

National Aeronautics
and
Space Administration



EARTHDATA

Altimetry Data and Services at PO.DAAC

OSTST June 23, 2026

Presenter: Celia Ou^{1,2}

PO.DAAC Data Publication, Applied Sciences Systems Engineering

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Nicholas Tarpinian^{1,2}

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² RTX



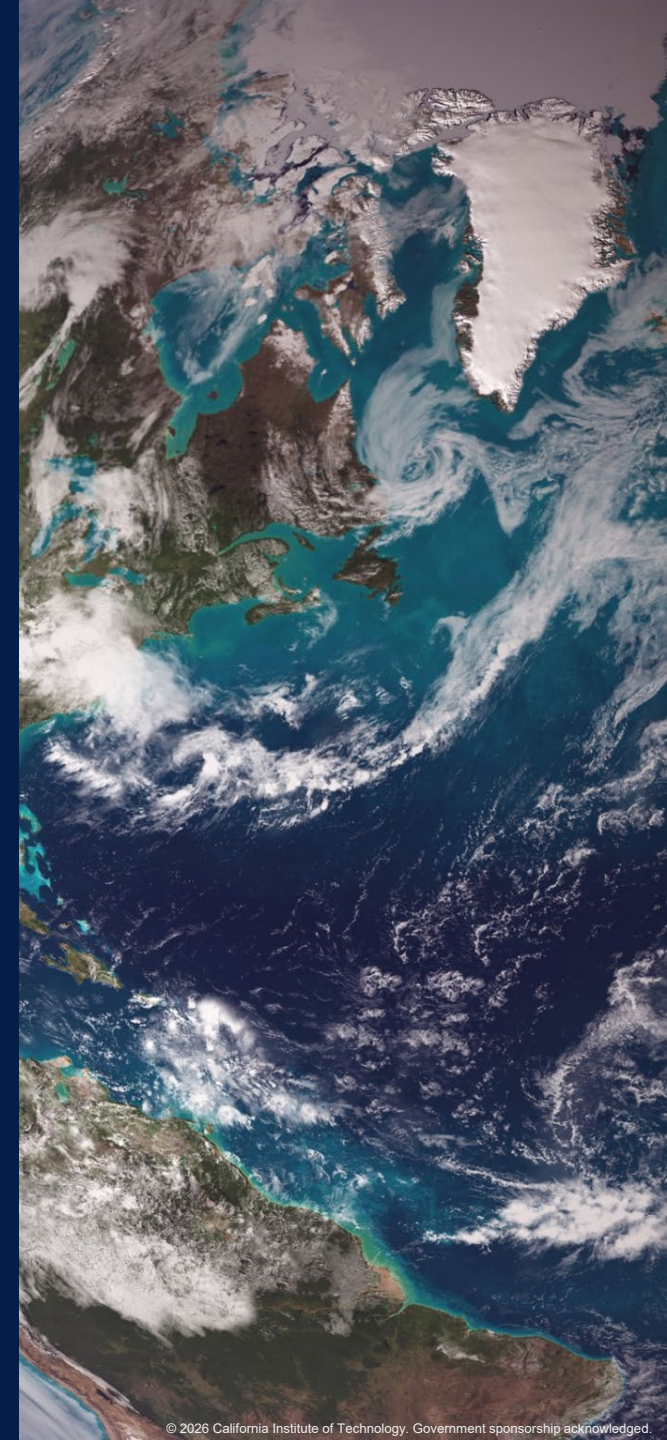
Summary

About PO.DAAC

Transitions with Earthdata

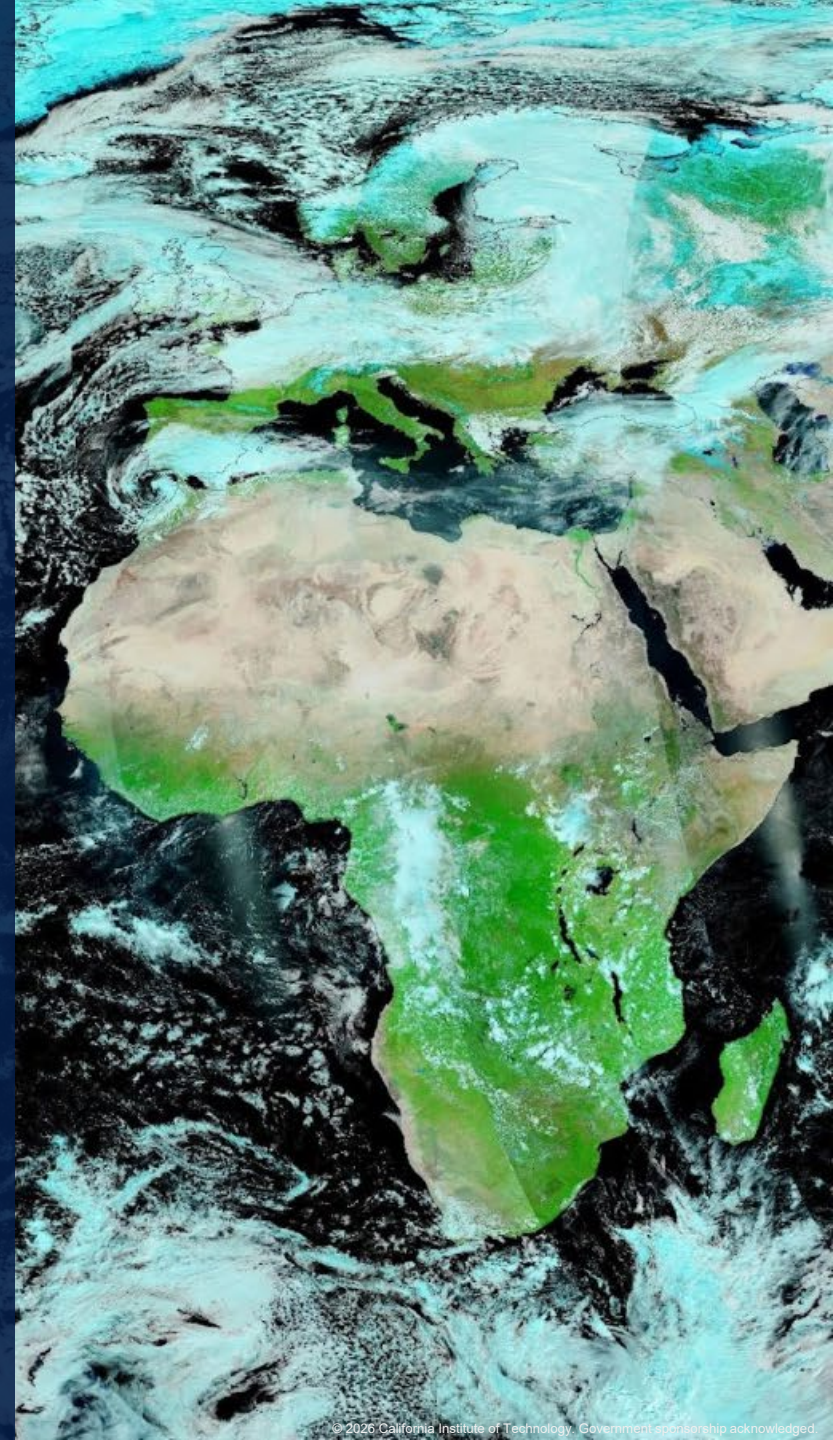
Resources and Outreach

New services - EGIS and VDS



Overview of PO.DAAC

- About PO.DAAC
- Distribution and User Access
- Support for Sentinel-6 and SWOT



About PO.DAAC



Our Missions
ADEOS-II

- Physical Oceanography Distributed Active Archive Center (PO.DAAC)
- NASA Archive for Oceanography & Terrestrial Hydrosphere Data
- Data publication, access, & user support

