

CODE-DE

Copernicus Data and Exploitation Platform for Germany

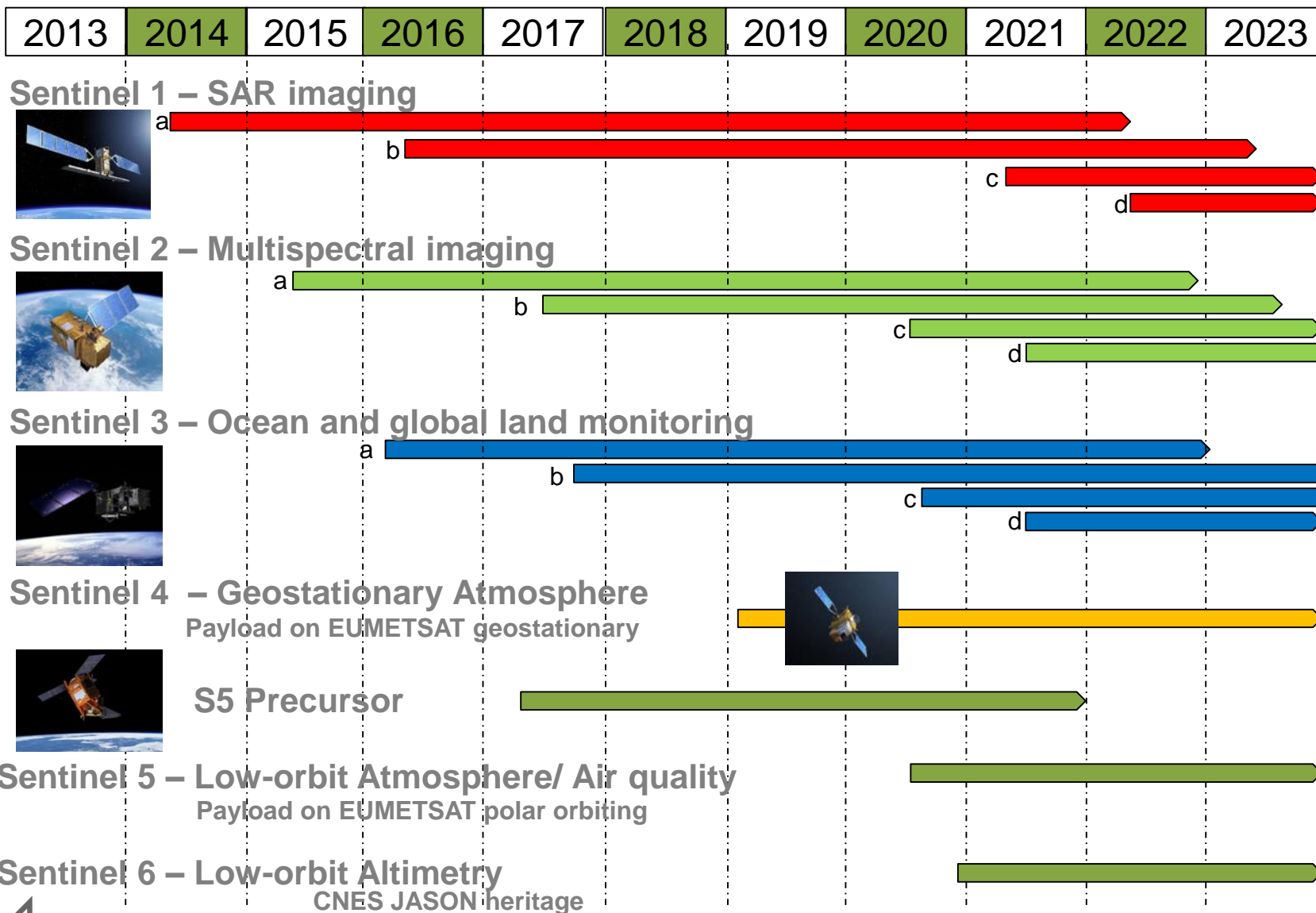
Deutsches Zentrum für Luft und Raumfahrt

Christoph Reck, Andreas Müller, Gunter Schreier,
Vanessa Keuck, Jörn Hoffmann, Hans-Peter Lüttenberg
Martin Böttcher (Brockmann Consult)



Knowledge for Tomorrow

The Sentinel Satellite Family





....and rising data volume

Sentinel user products in the ESA Data Hub	2014	2015	2016	2017	2018	2019	2020
yearly volumen [TB]	180	966	4.490	6.591	7.250	7.469	8.127
average rate [Mbit/s]	194	257	1.194	1.753	1.928	1.987	2.162

Februar 2016: 14 month Sentinel-1 PAC:

1 Petabyte; > 750,000 data products

The S1-A amount stored since December 2014 exceeds the total amount of 10 years Envisat ASAR mission.



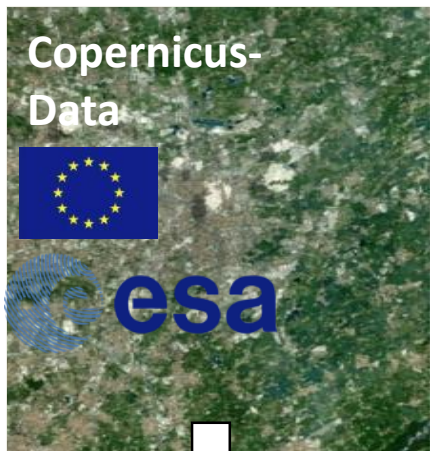
Deutsches Satelliten Daten Archiv

Sentinel PAC Archive

50 (+33) PetaByte storage capacity
~ 1,5 PetaByte of product data per
year per Sentinel



CODE-DE: Copernicus Data and Exploitation Platform



Funding:
 Bundesministerium für Verkehr und digitale Infrastruktur

Short term-archive (National mirror)

Processing (Orchestration, Prozessing, Services)

