Exercises: Using the EUMDAC (EUMETSAT Data Access Client) from command-line

EUMDAC is the EUMETSAT Data Access Client. It provides access to EUMETSAT data which has various satellite missions. As a Python library, it comes with many methods and functions to use EUMETSAT APIs (Application Programming Interfaces), like Data Store and the Data Tailor. It also provides a variety of useful command-line utilities for data search, download, and customizing.

In our exercises we will be focusing on EUMDAC usage on command-line interface (CLI) on both MacOS and Windows OS.

EXTRA: EUMDAC User Guide: <u>https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide</u>

Exercise 1: Get EUMDAC running (approx. 12 min)

In our exercises, we will be using standalone binaries. This solution is regarded as a simple but effective one.

 Get the latest version of the EUMDAC binary under the following link: <u>https://gitlab.eumetsat.int/eumetlab/data-services/eumdac/-/releases/2.2.3</u> Download the package fitting your operating system and run it for the first time.



- 2. After downloading and uncompressing it you will see a file named "eumdac".
- 3. Open a terminal page, go to your downloaded binary location, and run the binary for the first time.

Windows:

\$ eumdac.exe

(base) C:\Users\Altintas	\Downloads\eumdac-win>eumdac.exe
usage: eumdac.exe [-h] [-v] [version] [-y] [debug] {set-credentials,token,describe,search,download,tailor,local-tailor,order}
EUMETSAT Data Access Cli	ent
<pre>positional arguments: {set-credentials,token set-credentials token describe search download tailor local-tailor order</pre>	,describe,search,download,tailor,local-tailor,order} permanently set consumer key and secret, see https://api.eumetsat.int/api-key generate an access token describe a collection or product search for products download products, with optional customisation manage Data Tailor resources manage local Data Tailor instances manage orders
optional arguments: -h,help -v,verbose version -y,yes debug	show this help message and exit increase output verbosity (can be provided multiple times) show program's version number and exit set any confirmation value to 'yes' automatically show additional debugging info and traces for errors
MacOS & Linux:	
\$./eumdac	
usage: eumdac [-h] {set- EUMETSAT Data Acces	[-v] [version] [-y] [debug] -credentials,token,describe,search,download,tailor,local-tailor,order} ss Client
positional argument {set-credentials; set-credentials; token describe search download tailor local-tailor order	<pre>ts: ,token,describe,search,download,tailor,local-tailor,order} s permanently set consumer key and secret, see https://api.eumetsat.int/api-key generate an access token describe a collection or product search for products download products, with optional customisation manage Data Tailor resources manage local Data Tailor instances manage orders</pre>
optional arguments: -h,help -v,verbose version -y,yes debug ~/D/arm64 \$	show this help message and exit increase output verbosity (can be provided multiple times) show program's version number and exit set any confirmation value to 'yes' automatically show additional debugging info and traces for errors

EXTRA: We have many other ways to start with EUMDAC (installing with pip, conda, from source etc.). You can look at this link: <u>https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide#ID-Get-EUMDAC</u>

Exercise 2: Set your credentials with EUMDAC to interact with EUMETSAT APIs (approx. 10 min)

- Find your CONSUMER-KEY and CONSUMER-SECRET from <u>https://api.eumetsat.int/api-key/</u>. You will need an EOPortal account for this. If you do not have an account in Earth Observation Portal at EUMETSAT, please create one in <u>https://eoportal.eumetsat.int/</u>.
- 2. Prepare an EUMDAC command with your own CONSUMER credentials:

```
Windows:
```

eumdac.exe set-credentials CONSUMER-KEY CONSUMER-SECRET

```
MacOS & Linux:
```

./eumdac set-credentials CONSUMER-KEY CONSUMER-SECRET

EXTRA: Try adding "-vv" flag at the end of the eumdac set-credentials command and see what API (Application Programming Interfaces) calls EUMDAC is querying in the background. This applies to all EUMDAC commands! Meaning you can always use "-vv" flag with any API call EUMDAC commands.

Windows:

eumdac.exe set-credentials CONSUMER-KEY CONSUMER-SECRET -vv

MacOS & Linux:

./eumdac set-credentials CONSUMER-KEY CONSUMER-SECRET -vv

Exercise 3: Check what collections the Data Store has (approx. 10 min)

1. Use describe command to see all the available collections in the Data Store.

Windows: eumdac.exe describe

MacOS & Linux:

./eumdac describe

Confirm many numbers of collections are printed back.

