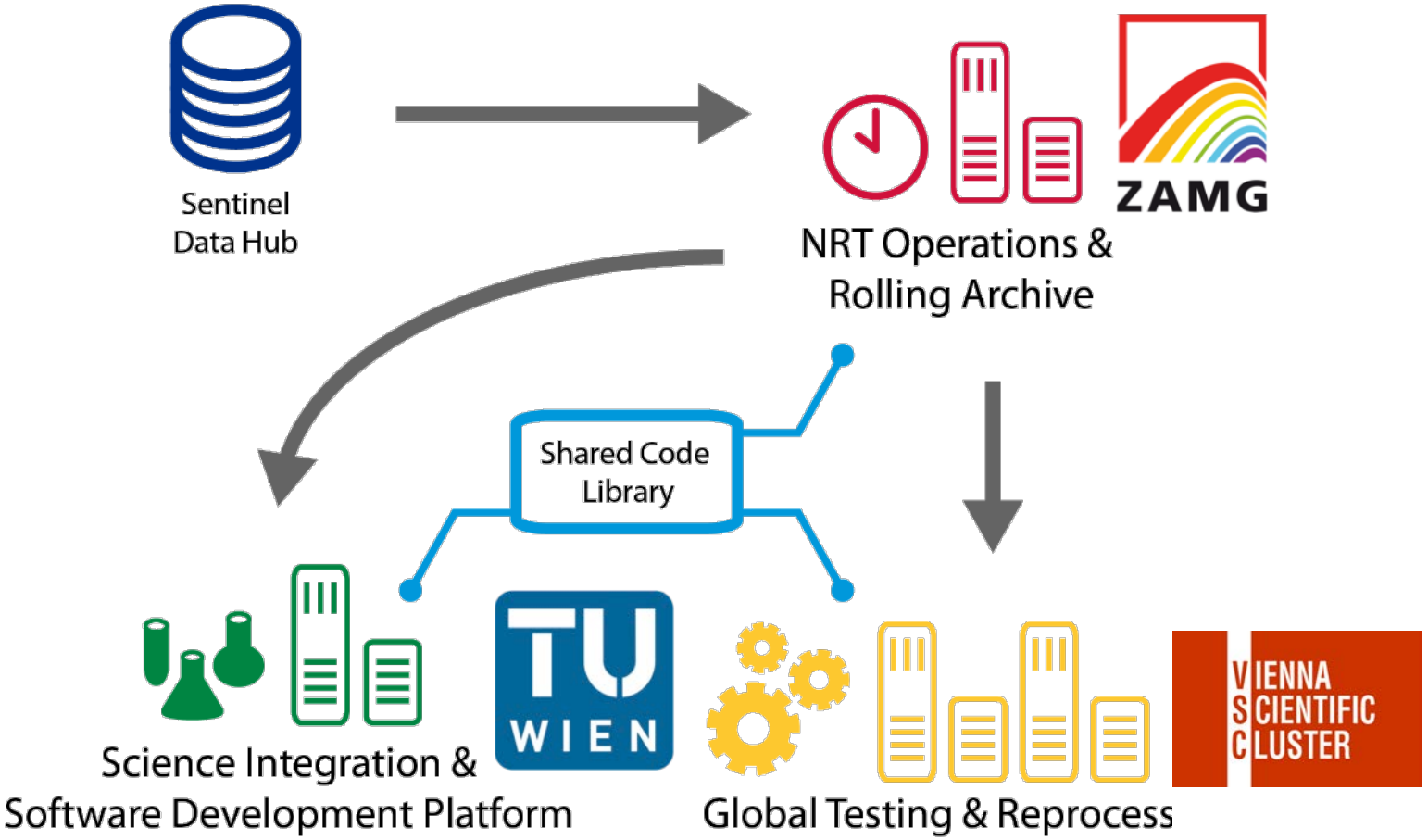
- SME founded in 2014: **public-private partnership**
- EODC serves as **community facilitator** for **collaboration between public and private partners** with the aim to
  - Establish, manage and operate a **joint IT infrastructure** offering **Big EO Data storage** and **high performance computing (HPC)**
  - **Provide data, processing chains and value-added products**
  - To offer a **virtual research, development and operation environment**