Access (Search, Visualisation, Load)

Web - Portal

- CSW
- Open Search
- W*S
- http(s)
- email



CODE-DE: Copernicus Data and Exploitation Platform – Deutschland (Germany)

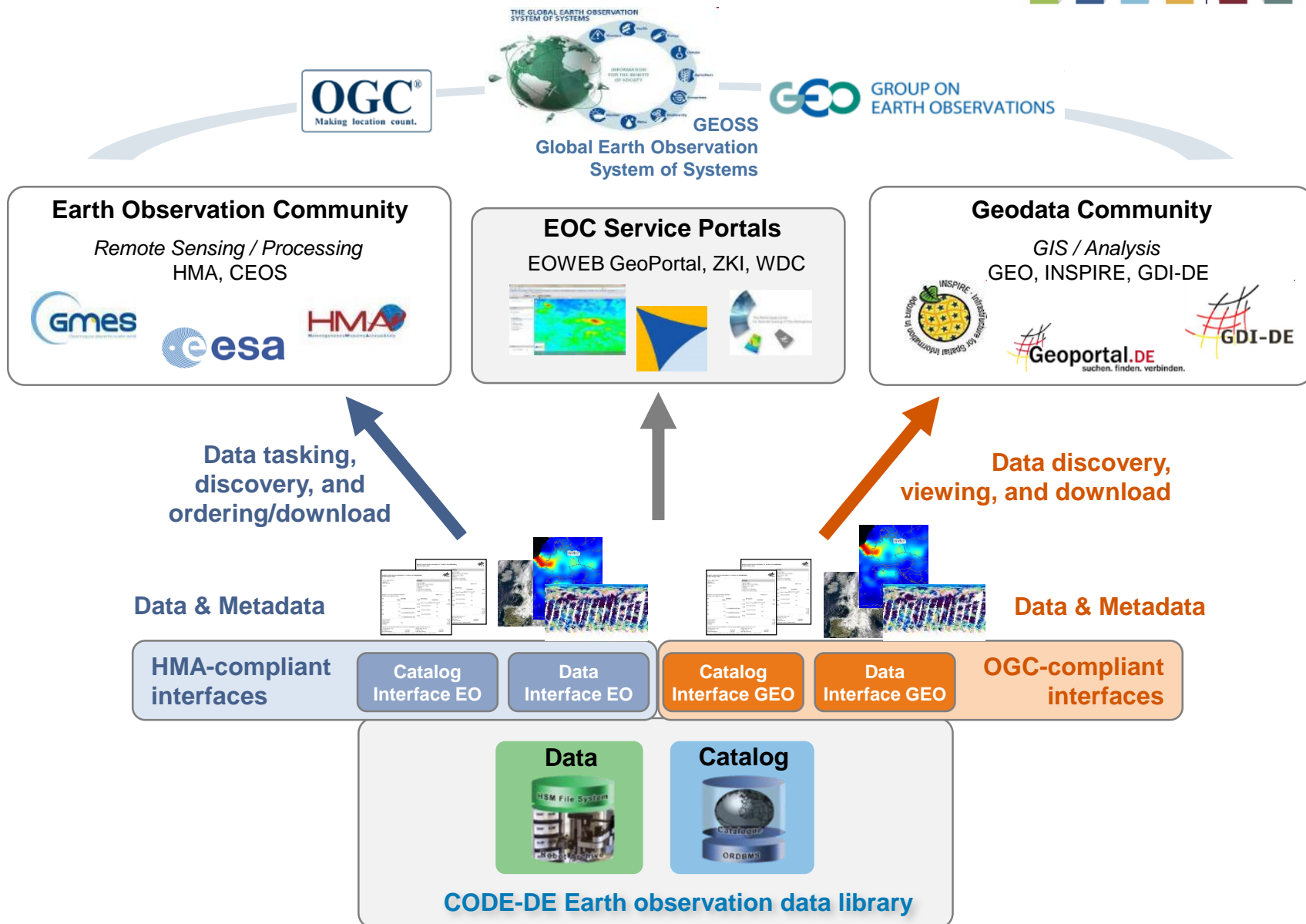


- Time: 01.07.2016 – 31.03.2019
- Phases:
 - Operational Data Access: March 2017
 - Fully operational, including processing: Q4/2017
- Access CODE-DE
 - Open View and Discovery Service
 - Download after self-registration
 - On-demand processing access
 - Free-of-charge for selected “applications” (beta users)
 - Scalable processing environment also for any third party users





