Ocean Virtual Laboratory online and standalone tools tutorial
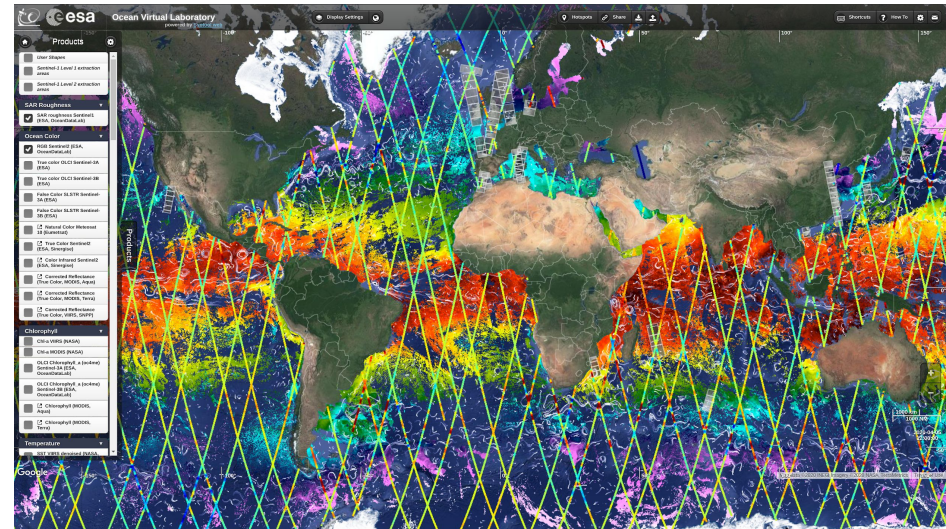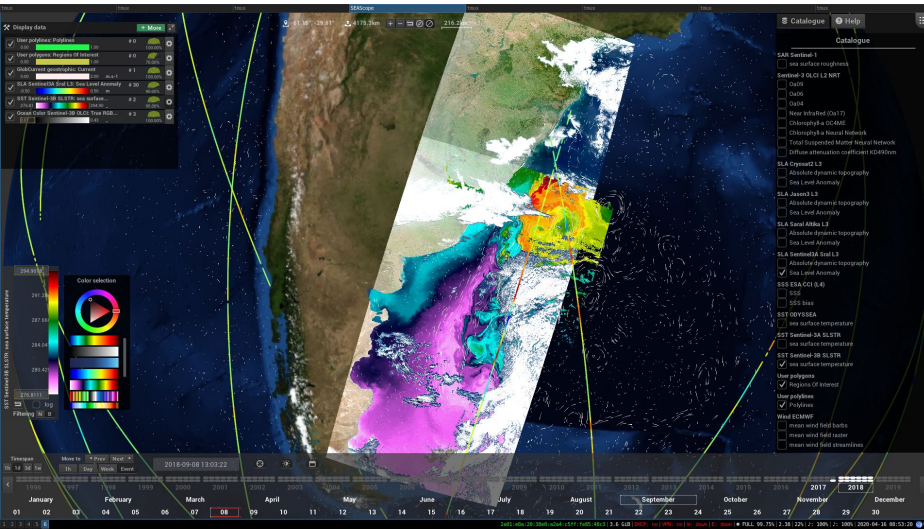
OceanDataLab team

LPS 22, 2022/05/23-24

Challenge

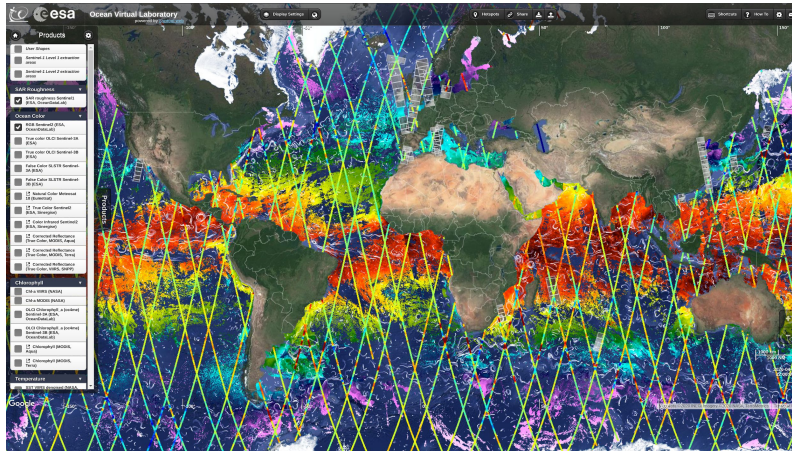We have more and more satellite data available at very high resolution:

How to benefit from the synergy from data (e.g. from Sentinel 1-2-3-6)?
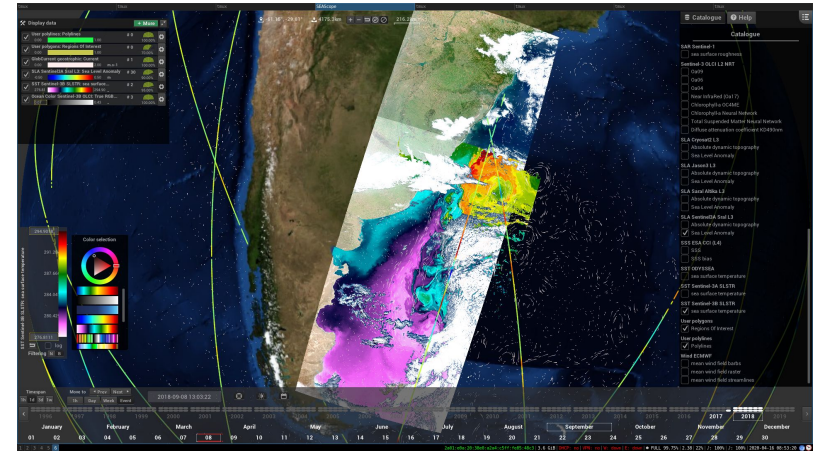
Solutions

Provide a solution to easily open, visualise, compare and blend data collocated in space and time.