(base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe describe
EO:EUM:DAT:MSG:CLM-IODC - Cloud Mask - MSG - Indian Ocean
EO:EUM:DAT:0394 - Land Surface Temperature with Directional Effects - MSG
EO:EUM:DAT:0412 - SLSTR Level 2 Sea Surface Temperature (SST) - Sentinel-3
EO:EUM:DAT:0237 - Poseidon-4 Altimetry Level 1B Low Resolution (baseline version F06) - Sentinel-6 - Reprocessed
E0:EUM:DAT:0241 - Climate-quality Advanced Microwave Radiometer Level 2 Products (baseline version F06) - Sentinel-6 - Re
E0:EUM:DAT:0857 - Poseidon-4 Altimetry Level 2P Low Resolution - Sentinel-6
EO:EUM:DAT:0862 - AVHRR Fundamental Data Record - Release 1 - Multimission
EO:EUM:DAT:0882 - MVIRI Level 1.5 Climate Data Record Release 2 - MFG - 63 degree
EO:EUM:DAT:METOP:ASCSZF1B - ASCAT Level 1 Sigma0 Full Resolution - Metop - Global
EO:EUM:DAT:METOP:ASCSZR1B - ASCAT Level 1 Sigma0 resampled at 12.5 km Swath Grid - Metop - Global
EO:EUM:DAT:MSG:MSG15-RSS - Rapid Scan High Rate SEVIRI Level 1.5 Image Data - MSG
EO:EUM:DAT:0855 - Poseidon-4 Altimetry Level 2 High Resolution - Sentinel-6
EO:EUM:DAT:0836 - SRAL Level 1A Unpacked L0 Complex Echoes (version BC005) - Sentinel-3 - Reprocessed
EO:EUM:CM:METOP:ASCSZFR02 - ASCAT Level 1 SZF Climate Data Record Release 2 - Metop
EO:EUM:DAT:0081 - MVIRI Level 1.5 Climate Data Record Release 1 - MFG - 57 degree
EO:EUM:DAT:0398 - Fire Risk Map - Released Energy Based - MSG
EO:EUM:DAT:0405 - Atmospheric Motion Vectors Climate Data Record Release 2 - MFG and MSG - 0 degree

2. Now you can copy any of the collection ID's and get more information. "-c" used in the command is "collection". You can also use "--collection" in place of it.

Windows:

eumdac.exe describe -c EO:EUM:DAT:0412

MacOS & Linux:

./eumdac describe -c EO:EUM:DAT:0412

(base) C:\Users	Altintas\Downloads\eumdac-win>eumdac.exe describe -c E0:EUM:DAT:0412
EO:EUM:DAT:0412	- SLSTR Level 2 Sea Surface Temperature (SST) - Sentinel-3
Date: 2017-07-0	- now
SLSTR SST has a	spatial resolution of 1km at nadir. Skin Sea Surface Temperature following the GHRSST L2P GDS2 format spe
able at pick-up	point in less than 3h - All Sentinel-3 Non Time Critical (NTC) products are available at pick-up point in
the umbrella of	the EU Copernicus programme.
Licence: Copern	LCUS
Search options:	
bbox	- Inventory which has a spatial extent overlapping this bounding box, in CLIbbox
geo	- Inventory which has a spatial extent overlapping this Well Known Text geometry, in CLIgeometry
title	- Can be used to define a wildcard search on the product title (product identifier), use set notation as
sat	- Mission / Satellite, accepts: ['Sentinel-3A', 'Sentinel-3B'], in CLIsatellite
type	- Product Type, accepts: ['SL_2_WST'], in CLIproduct-type,acronym
dtstart	- Temporal Start, in CLI -s,start
dtend	- Temporal End, in CLI -e,end
publication	- publication date, in CLIpublication-after,publication-before
zone	- Equi7grid main continental zone, accepts: ['NA', 'AN', 'OC', 'AS', 'SA', 'EU', 'AF']
t6	- Equi7grid 600km tile
timeliness	- Timeliness, accepts: ['NT', 'NR'], in CLItimeliness
orbit	- Orbit Number, must be a positive integer, in CLIorbit
relorbit	- Relative Orbit Number, must be a positive integer, in CLIrelorbit
orbitdir	- Orbit Direction, accepts: ['DESCENDING', 'ASCENDING']
cycle	- Cycle Number, must be a positive integer, in CLIcycle
sort	- SRU sort keys, see OpenSearch Extension for EO for details, accepts: ['publicationDate', 'start,time']
set	- element set to return for each hit, default is full, accents: ['full', 'brief']

EXTRA: You can also get information from the products themselves by passing the "-p" flag and inserting the name of the product.