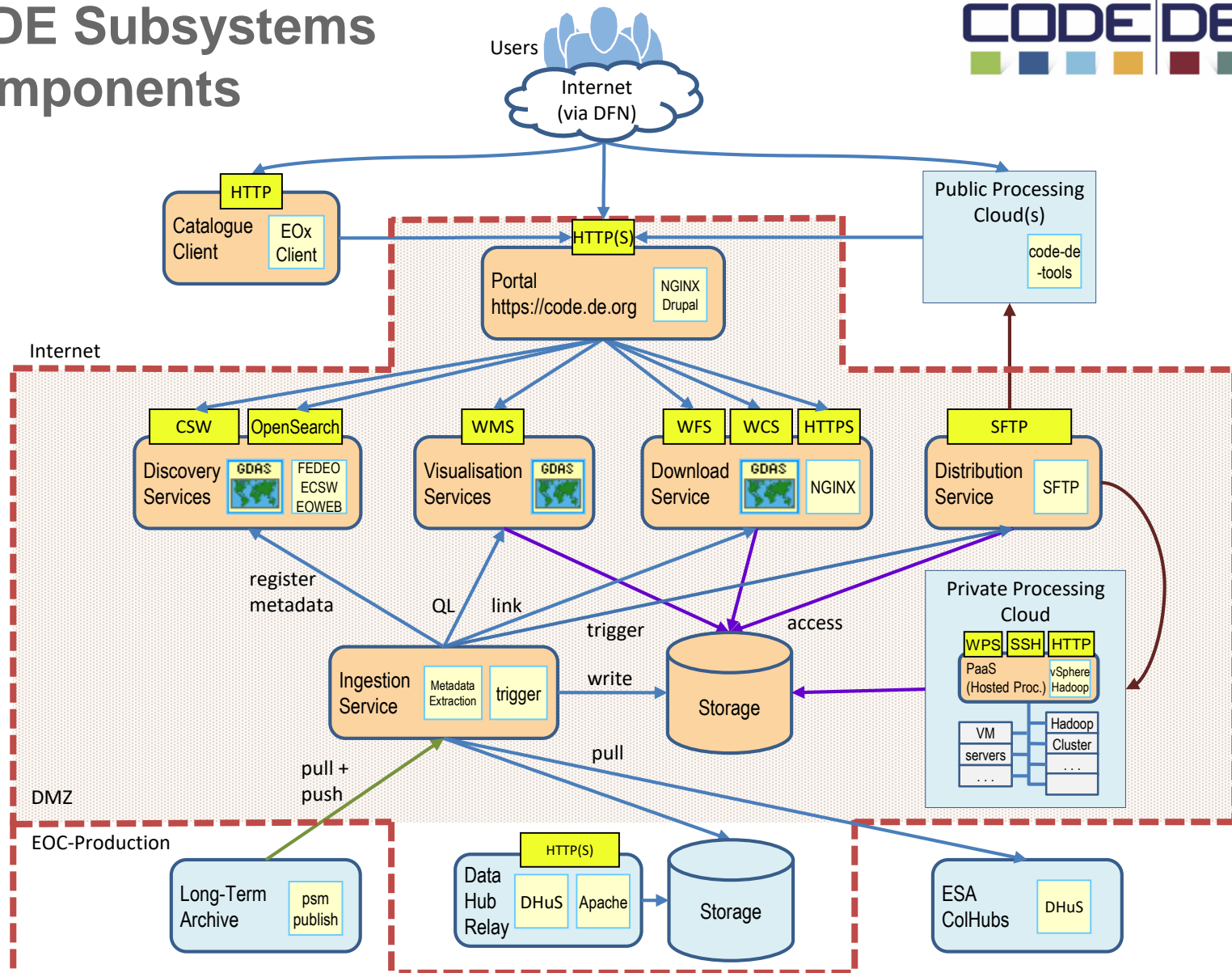
Standardised Access and Interfaces





CODE-DE Subsystems and Components

- Governance
- User Management
- Monitoring
- Reporting



Portal



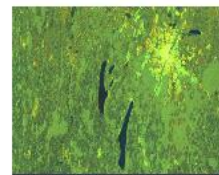
Launched 09.03.2017

<http://code-de.org>

The Copernicus Data and Exploitation Platform – Deutschland (CODE-DE) is the German entry point to the Sentinel Satellite Systems, their data products and the products of the Copernicus Services.

[read more >](#)

Featured Content



Sentinel-1



Sentinel-2



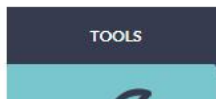
Tools



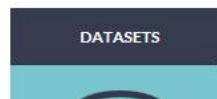
MAP



MARKETPLACE



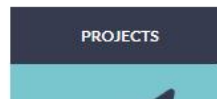
TOOLS



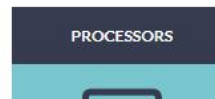
DATASETS



SERVICES



PROJECTS



PROCESSORS

Latest News



August 28, 2017 - 10:24
Return to nominal Sentinel-2 real-time production (relates to News of 17th August 2017)

August 24, 2017 - 12:00
Maintenance on Thursday, August 31, from 11:00 to 15:00 (UTC)

August 17, 2017 - 10:24
Temporary unavailability of Sentinel-2 data (11 August 2017)

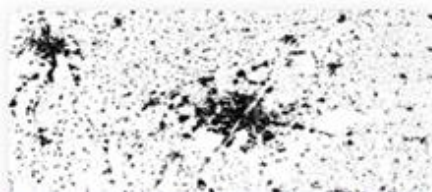


GET IN CONTACT WITH OUR
USER-HELPDESK ...

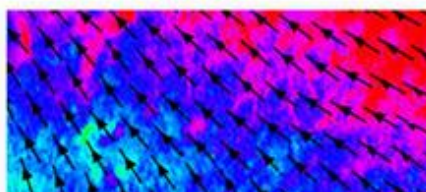
... or check out our USER MANUAL

DATASETS >

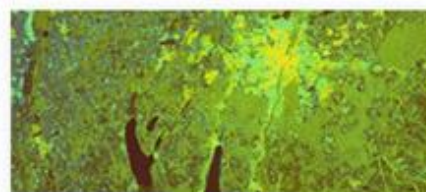
The Service Marketplace includes a JavaScript based CSW client which allows creating CSW queries for the Discovery Service of the CODE-DE infrastructure. The Discovery Service returns metadata entries that are INSPIRE conform about products from the collaborative platform as well as third-party missions.