Proposed Tools

Web-based and online: **Ocean Virtual Lab Syntool**

Stand-alone: **SEAScope** interactive viewer

1 - OVL online portal

- Overview of portals
- Main functionalities / How To
- Shapes: draw / import / export
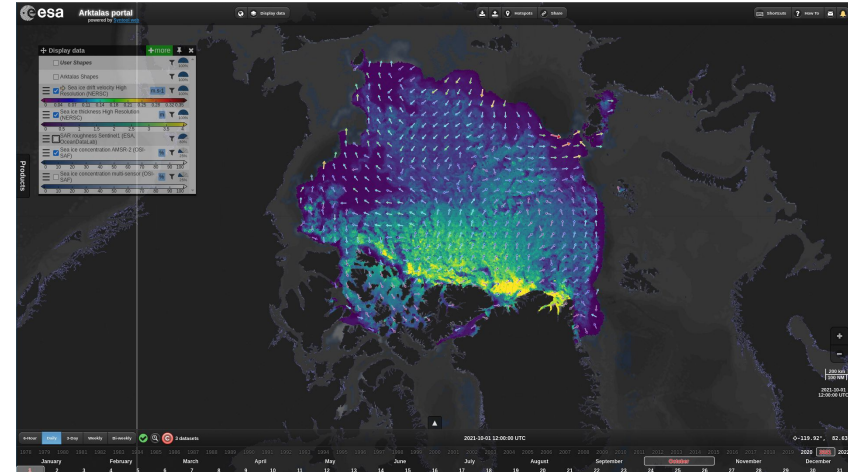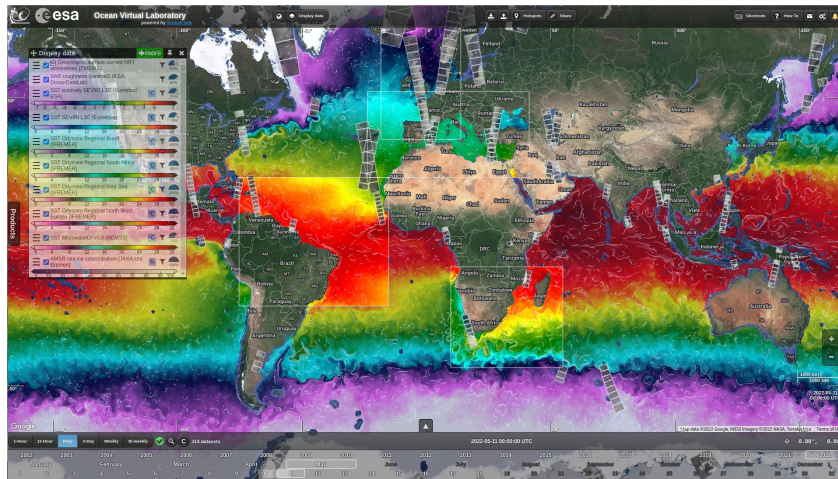- Capture and share an interesting case using SEAShot

2- SEAScope stand alone tool

- Install on Linux / macOS / Windows
- Open SEAScope and main functionalities overview
- Add data to SEAScope
- Convert data into SEAScope netCDF format (IDF)
- Shapes: draw / import / export
- Two-ways interaction using Jupyter Python notebooks

Overview of portals

2D Maps are available online showing more than 200 products and some of them are available in near real time.

- General portal: https://ovl.oceandatalab.com
- In-situ sea campaigns: https://realtime.oceandatalab.com
- Polar view: https://arktalas.oceandatalab.com

Main functionalities

- Search, select product and look at selection in "Display data" panel:
  - https://youtu.be/JmmjXxXYvvE
- Rearrange order of layers in "Display data" panel
- Compare data using transparency:
  - https://youtu.be/OieBsyeamQo
- Time span / Calendar:
  - https://youtu.be/LSLuJCebDVk
- Share your nice illustration using a shortlink
- Measure the length or displacement of a structure (distance)
  - https://youtu.be/Y9UGZOiF45w

Tutorial videos can be found on OceanDataLab Youtube channel:

https://youtube.com/playlist?list=PL_Nrq3gZvmM-rrE64qr7QqzQir23kzol1

## Drawing capabilities: draw shapes, export, import

- Select "User shapes" in the list of products (in the Annotation group)

- A box with shapes appears on the right, you can choose between point, arrow, polyline, polygon, eddy, mushroom or text

- Select the desired shape and click on the map to draw
  TIP: for continuous line drawing, hold down Ctrl (or Cmd on mac)

- You can select a single shape by clicking on it or an ensemble of shapes using Ctrl+A (or Cmd+A on mac), you can edit your selection and export them using the right panel
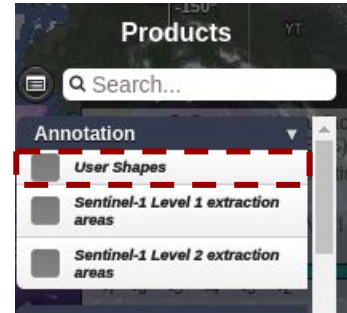
Look at the Youtube tutorial video for more features: https://youtu.be/6YPwJCFHBIc