Windows:

eumdac.exe describe -c EO:EUM:DAT:0412 -p S3A SL 2 WST 20240709T075743 20240709T080043 20240709T084709 01 79_114_235_0540_MAR_0_NR_003.SEN3

MacOS & Linux:

./eumdac describe -c EO:EUM:DAT:0412 -p S3A SL 2 WST 20240709T075743 20240709T080043 20240709T084709 01 79 114 235 0540 MAR O NR 003.SEN3

Exercise 4: Search for products in collections using Data Sore (approx. 8 min)

1. Search for a collection with eumdac search. "--limit 5" is used for limiting the number of results of the command.

```
Windows:
eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
MacOS & Linux:
./eumdac search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
```

2. Confirm that the latest 5 HRSEVIRI products available are returned. (base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5 MSG3-SEVI-MSG15-0100-NA-20240709094242.237000000Z-NA MSG3-SEVI-MSG15-0100-NA-20240709092742.280000000Z-NA MSG3-SEVI-MSG15-0100-NA-20240709091242.324000000Z-NA 1SG3-SEVI-MSG15-0100-NA-20240709085742.367000000Z-NA MSG3-SEVI-MSG15-0100-NA-20240709084242.410000000Z-NA

EXTRA: You can use many other filtering options for further searching. "--satellite" is clarifying which satellite you will be using.

Windows: eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --satellite MSG3 --limit 4

MacOS & Linux: ./eumdac search -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --satellite MSG3 --limit 4

Exercise 4: Download products in collections using Data Store (approx. 8 min)

1. With eumdac you can easily download products. After searching for your products, you can simply replace "search" with "download".

 Job 2: Downloading C:\Users\Altintas\Downloads\eumdac-win\MSG3-SEVI-MSG15-0100-NA-20240709091242.324000000Z-NA.zip

 [======================]
 100.0% 6.37 MB/s

 Job 3: Downloading C:\Users\Altintas\Downloads\eumdac-win\MSG3-SEVI-MSG15-0100-NA-20240709092742.280000000Z-NA.zip

 [=====================]
 100.0% 6.41 MB/s

 Job 4: Downloading C:\Users\Altintas\Downloads\eumdac-win\MSG3-SEVI-MSG15-0100-NA-20240709094242.237000000Z-NA.zip

 [=======================]
 100.0% 6.57 MB/s

 Job 5: Downloading C:\Users\Altintas\Downloads\eumdac-win\MSG3-SEVI-MSG15-0100-NA-20240709095742.19500000Z-NA.zip

[======] 100.0% 6.90 MB/s Removing successfully finished order <u>2024-07-09#0001</u>

EXTRA: You can download individual files in a product with just an additional flag "--entry".

Windows:

eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --limit 2 --entry "manifest.xml"

MacOS & Linux:

./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --limit 2 --entry "manifest.xml"

Exercise 5: Tailor products in collections using the Data Tailor Web Services (DTWS) (approx. 15 min)

1. You can use EUMDAC to interact with the DTWS (Data Tailor Web Services) to customize products before downloading them. After finding your products, just add "--tailor" flag in your eumdac command with a chain configuration. Eg

```
Windows:
eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --
tailor "product: HRSEVIRI, format: geotiff"
MacOS & Linux:
./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --
tailor "product: HRSEVIRI, format: geotiff"
```