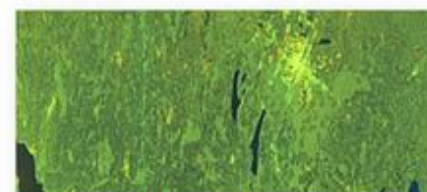
Global Urban Footprint (GUF) - TSX/TDX - global



Sentinel-1 SAR - Level 2 (Ocean Product)



Sentinel-1 SAR - Level 1 (Ground Range Detected)



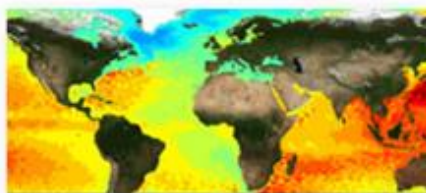
Sentinel-1 SAR - Level 1 (Single-Look Complex)

SERVICES >

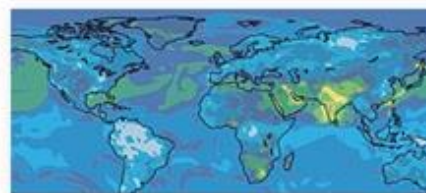
These services include search and access (see also DATASETS), browsing imagery, downloading and processing (available from mid-2017). Application projects



Copernicus Land Monitoring Service



Copernicus Marine Environment Monitoring Service



Copernicus Atmosphere Monitoring Service



Copernicus Emergency Management Service

TOOLS >

CODE-DE provides useful tools like the Sentinel toolboxes. Tools that are externally hosted will be linked; other tools can be directly downloaded from the marketplace. For information on how to use these tools in the frame of CODE-DE check the user manual or contact HelpDesk.



QGIS



CODE-DE User Tools

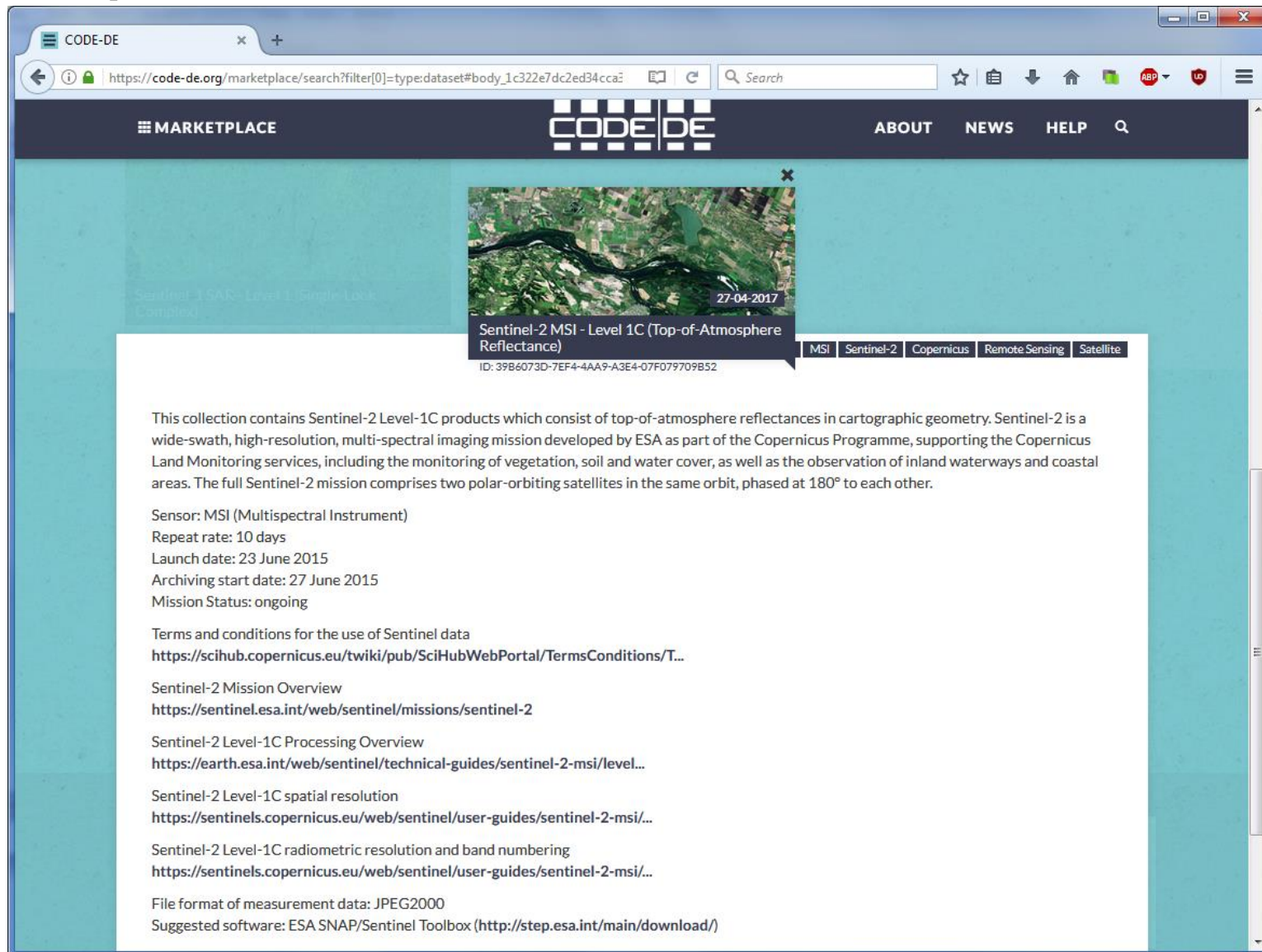


ESA Sentinel Application Platform



ArcGIS Sentinel-2 Download Tools

Marketplace



The screenshot shows a web browser window with the URL [https://code-de.org/marketplace/search?filter\[0\]=type:dataset#body_1c322e7dc2ed34cca3](https://code-de.org/marketplace/search?filter[0]=type:dataset#body_1c322e7dc2ed34cca3). The page features a dark navigation bar with the CODE-DE logo and links for ABOUT, NEWS, and HELP. The main content area has a teal background and displays a search result for Sentinel-2 MSI Level 1C data. A satellite image of a river valley is shown with a date stamp of 27-04-2017. Below the image, the dataset title is "Sentinel-2 MSI - Level 1C (Top-of-Atmosphere Reflectance)" with ID: 39B6073D-7EF4-4AA9-A3E4-07F079709B52. A list of tags includes MSI, Sentinel-2, Copernicus, Remote Sensing, and Satellite. The description states that the collection contains Sentinel-2 Level-1C products, which are top-of-atmosphere reflectances in cartographic geometry. It also provides technical details such as the sensor (MSI), repeat rate (10 days), launch date (23 June 2015), and mission status (ongoing). Links are provided for terms and conditions, mission overview, processing overview, spatial resolution, and radiometric resolution.

