

→ ESA ADVANCED OCEAN SYNERGY TRAINING COURSE 2019

4–8 November 2019 | Center of Mediterranean Architecture | Chania, Greece

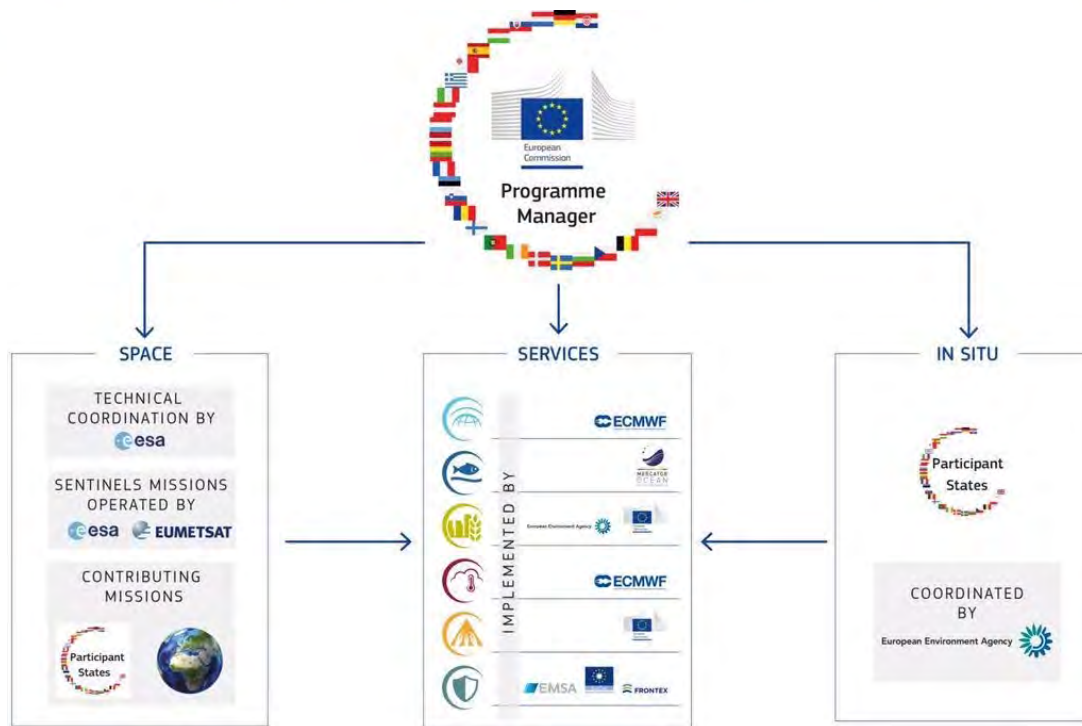
Marine data services @ EUMETSAT

V. Rosmorduc

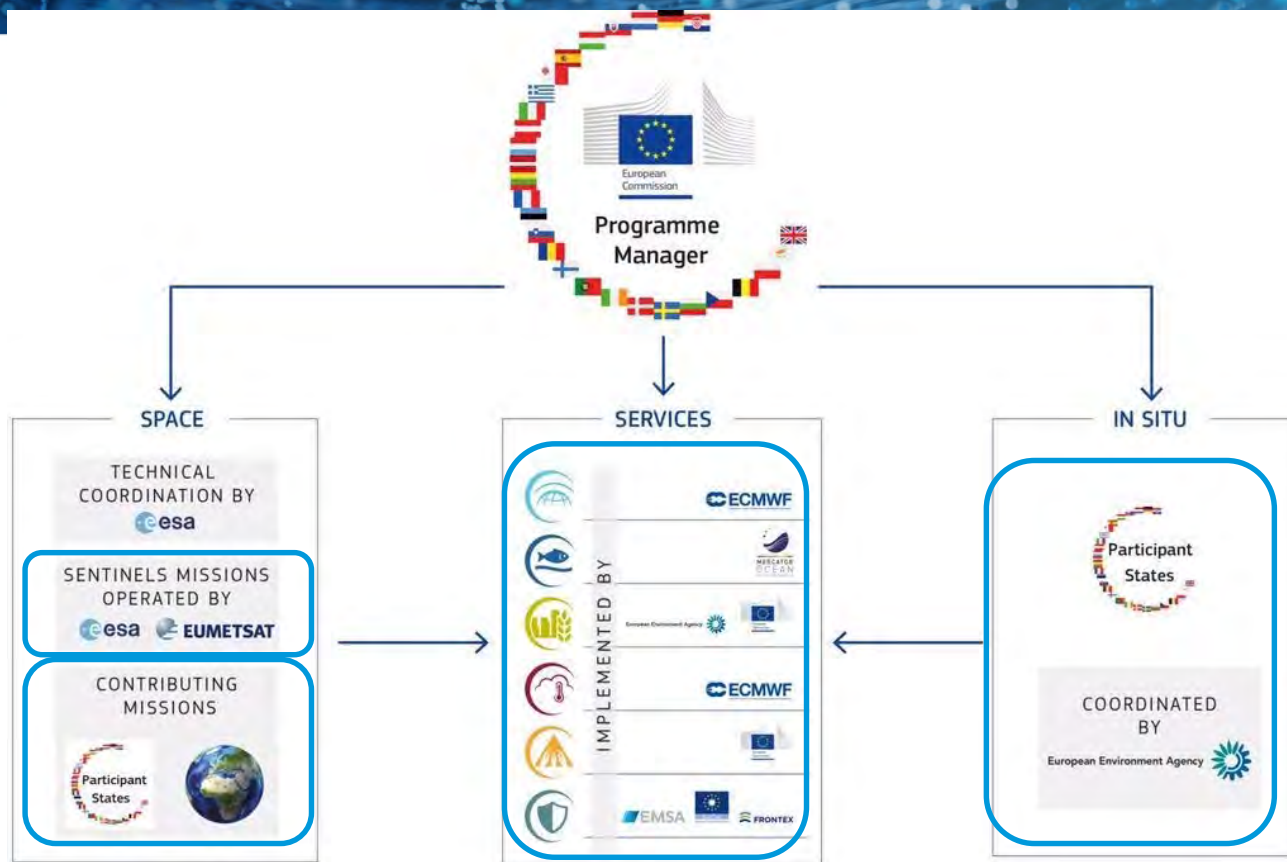
Prepared by Hayley Evers-King and Benjamin Loveday

