

The SWOT logo is located in the top left corner. It consists of the word "SWOT" in a blue, sans-serif font. The letter "O" is replaced by a blue circle with a white dot in the center, resembling an eye or a sensor.

CNES SWOT Products, Data Access and Tools

October 14th, 2025

C. Germineaud & C. Emery (CNES) on behalf of the SWOT CNES Team

SWOT Science Team, Arcachon, France



- SWOT Products Overview – 5'
- CNES SWOT Data Access and Services – 10'
 - Ready-to-use tutorials (Jupyter notebooks) - 5'



SWOT Product Overview

Orbits

Cal/Val

1-day repeat
sparse coverage
28th March 2023 – 10th July 2023

Science

21-day repeat
global coverage
26th July 2023 – now

Main instrument

KaRIn 2D Interferometer
(Two 10-60 km swaths)

Timeliness levels

Near real time

3 to 4 days

Reprocessed data

More precise than NRT

KaRIn Resolutions

Low (Rate) Resolution

- Ocean
- 250 m to 2 km

High (Rate) Resolution

- Hydrology
- 10 m to 60 m

Version released

Baseline B	Nov 2023	Beta <i>prevalidated</i> release for early Cal/Val evaluation
Baseline C	March 2024	First « Science » release Declared as <i>validated</i> by the SWOT project (Aug 2024)
Baseline D	May 2025	Version D products for measurements from May 6, 2025 onward
Baseline D	October 2025	Version D reprocessed products (Calibration and Sciences phases)

Level	Dataset	Grid	Comment
Level-1B		~250 m Native grid	Interferogram Geo-location on a reference surface Surface height not computed High volumetry > 1 Tb per day
Level-2	Basic	2 km	Volumetry – 300 Mb to 1 Gb / per day
	Expert		
	WindWave		
	Unsmoothed	250 m native grid	Technical No Sea surface anomaly yet High volumetry – 22 Gb per day
Level-3	Basic	2 km	New geophysical standards Multi-mission calibrated
	Expert		
	Unsmoothed	250 m	High volumetry – 15 Gb per day Sea surface anomaly
Level-4	Nadir + KaRIn	Gridded (<0.125°)	Experimental datasets (available on AVISO only)

Level	Dataset	Resolution	Comment
Level-1B	HR Single Look Complex	half swath 64 km ² 3 m x 0.75 m	PO.DAAC distribution only
Level-2	Pixel Cloud	20-60 m	~600 Mo/Tile (64 km ²)
	Pixel Cloud Vector	20-60 m	
	Raster	100 m + 250 m	2 distinct products
	River Single Pass – Reach / Node	10 km/200 m	2 distinct products
	Lake Single Pass – Prior / Observed / Unassigned	-	3 distinct products
	River Average	10 km	Reach-only
	Lake Average	-	
	Prior River Database – SWORD v17b	10 km	Static : ~225000 reaches / ~4 x 10 ⁶ nodes
	Prior Lake Database – PLD v2.02	-	Static : ~6 x 10 ⁶ lakes

SWOT OCEAN DATA ACCESS & SERVICES

WHERE TO GET SWOT OCEAN PRODUCTS?