MARKETPLACE CODE-DE ABOUT NEWS HELP

Sentinel-2 MSI - Level 1C (Top-of-Atmosphere Reflectance)
ID: 39B6073D-7EF4-4AA9-A3E4-07F079709B52

MSI Sentinel-2 Copernicus Remote Sensing Satellite

This collection contains Sentinel-2 Level-1C products which consist of top-of-atmosphere reflectances in cartographic geometry. Sentinel-2 is a wide-swath, high-resolution, multi-spectral imaging mission developed by ESA as part of the Copernicus Programme, supporting the Copernicus Land Monitoring services, including the monitoring of vegetation, soil and water cover, as well as the observation of inland waterways and coastal areas. The full Sentinel-2 mission comprises two polar-orbiting satellites in the same orbit, phased at 180° to each other.

Sensor: MSI (Multispectral Instrument)
Repeat rate: 10 days
Launch date: 23 June 2015
Archiving start date: 27 June 2015
Mission Status: ongoing

Terms and conditions for the use of Sentinel data
<https://scihub.copernicus.eu/twiki/pub/SciHubWebPortal/TermsConditions/T...>

Sentinel-2 Mission Overview
<https://sentinel.esa.int/web/sentinel/missions/sentinel-2>

Sentinel-2 Level-1C Processing Overview
<https://earth.esa.int/web/sentinel/technical-guides/sentinel-2-msi/level...>

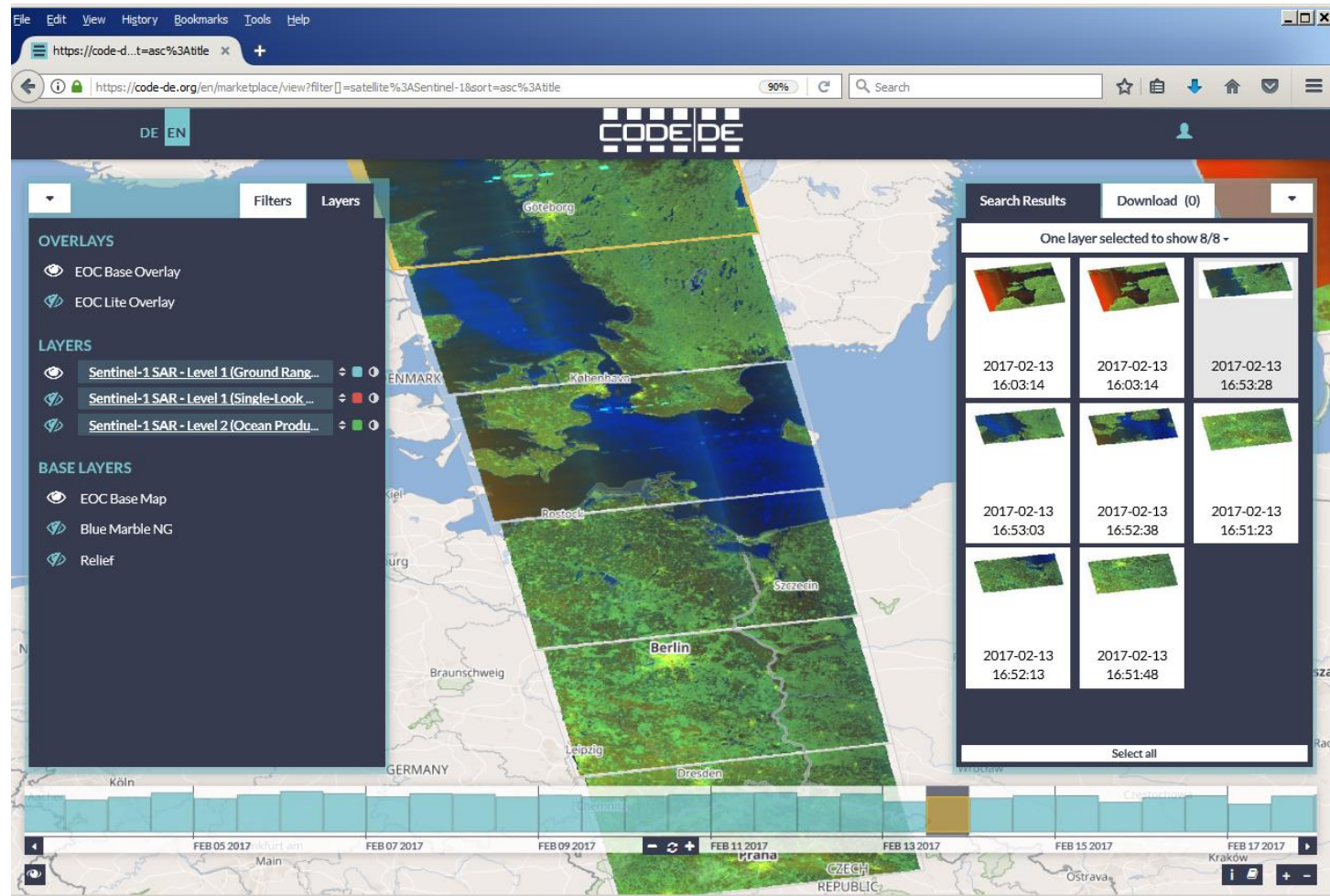
Sentinel-2 Level-1C spatial resolution
<https://sentinels.copernicus.eu/web/sentinel/user-guides/sentinel-2-msi/...>

Sentinel-2 Level-1C radiometric resolution and band numbering
<https://sentinels.copernicus.eu/web/sentinel/user-guides/sentinel-2-msi/...>