18/10/2016

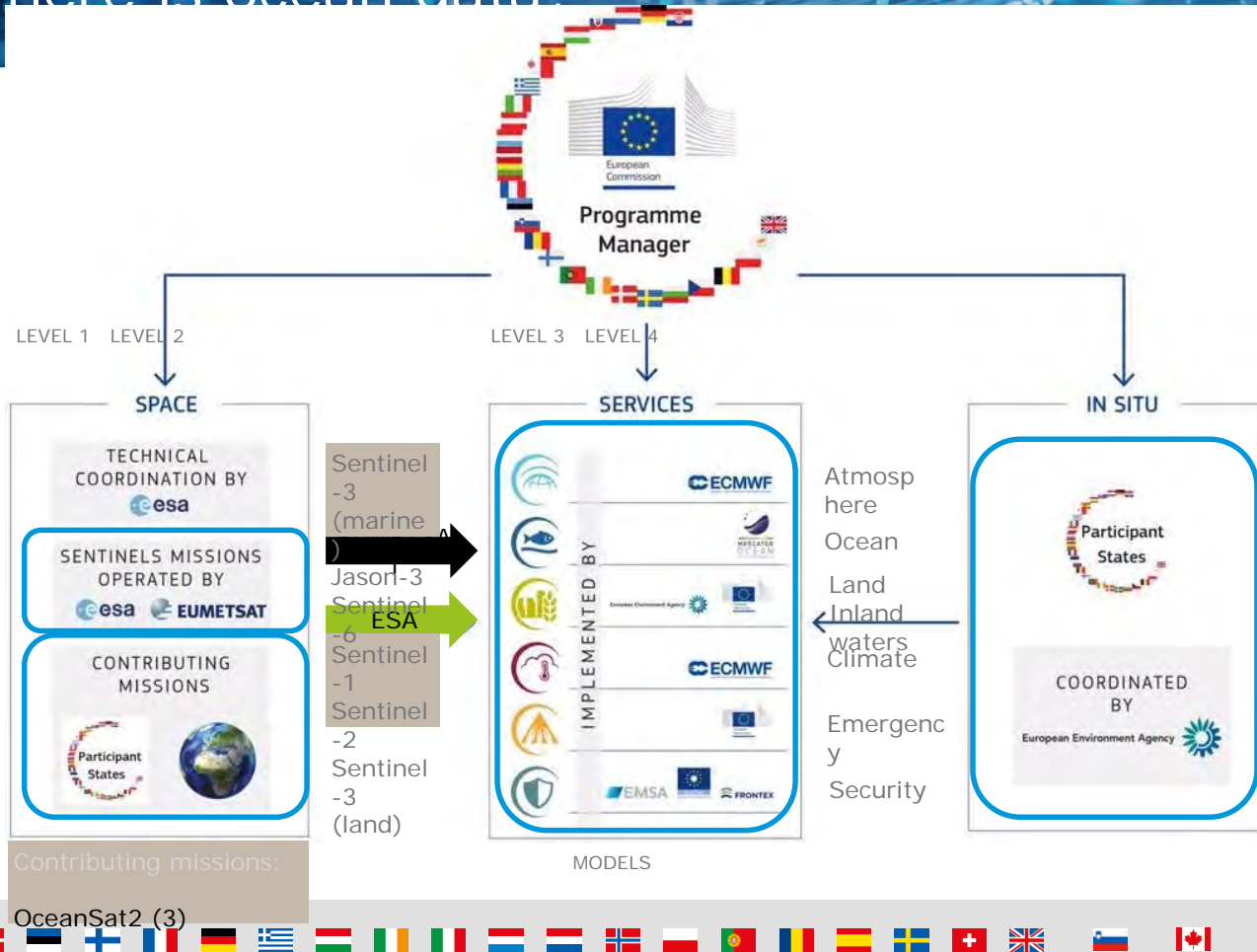




Where is ocean data?



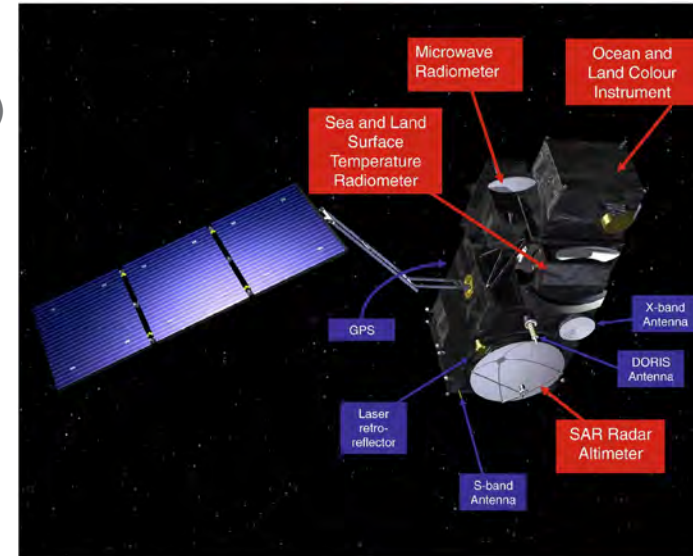
Where is ocean data?



EUMETSAT Copernicus Data Services: Sentinel-3



- Sentinel 3
 - SLSTR (SST)
 - OLCI (Ocean Colour)
 - SRAL/MWR/POD (Surface topography/altimetry)
- Builds on heritage but with improved resolution and sensors.
- S3A (launched 16th Feb 2016), S3B (launched 25th April 2018)
- Spacecraft Operations (routine phase) and marine data processing/performance/dissemination
- Many applications for ocean research and commercial operations.



Also operating Jason-3 (altimetry) and Sentinel-6/Jason-CS (from 2020) on behalf of European Commission.



European Space Agency

Sentinel-3A and 3B

Operation of satellite

Ground segment

Data processing

Data to services



Global Level 1 and Marine Level 2 data

Daily, highest resolution (sensor specific, native)

NRT/STC/NTC

Level 1 allows for the user to implement custom processing

Level 2 - geophysical products provided as standard

Processing Level	Description
Level 0	Reconstructed, unprocessed instrument and payload data at full resolution, with communications artefacts removed.
Level 1 (a+b)	Reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information.
Level 2 (+p)	Derived geophysical variables at the same resolution and location as Level 1 source data. Often involves atmospheric correction.
Level 3	Variables mapped on uniform space-time grid scales, usually with some completeness and consistency. Except topography (L4)
Level 4	Model output or results from analyses of lower-level data (e.g., variables derived from multiple measurements)

Eumetsat

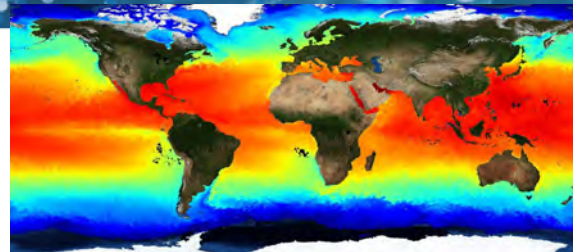
CMEMS

NOTE: There are differences in how parts of the remote sensing community define processing levels. And different instruments will include different methods at each level. Look at individual handbooks, product guides, ATBDs etc for more information.