ODATIS/AVISO



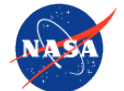
L2

L3/L4

L1B



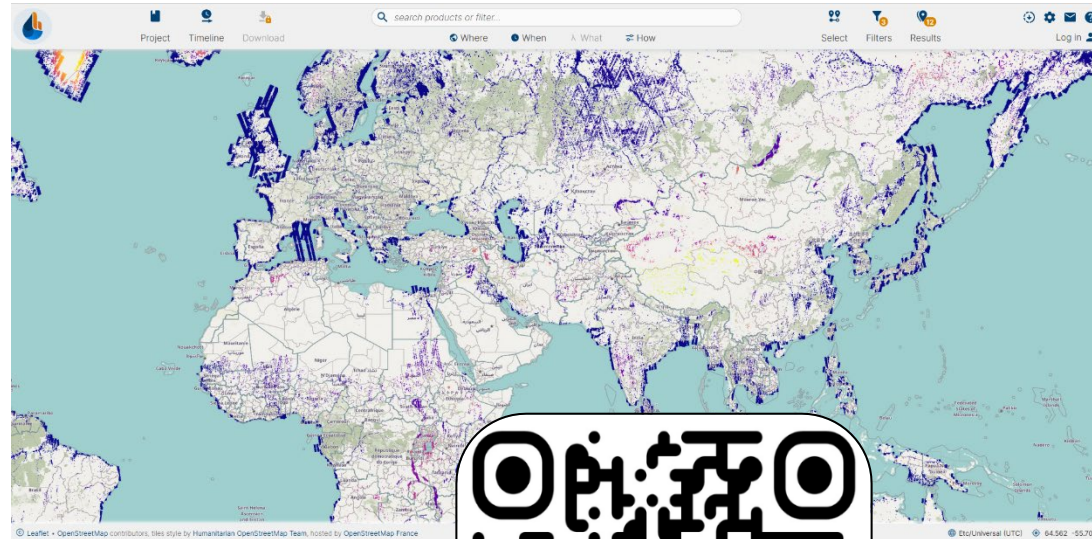
NASA/PODAAC



SWOT

SWOT HYDROLOGY DATA ACCESS & SERVICES

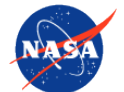
WHERE TO GET SWOT HYDROLOGY PRODUCTS?



THEIA/H.next



NASA/PODAAC





Going further on CNES HPC

Example: Study Hurricanes and Cyclones

Tutorial Objectives

- Access SWOT L2 and L3 ocean data, S1 SAR ocean surface winds, NOAA TCHP...
- Apply geographic and temporal selections to all datasets
- Visualize and interactively explore the collocated datasets



-

```
[ ]: import os
import re

import xarray as xr

from datetime import datetime
import numpy as np

from ocean_tools.swath.io import (NetcdfFilesDatabaseSwotLRL2,
NetcdfFilesDatabaseGriddedSLA,
NetcdfFilesDatabaseS1AOWI,
NetcdfFilesDatabaseOHC,
NetcdfFilesDatabaseSWH)

from ocean_tools.missions import S1AOWIProductType

import geoviews as gv
import holoviews as hv
import panel as pn

import geopandas as gpd, fiona
import pandas as pd

from vador import Coast, Swath, Grid, Alongtrack
from vador.plugins import ZcSwath
```