EODC Shareholders

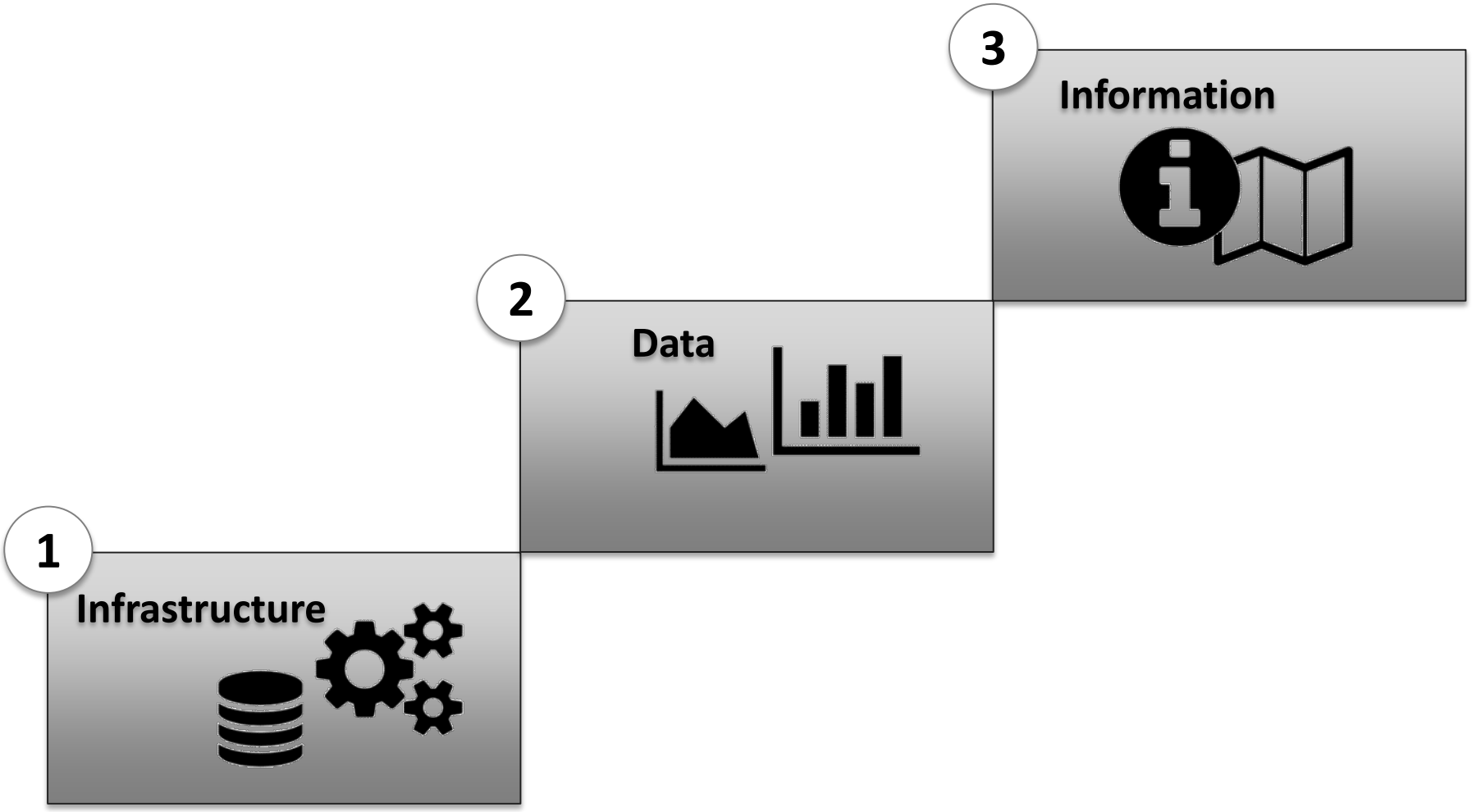


Christian Federspiel (Catalysts), Clement Atzberger (BOKU), Wolfgang Wagner (TU Wien), Michael Staudinger (ZAMG), Gerhard Wotawa (ZAMG), Christian Briese (TU Wien), Christian Wolf (TU Wien), Johannes Fröhlich (TU Wien), Christian Hoffmann (GeoVille) (f.l.t.r.)

Connecting Science and Operations



Operative EO services offered by EODC



1 Infrastructure services

Procurement, Setup, Maintenance

Evolution, Improvement, Extension

Virtualization, Federation

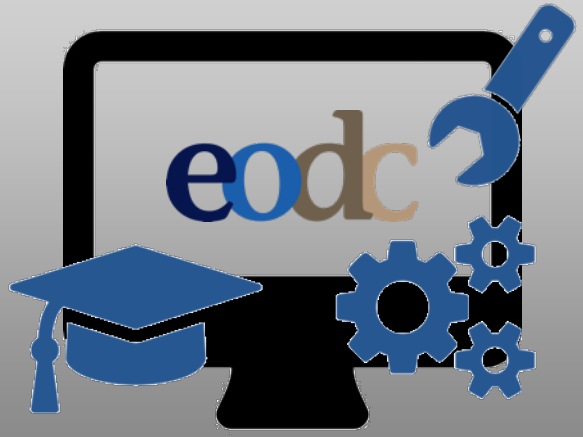
Synchronization, Backup

Search, Discovery, Retrieval

2 Data services

Sentinel – 2
MSI L1B, C

Sentinel – 1
SAR L1 SLC, GRD



Experimentation environments
Analysis tools
Processing software

Sentinel – 3
OLCI L1, SLSTR L1

Current EO Data @ EODC

- **Thematic scope** of EODC is **steered by its cooperation partners and driven by project funding/business opportunities**
  - Sentinel-1, Sentinel-2, Sentinel-3, …
  - Airborne laser scanning and digital imaging