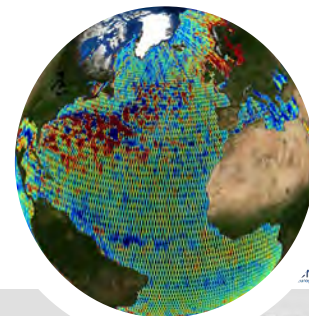
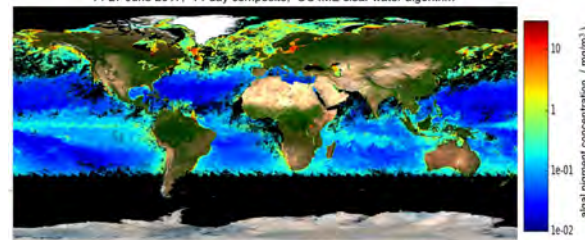
Primary oceanographic variables available through CMDS



- SLSTR (optical radiometry) L2 products:
 - Sea Surface Temperature (SST) (GHRSSST L2P)
- OLCI (optical radiometry) L2 products
 - Water leaving radiance
 - Chlorophyll (CHL)
 - Total Suspended Matter (TSM)
 - Absorption of gelbstoff and detritus (a_{dg})
 - Diffuse attenuation coefficient (K_d_{490})
 - Photosynthetically active radiation (PAR)
- SRAL* (SAR altimetry) L2 products:
 - Sea surface height (SSH)
 - Significant wave height (SWH)
 - Wind speed (WS)
 - Sea Level Anomaly (SSHA) (at L2)
 - Sea ice products



Sentinel-3A OLCI algal pigment concentration
14-27 June 2017, 14-day composite, OC4ME clear water algorithm



*plus MWR and POD



micus

EUMETSAT

European Space Agency

Level 2 Data Formats (SRAL*)

SAFE Format:

At Level-2, there are 3 different netCDF files contain different variables:

REDUCED
STANDARD
ENHANCED

Measurement file type:	REDUCED	STANDARD	ENHANCED
	1 Hz	1 Hz + 20 Hz	1 Hz + 20 Hz + WF
	<div>1 Hz PLRM/SAR Ku data set</div> <div>Sub-set of 1 Hz Ku band parameters from SAR-mode SRAL measurements, processed through the (P)LRM & SAR_Ku L2 chains.</div> <div>0.52 MB / orbit</div>	<div>1 Hz PLRM/SAR Ku/C data set</div> <div>1 Hz parameters from SAR-mode SRAL measurements, processed through the (P)LRM L2 (Ku & C band) & SAR_Ku (Ku band) chains.</div> <div>20 Hz SAR C data set</div> <div>20 Hz C band parameters from SAR-mode SRAL measurements processed through the (P)LRM L2 chain.</div> <div>20 Hz PLRM/SAR Ku data set</div> <div>20 Hz Ku band parameters from SAR-mode SRAL measurements processed through the (P)LRM and SAR_Ku chains.</div> <div>32 MB / orbit</div>	<div>1 Hz PLRM/SAR Ku/C data set</div> <div>1 Hz parameters from SAR-mode SRAL measurements, processed through the (P)LRM L2 (Ku & C band) & SAR_Ku (Ku band) chains.</div> <div>20 Hz SAR C data set</div> <div>20 Hz C band parameters from SAR-mode SRAL measurements processed through the (P)LRM L2 chain.</div> <div>20 Hz PLRM/SAR Ku data set</div> <div>20 Hz Ku band parameters from SAR-mode SRAL measurements processed through the (P)LRM and SAR_Ku chains.</div> <div>Waveforms</div> <div>Waveforms and associated parameters to reprocess the data.</div> <div>112 MB / orbit</div>

Which level of data should I use?

Questions to ask:

What variable do I need to analyse?

Is standard processing sufficient?

Can I process my own data?

What spatial/temporal scale do I need?

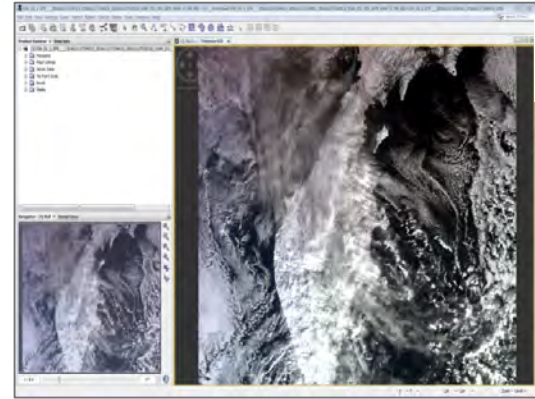
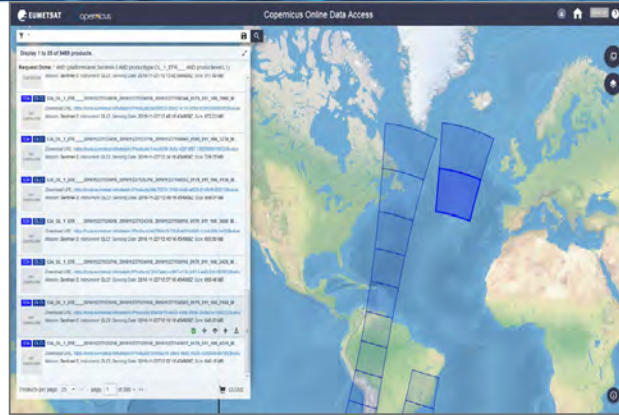
How will merging/averaging/interpolation affect the phenomena I wish to investigate?

Single sign on registration for online services at <https://eoportal.eumetsat.int>

way using

* ODA portal for Copernicus services and specific users (e.g. S3V)

EUMETSAT's CODA/CODAREP Download Service



Key Features:

CODA is an online rolling archive with http access. It provides access to Sentinel-3 Level 1 and Level 2 global data, all latency mode; Current service provides a one year archive.