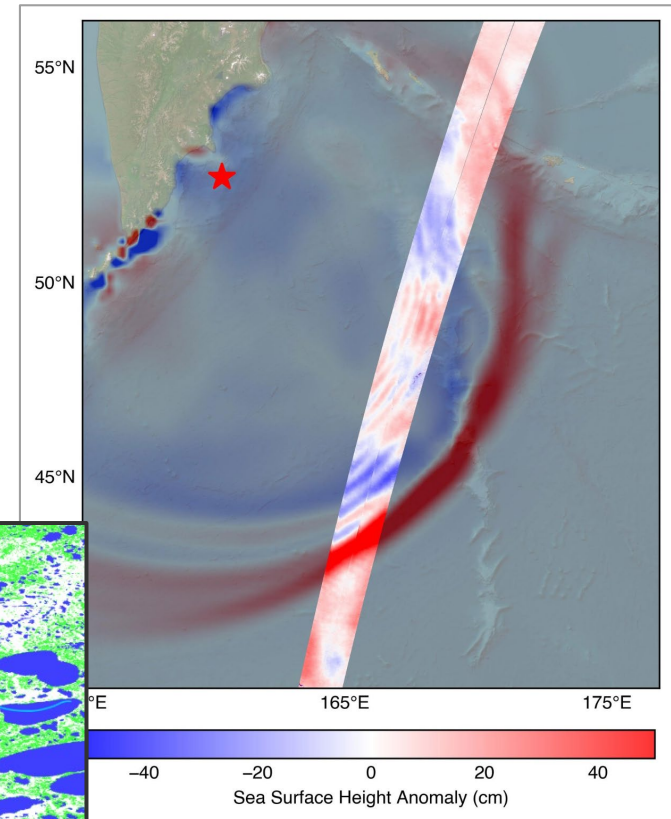
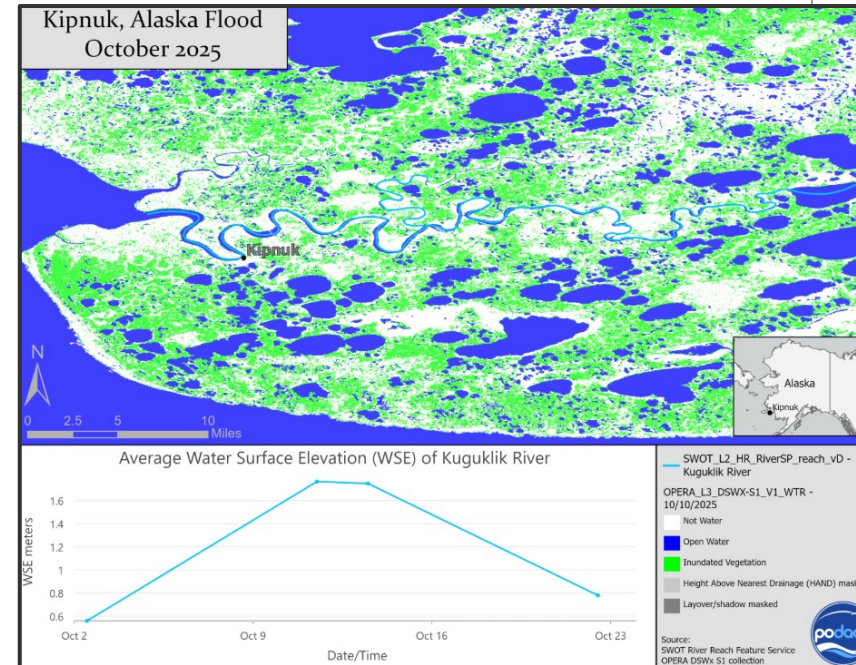
Distribution And User Access

Existing Mechanisms

- Download / In-region Access / Subscriber
- OPeNDAP
- Harmony
- earthaccess
- Hydrocron API
- Worldview

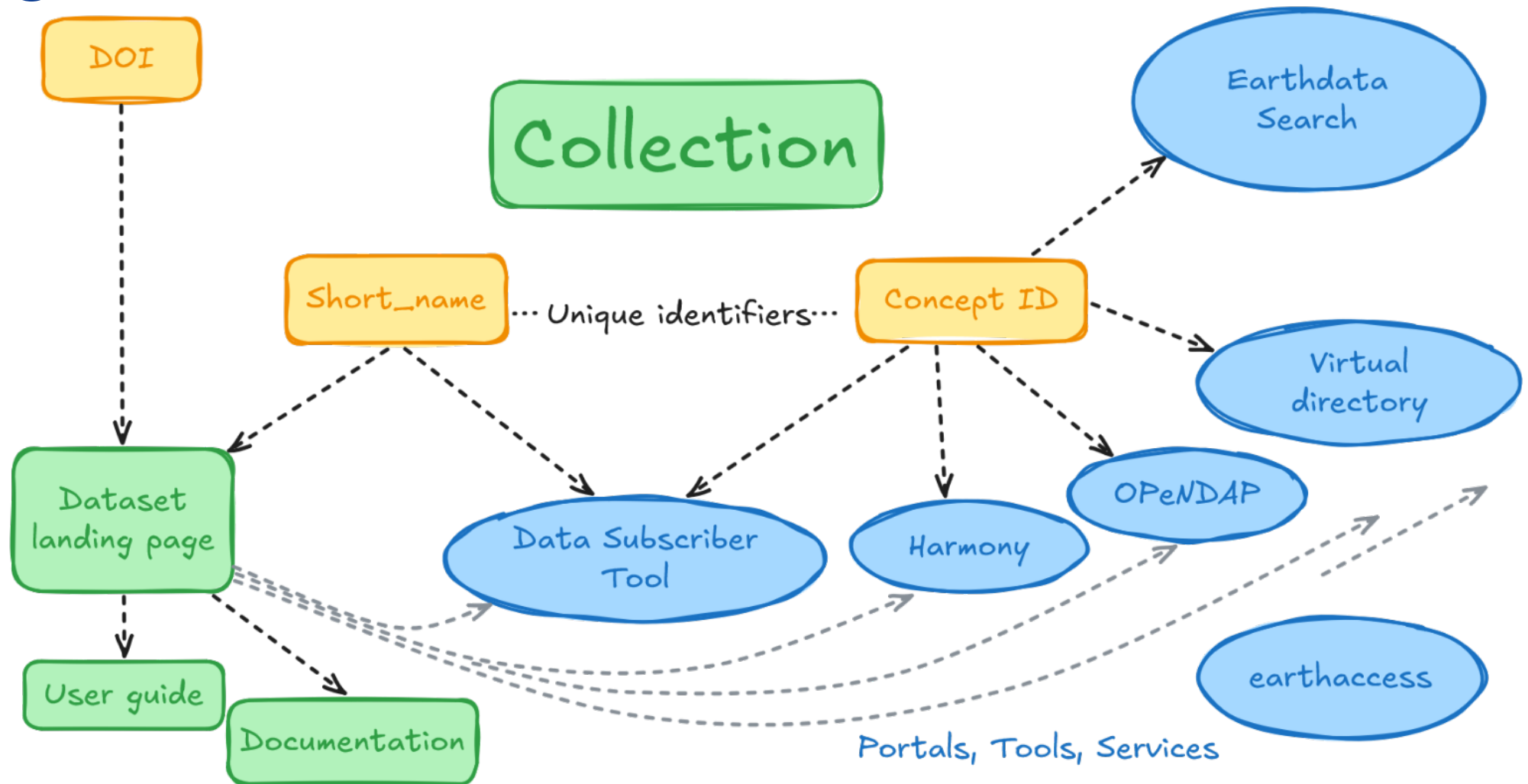
New and upcoming

- [Earthdata GIS](#)
- Virtual Datasets (VDS)



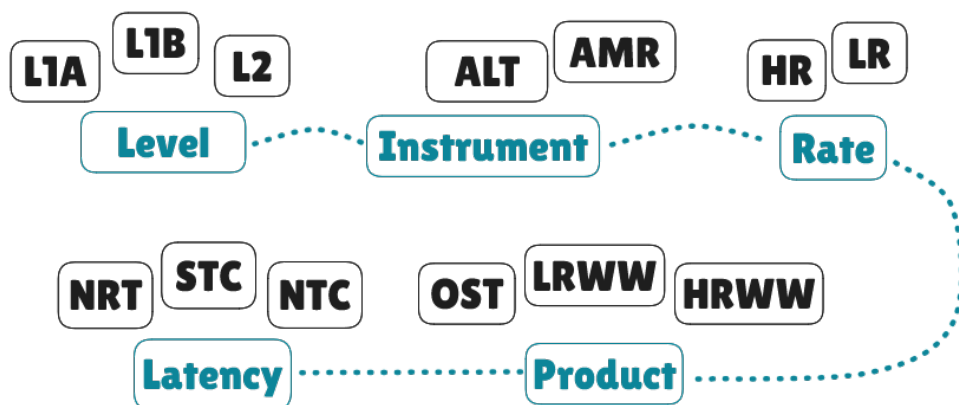
[SWOT Measures a Pacific Tsunami](#)