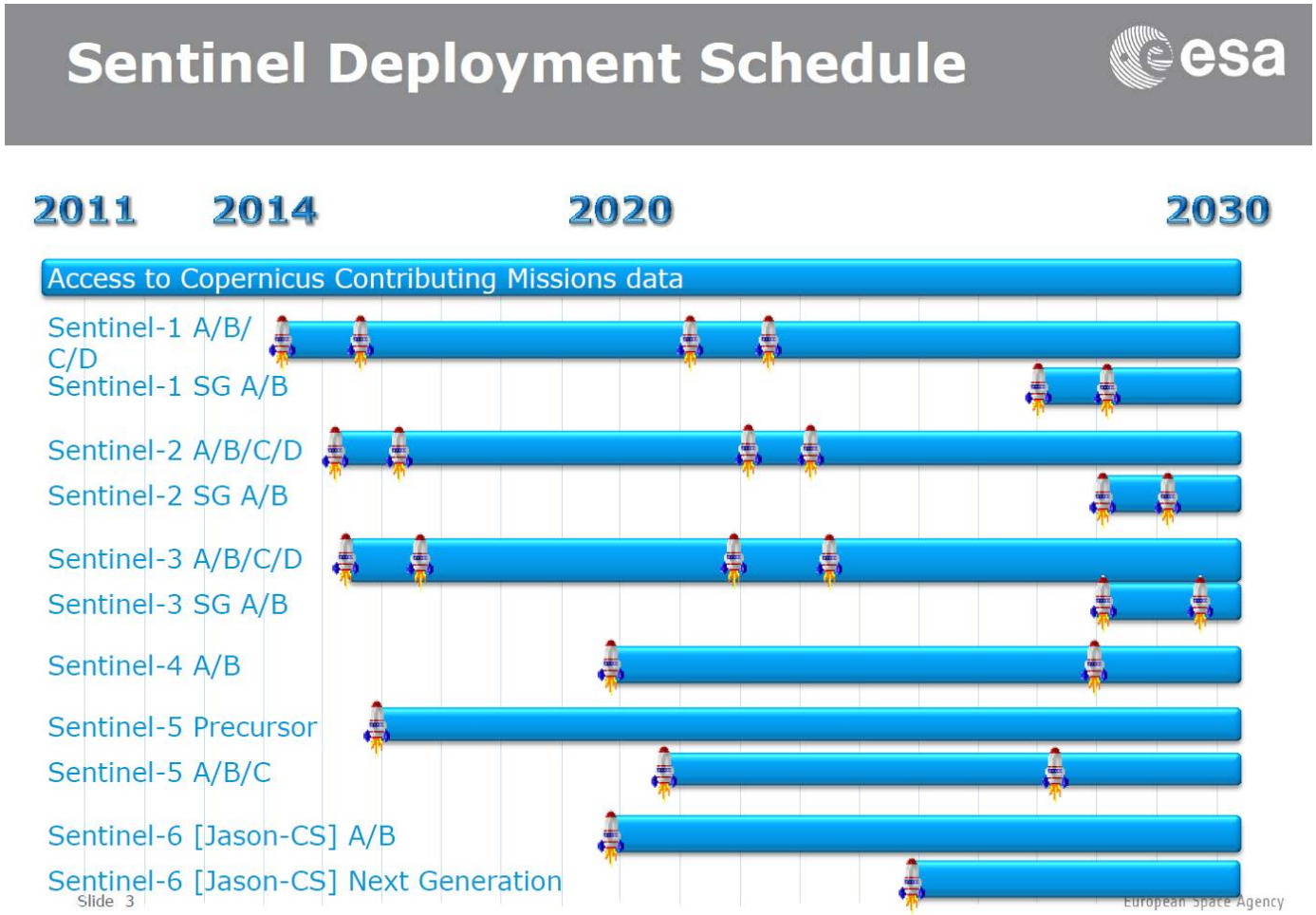

Sentinel-1


Sentinel-2


Sentinel-3

Satellite	Temporal	Product
Sentinel-1	static	Water Bodies
		Forest / Non-Forest
		Rice
	dynamic	Water Bodies
		Rice and Growing Status
		Soil Moisture
		Soil Water Index
		Start of Soil Water Season
		Dry / Wet Indices
		Flooding
		Snow
		Freeze / Thaw
Sentinel-2	static	Forest / Non-Forest
		Biomass Indices
		Land Cover
		Glacier Area
	dynamic	Forest Functional Parameters
		Evapotranspiration
		Lakes Water Quality
Sentinel-3	static	Glacier Area
	dynamic	Snow
		Lake / River Levels

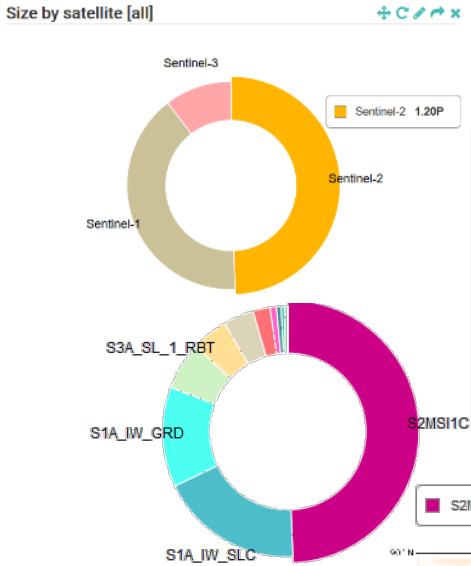
Timeline: Sentinel Satellites

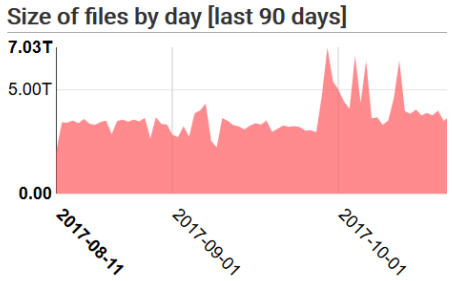


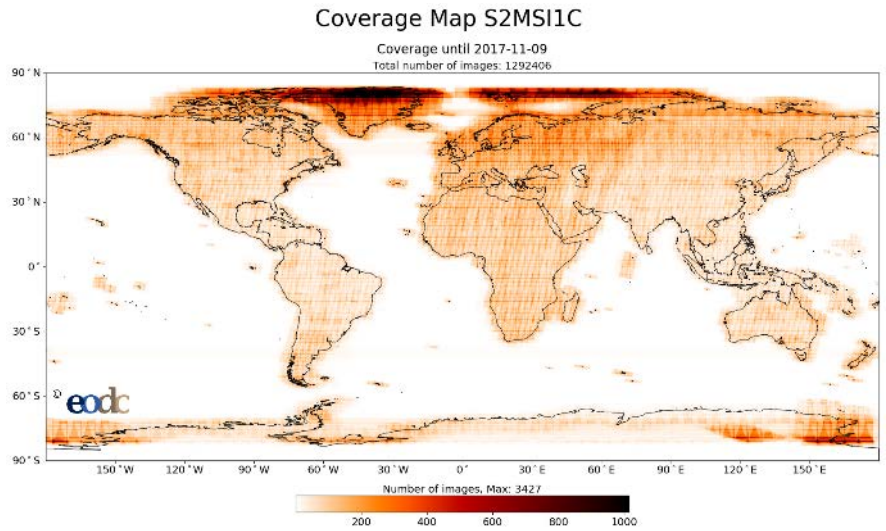
Source: ESA, 27.5.2014

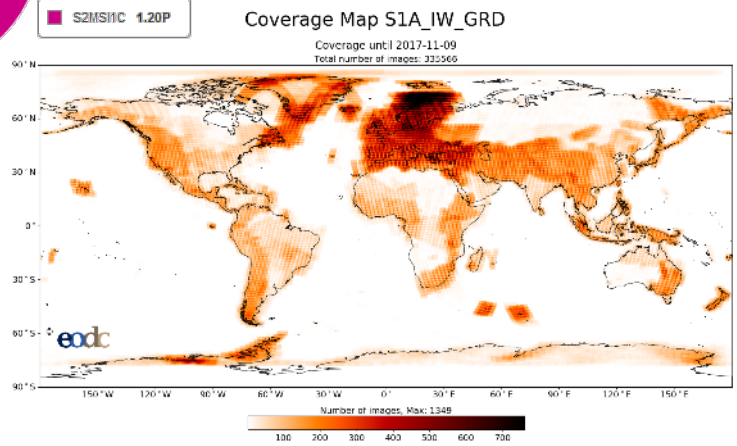
EO Sentinel data archive (Status 09.11.2017)

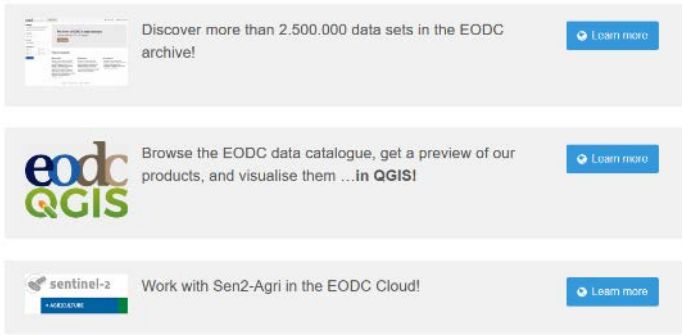
Sentinel-1a, Sentinel-1b, Sentinel-2a, Sentinel-3a