<https://codarep.eumetsat.int>

CODAREP provides with reprocessed data (latest versions)

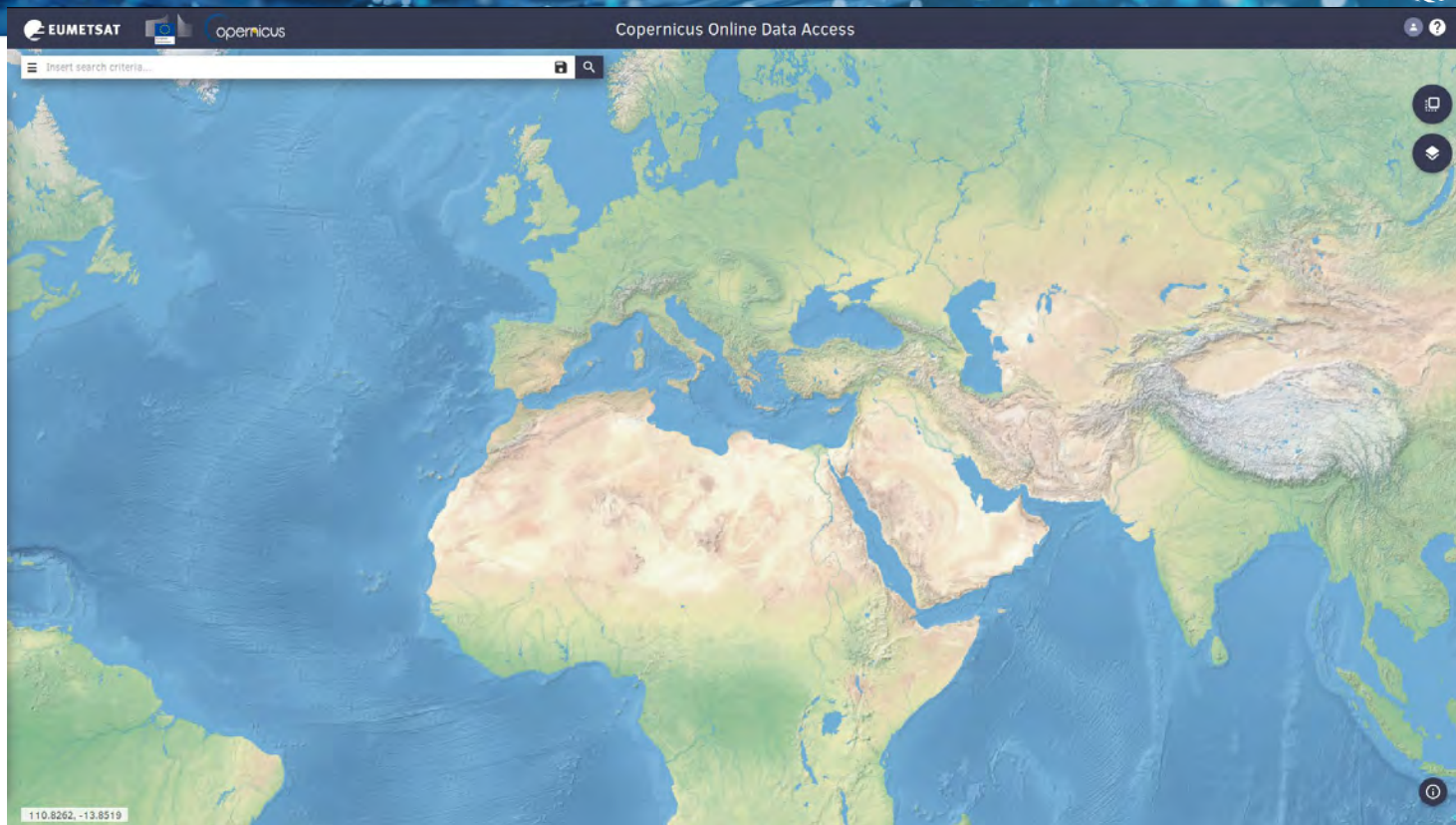
<https://codarep.eumetsat.int>

The user manual explains how to use the online tool, including how to download via an API;