Diagram of data access



Support for Sentinel-6

- Sentinel-6A ongoing
- Sentinel-6B release imminent



- Restricted access lists
 - ~20 S-6B collections available to S6VT list

JASON_CS_S6B_L1A_ALT_HR_NTC_G	JASON_CS_S6B_L2_ALT_HR_STD_OST_STC_G
JASON_CS_S6B_L1A_ALT_HR_STC_G	JASON_CS_S6B_L2_ALT_HR_RED_OST_STC_G
JASON_CS_S6B_L1B_ALT_HR_NRT_G	JASON_CS_S6B_L2_ALT_LR_STD_OST_NRT_G
JASON_CS_S6B_L1B_ALT_HR_STC_G	JASON_CS_S6B_L2_ALT_LR_RED_OST_NRT_G
JASON_CS_S6B_L1B_ALT_LR_NRT_G	JASON_CS_S6B_L2_ALT_LR_STD_OST_STC_G
JASON_CS_S6B_L1B_ALT_LR_STC_G	JASON_CS_S6B_L2_ALT_LR_RED_OST_STC_G
JASON_CS_S6B_L2_AMR_RAD_NRT	JASON_CS_S6B_L2P_ALT_HR_OST_NRT_G
JASON_CS_S6B_L2_AMR_RAD_STC	JASON_CS_S6B_L2P_ALT_HRWW_NRT_G
JASON_CS_S6B_L2_ALT_HR_STD_OST_NRT_G	JASON_CS_S6B_L2P_ALT_HR_OST_STC_G
JASON_CS_S6B_L2_ALT_HR_RED_OST_NRT_G	JASON_CS_S6B_L2P_ALT_LRWW_NRT_G

Support for SWOT

SWOT Events page

<https://www.earthdata.nasa.gov/data/platforms/space-based-platforms/swot/significant-events>

Recent: L2_LR_PreCalSSH

- <https://www.earthdata.nasa.gov/data/catalog/pocloud-swot-l2-lr-precalssh-d-d>

Subcollections:

- Basic
<https://www.earthdata.nasa.gov/data/catalog/pocloud-swot-l2-lr-precalssh-basic-d-d>
- Windwave
<https://www.earthdata.nasa.gov/data/catalog/pocloud-swot-l2-lr-precalssh-windwave-d-d>
- Expert
<https://www.earthdata.nasa.gov/data/catalog/pocloud-swot-l2-lr-precalssh-expert-d-d>
- Unsmoothed
<https://www.earthdata.nasa.gov/data/catalog/pocloud-swot-l2-lr-precalssh-unsmoothed-d-d>



SWOT Significant Events

Last updated 2026-06-05T14:00:05

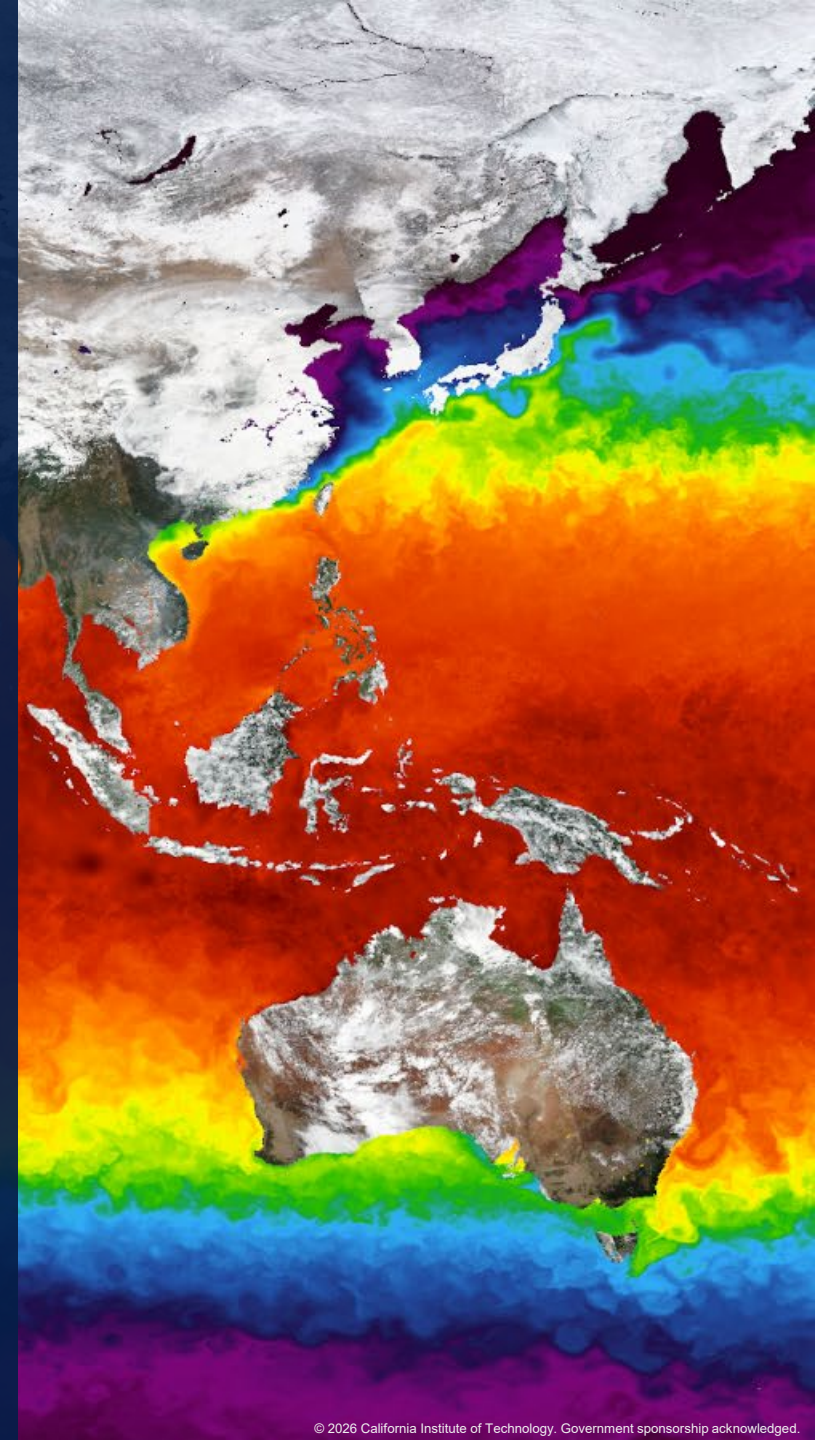
SWOT High-Rate Mask Timeline

[HR Mask](#) | [Events Table Top](#) | [Events Table Bottom](#) | [Cycle Table Top](#) | [Cycle Table Bottom](#) | [Events Text File](#) | [Cycle Time Text File](#)