Capture and share an interesting case using SEAShot

- Open OVL web portal: https://odl.bzh/0p0z-Rma and find an interesting test case
- Click on the camera button in the top bar to create a seashot
- The map is resized to give you an idea of how your seashot will look like
- You can pan and zoom in/out to adjust your preview, as well as add a title, a description and tags
- Changing the start and end time as well as steps fields will make a timelapse video
- Once you hit "Create", you will be asked to log in or create an account, follow the instructions
- Your seashot will be available on https://seashot.odl.bzh/, as well as many other public seashots
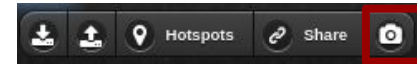
Wave breaking in Raz de Sein
posted on May 20, 2022 by lucile.gaultier
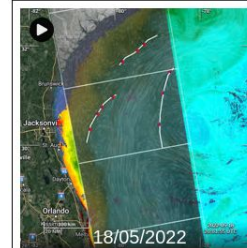draft ovl sentinel1 sar roughness
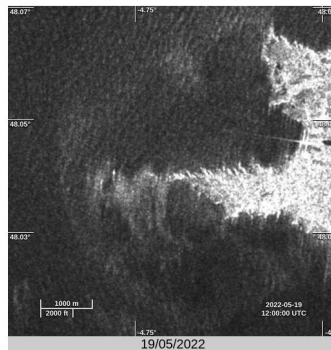
19/05/2022

Background is Google Hybrid

Products shown:
- SAR roughness Sentinel1 (ESA, OceanDataLab)
- OLCI Chlorophyll_a (oc4me) Sentinel-3B (ESA, OceanDataLab)
- SST SLSTR Sentinel-3B (ESA, OceanDataLab)
- SST SLSTR Sentinel-3A (ESA, OceanDataLab)

Waves visible in Raz de Sein

Gulf stream meanders ⬀ Open
posted on May 19, 2022 by dr.fab
public ovl

Sentinel3 OLCI chla and SLSTR SST associated to Sentinel1 SAR brings a clear picture of the location of Gulf Stream meanders off US East coast
Background is Google Hybrid
Products shown:
- OLCI Chlorophyll_a (oc4me) Sentinel-3A (ESA, OceanDataLab)
- SAR roughness Sentinel1 (ESA, OceanDataLab)
- Geostrophic surface current NRT streamlines (CMEMS)

18/05/2022

Resilience campaign : eddy tracking off Coffee bay ⬀ Open
posted on May 19, 2022 by dr.fab
public ovl

Sentinel3 OLCI Chla concentration and SLSTR SST can be usefull to locate eddies, even in NRT during oceanographic campaigns !
Background is Google Hybrid
Products shown:
- SAR roughness Sentinel1 (ESA, OceanDataLab)
- Marion Dufresne (IFREMER)
- OLCI Chlorophyll_a (oc4me) Sentinel-3A (ESA, OceanDataLab)
- OLCI Chlorophyll_a (oc4me) Sentinel-3B (ESA, OceanDataLab)

16/05/2022

Install the viewer

You can retrieve the archive from the usb key or https://seascope.oceandatalab.com

1 - Linux
Copy the archive `seascope_20220428.tar.gz` in your workspace.
Uncompress the archive: a directory named `seascope` is created

2 - macOS
Open the disk image `SEAScope-20220428.dmg`.
Drag SEAScope to the Applications folder and the "Import to SEAScope" droplet to your Desktop.

3 - Windows
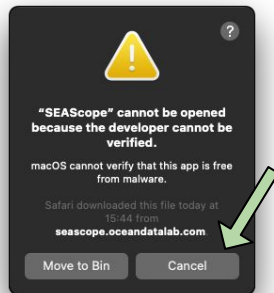Copy the archive `SEAScope_win64_20220428.zip` in your workspace.
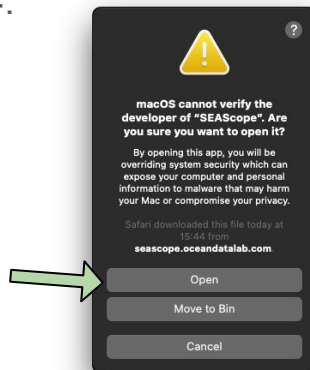Uncompress the archive: a directory named `seascope` is created
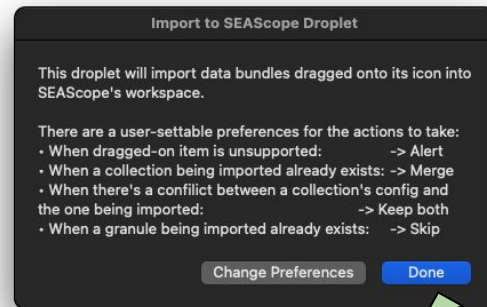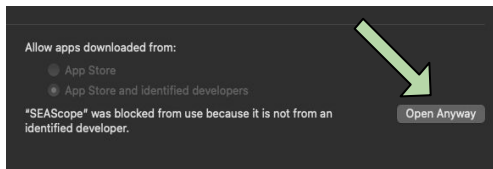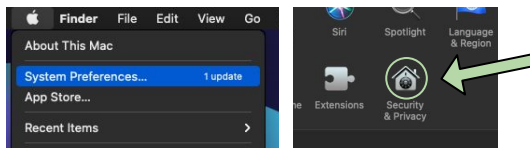
1. Open SEAScope
2.

3.

4.