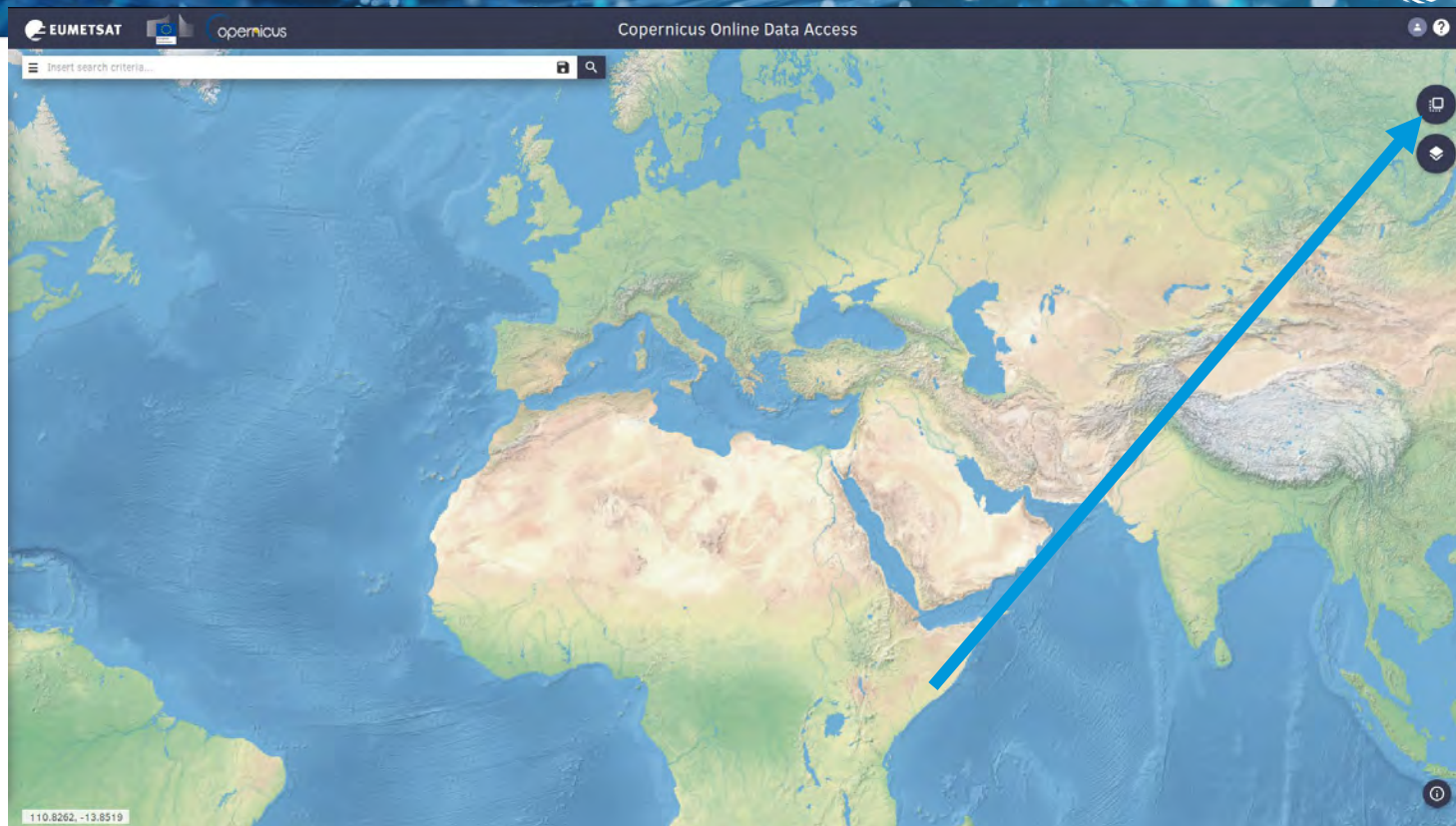
European Space Agency

Using CODA to get Sentinel-3 data



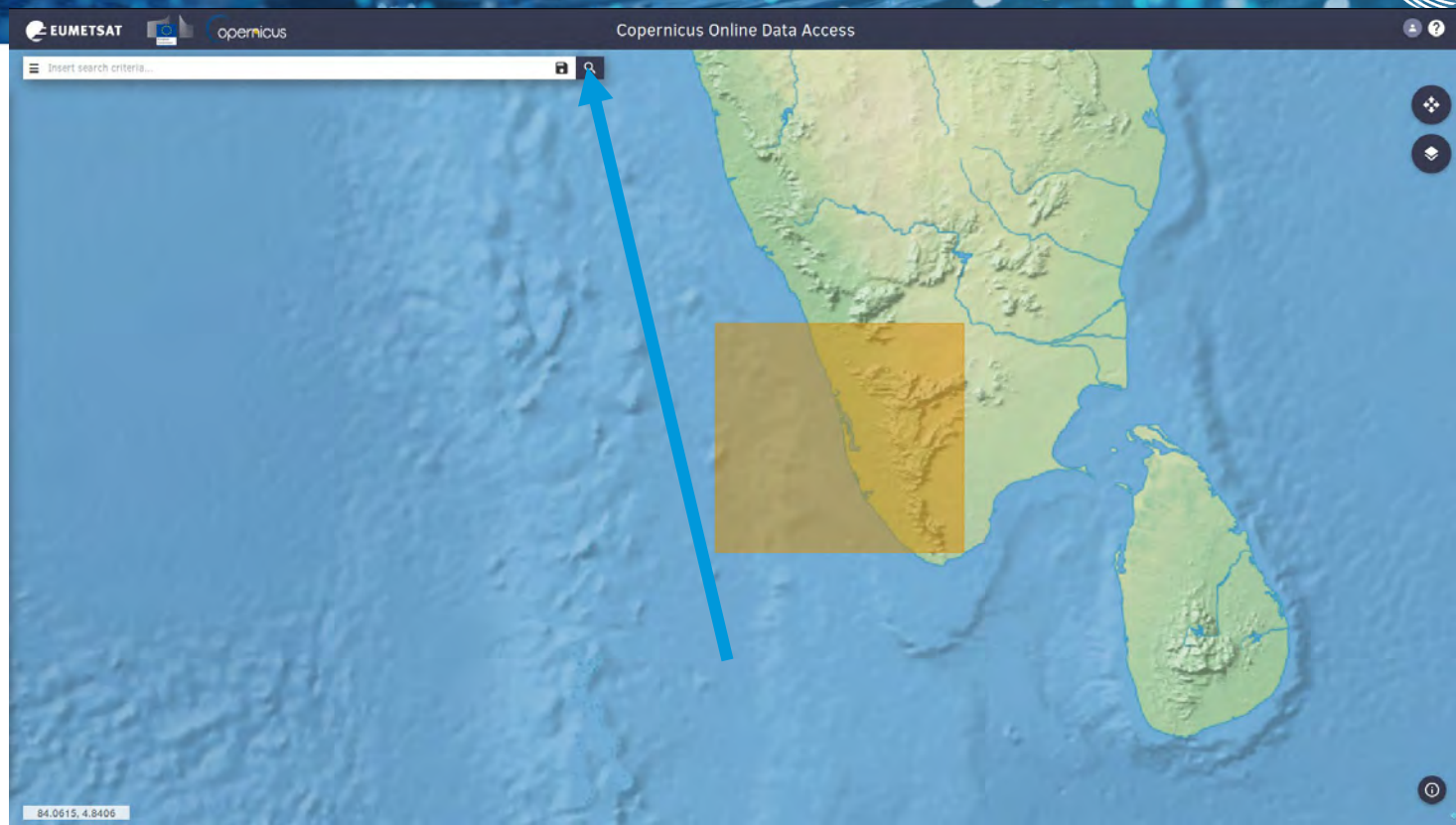
Upon first login, you will find yourself here.

Using CODA to get Sentinel-3 data



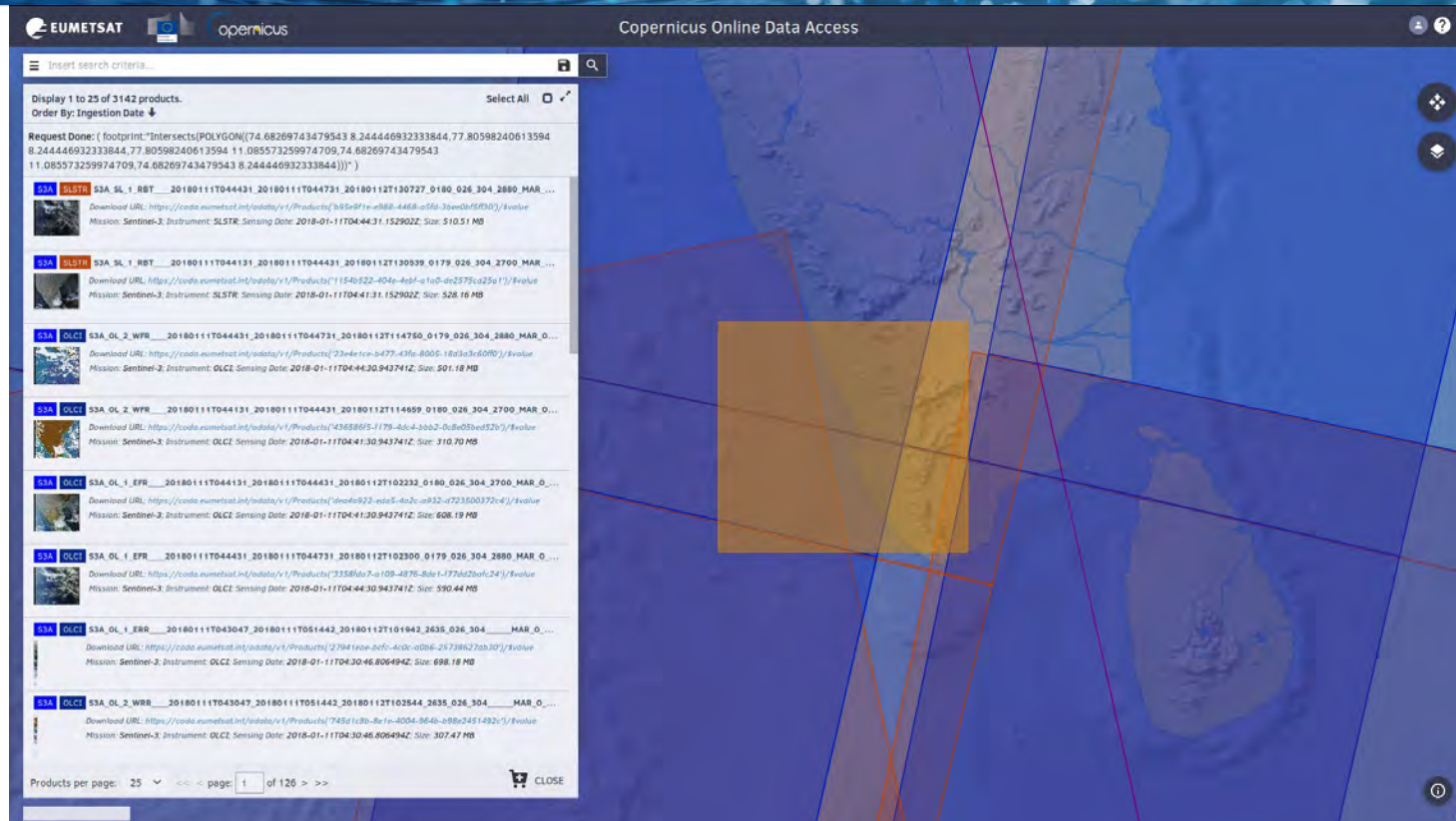
Use the button near the top right to switch between selection mode and panning mode