Start Time (UTC)	Start Cycle	Start Pass	Description	Mask Name
2023-04-05T20:16:13	481	28	Activate v04c at launch calibration orbit high-rate mask.	swot_calval_hr_2.0s_4.0s_Oct2021-v04c_perPass.kml
2023-04-07T13:17:13	483	20	Activate v07 nominal calibration orbit high-rate mask.	swot_calval_hr_Dec2022-v07_perPass.kml
2023-07-11T00:00:13	578	22	No high-rate data during transition to Science orbit.	
2023-07-26T11:37:56	1	148	Activate v05 nominal northern hemisphere summer high-rate mask.	swot_science_hr_2.0s_4.0s_Aug2021-v5_perPass.kml
2023-08-11T13:51:54	2	14	Emergency significantly reduced high rate mask for high priority calibration sites only, due to wildfires affecting Inuvik ground station.	
2023-08-21T12:01:36	2	292	Activate v06b off-nominal high-rate mask. 44% of nominal coverage due to wildfires affecting Inuvik ground station.	swot_science_hr_Aug2023-v6b_perPass.kml
2023-08-25T21:35:34	2	415	Activate v06c off-nominal high-rate mask. 44% of nominal coverage due to wildfires affecting Inuvik ground station.	swot_science_hr_Aug2023-v6c_perPass.kml
2023-09-14T23:59:31	3	393	Activate v05 nominal northern hemisphere summer high-rate mask.	swot_science_hr_2.0s_4.0s_Aug2021-v5_perPass.kml
2023-11-30T23:58:35	7	213	Activate v05 nominal northern hemisphere winter high-rate mask.	swot_science_hr_Dec2021-v05-seasonal_perPass.kml
2024-02-29T23:57:46	11	424	Activate v05 nominal northern hemisphere summer high-rate mask.	swot_science_hr_2.0s_4.0s_Aug2021-v5_perPass.kml
2024-03-19T14:12:28	12	360	Activate v06c off-nominal high-rate mask. 44% of nominal coverage due to cut internet cables affecting Hartebeesthoek downlink station.	swot_science_hr_Aug2023-v6c_perPass.kml
2024-03-21T13:12:11	12	415	Activate v07 off-nominal high-rate mask. 76% of nominal coverage due to cut internet cables affecting Hartebeesthoek downlink station.	swot_science_hr_Mar2024-v7_perPass.kml
2024-04-19T14:07:09	14	60	Activate v07b off-nominal high-rate mask. 76% of nominal coverage due to cut internet cables affecting Hartebeesthoek downlink station.	swot_science_hr_Apr2024-v7b_perPass.kml
2024-04-30T13:39:09	14	367	Activate v05 nominal northern hemisphere summer high-rate mask.	swot_science_hr_2.0s_4.0s_Aug2021-v5_perPass.kml
2024-08-20T15:16:17	19	584	Activate v07b off-nominal high-rate mask. 76% of nominal coverage due to equipment issues at Hartebeesthoek downlink station.	swot_science_hr_Apr2024-v7b_perPass.kml
2024-09-04T13:31:29	20	418	Activate v08 off-nominal high-rate mask. 90% of nominal coverage due to equipment issues at Hartebeesthoek downlink station.	swot_science_hr_Aug2024-v8_perPass.kml
2024-09-09T13:41:33	20	558	Activate v05 nominal northern hemisphere summer high-rate mask.	swot_science_hr_2.0s_4.0s_Aug2021-v5_perPass.kml
2024-11-23T00:00:00	24	305	Activate v09 northern hemisphere winter high-rate mask.	swot_science_hr_Nov2024-v09-seasonal_perPass.kml
2025-02-27T13:16:31	29	88	Activate v09 nominal northern hemisphere summer high-rate mask.	swot_science_hr_Feb2025-v09-nominal_perPass.kml

Transitions with Earthdata

- Earthdata Website Unification
- Transition of Tools & Services



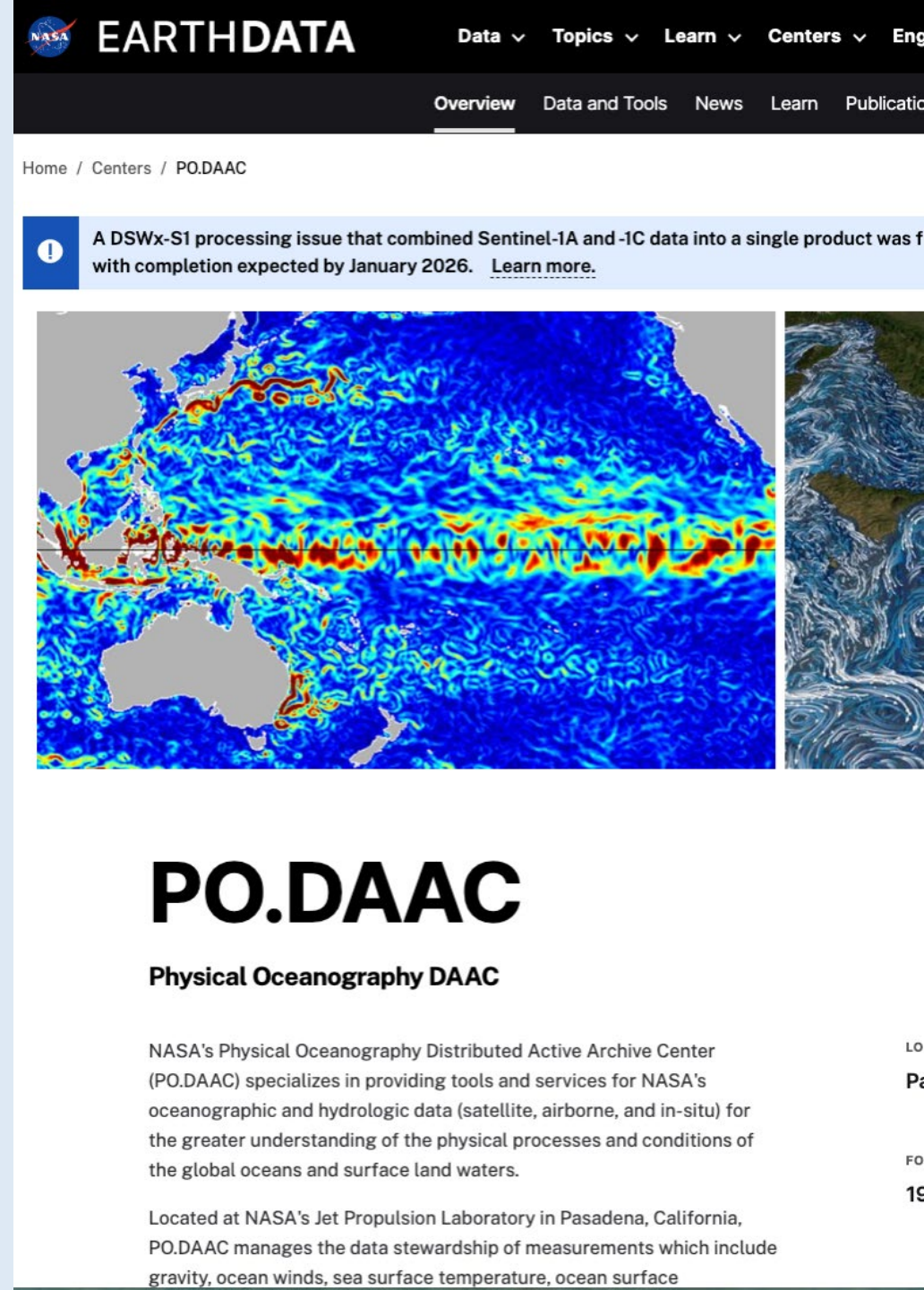
Earthdata Website Unification

Unification of NASA DAAC Websites is underway. PO.DAAC content has been migrated to earthdata.nasa.gov.

Dataset DOIs now point to Earthdata pages

Right: The PO.DAAC Center page available on the Unified Earthdata website

<https://www.earthdata.nasa.gov/centers/po-daac>

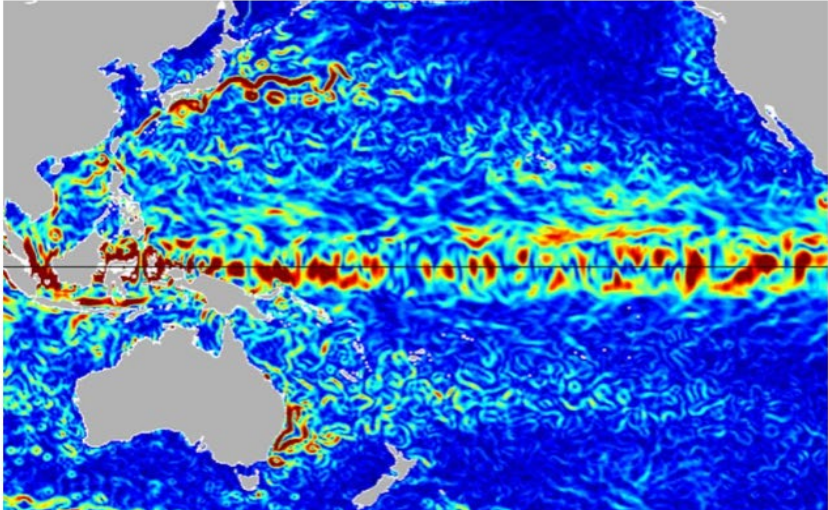


EARTHDATA Data Topics Learn Centers Eng

Overview Data and Tools News Learn Publication

Home / Centers / PO.DAAC

i A DSX-S1 processing issue that combined Sentinel-1A and -1C data into a single product was f with completion expected by January 2026. [Learn more.](#)



PO.DAAC

Physical Oceanography DAAC

NASA's Physical Oceanography Distributed Active Archive Center (PO.DAAC) specializes in providing tools and services for NASA's oceanographic and hydrologic data (satellite, airborne, and in-situ) for the greater understanding of the physical processes and conditions of the global oceans and surface land waters.