5. Repeat steps 1 to 4 but for the "Import to SEAScope" droplet


6. Quit SEAScope and you're done

How SEAScope works

The first time SEAScope is started, the application creates a configuration file named `config.ini` that contains paths for the colormaps, data, plugins,… directories.

The `data` directory will have one subdirectory for each collection:
it contains one or several granules, as well as a configuration file (also named `config.ini`) that defines how SEAScope should render these granules.

At startup SEAScope will also create an index for all the compatible granules found in the `data` directory (if it exists):
this index will contain the full path for each file that SEAScope is able to load.
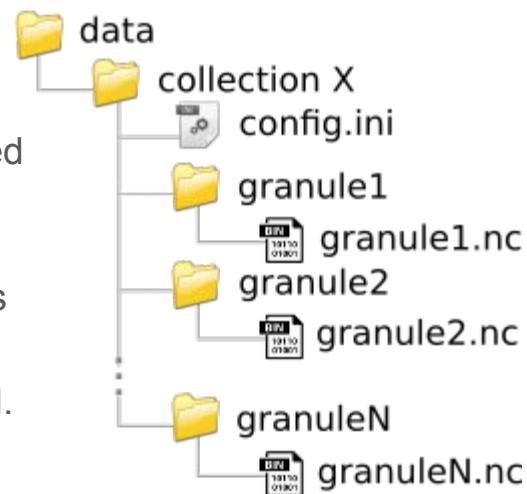
If you decide to move the `seascope` directory somewhere else, make sure to delete the `seascope/config.ini` and `seascope/index.fb` files because they will still contain references to the old location. SEAScope will recreate them for you the next time you start the application.

Open SEAScope viewer

1 - Linux

In a shell:

```
> cd [workspace]/seascope
> ./seascope
```

2 - macOS

Open SEAScope like you do any other application

3 - Windows

In the file explorer:
 - open the `[workspace]/seascope` directory
 - double-click on `launch_seascope.bat`

Add data to SEAScope

The `data` directory on the USB key contains samples for several collections.

1 - Linux

Copy the content of the `data` directory from the USB key into `[workspace]/seascope/data`

2 - macOS

Drag-n-drop the content of the `data` directory from the USB key onto the "Import to SEAScope" droplet

Alternatively you can copy the content into `~/SEAScope-workspace/data`

3 - Windows

Copy the content of the `data` directory from the USB key into `[workspace]/seascope/data`
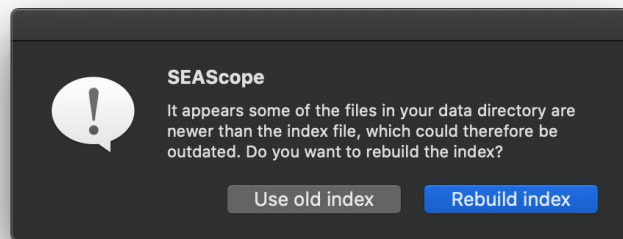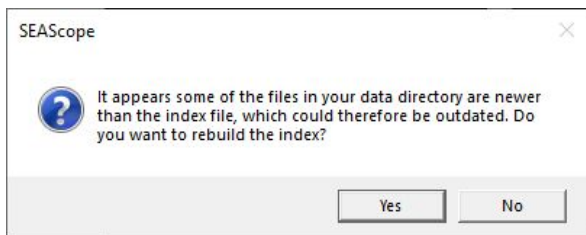
Add data to SEAScope

At startup SEAScope builds/updates an index that lists all the granules available in the data directory.

If SEAScope detects a change in the `data` directory, it will ask you whether or not the index should be updated. When prompted, agree to rebuild the index.

Alternatively, you can delete the `[workspace]/seascope/index.fb` file (or `~/SEAScope-workspace/index.fb` on macOS) when SEAScope is not running: the file will be regenerated automatically next time you start the application.

Convert data into SEAScope

1- Install the converter (python code)

Get the idf_converter python 3 package from the USB key

In conda or in a shell:

```
> pip install idf_converter-0.0.277.tar.gz
```

2- Convert your data using a configuration file

Conversion options can be passed directly on the command line or using configuration files.

Sample configuration files can be found on the USB key, in the `configuration` directory.

```
> idf-converter [path to the config file].txt@ -i path = [path to your input file] -o path = [path to your
output directory]
```
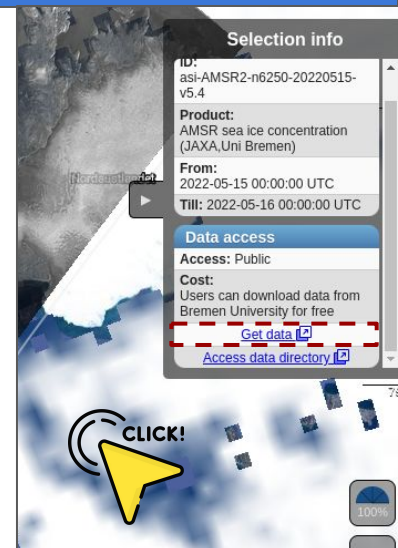
Convert data into SEAScope

3 - Practice converting AMSR-2 sea ice concentration data

- Go to OVL web portal: https://odl.bzh/k1Pbfm3U, click on AMSR-2 sea ice concentration data displayed on the map to open the Selection info panel and click on "Get data"

- or get data from the Bremen University website:
  https://seaice.uni-bremen.de/data/amsr2/asi_daygrid_swath/n6250/netcdf/2022/asi-AMSR2-n6250-20220515-v5.4.nc