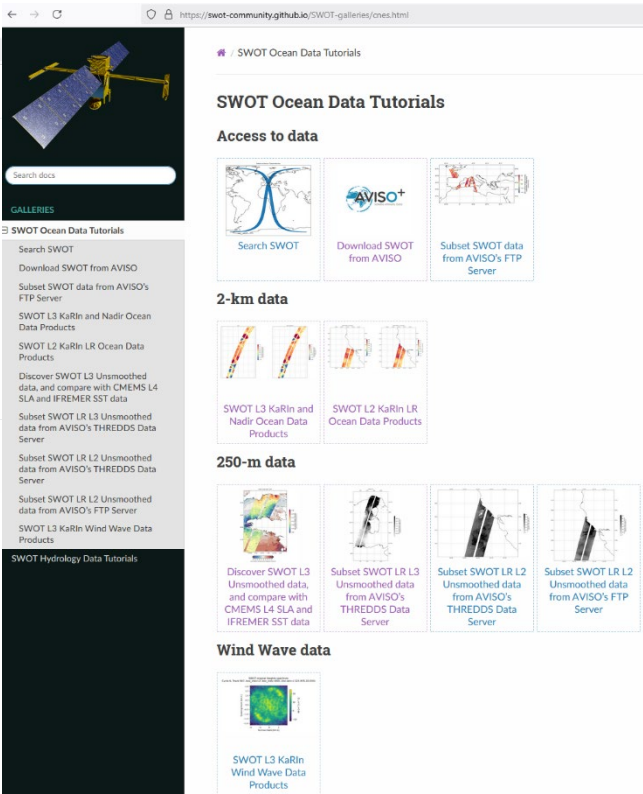
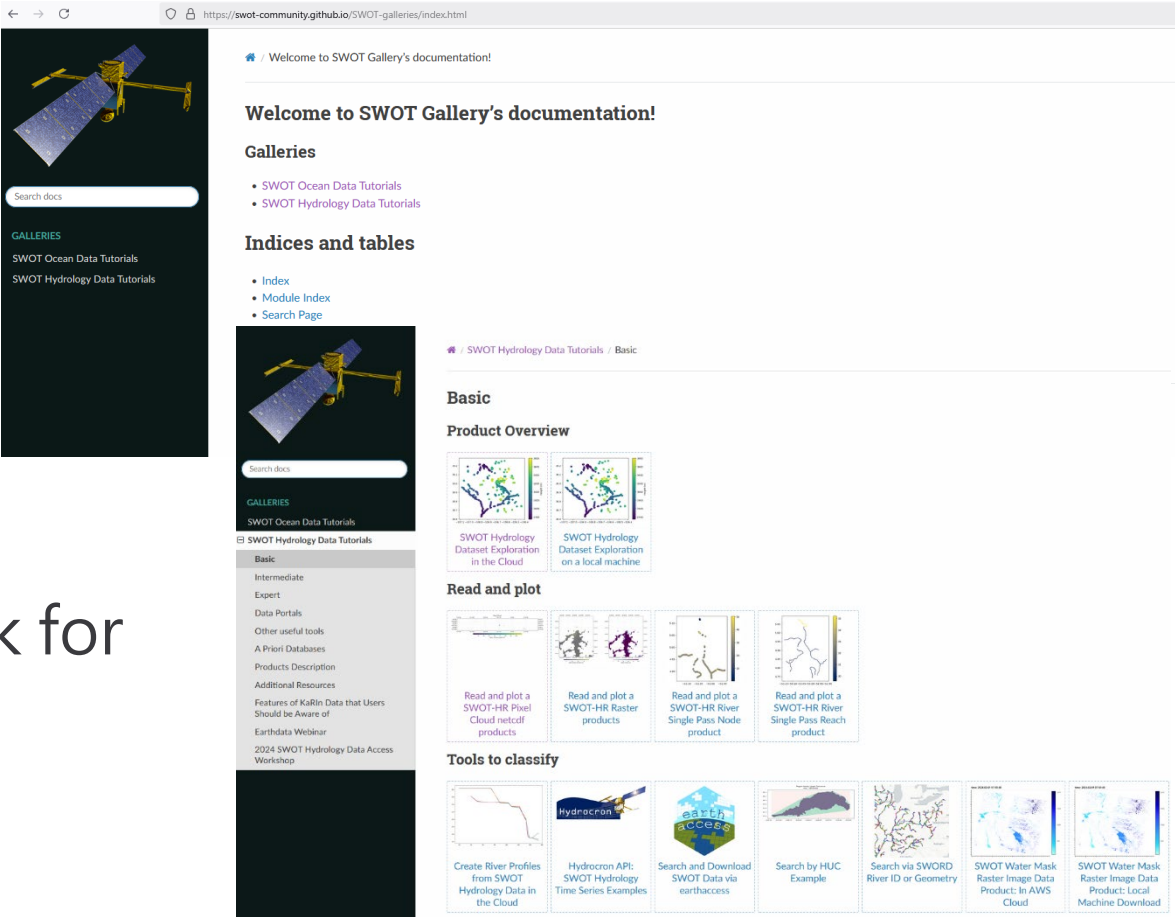
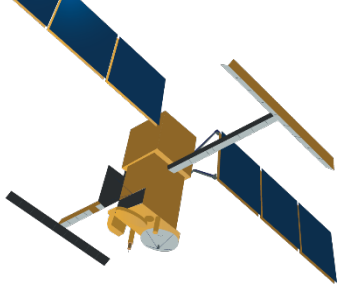
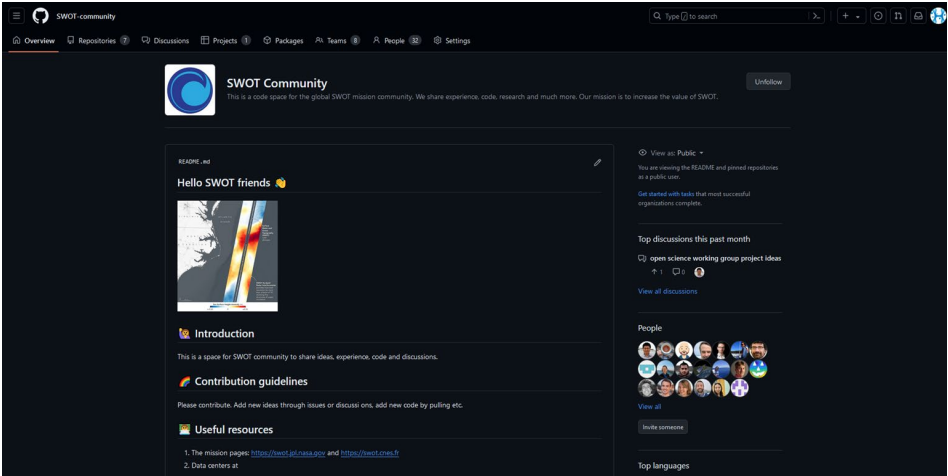