Located at NASA's Jet Propulsion Laboratory in Pasadena, California, PO.DAAC manages the data stewardship of measurements which include gravity, ocean winds, sea surface temperature, ocean surface

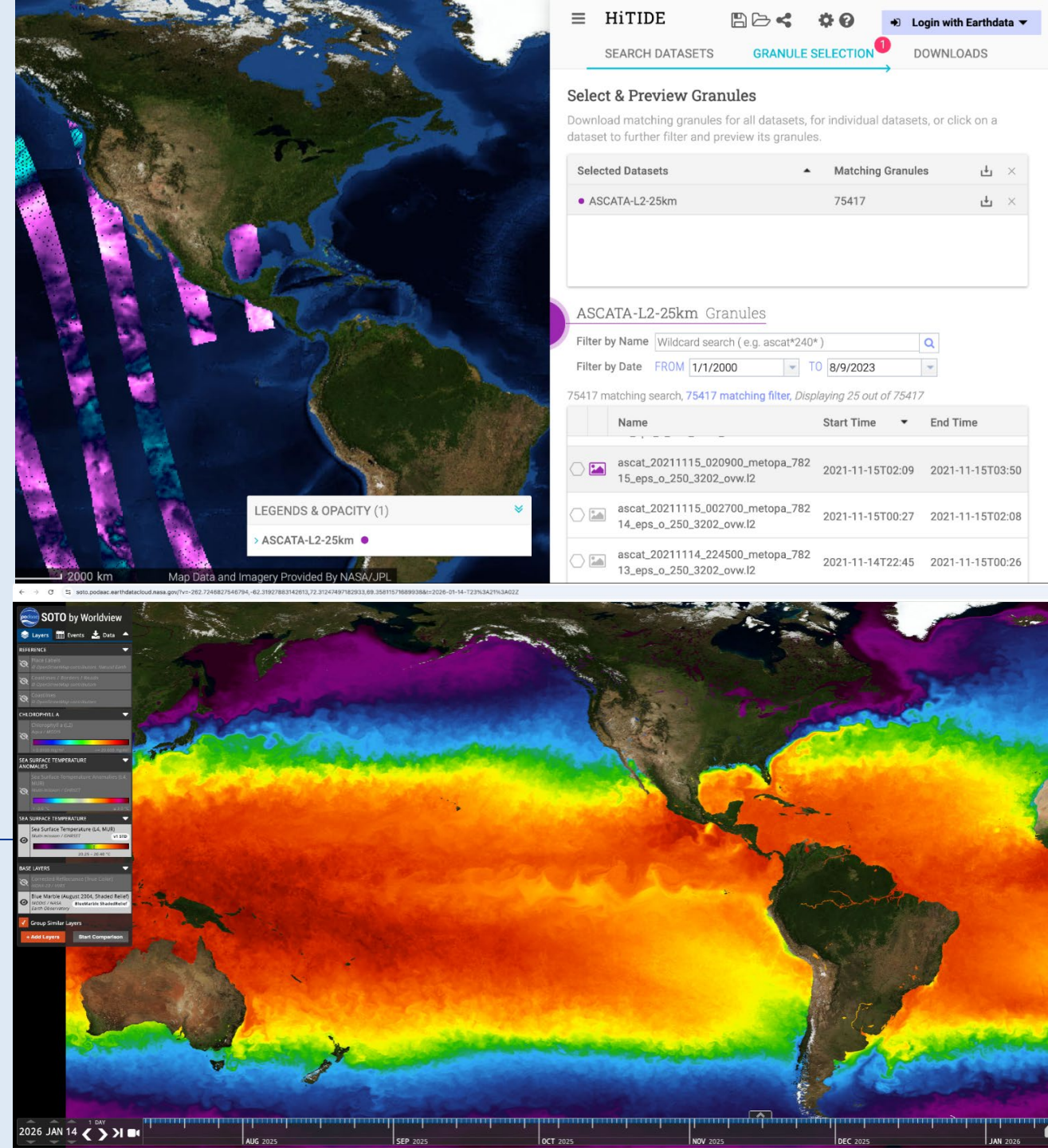
Transition of Tools & Services

HITIDE and **SOTO by Worldview** front ends have retired in favor of the main Earthdata services.

HITIDE >>> Earthdata Search Client
<https://search.earthdata.nasa.gov/search?portal=hitide>

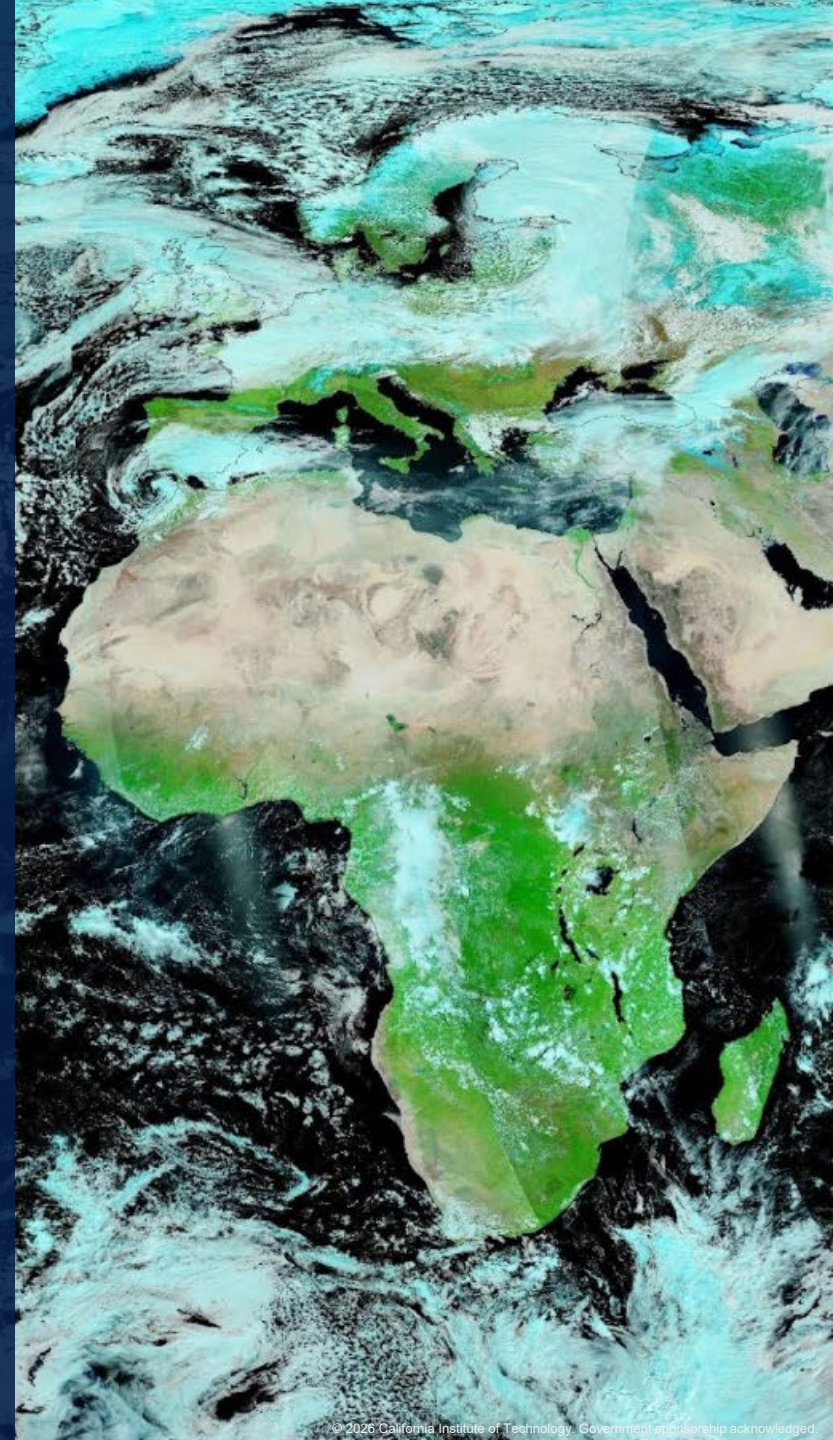
SOTO by Worldview >>> Earthdata Worldview
<https://worldview.earthdata.nasa.gov/>

The underlying transformation services remain accessible.