File format of measurement data: JPEG2000
Suggested software: ESA SNAP/Sentinel Toolbox (<http://step.esa.int/main/download/>)

Search und Access

- Discover datasets (CSW, OpenSearch)
- View datasets (WMS)
- Download (WCS, WFS, DSEO)



Geo-Client

DE EN



Filters **Layers**

TIME FILTER ▾

Using same time as for map

2017-09-18 00:49:57 - 2017-09-23 00:00:00

Start

2017-09-18 00:49:57

End

2017-09-23 00:00:00

SPATIAL FILTER ▾

Coordinates are in degrees (longitude, latitude) WGS84

Using bounds of currently visible map

-0.04 - 46.07 - 21.05 - 56.22

Draw

Point	Rectangle	Polygon
-------	-----------	---------

Upload

Browse No file selected

Select Feature ▾

ADDITIONAL FILTERS ▾

Production Status --- ▾

Cloud Cover

Orbit Direction --- ▾

Orbit Number

Resolution

Platform Serial Identifier

Processing Level

Polarisation Mode --- ▾

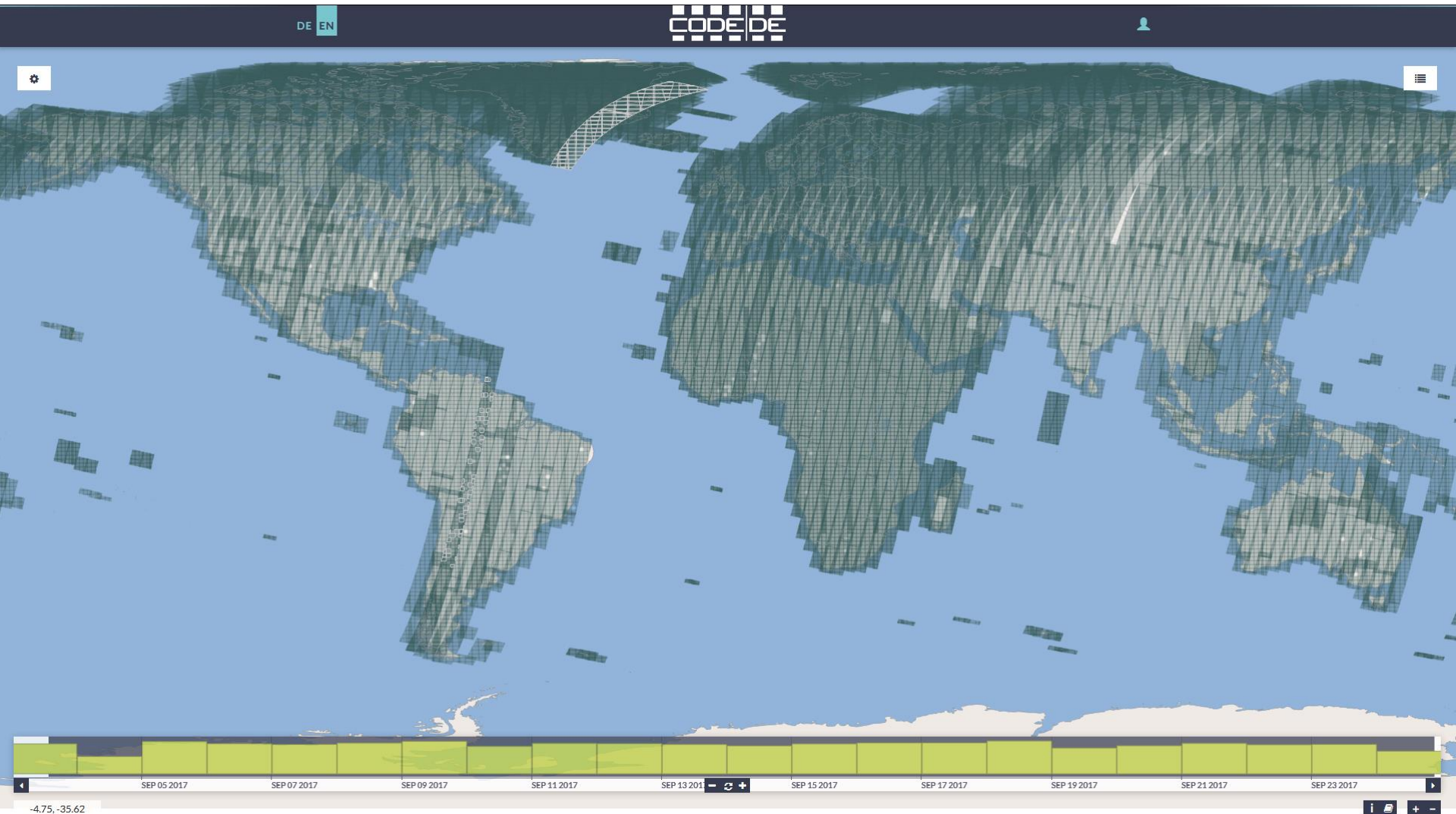
Polarisation Channels --- ▾

Antenna Look Direction --- ▾

Minimum Incidence Angle



Geo-Client



Geo-Client

The screenshot displays the Geo-Client interface. At the top, there are language options (DE, EN) and the CODE DE logo. The main map shows a satellite view of Europe with a red rectangular selection box over the Alps region. The left sidebar contains several filter sections: 'TIME FILTER' with start and end date pickers, 'SPATIAL FILTER' with coordinate input fields, 'Draw' with Point, Rectangle, and Polygon options, 'Upload' with a file browser, and 'ADDITIONAL FILTERS' for Production Status, Cloud Cover, Orbit Direction, Orbit Number, Resolution, Platform Serial Identifier, Processing Level, Polarisation Mode, Polarisation Channels, Antenna Look Direction, Minimum Incidence Angle, and Maximum Incidence Angle. The right sidebar shows 'Search Results' with a 'Download (1)' button and a grid of 12 satellite image thumbnails, each with a timestamp of 2017-09-04 10:20:21. A 'Select all' button is at the bottom of the grid. The bottom of the interface features a timeline navigation bar with dates from AUG 29 2017 to SEP 03 2017 and a coordinate display of 13.60, 50.19.