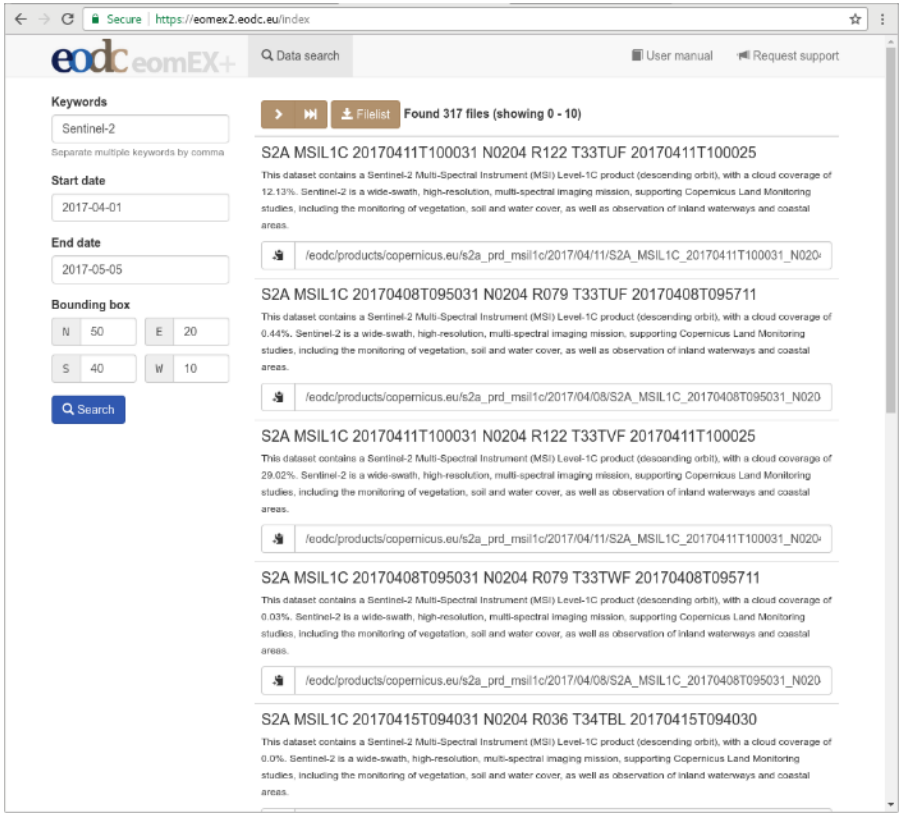
https://www.eodc.eu/services/data-services/

EODC Metadata Infrastructure

eomEX+

- Earth Observation Metadata Explorer
- Web interface to the EODC Metadata infrastructure
- Web GUI
- Simple API

https://eomex.eodc.eu



3 Information services

Value-added products

Quality Improvement and Control

Data and product delivery

IT infrastructure operated by EODC

ZAMG Austrian National Copernicus Mirror

ZAMG NRT Operations & Rolling Archive

EODC's co-located IT components

VIENNA SCIENTIFIC CLUSTER

Object 214 – TU Wien Science Centre (Arsenal)

SIDP
Cloud Plattform
200 cores
5.32 TB RAM
122 TB Disc Storage

VSC-3
Supercomputer
>32.000 cores
>128 TB RAM
600 TB HDD (clustered FS)

Ethernet 2 x 10 GBit

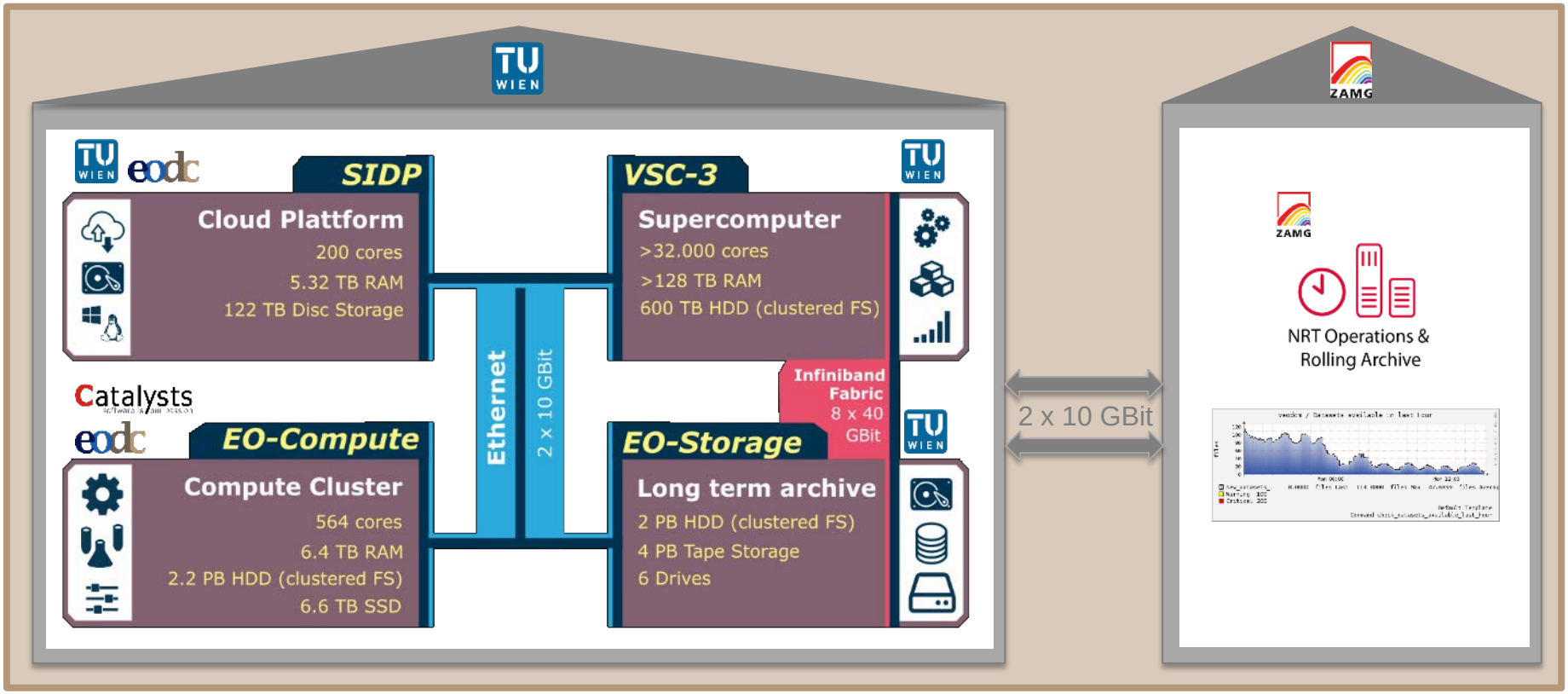
Infiniband Fabric 8 x 40 GBit

EO-Compute
Compute Cluster
564 cores
6.4 TB RAM
2.2 PB HDD (clustered FS)
6.6 TB SSD