Using CODA to get Sentinel-3 data



Select your area of interest. Click on the search button now if you would like to see all possible data for your region of interest

Using CODA to get Sentinel-3 data



EUMETSAT **copernicus** Copernicus Online Data Access

Insert search criteria...

Display 1 to 25 of 3142 products. Order By: Ingestion Date

Request Done: ("footprint:Intersects(POLYGON((74.68269743479543 8.24444693233844, 77.80598240613594 8.24444693233844, 77.80598240613594 11.085573259974709, 74.68269743479543 11.085573259974709, 74.68269743479543 8.24444693233844)))")

S3A SLSTR S3A_SL_1_RBT_..._20180111T044431_20180111T044731_20180112T130727_0180_026_304_2880_MAR_...
Download URL: [https://roda.eumetsat.int/odata/v1/Products\('S3A-SLSTR-20180111T044431-20180112T130727-0180-026-304-2880'\)/\\$value](https://roda.eumetsat.int/odata/v1/Products('S3A-SLSTR-20180111T044431-20180112T130727-0180-026-304-2880')/$value)
Mission: Sentinel-3; Instrument: SLSTR; Sensing Date: 2018-01-11T04:44:31.152902Z; Size: 510.51 MB

S3A SLSTR S3A_SL_1_RBT_..._20180111T044431_20180111T044431_20180112T130939_0179_026_304_2700_MAR_...
Download URL: [https://roda.eumetsat.int/odata/v1/Products\('S3A-SLSTR-20180111T044431-20180112T130939-0179-026-304-2700'\)/\\$value](https://roda.eumetsat.int/odata/v1/Products('S3A-SLSTR-20180111T044431-20180112T130939-0179-026-304-2700')/$value)
Mission: Sentinel-3; Instrument: SLSTR; Sensing Date: 2018-01-11T04:44:31.152902Z; Size: 528.16 MB

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Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:44:30.943741Z; Size: 501.18 MB

S3A OLCI S3A_OL_2_WFR_..._20180111T044431_20180111T044431_20180112T114659_0180_026_304_2700_MAR_...
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Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:41:30.943741Z; Size: 310.70 MB

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Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:41:30.943741Z; Size: 608.19 MB

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Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:44:30.943741Z; Size: 590.44 MB

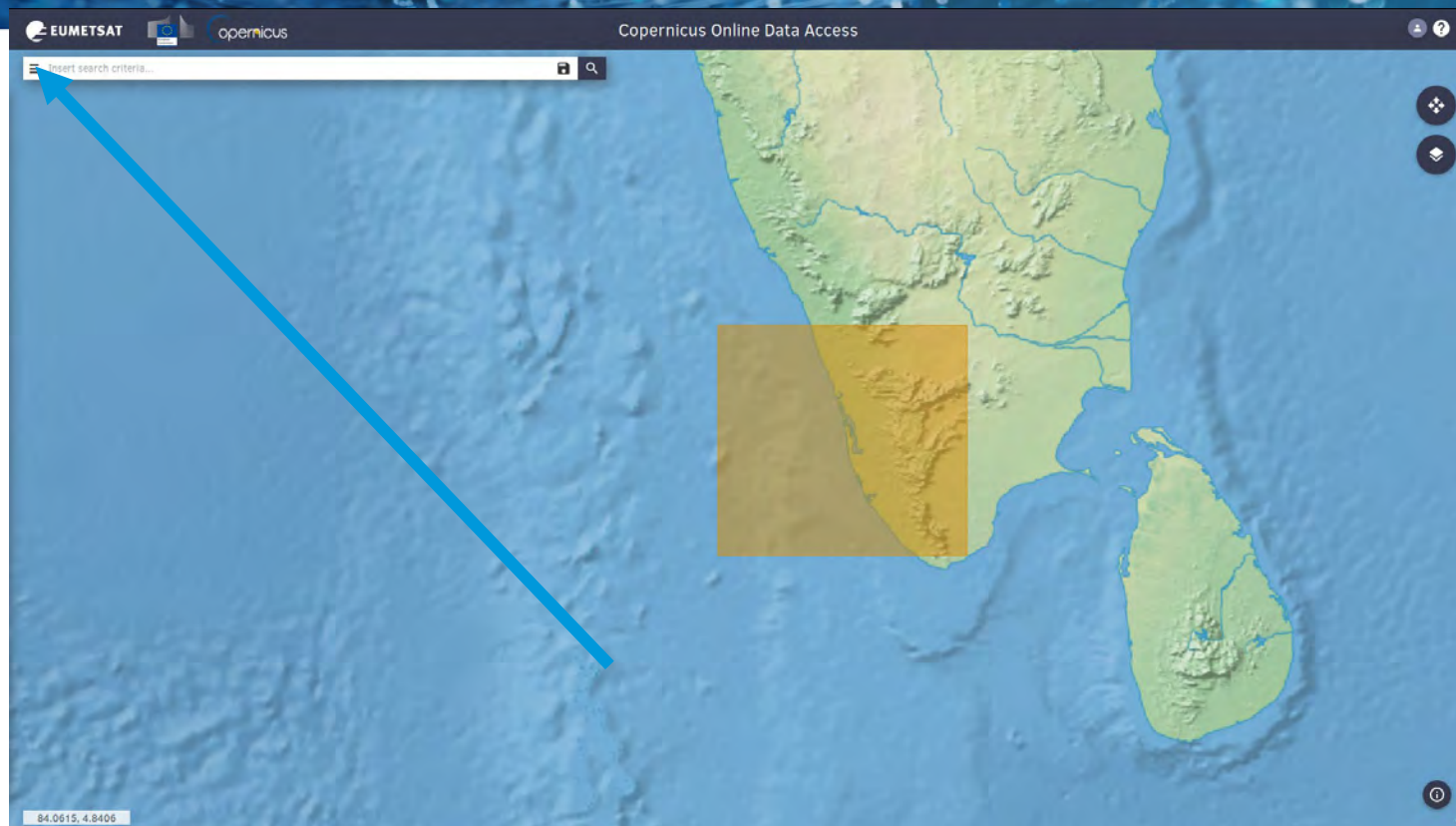
S3A OLCI S3A_OL_1_FRR_..._20180111T043047_20180111T051442_20180112T101042_2635_026_304_..._MAR_...
Download URL: [https://roda.eumetsat.int/odata/v1/Products\('S3A-OLCI-1-20180111T043047-20180112T101042-2635-026-304-...'\)/\\$value](https://roda.eumetsat.int/odata/v1/Products('S3A-OLCI-1-20180111T043047-20180112T101042-2635-026-304-...')/$value)
Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:30:46.806494Z; Size: 698.18 MB