2. Confirm that the GeoTIFF files are now downloaded into your current directory.

(base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe download -c E0:EUM:DAT:MSG:HRSEVIRIlimit 3tailor "product: HRSEVIRI, format: geotiff" Benerassing 3 products
liging Data Tailor Web Service
Denducts will be customized with the following parameters:
formation of the contract with the following phone cers.
product HESEVIRT
Distra cher 2024.07.0949001
Joh 1 of 3 starting
Tob 2 of 3 starting
Do 3 of 3 starting
Tob 3' Customication 98312656 for MSG3-SEVT-MSG15-0100-NA-20240709101242 1520000007-NA is now running
Tob 2: Custamisation ffr85067 for MSG3-SEVT-MSG15-0100-NA-20200700107701 1100000007-NA is now running
Tob 1: Customisation 677erfbf for MSG3-SEVT-MSG15-0100-NA-20200700095742 1950000007-NA is now running
lob 1: Customisation 677ecfbf for MSG3-SEVT-MSG15-0100-NA-20240709095742 1950000007-NA bas finished
Job 3: Customisation 98312e56 for MSG3-SEVI-MSG15-0100-NA-20240700101242 1520000007-NA has finished
lob 2: Customisation ffc85967 for MSG3-SEVI-MSG15-0100-NA-20240709102742.1100000007-NA has finished
Job 1: Downloading output of job 677ecfbf for MSG3-SEVI-MSG15-0100-NA-20240709095742.1950000002-NA
Job 3: Downloading output of job 98312e56 for MSG3-SEVI-MSG15-0100-NA-20240709101242.1520000007-NA
Job 1: HRSEVIRI 20240709T094509Z 20240709T095742Z epct 677ecfbf F.tif has been downloaded.
Job 1: Deleting customization 677ecfbf for MSG3-SEVI-MSG15-0100-NA-20240709095742.1950000002-NA
Job 2: Downloading output of job ffc85967 for MSG3-SEVI-MSG15-0100-NA-20240709102742.110000000Z-NA
Job 3: HRSEVIRI 20240709T1000009Z 20240709T101242Z epct 98312e56 F.tif has been downloaded.
Job 3: Deleting customization 98312e56 for MSG3-SEVI-MSG15-0100-NA-20240709101242.152000000Z-NA
Job 2: HRSEVIRI 20240709T101509Z 20240709T102742Z epct ffc85967 F.tif has been downloaded.
Job 2: Deleting customization ffc85967 for MSG3-SEVI-MSG15-0100-NA-20240709102742.110000000Z-NA
Removing successfully finished order 2024-07-09#0001

EXTRA: You can further populate the chain configuration. For example, you can add filter, projection, and ROI (Region of Interest), also change the format into an image format. You can also put "--entry" flag to download only "*.png" files and no metadata files.

Windows:

eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor "product: HRSEVIRI, format: png_rgb, filter: hrseviri_natural_color, roi: western_europe, projection: geographic" --entry "*.png"

MacOS & Linux:

./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor "product: HRSEVIRI, format: png_rgb, filter: hrseviri_natural_color, roi: western_europe, projection: geographic" --entry "*.png"

Tasks: Using the EUMDAC (EUMETSAT Data Access Client) from command-line

Feel free to check the above exercises or our documentation pages if you are stuck in one of the tasks.

Data Store Guide: https://user.eumetsat.int/resources/user-guides/data-store-detailed-guide

EUMETSAT Data Access Client (EUMDAC) guide: https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide

Data Tailor Standalone Guide: https://user.eumetsat.int/resources/user-guides/data-tailor-standalone-guide

DTWS Section in Data Store Guide: https://user.eumetsat.int/resources/user-guides/datastore-detailed-guide#ID-Customising-products-with-the-Data-Tailor

Task 1: Use "eumdac describe" to describe an MSG High Rate SEVIRI (HRSEVIRI) collection. Look at its available dates, its description, and its search options. (approx. 10 min)

Task 2: Use "eumdac describe" to describe a product of MSG HRSEVIRI collection. Look at its platform, instrument, sensing start-end times and SIP (Submission Information Package) entries (files that are inside the product). (Tip: Use eumdac search-c COLLETION-ID--limit 3 to find a product ID) (approx. 10 min)

Task 3: Use "eumdac search" with a time filter (--start DATETIME –end DATETIME) and search for products from a METOP collection. The dates should be 2023-11-25T19:30 and 2023-11-26T19:30. Note the number of products returned. (approx. 10 min)

Task 4: Use "eumdac search" with a time and satellite filter (--satellite) on a Sentinel-3 collection. The dates should be 2023-11-25T19:30 and 2023-11-26T19:30 and satellite should be set as Sentinel-3B (approx. 10 min)

Task 5: Use "eumdac download" to download latest 5 products in an MSG collection (EO:EUM:DAT:MSG:HRSEVIRI- High Rate SEVIRI Level 1.5 Image Data- MSG- 0 degree). (Tip: Remember to use --limit) (approx. 10 min)

Task 6: Use "eumdac download" to download a file named "enhanced_measurement.nc" inside the products from a Sentinel-3 collection (EO:EUM:DAT:0415- SRAL Level 2 Altimetry Global- Sentinel-3). Products should be filtered with a sensing time of 2023-11-25T19:30 and 2023-11-26T19:30. (Tio: Remember to use--entry) (approx. 10 min)

Task 7: Use DTWS to customize six MSG HRSEVIRI products into GeoTIFF format with geographic projection. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 8: Use DTWS to customize three METOP products into NetCDF4 format with layer filtering and ROI as West Africa. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 9: Use DTWS to customize one Sentinel-3 product into a jpeg image file with geographic projection. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 10: Use DTWS to customize single AVHRRL1 product from 2022 into a RGB Jpeg image file with geographic projection and set filter as Natural Color. (approx. 10 min) (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section)