Open access GitHub platform



Contact:
aviso-swot@altimetry.fr

Use, Contribute, Ask for new tutorials

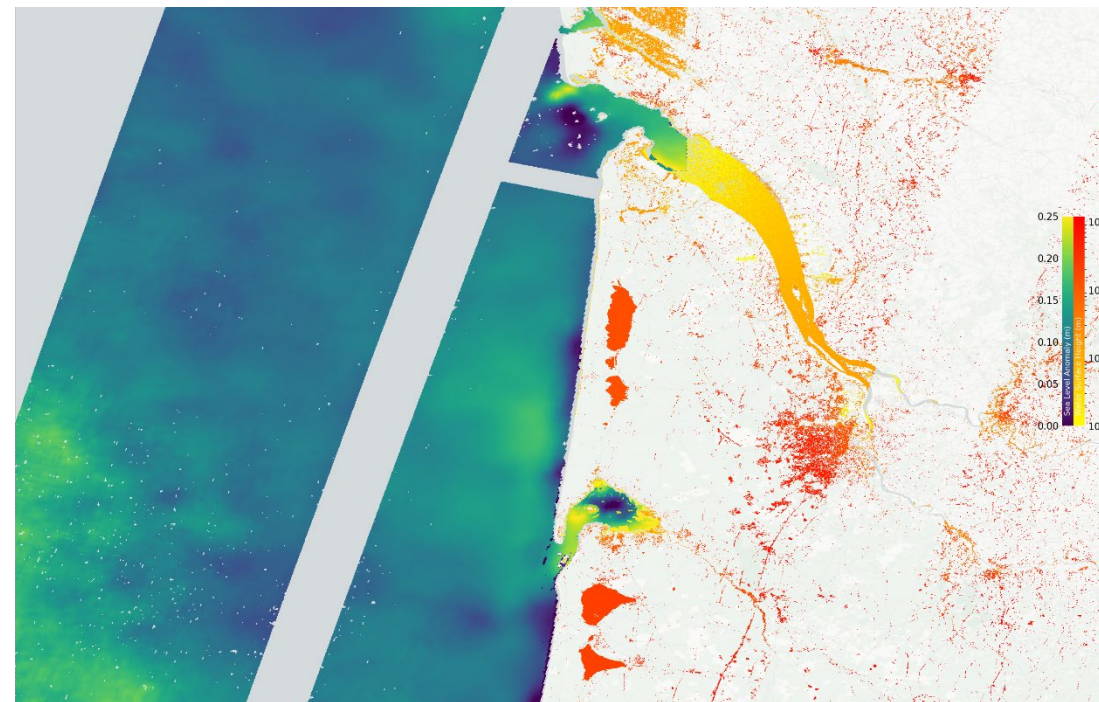


- The CNES cloud-like service is still open to new projects. You can apply via

aviso-swot@altimetry.fr (oceanography) and
swot_ce@cnes.fr (hydrology)

- Upcoming support topics include **coastal zones** and **polar regions**. Expert analyses are welcome
- Stay tuned to the examples gallery for new tutorial contributions!