EO-Storage
Long term archive
2 PB HDD (clustered FS)
4 PB Tape Storage
6 Drives

TU WIEN

IT infrastructure operated by EODC



SIDP: Science Integration and Development

- Fully equipped and flexible cloud infrastructure
  - managed by EODC

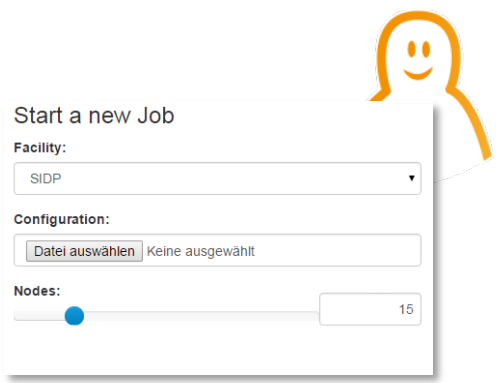
- Usage depends on user‘s needs:
  - Remote Workstation: develop methods & algorithms from virtually anywhere
  - Small-scale compute environment for testing
  - Host own services

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

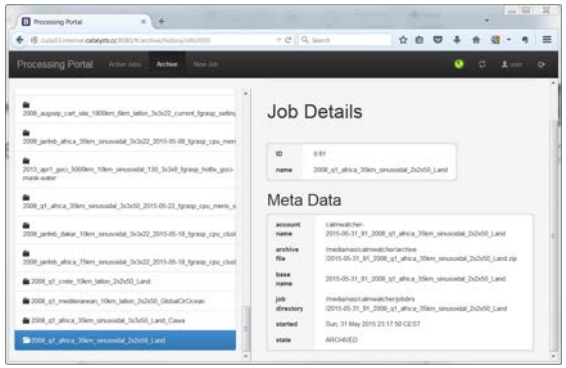
- Hosted by Science Center of TU Wien
  - *Physically co-located with EODC SIDP and storage*
  - Direct InfiniBand interconnection to VSC-3
- Specifications:
  - > 2000 nodes
    - ➔ ca. 32.000 cores
  - > 600 Teraflops
    - ➔ #85 Top500 Nov/14

Austrian initiative on high performance computing

Processing framework and Compute cluster



Trigger Processing

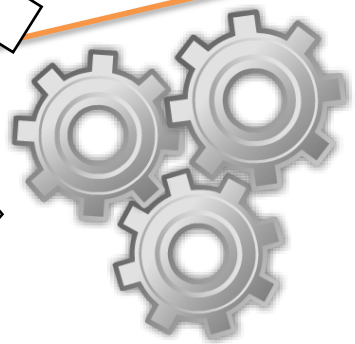


Browse Results

Processing Containers

Source Code & Configuration

Cluster Setup



Data Processing

Catalysts
software is our passion

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

eodc

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

VM(s)

EO-Compute

VSC-3

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

Data Storage

Data and results

Geo-server X

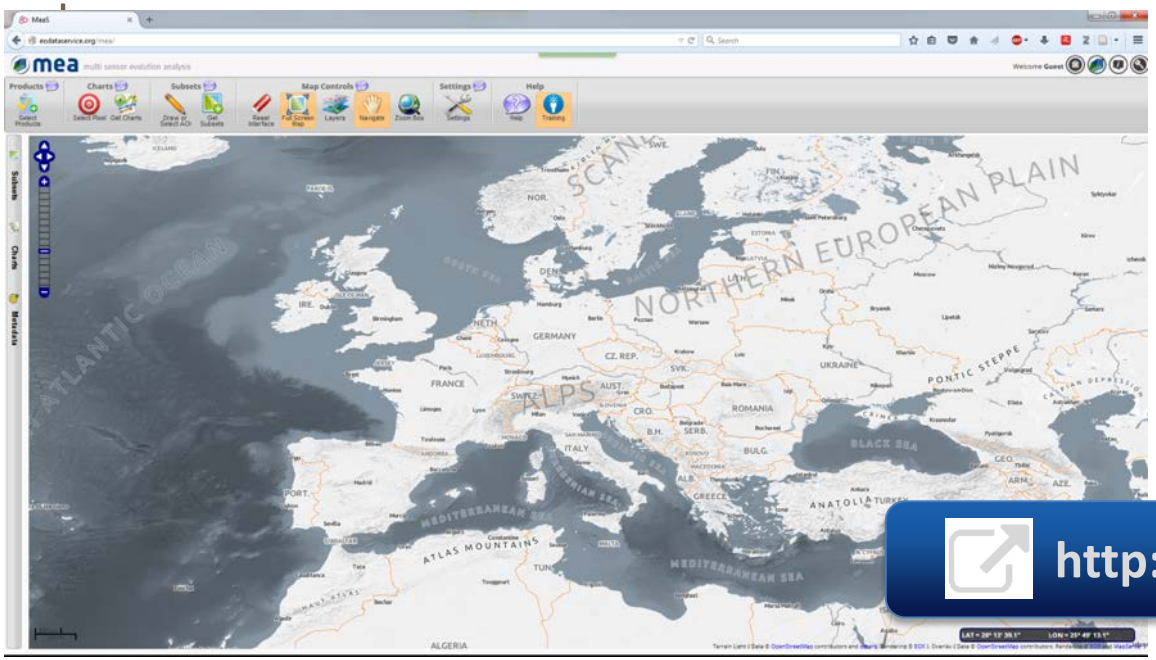
Delivery (WMS, WCS)

https://processing.eodc.eu

Hosting

- Multi-Sensor Evolution Analysis MEA

  (WCS and WCPS services) developed by company **MEEO**) and hosted at EODC's SIDP, based on Landsat

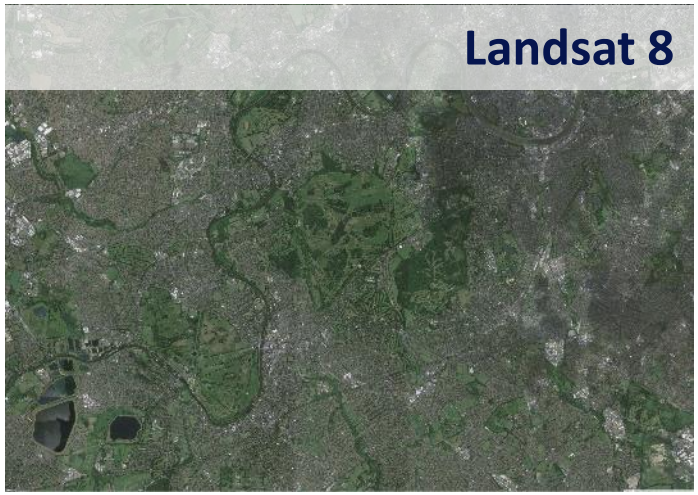


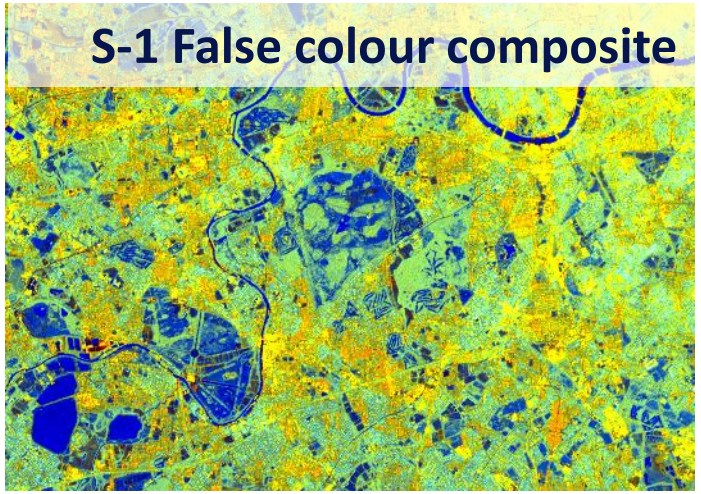
rasdaman MEEO esa eodc

http://eodatacube.eu/

Service: 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





S-2 L2A on-demand processor

- **Sentinel-2 metadata catalogue for EODC archive exploration**
  - It allows queries for product, granules and image information
- **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