Rolling Archive and LTA-Reload

Mission	Level and Product	Size [TB]	Retention Time [Months]		
			Central Europe	Europe	Global
Sentinel-1	L1 SLC	90	36	12	0
	L1 GRD	50	36	12	1
	L2 OCN	10	-	-	6
Sentinel-2	L1C MSI	320	36	12	1
Sentinel-3	L1 OLCI	60	36	12	1
	L2 SLSTR	60	36	12	1
	L2 SYN	15	36	12	1
	L2 VG	15	36	12	1
Sentinel-5p	L1 TROPOMI	100	-	-	1

CODE-DE “Sentinel-Rolling Archive”



Central Europe



Tools



dlr-eoc / code-de-tools

Watch 2 Star 3 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Pulse Graphs

Copernicus Data-access and Expoitation platform for Germany (CODE-DE) - user tools

10 commits 1 branch 0 releases 1 contributor Apache-2.0

Branch: master New pull request Find file Clone or download

ch-reck committed on GitHub Update dataHubTransfer.sh Latest commit fbe56b8 on Jan 27

File	Commit Message	Time
bin	Update dataHubTransfer.sh	a month ago
LICENSE	Initial commit	2 months ago
NOTES.md	Update NOTES.md	a month ago
README.md	Update README.md	2 months ago

README.md

code-de-tools

Copernicus Data-access and Expoitation platform for Germany (CODE-DE) - user tools

Description

This tools package publishes several scripts, examples and utilities to automate queries and data retrieval from the CODE-DE offerings.

The CODE-DE Platform provides standardized interfaces for dataset discovery, Earth-Observation product filtered searches and download.

Contents

The scripts are located in the `bin/` subdirectory. The script header contains instructions on how to use. For convenience the usage help is listed below.

code-de-query-download.sh

Performs an OpenSearch query and downloads the found products.

```

USAGE:

./code-de-query-download.sh -c|--condition=... [-b|--baseUrl=https://code-de.org] [-l|--limit=50] [-p|--parallel=1]
--condition is the full OpenSearch query, for example:
-c 'parentIdentifier=EOP:CODE-DE:S2_MSI_L1C&startDate=2017-01-04T00:00:00.000Z&endDate=2017-01-04T23:59:59.999Z'
--baseUrl of the CODE-DE services (default is https://code-de.org)
--limit the amount of products to be retrieved (default=50, max=500)
--parallel count of retrievals, WARNING: do not overload your system and network (the server might limit you to 1)
  
```

Output products are placed in the current directory.

Content

- Overview of the Portal
- FAQs
- Marketplace
- Catalogue Client
- User Management
- Search
- Help Desk
- Browser Requirements
- Documentation of the Sentinel missions (links to ESA and d-copernicus)

Help

Overview of the Portal

CODE-DE is the German access point to the European Earth observation programme Copernicus. Data of the Sentinel satellites are the core of this Earth observation programme.

The goal of the Copernicus Data and Exploitation Platform – Deutschland (CODE-DE) is to set up a platform for data access (connection to the ESA Collaborative Data Hub) and environmental information for further value adding. The platform will provide capacities for value-added product generation that can be cost-effectively re-used by many projects and services (public, scientific and commercial) in Germany.

FAQs

Frequently asked questions (FAQ) or Questions and Answers (Q&A), are listed questions and answers, all supposed to be commonly asked in some context, and pertaining to a particular topic

- What is CODE-DE?
- How can I get Copernicus Data?
- Who has access to Copernicus / CODE-DE and according to which criteria?
- How do I request additional permissions?
- Who provides Copernicus services?
- Are Copernicus services already available?
- Are Copernicus services fully free-of-charge for users? Who pays for Copernicus Services?

Help Desk

GET IN CONTACT WITH OUR
USER-HELPDESK ...

... or check out our **USER MANUAL**

SUBJECT

YOUR NAME

MESSAGE

YOUR E-MAIL ADDRESS

SEND MESSAGE >



Web Interface of the processing service



Central Authentication Service (CAS)

Enter your Username and Password

Username:

cvop

Password:

Warn me before logging me into other sites.

LOGIN clear

For security reasons, please Log Out and Exit your web browser when you are done accessing servi

Languages:
[English](#) | [Deutsch](#)

Copyright © 2005–2012 Jasig, Inc. All rights reserved.
 Powered by [Jasig Central Authentication Service 4.0.0](#)

Quick tour:

- interface
- Datasets
- Processors
- Processing
- Results

CODE-DE Web portal **authentication** provides user information to processing service Web interface

- currently test environment
- operational environment by configuration

Input selection by

- dataset
- time period
- region

Input selection by scene list planned with catalogue client integration



Web Interface of the processing service

Processor selection from

- system-provided processors
- user-provided processors

Parameterisation

- forms generated from processor descriptors



Web Interface of the processing service

Input Types: S2_L1C
Bundle: Idepix v6.0
Owner: System

Browse... No file selected. Edit Parameters

▼ Processor description:
Show Help

Output Parameters

Production name: S2 cloud screening Rheinland

Provide a name for the production to identify it later on. If left empty, a name will be generated from the given parameters.

Process to Cluster-Internal-Format
 User product

Product file format: GeoTiff
Note that the available NetCDF4 may depend on the selected processor.

Perform staging storage production

Percentage of allowed: 5

Request queue: default
If you are entitled for several queues select the queue for the project you are processing for.