Resources and Outreach

- PO.DAAC Cookbook
- Recent Webinars



PO.DAAC Cookbook

- Our one-stop shop for learning resources (tutorials, guides, workshops)
- Under active, open development - Community contributions welcomed
- Code annotated with narrative
- Underlying Github repository
 - <https://github.com/podaac/tutorials>

<https://podaac.github.io/tutorials/>



Welcome	
Cheatsheets & Guides	
How To	>
Tutorials	✓
Dataset Specific	✓
ECCO	>
GHRSSST	>
OPERA	>
Sentinel-6 Michael Freilich	>
SMAP	>
S-MODE	>
SWOT	✓
Search	>
Access & Visualization	>
River Profiles Data Story	>
Discharge and WQ	>
GIS Workflows	>
Transform Data	>
Tools	>
Additional Resources	>

Tutorials > Dataset Specific > SWOT

SWOT

SWOT Data Tutorials

SWOT Background

The Surface Water and Ocean Topography (SWOT) mission and its terrestrial surface water such as lakes, rivers, and wetlands (SWOT-terrestrial), with contributions from the Canadian Space Agency (CNES), was launched on December 16, 2022. PO.DAAC is the NASA archive for SWOT data. Earthdata Cloud (hosted in AWS) with direct download capabilities. Product description documents can be found in the chart below. [webpage](#) and the [SWOT Data User Handbook](#). Refer to this page for information on how to use the data and its impact data quality and availability. To give feedback or ask a question, please contact the [SWOT Data User Handbook](#).

SWOT Data Resources & Tutorials

Search & Download

Via Graphical User Interface:

- Find/download [SWOT data on Earthdata Search](#)
- WISP (Water Information from SPace) by USGS <https://water.usgs.gov/wisp/>
- SWOT Viz by CUAHSI <https://swotvis.cuahsi.io/>

Programmatically: ie. within Python code workflows

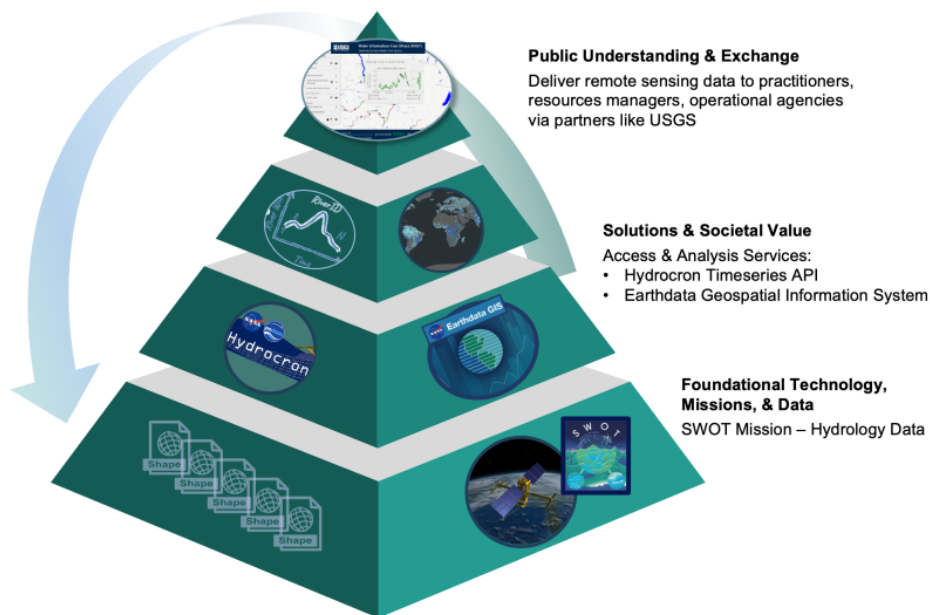
- [Search and Download via earthaccess](#)
- [with unique SWORD river reach ID](#)
- [with unique Hydrologic Unit Code \(HUC\) basin ID](#)

Recent Webinars



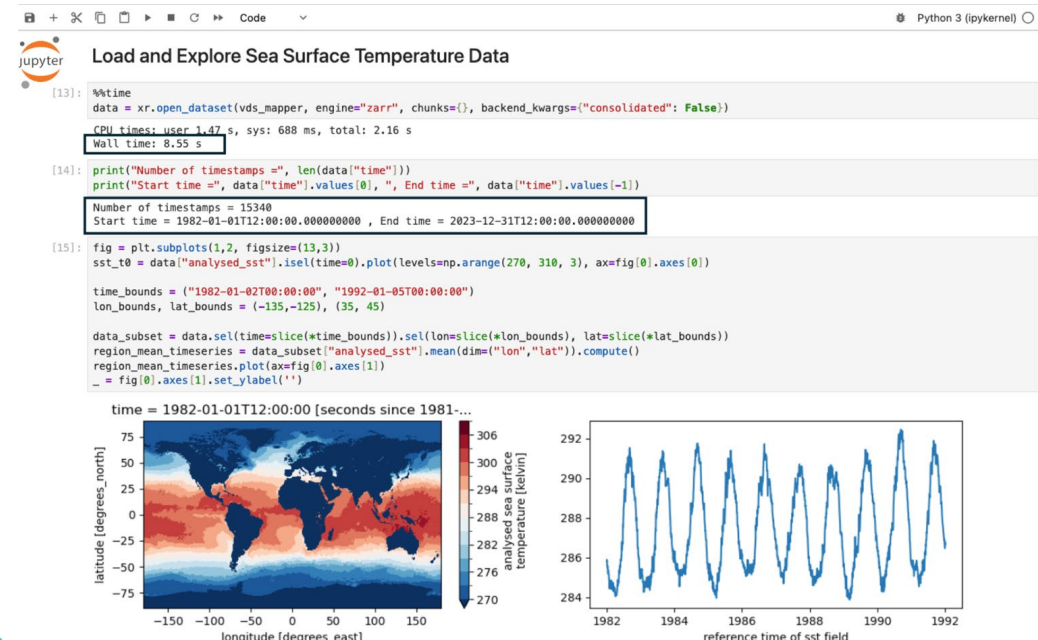
Hydrocron API & GIS Service - See 2025 Earthdata Webinar: From Space to Solutions: Access, Visualization, and Analysis Services for SWOT Hydrology

<https://www.earthdata.nasa.gov/learn/webinars/from-space-solutions-access-visualization-analysis-services-swot-hydrology>



Virtualized Data - See 2025 Earthdata Webinar: Accelerating Science Using Virtualized Data at PO.DAAC

<https://www.earthdata.nasa.gov/learn/webinars/accelerating-science-using-virtualized-data-po.daac>