- To convert this file to IDF, run in a shell or conda:

```
> idf-converter [path to usb key]/configuration/bremen_amsr_l3_sic/bremen_amsr_l3_sic.txt@ \
            -i path = [downloads]/asi-AMSR2-n6250-20220515-v5.4.nc \
            -o path = [workspace]/seascope/data
```

NB: macOS users should replace "`[workspace]/seascope/data`" with "`~/SEAScope-workspace/data`"

Convert data into SEAScope

- The `data` directory now contains a subdirectory for the `bremen_amsr_l3_sic` collection.

```
seascope/data/bremen_amsr_l3_sic
            └── asi-AMSR2-n6250-20220515-v5.4
                └── asi-AMSR2-n6250-20220515-v5.4_idf_00.nc
```

- You just added a new collection containing one granule in the `data` directory, but SEAScope does not know how to display these data yet: we need to provide a configuration file where the application will find the rendering settings for all the granules that belong to the `bremen_amsr_l3_sic` collection.

  A sample configuration file is available for this collection on the USB key, copy `[path to usb key]/configuration/bremen_amsr_l3_sic/config.in` to the `[workspace]/seascope/data/bremen_amsr_l3_sic/` directory.

- And now we're all set! (Re)start SEAScope to let the application detect the new data and update the index.

  NB: macOS users should replace "`[workspace]/seascope/data`" with "`~/SEAScope-workspace/data`"

4 - Practice converting Sentinel-1 SAR data

- Go to OVL web portal: https://odl.bzh/k1Pbfm3U, click on the dataset you want to download to open the Selection info panel and click on "Get data"
- You will be redirected to Creodias Finder and will have to create an account or log in to retrieve the dataset
- Alternatively you can download this sample from our ftp: https://ftp.odl.bzh/odl/events/lps_2022/S1A_EW_GRDM_1SDH_20220515T03313 9_20220515T033239_043216_05294F_F79D.zip
- Unzip the downloaded data
- Run in a shell or conda:
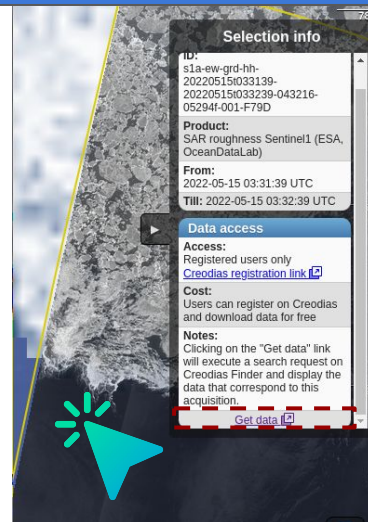
```
> idf-converter [path to usb key]/configuration/sentinel1_l1_roughness_IWEW_GRD/sentinel1_l1_roughness_IWEW_GRD.txt @ \
    -i path = [downloads]/S1A_EW_GRDM_1SDH_20220515T033139_20220515T033239_043216_05294F_F79D.SAFE/ \
measurement/s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001.tiff
    -o path = [workspace]/seascope/data
```

NB: macOS users should replace "`[workspace]/seascope/data`" with "`~/SEAScope-workspace/data`"

- The `data` directory now contains a subdirectory for the `sentinel1_l1_roughness_IWEW_GRD` collection.

```
seascope/data/sentinel1_l1_roughness_IWEW_GRD
        └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_00.nc
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_01.nc
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_02.nc
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_03.nc
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_04.nc
            └── s1a-ew-grd-hh-20220515t033139-20220515t033239-043216-05294f-001-F79D_idf_05.nc
```

- You just added a new collection containing one granule in the `data` directory, but SEAScope does not know how to display these data yet: we need to provide a configuration file where the application will find the rendering settings for all the granules that belong to the `sentinel1_l1_roughness_IWEW_GRD` collection.

  A sample configuration file is available for this collection on the USB key, copy `[path to usb key]/configuration/sentinel1_l1_roughness_IWEW_GRD/config.ini` to the `[workspace]/seascope/data/sentinel1_l1_roughness_IWEW_GRD` directory.

  NB: macOS users should replace "`[workspace]/seascope/data`" with "`~/SEAScope-workspace/data`"

Convert data into SEAScope (Advanced, for training at home)

- And now we're all set! (Re)start SEAScope to let the application detect the new data and update the index.

- Select the "sea ice concentration" variable under the "AMSR (-E/-2) ARTIST Sea Ice" category