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

Date range

07/01/2016

-

07/31/2016

UTM tile

Clouds Coverage

from 0 to 50

Coordinates (WGS-84)

21.83

34.15

GeoJSON:

Atmospherically corrected

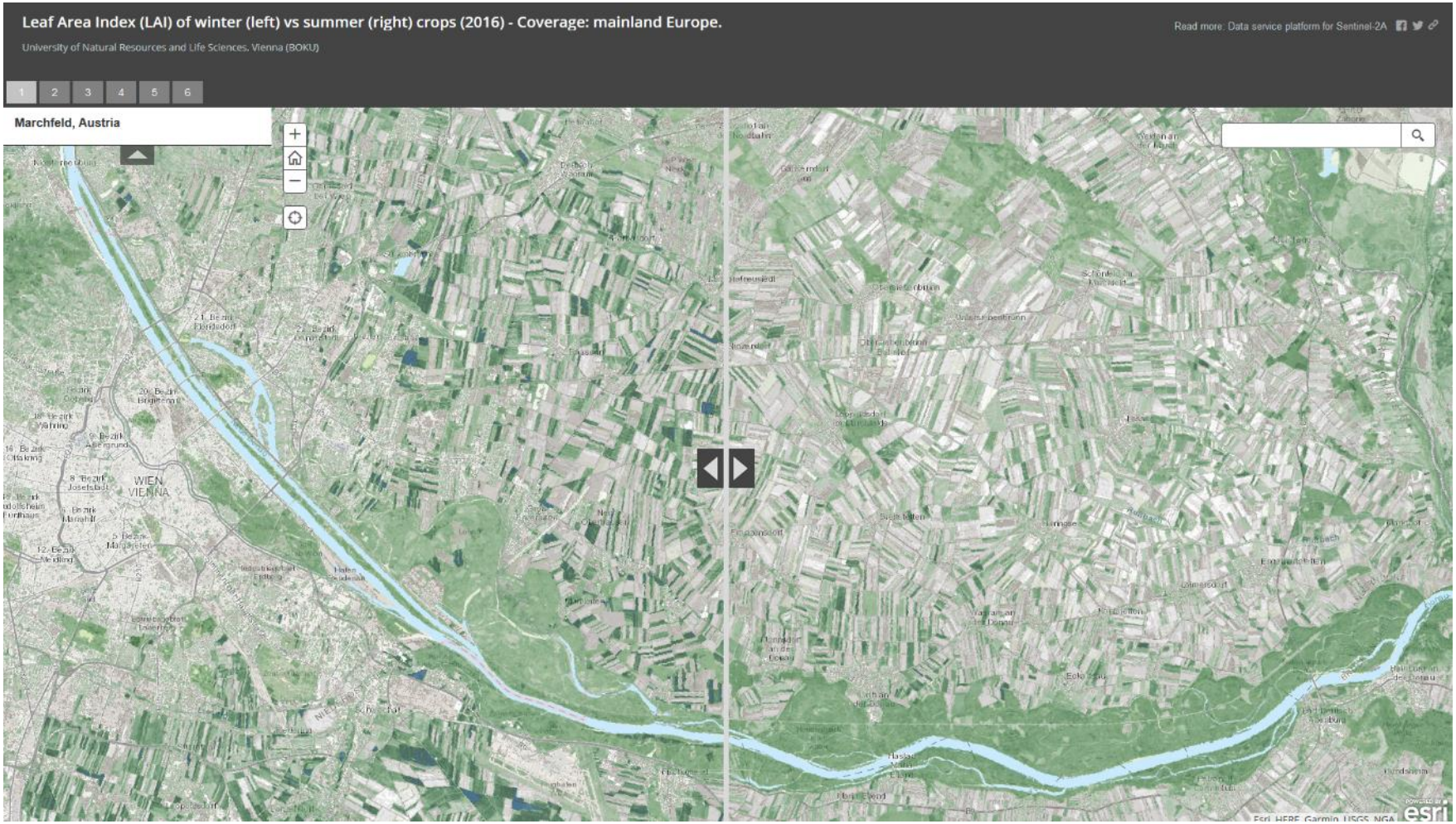
sen2cor >= 2.2

Show 10 entries

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

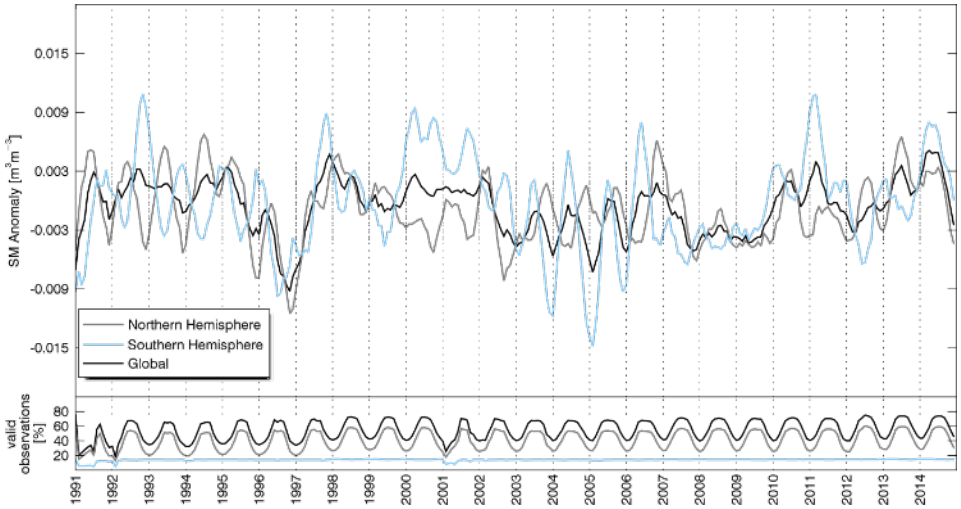
Leaf Area Index (LAI)