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Download URL: [https://roda.eumetsat.int/odata/v1/Products\('S3A-OLCI-2-20180111T043047-20180112T102544-2635-026-304-...'\)/\\$value](https://roda.eumetsat.int/odata/v1/Products('S3A-OLCI-2-20180111T043047-20180112T102544-2635-026-304-...')/$value)
Mission: Sentinel-3; Instrument: OLCI; Sensing Date: 2018-01-11T04:30:46.806494Z; Size: 307.47 MB

Products per page: 25 << >> page: 1 of 126 >>> CLOSE

Some example results from a complete search

Using CODA to get Sentinel-3 data



If you want to refine your search using specific criteria, click the menu button to the left of the search bar

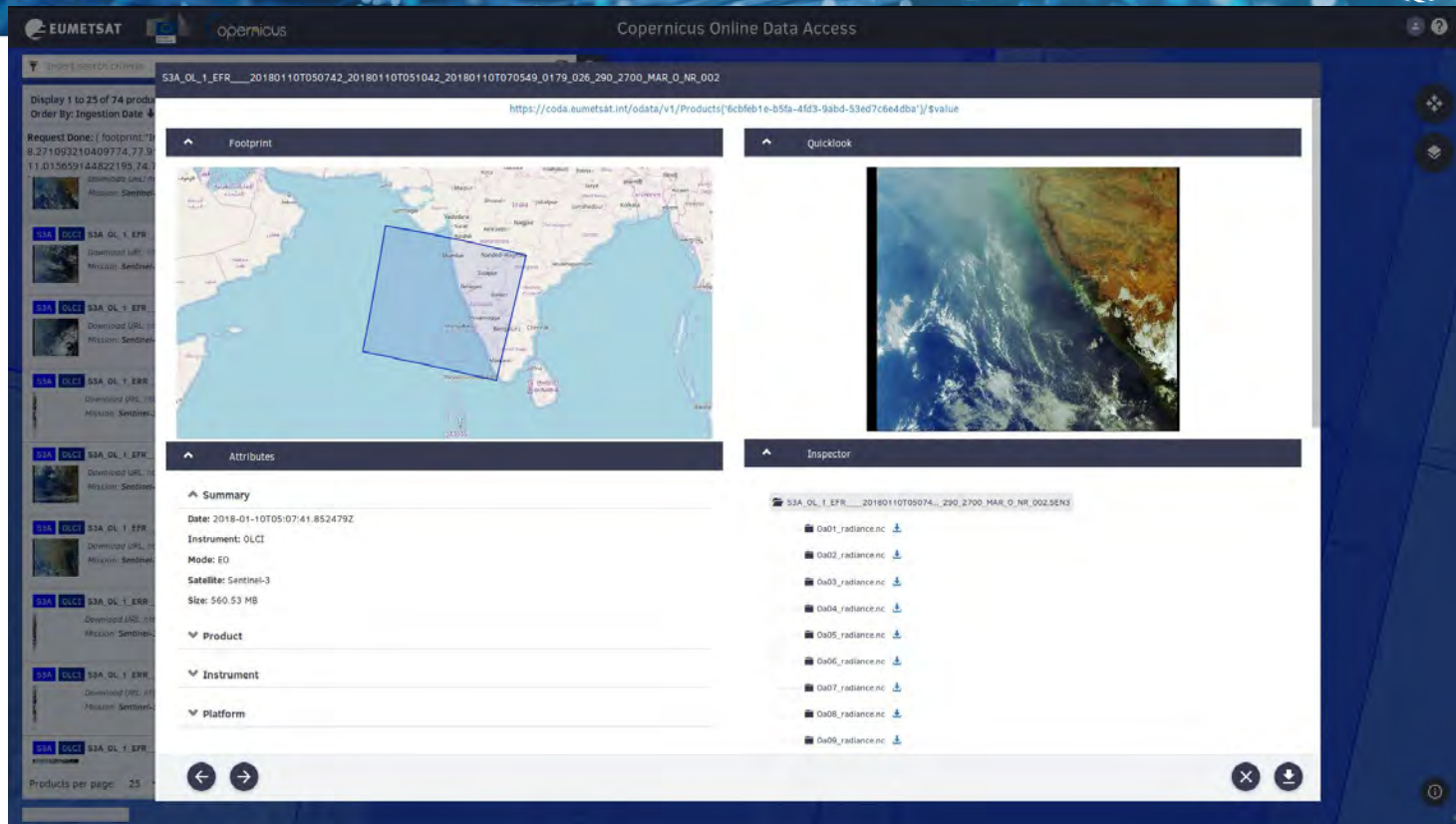
Using CODA to get Sentinel-3 data



If you put your mouse over one of the results, you will be given options to take a peek at the file, add it to your cart or download the file right away



Using CODA to get Sentinel-3 data



The screenshot displays the Copernicus Online Data Access (CODA) interface. The top navigation bar includes the EUMETSAT and Copernicus logos, and the title "Copernicus Online Data Access". The main content area is divided into several panels:

- Left Panel:** A list of products with columns for "Display 1 to 25 of 74 products", "Order by: Ingestion Date", and "Request Done: (footprint: 8.271093210409774, 77.911.015659144822195, 74.7)". Below this is a list of products with "Download URL" and "Mission: Sentinel-3" information.
- Top Center:** A URL bar showing the product ID: "S3A_OL_1_EFR_20180110T050742_20180110T051042_20180110T070549_0179_026_290_2700_MAR_O_NR_002". Below it is a URL: "https://roda.eumetsat.int/odata/v1/Products('6cbfeb1e-b5fa-4fd3-9abd-53ed7c664dba')/\$value".
- Footprint:** A map showing the geographic footprint of the data over the Indian Ocean and surrounding landmasses.
- Quicklook:** A satellite image showing the Earth's surface, likely a coastal area.
- Attributes:** A section containing metadata:
 - Summary:** Date: 2018-01-10T05:07:41.852479Z, Instrument: OLCI, Mode: EO, Satellite: Sentinel-3, Size: 560.53 MB.
 - Product:**
 - Instrument:**
 - Platform:**
- Inspector:** A list of data products available for download, including "Da01_radiance.nc", "Da02_radiance.nc", "Da03_radiance.nc", "Da04_radiance.nc", "Da05_radiance.nc", "Da06_radiance.nc", "Da07_radiance.nc", "Da08_radiance.nc", and "Da09_radiance.nc".