- Select the "sea surface roughness" variable under the "Sentinel-1 SAR Roughness IW/EW GRD" category
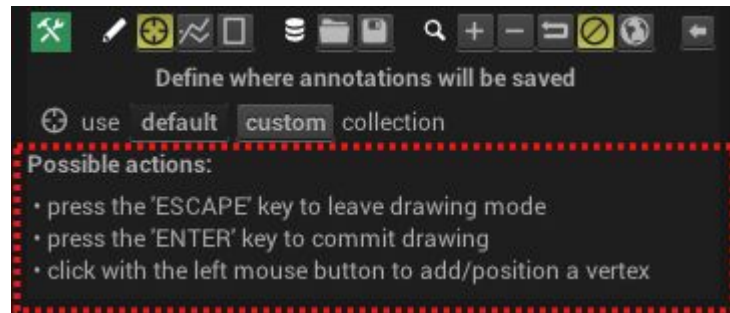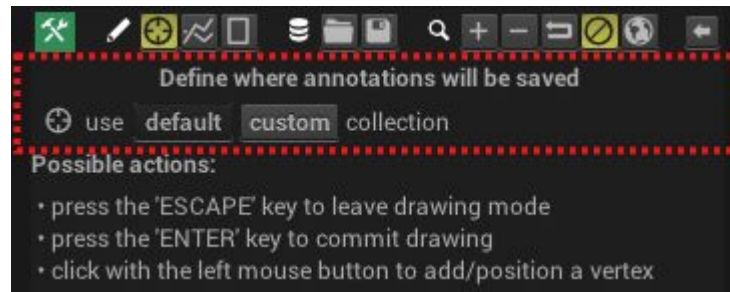
- Enjoy :)
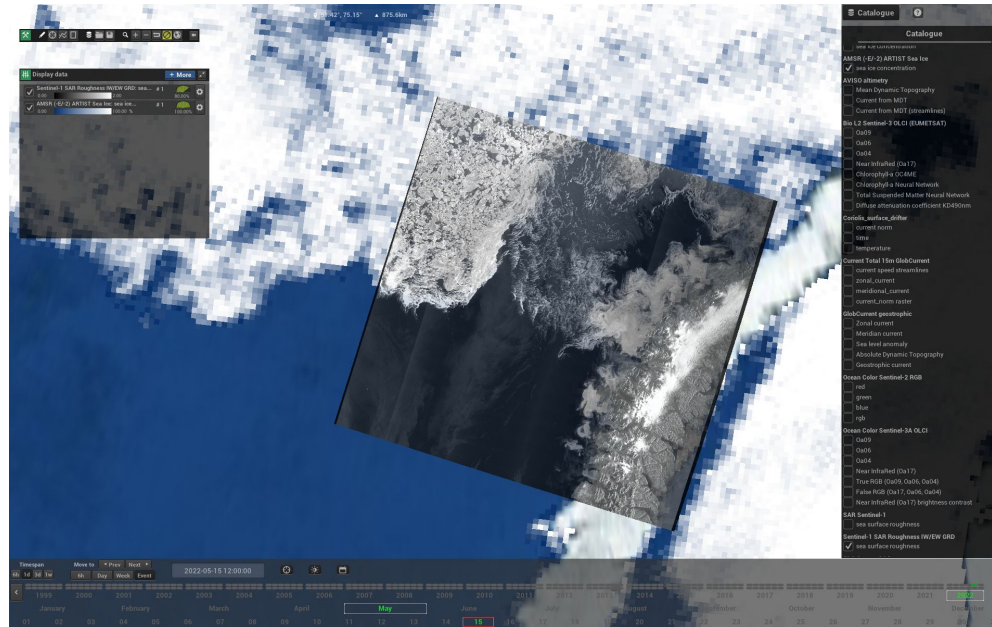
Shapes: **Draw** / export / import

Select one of the drawing tools:
 - point (Shift + D)
 - polyline (Shift + L)
 - polygon (Shift + P)

By default the shapes you draw will be associated with a collection that SEAScope creates automatically, but you can select a custom collection if you want (not demonstrated here)

Define where annotations will be saved

⊕ use default custom collection

Possible actions:
• press the 'ESCAPE' key to leave drawing mode
• press the 'ENTER' key to commit drawing
• click with the left mouse button to add/position a vertex

SEAScope will provide some guidance regarding the actions that you can perform:

Define where annotations will be saved

⊕ use default custom collection

Possible actions:
• press the 'ESCAPE' key to leave drawing mode
• press the 'ENTER' key to commit drawing
• click with the left mouse button to add/position a vertex

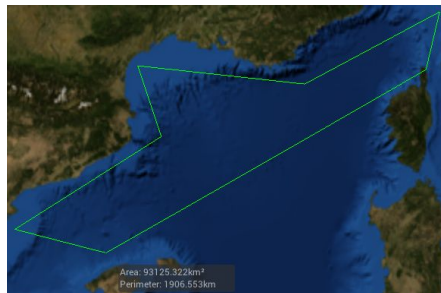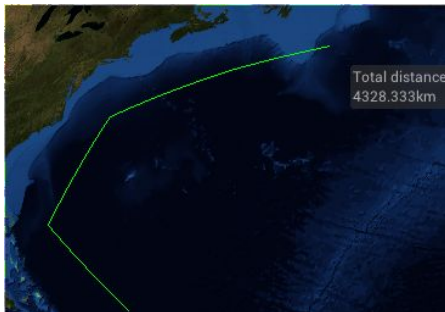## Shapes: **Draw** / export / import

Note that the shapes you draw will be considered as drafts and remain unstyled until you commit them by pressing the Enter key

SEAScope will display the total length of the polyline while you are drawing it.
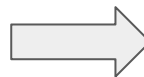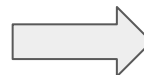
The same applies to polygons (area and perimeter).

After committing a shape, its measurements can be displayed in a contextual menu by selecting it on the globe.
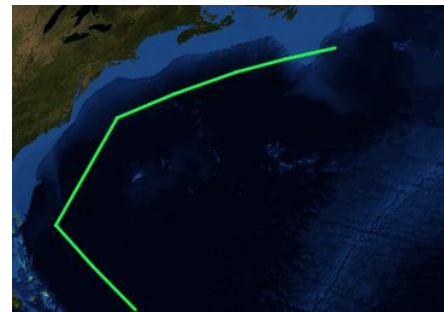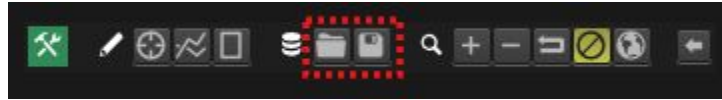

Draft
(while drawing)