*250-m L3 LR (ocean) and 100-m L2 HR (hydro)
Products*



Credits: CNES

SWOT research-grade sea-ice classification flags



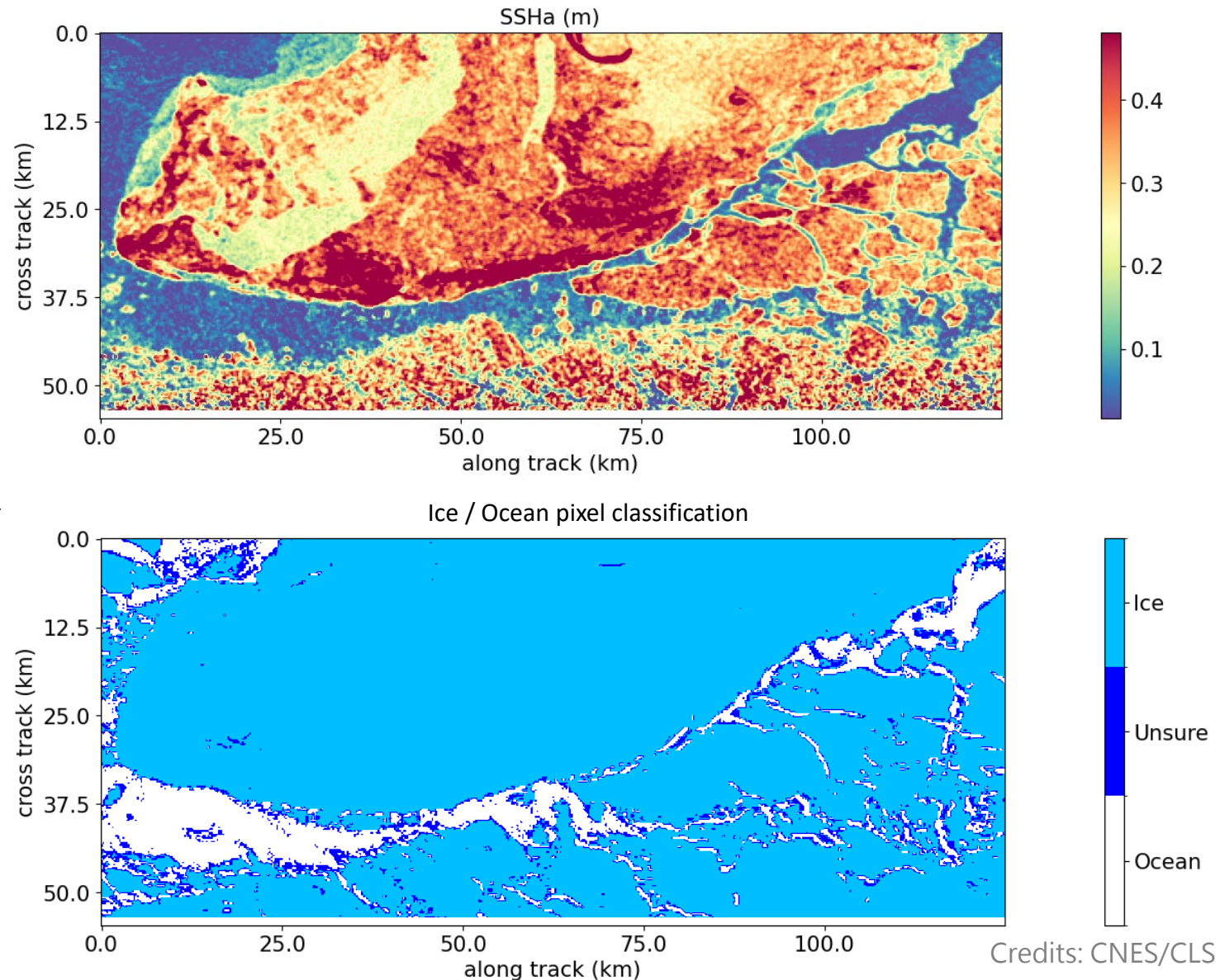
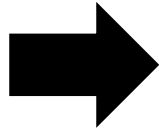
250-m L3 product only

Added surface classification
(ice/leads) in editing flag

Editing flag

- ocean is flagged as 0
- sea-ice is flagged as 21
- undermined as 20

Retrieved SSHa in sea-ice leads
(as much as ocean coverage as possible)