Show Help

Check Request Save Request Order Production

Request submission

- selection of output format
- selection of queue
- ordering production



Web Interface of the processing service

CODE-DE Processing Service

cvop HELP ABOUT LOG OUT

Show productions of all users

<input type="checkbox"/>	Production	User	Processing Status	Processing Time	Staging Status	Result
<input type="checkbox"/>	20170918171706_L2Plus_9dced9a985833 S2 cloud screening Rheinland	cvop	SCHEDULED		UNKNOWN	Cancel
<input type="checkbox"/>	20170918131004_L2Plus_98949aea4c2d6 Level 2 BandMaths 2017-06-02 to 2017-06-02 (Globe)	cvop	COMPLETED	0:28:56	COMPLETED	Edit Auto-staging Download
<input type="checkbox"/>	20170918130748_L2Plus_98949aea4c2d6 Level 2 Idexix.Landsat8.OLI 2016-06-01 to 2016-06-01 (Globe)	cvop	COMPLETED	2:57:29	COMPLETED	Edit Auto-staging Download

CODE-DE Processing Service - staging area

Staging area 20170918113225_L2Plus_98949aea4c2cb

Filename	Size	Last Modified
L2_of_S2A_MSL1C_20170602T104021_N0205_R008_T32ULB_20170602T104212_SAFE.nc	33500.9 kb	Mon, 18 Sep 2017 12:17:22 GMT
Level_2_Idexix_Sentinel2_2017-06-02_to_2017-06-02_(Bonn).zip	68438.4 kb	Mon, 18 Sep 2017 12:17:25 GMT
L2_of_S2A_MSL1C_20170602T104021_N0205_R008_T31UGS_20170602T104212_SAFE.nc	35803.5 kb	Mon, 18 Sep 2017 12:17:23 GMT

Copyright © 2016 - 2017 CODE-DE Legal Notice Privacy Statement

Opening L2_of_S2A_MSL1C_20170602T104021_N0205_R008_T32ULB_201...

You have chosen to open:
 ...02T104021_N0205_R008_T32ULB_20170602T104212.SAFE.nc
 which is: NC file (32.7 MB)
 from: http://cd-cvmaster:8080

What should Firefox do with this file?

Open with

Save File

Do this automatically for files like this from now on.

Cancel OK

Active and done productions

- Status and progress
- Result access
- Edit and re-submit

Access to results

- Use on the platform
- Download

Integration with CODE-DE access planned



Web Interface of the processing service

The screenshot displays the SNAP (Scientific Data Processing) software interface. The main window shows a satellite image with a yellow mask overlay. The 'Mask Manager' panel on the right lists various processing steps:

Name	Type	Colour	Trans.	Description
IDEPIX_...	Maths	Yellow	0.5	Invalid pixels
IDEPIX_...	Maths	Yellow	0.5	Pixels which are either cloud...
IDEPIX_...	Maths	Yellow	0.5	Semi transparent clouds, or
IDEPIX_...	Maths	Yellow	0.5	Fully opaque clouds with full
IDEPIX_...	Maths	Red	0.5	A buffer of n pixels around a cloud...
IDEPIX_...	Maths	Cyan	0.5	Pixels is affected by a cloud shadow
IDEPIX_...	Maths	Blue	0.5	Clear snow/ice pixels
IDEPIX_...	Maths	Red	0.5	Bright pixels
IDEPIX_...	Maths	Green	0.5	White pixels
IDEPIX_...	Maths	Green	0.5	Pixels at a coastline
IDEPIX_...	Maths	Green	0.5	Clear land pixels
IDEPIX_...	Maths	Green	0.5	Cirrus clouds with full confidence of the
IDEPIX_...	Maths	Green	0.5	Cirrus clouds, or clouds where the dete
IDEPIX_...	Maths	Green	0.5	Clear water pixels
IDEPIX_...	Maths	Green	0.5	Water pixels
IDEPIX_...	Maths	Blue	0.5	'Brightwhite' pixels
IDEPIX_...	Maths	Cyan	0.5	Pixels with vegetation risk

The 'Processing Service - staging area' window in the top right shows a file selection dialog with the following text:

You have chosen to open:
...G01104021_00205_0008_1320104_20170602104212.SAFE.tif
which is: NC File (32.7 MB)
From: https://code-de.dlr.de/tereno/000

What should Firefox do with this file?
Open with...
Save this file
Do this automatically for files like this from now on.

The bottom left shows a histogram for the 'B4' band with the following statistics:

Name: B4
Unit: dl
Min: 0.02
Max: 1.265
Rough statistics!

S2 cloud screening
• processed on CODE-DE

Nutzerprioritäten

- **Bundesbehörden.** Dazu gehören Mitarbeiter von Bundesbehörden und Forschungseinrichtungen des Bundes sowie deren Auftragnehmer, die im Rahmen eines Auftrags für eine Bundesbehörde CODE-DE nutzen. Diese Nutzerkategorie ist die primäre Zielgruppe von CODE-DE. (**Prio 1**)
- **Nutzer aus Deutschland.** Dazu gehören Mitarbeiter sonstiger deutscher Behörden (**Prio 2**), Unternehmen (**Prio 3**), Forschungs- und Bildungseinrichtungen (**Prio 3**), NGO (**Prio 3**) oder Bürger (**Prio 3**)
- **Sonstige Nutzer.** Dazu gehören alle Nutzer, die nicht in eine der anderen Nutzerkategorien fallen, d.h. primär Nutzern, die nicht aus Deutschland stammen. (**Prio 4**)
- **Background Nutzung durch CODE-DE intern (e.g. Global Base Map)**
- **Weitere Nutzer (Sonderregelungen)**
- **Governance Modell in Vorbereitung**



Way Forward in CODE-DE

- Successful installation of all CODE-DE components
 - Improve search performance
 - Full resolution browsing, Web Coverage Service
 - Processing capacities incl. coupling to Open Cloud (OTC)
 - Integration of different application examples
- Phase-in the CODE-DE long-term operation



Questions?