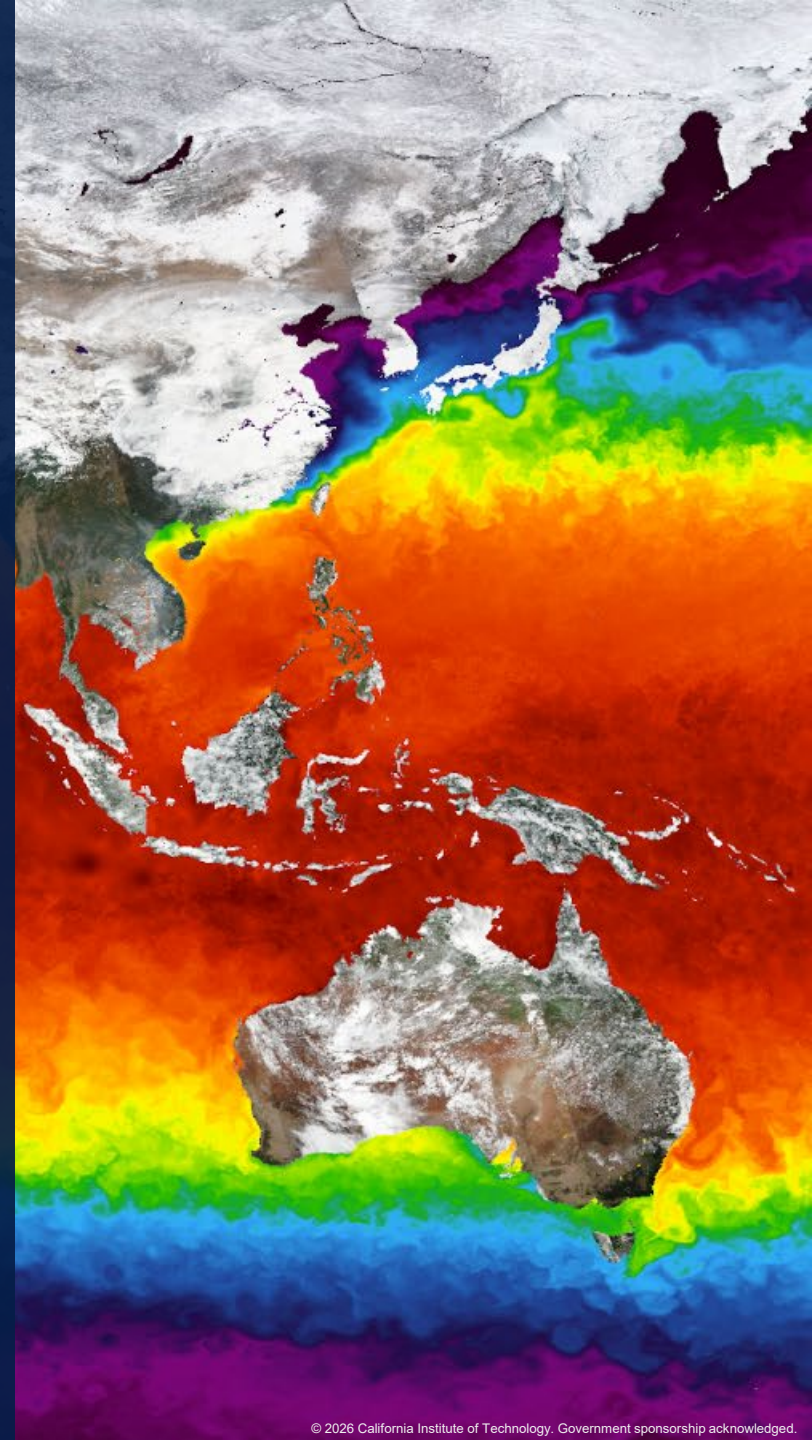


EARTHDATA

Earth Science Data and Information
System (ESDIS) Project

New Services

- EGIS
- VDS



Earthdata GIS (EGIS)

Discover and use from NASA
Earthdata GIS (EGIS) and PO.DAAC
Cookbook.

- EGIS **SWOT** Feature Service for L2 HR RiverSP collection - available now
- EGIS **OPERA-DSWx** Image Service - to be released July 2026



Tutorials > GIS

GIS

StoryMaps and Tutorials using Geographic Information Systems

NASA Earthdata GIS (EGIS)

- SWOT HR Level 2 River Single-Pass Vector Data Product GIS services
- [SWOT Level 2 River Single-Pass Vector Data Product GIS services](#)
- [SWOT Rivers EGIS Access Guide](#)
- [SWOT Rivers EGIS Python Guide](#)

GIS StoryMaps of Select Datasets:

[PO.DAAC GIS StoryMap Collection Page](#)

- [Exploring Water Surface Extent with Satellite Data](#)
- [SWOT: Through a GIS Lens](#)
- [Utilizing GRACE data over the Colorado River Basin](#)
- [The Oceans & Melting Glaciers: OMG & GRACE](#)

GIS Walkthroughs

- [Mapping Sea Surface Temperature Anomalies in QGIS](#)
- [Transform SWOT Datetime field for use in GIS](#)

GIS Jupyter Notebook Tutorials

- [GIS SWOT shapefile exploration](#)
- NetCDF to Geotiff Conversion: SWOT Data Example - [mac or Linux](#) | [Windows](#)
- OPERA DSWx-HLS access & mosaic visualization - [in the cloud](#) | [locally](#)

https://podaac.github.io/tutorials/quarto_text/GIS.html



Earthdata GIS

Earthdata GIS

NASA's Earthdata Geographic Information System (EGIS) is a resource for distributing cloud-native, GIS-ready NASA Earth Science data, services, and resources. These include ArcGIS and Open Geospatial Consortium (OGC)-compliant raster and feature geospatial services*. To access to the full NASA Earth observation repository for data download, please visit [Earthdata Search](#).

EGIS is actively deploying new services, please visit the Gallery to see the full list of publicly available content.

*Core functionality is available for EGIS web services; however, some unique behaviors persist. Please see our [Expected Behavior and Known Limitations](#) for more details.

[Get information and guides](#) to help you find and use NASA Earth science data, services, and tools.

Please contact us at support@earthdata.nasa.gov with any questions or feedback.

Featured Missions, Initiatives, Earth Action Projects

Explore content from featured contributing groups across NASA. These links will bring you to curated collections of layers, maps, and apps, as well as information about each mission, initiative, or Earth Action Project.



NASA's Landslides Initiative



TEMPO



SWOT



PACE

<https://gis.earthdata.nasa.gov/portal/home/index.html>

SWOT EGIS Feature Service

- SWOT HR River Reaches Feature Service has two different services for each Version (vC (2.0) and vD):
 - **SWOT_L2_HR_RiverSP_reach_vD/vC** which includes the full attribute table records.
 - **SWOT_L2_HR_RiverSP_reach_vD/vC_BASIC** which only includes select “Basic” attributes (see [SWOT L2_HR_RiverSP Product Description Doc](#) for definition of “basic”).
 - This will allow for quicker load times as there won’t be as many records to load.
- Services will have zoom level extents of 1:5,000 (City Parcel) - 1:10,000,000 (Continent).
- Feature service access will be available through the [EGIS Homepage](#).
- Service endpoints available as follows:
 - ArcGIS REST API:
 - Feature Service: Visualization and querying of attribute table records.
 - Map Image Service: Dynamic tiling for quick visualization.
 - Open Geospatial Consortium (OGC):
 - Web Feature Service (WFS): Querying a subset of the feature service.
 - OGC Feature Layer: Similar to WFS but with updated standards and faster response.





SWOT EGIS Feature Service - Access

Content Landing page

SWOT_L2_HR_RiverSP_reach_vD_BASIC

Surface Water and Ocean Topography (SWOT) Level 2 River Single-Pass Vector Data Product, Version D (SWOT_L2_HR_RiverSP_D) with Basic Attributes.

Feature layer by [nicholas.k.tarpinian](#)

Item created: Jul 17, 2025 Item updated: Jul 18, 2025 View count: 19

Open in Map Viewer

Open in Scene Viewer

Open in ArcGIS Desktop

Metadata

Description

The SWOT Level 2 River Single-Pass Vector Data Product (SWOT_L2_HR_RiverSP_D) provides hydrologic measurements for predefined river reaches and nodes, derived from high-resolution radar observations collected by the Ka-band Radar Interferometer (KaRin) aboard the SWOT satellite. This product reports water surface elevation, slope, width, area, and discharge estimates for each reach, along with corresponding node-level details. All features are defined by the Prior River Database (PRD), which encodes river geometry and topology across global basins.

Each granule covers a single satellite pass over one or more continents and includes two ESRI shapefiles: one for river reaches (as polylines) and one for nodes (as points). Shapefile attributes include both SWOT-derived measurements and metadata from the PRD. Water surface elevations are referenced to the WGS84 ellipsoid and are corrected for geoid height and solid Earth, load, and pole tides. Measurements are aggregated from lower-level pixel detections (PIXC product) assigned to hydrologic features via the auxiliary PIXCVec product. The product also includes consensus and algorithm-specific river discharge estimates, both unconstrained and constrained by historical gauge data.

The RiverSP product provides reach-scale hydrologic variables suitable for analyzing inland water dynamics, estimating discharge, and monitoring river changes over time. It enables direct integration with the PRD-defined river network and supports applications in large-scale hydrologic modeling, basin monitoring, and water resource management. Data are distributed in shapefile format with metadata and attribute definitions aligned to GIS and hydrologic standards.

This collection is a sub-collection of its parent: <https://doi.org/10.5067/SWOT-RIVERSP-D>

This service includes a subset of the "Basic" attributes. "Basic" attributes are intended for users interested in the KaRin measurements as provided. For more info on the differences between "Basic" and "Expert" attributes please review the [Product Description Document \(PDD\)](#).

For question about this service, please contact podaac@podaac.jpl.nasa.gov

Layers

SWOT_L2_HR_RiverSP_reach_vD_BASIC
Line layer

Terms of Use

"Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement by the United States Government or the Jet Propulsion Laboratory, California Institute of Technology."

Access points

Details

Source: Feature Service
Size: 1 KB
ID: a5573390413f4350a8ce7ecc9ded590
☆☆☆☆☆

Share

Owner

[nicholas.k.tarpinian](#)

Tags

SWOT, Hydrology, River Reach, NASA, PODAAC, Earth Science, Earth Data

Credits (Attribution)

Surface Water Ocean Topography (SWOT) Project, National Aeronautics and Space Administration (NASA), NASA Jet Propulsion Laboratory (JPL), Physical Oceanography Distributed Active Archive Center (PO.DAAC).