Service: Soil moisture

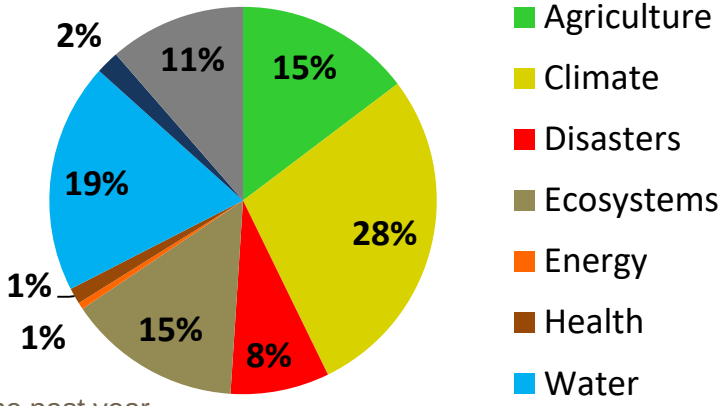
soil moisture cci

Global long-term satellite based SM



[Dorigo et al., 2015, BAMS State of the climate in 2014]

more than 2640 registered users

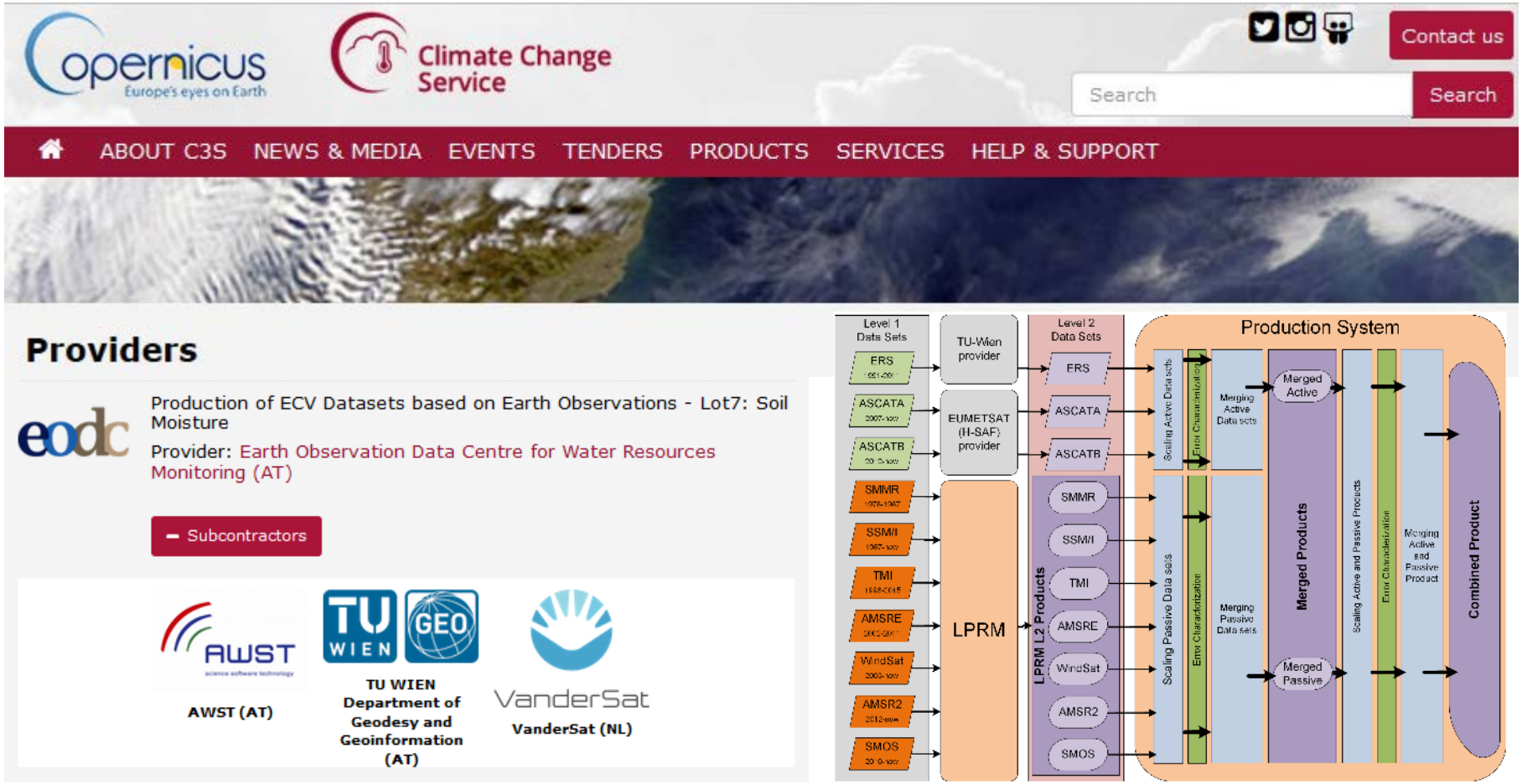


Agriculture is growing +2% in the past year

climate change initiative

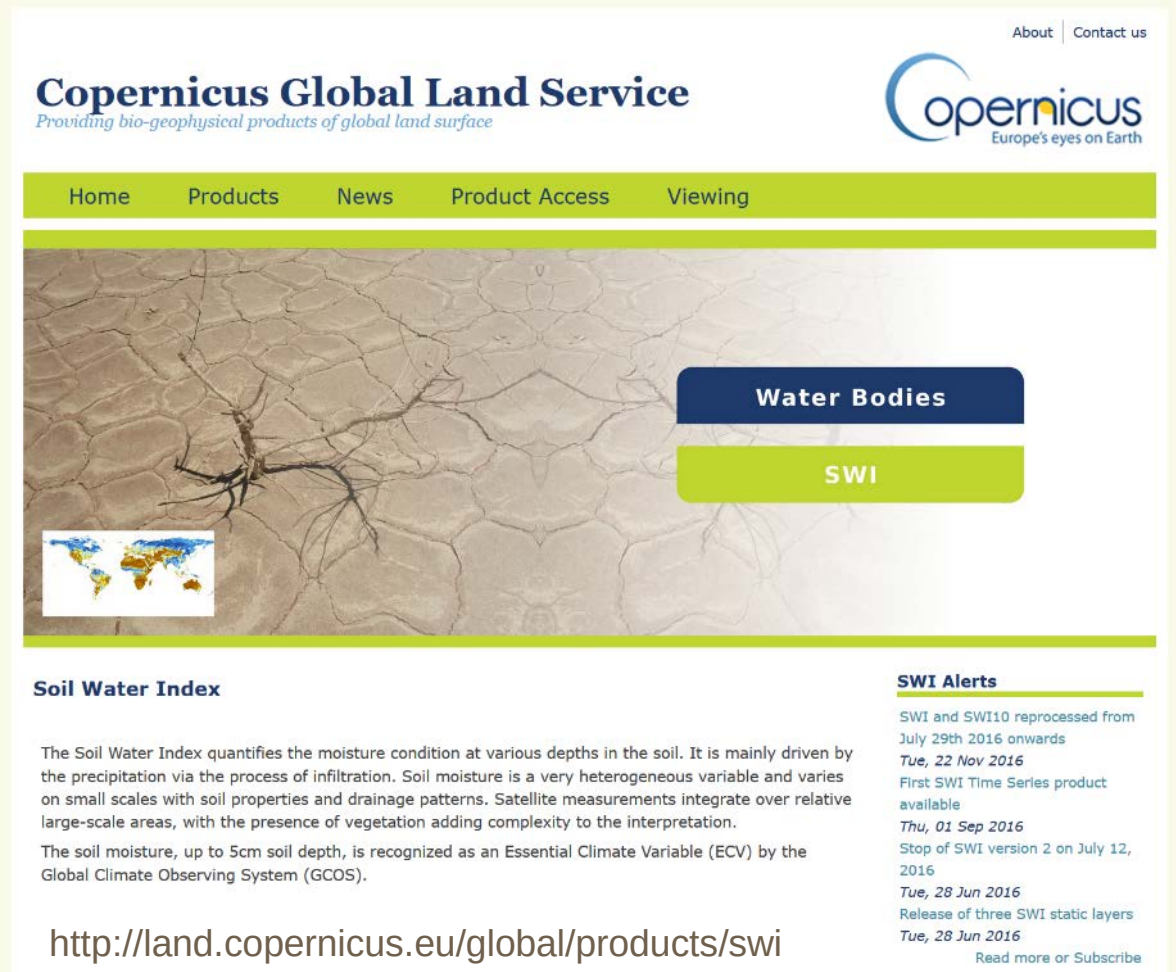
European Space Agency

Copernicus Climate Change Service (C3S)



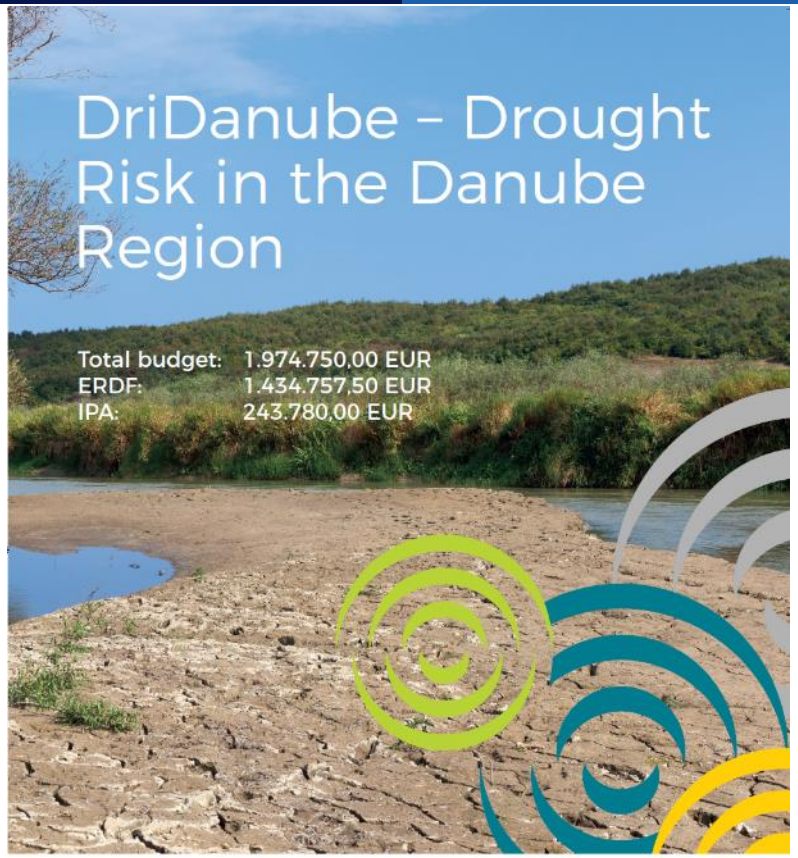
https://climate.copernicus.eu/providers

Copernicus Global Land Service

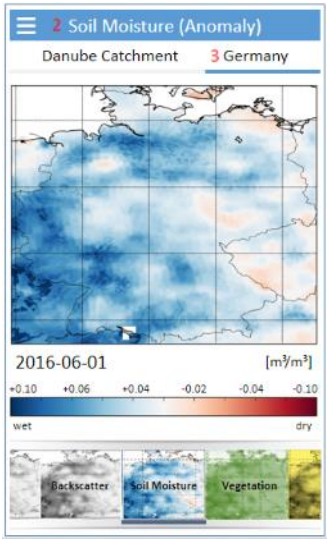


http://land.copernicus.eu/global/products/swi

Interreg Project: DriDanube



EODC leads WP3 “Drought User Service” and provides the IT platform



Interreg
Danube Transnational Programme
DriDanube

www.interreg-danube.eu/dridanube

Project co-funded by European Union funds (ERDF, IPA)

eodc

EODC: international partnership

- 16 Cooperation Partners from 8 countries

Principle Cooperation Partners (8)

Vienna University of Technology
Karlsplatz 13, 1040 Vienna, Austria
http://www.tuwien.ac.at
Contact: Vizerektor 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

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

Associate Cooperation Partners (8)

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

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

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

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

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

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

United Nations World Food Program
Via Cesare Giulio Viola, 68-70, 00148 Rome, Italy
http://www.wfp.org
Contact: Dr. Rogério Bonifácio

University of Graz, Wegener Center for Climate and Global Change (WEGC)
Brandhofgasse 5, 8010 Graz, Austria
https://wegcenter.uni-graz.at/
Contact: Univ.-Prof. Dr. Gottfried Kirchengast

Further Options for Cooperation:

Individual agreements

- with further **organisations**
- with **individuals** (e.g. researchers)

Copernicus Hackathon
Vienna, 4/5 November 2016

bmvit Bundesministerium für Verkehr, Innovation und Technologie

FFG

INiTS Innovation into Business

eodc

EODC Forum

EODC Forum 2017: 9th and 10th May 2017

EODC has gained further momentum.

- > 95 participants
- 50 organisations
- 11 different countries

Supported by:

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 organisations**

  to the **benefit** of its cooperation **partners** and service **users**
- **Goal: visible and sustainable role for the EODC network**

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