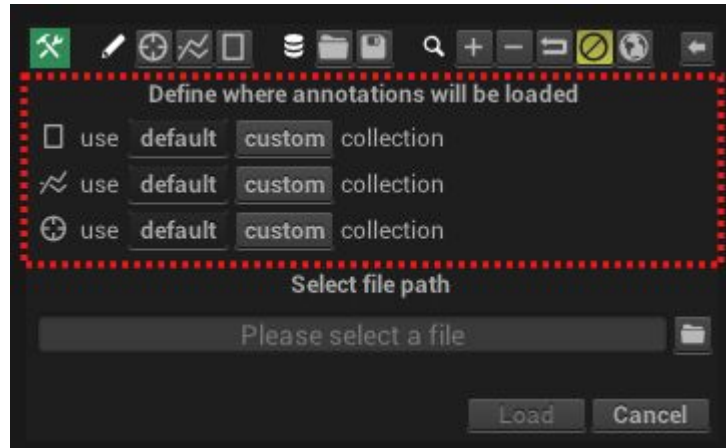Commit
(press Enter)

Styled shape

Total distance:
4328.333km
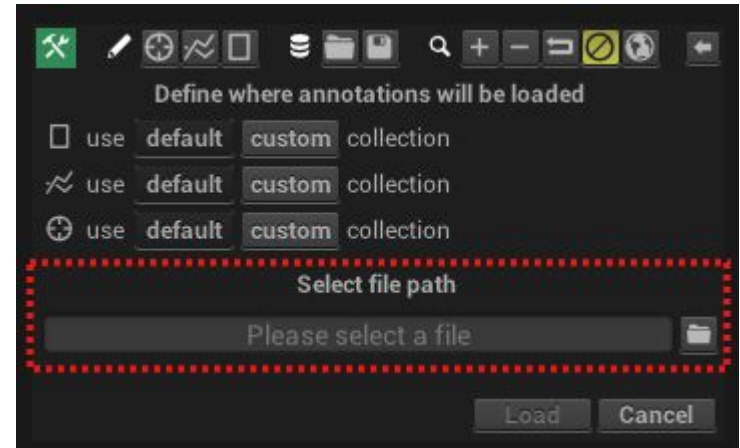
Area: 93125.322km²
Perimeter: 1906.553km

Shapes: Draw / export / import

1. SEAScope lets you import (folder icon) and export (floppy disk icon) shapes in a Syntool-compatible format
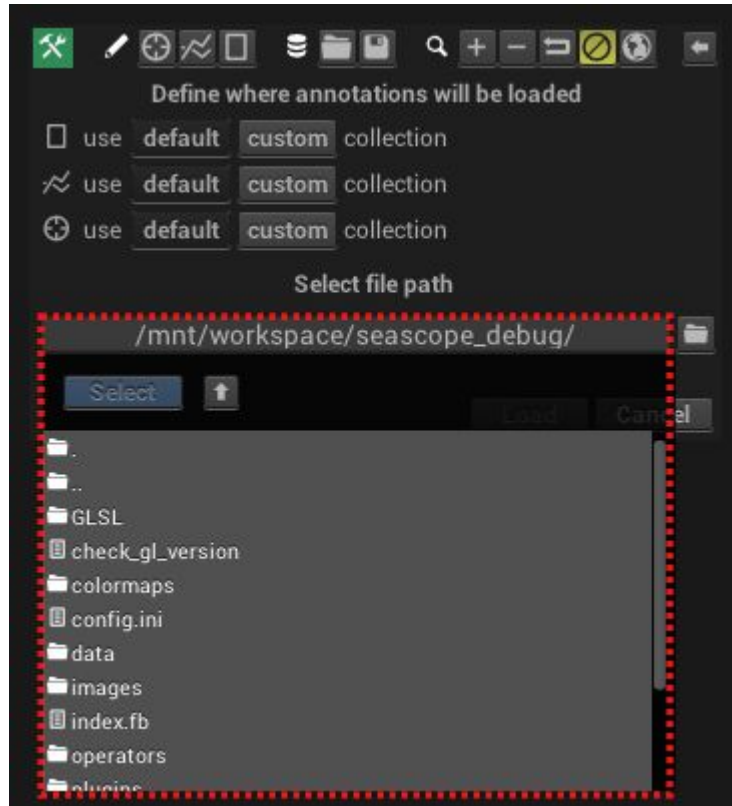

2. It is possible to define which collection will store the imported shapes (resp. which collections to export)
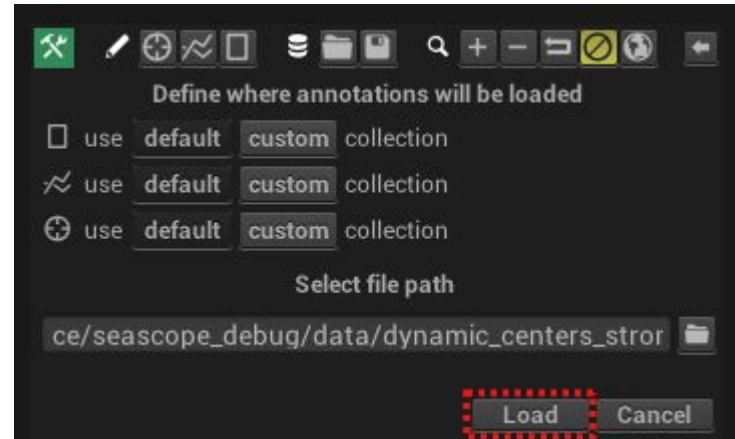

3. You can type the path of the file to import from (resp. to export to) or click the folder icon to browse the storage available on your computer

Shapes: Draw / export / import

4. You can select a file by double clicking on it in the dropdown list, or by clicking once on the file in the list and once on the "Select" button