The quick look gives you some in-depth information about the file as well as the ability to download individual products from within

- Use the CODA 'cart' function.
- UNIX (Linux/OSx):
 - Command line tools are available for EUMETSAT L1/L2 and CMEMS data.
 - Uses wget at its heart (so, can't* be implemented in windows)
 - We have these tools to share.
- All OS:
 - Python: You can download from most EO portals (e.g. CODA, ESA hubs), using ***requests*** library to manage connections.
 - Best 'operational' approach.
 -

Copernicus Marine Data Stream: Data Archive



EUMETSAT MONITORING WEATHER AND CLIMATE FROM SPACE

EUMETSAT WEBSITE

USER SERVICES CLIENT

SEARCH AND ORDER
ORDER STATUS
HELP
FEEDBACK
MY PROFILE
LOGOUT
KNOWN ISSUES
DATA CENTRE INFO

SELECT PRODUCT > FILTER > DATE/TIME > FORMAT > DELIVERY METHOD > CHECK OUT

SELECT PRODUCT

Search Term

Products **Sentinel 3 DataSets**

- ☐ OLCI L1 RR(1km) Arctic(NRT)
- ☐ OLCI L1 RR(1km) Black Sea(NRT)
- ☐ OLCI L1 RR(1km) Mediterranean(NRT)
- ☐ OLCI L1 RR(1km) North Atlantic(NRT)
- ☐ OLCI L2 FR Arctic(NRT)
- ☐ OLCI L2 FR Baltic(NRT)
- ☐ OLCI L2 FR Black Sea(NRT)
- ☐ OLCI L2 FR Mediterranean(NRT)
- ☐ OLCI L2 FR North Atlantic(NRT)
- ☐ OLCI L2 RR(1km) Arctic(NTC)
- ☐ OLCI L2 RR(1km) Black Sea(NTC)
- ☐ OLCI L2 RR(1km) Mediterranean(NTC)
- ☐ OLCI L2 RR(1km) North Atlantic(NTC)
- ☐ SST Arctic(NRT)
- ☐ SST Baltic(NRT)
- ☐ SST Black Sea(NRT)
- ☒ SST Global(NRT)
- ☐ SST Mediterranean(NRT)
- ☐ SST North Atlantic(NRT)

Thematic Filter

- Marine
- Land
- Atmosphere
- Aerosol
- Analysis
- Cloud
- Fire
- Forecast
- Humidity
- Model
- Observation
- Ocean**
- Precipitation
- Pressure
- Radar Blackscatter NRCS
- Radiation
- Soil Moisture Index
- Sea Ice
- Sea Surface Temperature
- Snow and Ice
- Temperature
- Vegetation
- Wave

benloveday

Selected Product
SST Global(NRT)

SST Global(NRT)

NEXT STEP

CONTACT US
LEGAL INFORMATION

<http://archive.eumetsat.int>



EUMETCAST Satellite Link

Secure delivery of data via encrypted satellite link





Extremely useful in areas with difficulties accessing the internet

Not as expensive as it sounds

<https://www.eumetsat.int/website/home/Data/DataDelivery/EUMETCast/>

EUMETSAT data discovery and delivery mechanisms

Single sign on registration for online services at <https://eoportal.eumetsat.int>

	EUMETCast	https://www.eumetsat.int/website/home/Data/DataDelivery/EUMETCast/
	Copernicus Online Data Access (CODA)*	https://coda.eumetsat.int https://codareo.eumetsat.int
	Data Centre Long-Term Archive	https://archive.eumetsat.int/usc/
	EUMETView	https://eumetview.eumetsat.int/

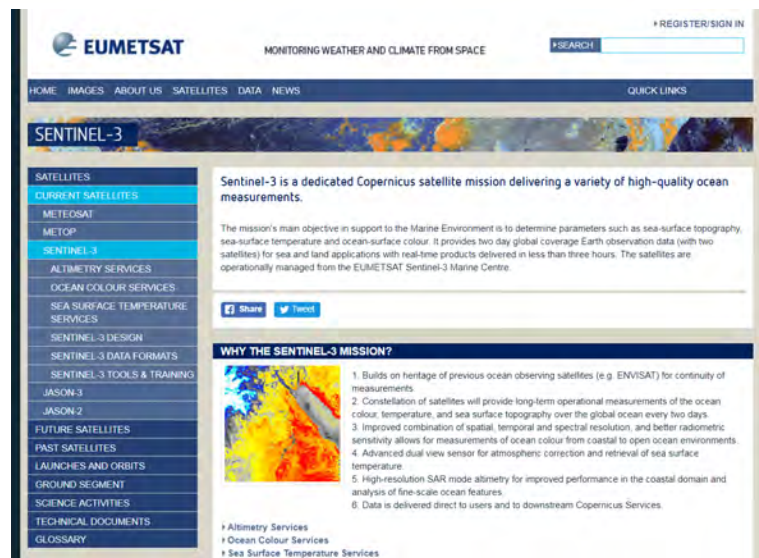
Getting more information



Detailed information available through the EUMETSAT dedicated Sentinel-3/Jason-3 web pages:

Including:

Product Handbooks
Algorithm
Theoretical Basis
Documents
Product notices



<https://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Sentinel3/index.html>

<https://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Jason3/index.html>



European Space Agency

How to keep in touch and ask questions



Training

Attend/send students – <http://training.eumetsat.int>

Collaborate – we want to support other projects.

Contact Copernicus.Training@eumetsat.int

Copernicus Marine User Forum

<http://forums.eumetsat.int/forums/forum/copernicus-marine-calval/>

Questions

Share results/papers/campaigns (case studies)

Helpdesk – ops@eumetsat.int

Twitter – [@eumetsat_users](https://twitter.com/eumetsat_users)

Copernicus Collaborative Exchange:

<https://www.eumetsat.int/website/home/TechnicalBulletins/Training/index.html>

Join the **Sentinel-3 Validation Team** www.s3vt.org



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