URL

<https://gis.earthdata.nasa.gov/imag>

Help

Feature layers
Feature layers (developer)

Access point

ArcGIS
Online
Map
Viewer

```
url = "https://gis.earthdata.nasa.gov/image/rest/services/C3233944997_POCLD/SWOT_L2_HR_RiverSP_reach_vD_BASIC/FeatureServer/1/query"
params = {
    "where": "river_name='Colorado River'", # Change to your river reach of interest
    "outfields": "",
    "f": "geojson",
    "resultRecordCount": 10000
}

response = requests.get(url, params=params)
geojson = response.json()
print("Status code:", response.status_code)
print("response:", response.text[:500])
```

python (& leafmap)

QGIS

EARTHDATA
Earth Science Data and Information
System (ESDIS) Project

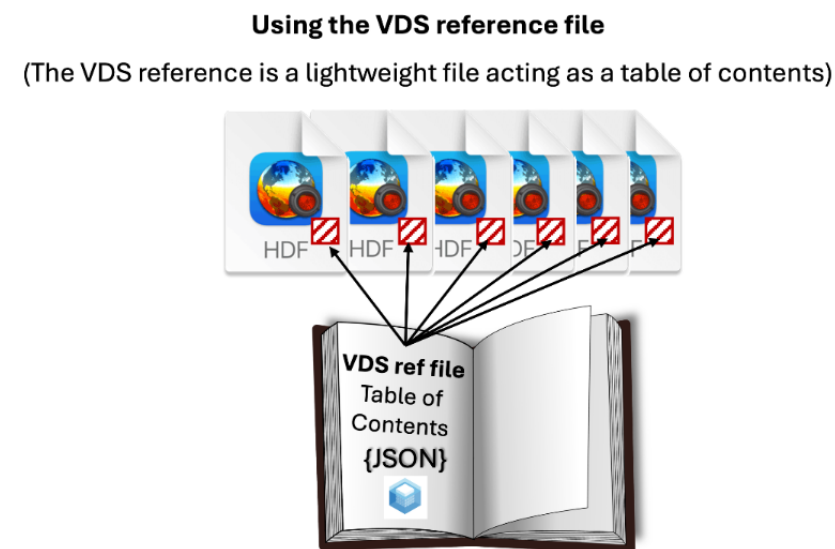
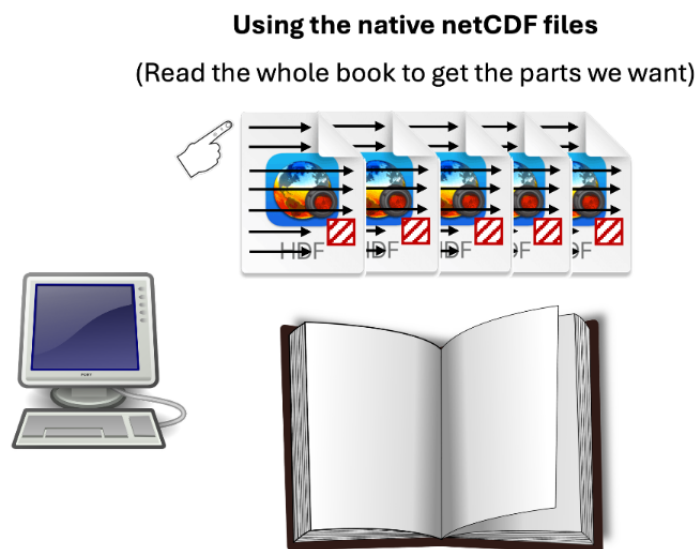
© 2026 California Institute of Technology. Government sponsorship acknowledged.

Virtual data store (VDS)

Cookbook section:

https://podaac.github.io/tutorials/quarto_text/UsingVirtualDatasets.html

Without VDS	With VDS
Search for granules within time frame	Call subset along time, spatial, or other indices
(Non-cloud) Download granules	
Stitch together granules	



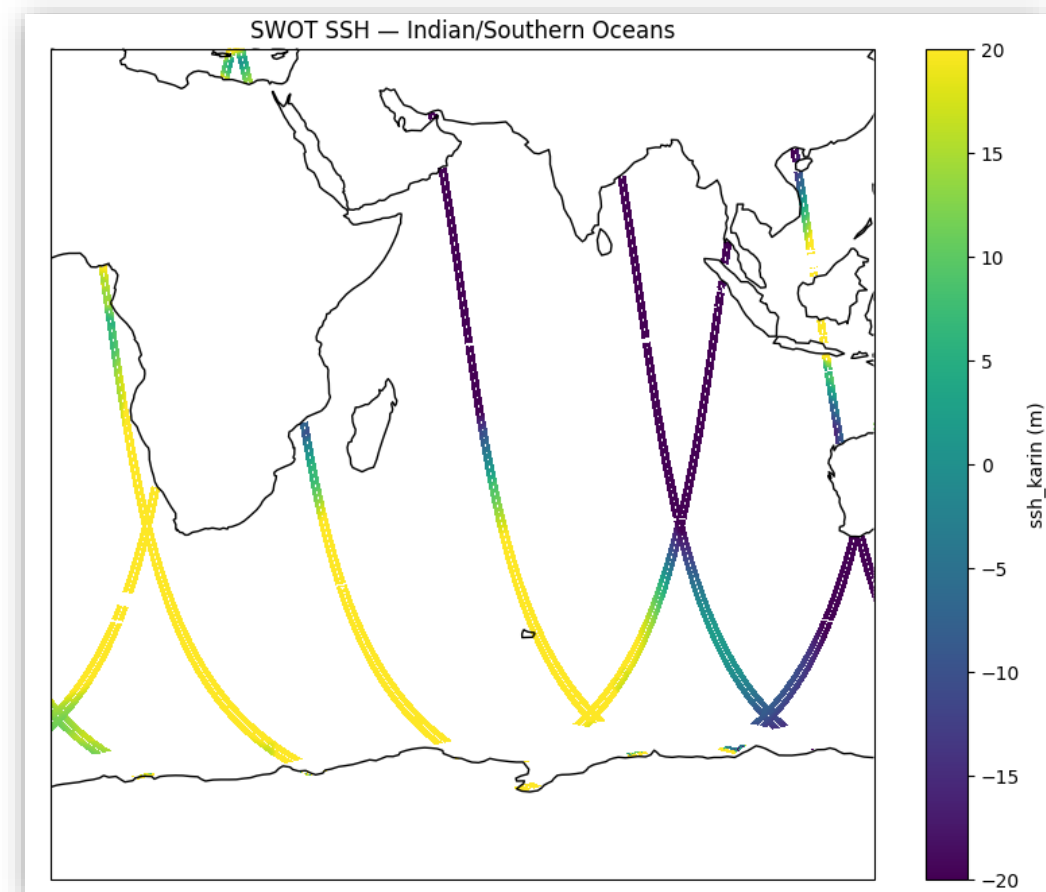
New VDS for SWOT L2 SSH

VDS Goals

- Seamless access to cloud optimized data
- Easy to open and subset any part of the SWOT time series (i.e, “lazy load”) in xarray or zarr python
- Then compute on just the parts you need

Implementation

- https://archive.podaac.earthdata.nasa.gov/podaac-ops-cumulus-public/virtual_collections/SWOT_L2_LR_SSH_Basic_D/SWOT_L2_LR_SSH_Basic_D_virtual_https.json
- https://archive.podaac.earthdata.nasa.gov/podaac-ops-cumulus-public/virtual_collections/SWOT_L2_LR_SSH_Basic_D/SWOT_L2_LR_SSH_Basic_D_virtual_s3.json
- Concatenated cycle/pass/time - select by cycle, pass, filename, or



VDS items in progress...

- 12 total available (ECCO, NeurOST SSH, SWOT) with more to come!
- operationalize and update with forward stream data
- transition to *icechunk* library
 - keeping up with the community and relaying needs
- metrics
- https://podaac.github.io/tutorials/quarto_text/UsingVirtualDatasets.html



Please let us know any needs or wishlist items regarding VDS, and give feedback on current VDS resources!

cc: Ed Armstrong, edward.m.armstrong@jpl.nasa.gov



Contact presenter:

Please say hi and exchange emails!
I'm happy to walk through any PO.DAAC
resources one-on-one!

Celia Ou
celia.y.ou@jpl.nasa.gov

OR
podaac@podaac.jpl.nasa.gov, and ask to be redirected

<https://www.earthdata.nasa.gov/centers/po-daac>

EARTHDATA

earthdata.nasa.gov

Thank you!

<https://www.earthdata.nasa.gov/centers/podaac>

podaac@podaac.jpl.nasa.gov

forum.earthdata.nasa.gov