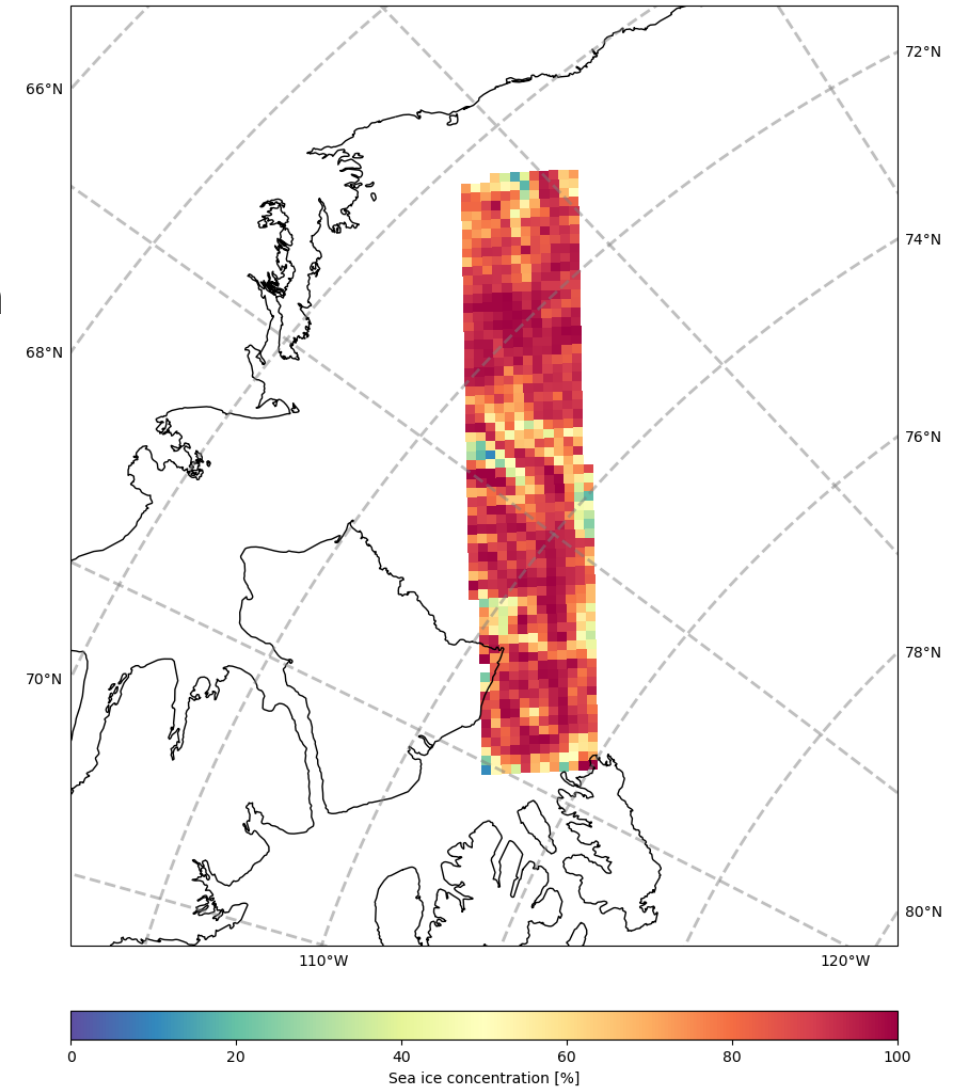
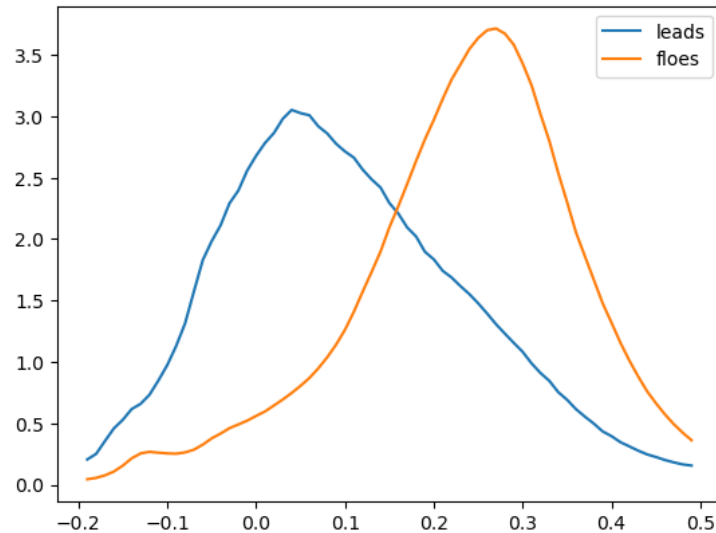


SWOT research-grade sea-ice classification flags



Tutorial Objectives

- Visualization of Sea Ice Classification with Flag Application
- Binning and Visualization of Sea Ice Concentration
- 2D Histogram (PDF) Analysis for Leads and Floes



Credits: CNES/CLS

SWOT DATA ACCESS & SERVICES IN A NUTSHELL

SWOT

DATA ACCESS

- SWOT KaRIn and Nadir data (L2, L3 & L4 products)
- Easy access to other data sets
- Catalog requests & download tools...