5. Finally, click on the Load (resp. Save) Button: the import/export menu will disappear once the operation is complete
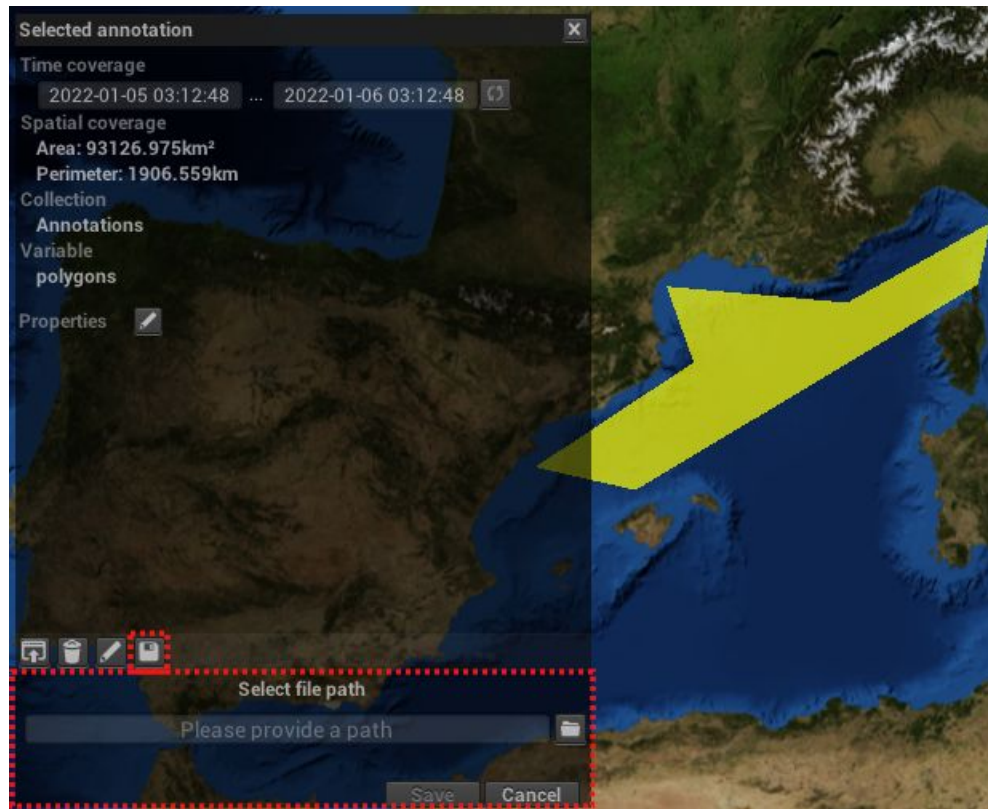
Shapes: Draw / **export** / **import**

Note that SEAScope will only export shapes that belong to the collections you selected in the import/export menu **and** that are currently displayed on the globe.

It is also possible to export shapes individually using the export button (floppy disk icon) located at the bottom of the contextual menu that appears when you select the shape. ⟹

SEAScope embeds an editor to attach properties to the shapes (not demonstrated here).

All these properties are included in the export file, so you can use shapes to make annotations and share them with other SEAScope users.

1 - Install SEAScope Python package

Go to the notebooks directory on the USB key, install the python package, in a shell or using conda:

```
> cd [path to usb key]/notebooks
> pip install -r requirements.txt
```
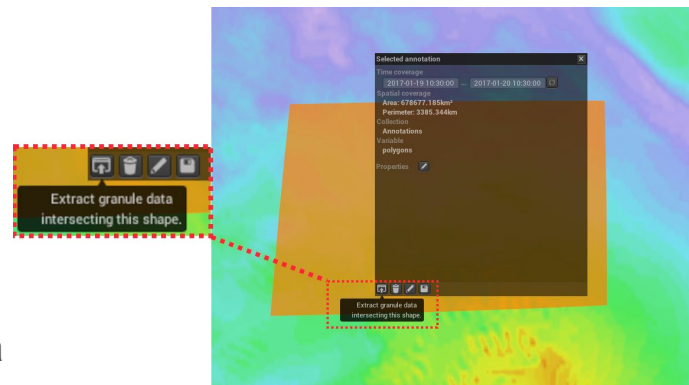
2 - Open JupyterLab environment

```
> jupyter lab
```

Select the desired notebook and double click to open it, we will exercise with ekman.ipynb notebook to compute wind-induced current using ECMWF wind data

3 - Extract

Draw a polygon and click on the bottom-left button to extract data

4 - Run the Python notebook

Go back to your ekman.ipynb notebook and run the cell to see how to:

- Get data from SEAScope
- Perform some analysis (here compute the wind-induced current using the Ekman equation)
- Make some plots
- Export your results to SEAScope and configure the rendering (colormaps, representation, min-max)

Tips: to run cells in a Jupyter notebook you can either click on the play button, or press Shift+Enter on each selected cell.

5 - Look at the results in SEAScope

Go back to SEAScope to look at your results, a collection with the exported dataset(s) has been created. Here it is labeled "User - Ekman Current" and three variables are available: "Zonal Ekman Current", "Meridional Ekman Current" and "Norm of Ekman Current"

Contacting us

About the OVL online portal (based on Syntool)

Website: https://ovl.oceandatalab.com

By email: syntool@oceandatalab.com

Forum: https://forum.oceandatalab.com/syntool

About SEAScope

Website: https://seascope.oceandatalab.com

By email: seascope@oceandatalab.com

Forum: https://forum.oceandatalab.com/seascope

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