ENVIRONMENT

- Research-orientated Python libraries
- SWOT community-driven toolbox (GitHub)
- Free hosting of SWOT Projects



USER SUPPORT

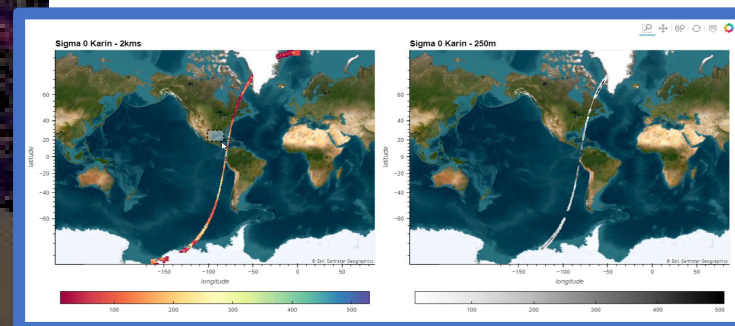
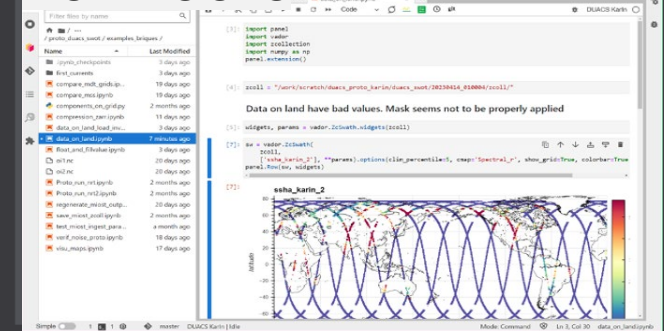
- Use case examples (Jupyter Notebooks)
- SWOT data training
- Help for code optimization
- Helpdesk
- User guides...

HELPDESK & TECHNICAL SUPPORT

swot_ce@cnes.fr (hydrology)

aviso-swot@altimetry.fr (oceanography)

JUPYTER NOTEBOOKS



INTERACTIVE VISUALISATION TOOL



Thank you for your attention

CNES SWOT Hydrology Data Access

HELPDESK & TECHNICAL SUPPORT

swot_ce@cnes.fr
(CNES HPC user support)

exp.hysope2@cnes.fr (hydrology)

aviso-swot@altimetry.fr
(oceanography)

CNES SWOT Ocean Data Access



SWOT Level-2 Ocean Products

- Nadir Altimeter and Radiometer (O/I)GDR products (similar to Jason-2/3)
- KaRIn L2_LR_SSH (2km & 250m)

KaRIn L2_LR_SSH	Grid	Volume
		/day - /year
Basic SSH ['Basic']	2km geographically fixed swath-aligned grid	< 1GB – 365 GB
Wind and Wave ['WindWave']	2km geographically fixed swath-aligned grid	< 1GB – 365 GB
Expert SSH with Wind and Wave ['Expert']	2km geographically fixed swath-aligned grid	1GB – 365 TB
Unsmoothed SSH ['Unsmoothed']	250m sampling grid	< 25 GB – 10 TB

SWOT KaRIn Level-2 Ocean L2_LR_SSH Products



Accuracy 			
Latency 			
Data sets	OGDR	IGDR	GDR
Reduced 1 Hz	OGDR-SSHA	IGDR-SSHA	GDR-SSHA
1 Hz + 20 Hz	OGDR	IGDR	GDR
1 Hz + 20 Hz + waveforms	Not generated	S-IGDR	S-GDR
Latency	3-5 hours	1-2 days	~90 days

Size and
Complexity



SWOT Nadir Altimeter Level-2 products

SWOT Level-3 Ocean Products (2km & 250m)

- Level-3 (KaRIn & Nadir) Basic 2km Product (SSHA and MDT only)
- Level-3 (KaRIn & Nadir) Expert 2km Product (unedited SSHA + all calibration/corrections and geostrophic velocity anomaly)
- Level-3 (KaRIn only) Unsmoothed 250m Product

Level-4 Ocean Multi-Mission Products

- Using SWOT Level-3 (KaRIn & Nadir) + CMEMS L3 along-track datasets



