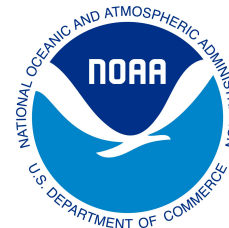




Accessing CoastWatch Data: HTTPS and THREDDS Services



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Satellite 201 Course

July 2026

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CoastWatch provides several services to access data

ERDDAP Data Service

- Covered in the [tutorials](#) and [presentations](#) of our introductory satellite data course on the [CoastWatch Training Website](#)

→ HTTPS and THREDDS Data Services are also available

- Not all datasets are available through ERDDAP
- Some workflows are better suited to HTTPS or THREDDS

What We'll Cover



Why Pick One Data Service Over Another?



Finding Data with the CoastWatch Central Website



Working with the HTTPS Data Server



Working with the THREDDS Data Server



Live Demonstrations: [HTTPS](#) & [THREDDS](#) Workflows



Do It Yourself: Explore Additional Examples

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Compare Features to Select Service to Use

Feature	HTTPS	THREDDS	ERDDAP
Primary Use	Single or bulk downloads	Automated pipelines	Automated pipelines, visualizations, & format conversion
Data Awareness	No: Sees a file as a string of binary bytes	Yes: Reads internal headers & metadata	Yes: Reads internal headers & metadata
Subsetting	No: Download the entire file	Yes: Select variables, time, & area	Yes: Select variables, time, & area
Aggregation	No: Files remain isolated	Yes: Virtual continuous dataset	Yes: Virtual continuous dataset
Gridded (L3) and Swath (L2) Data	Yes: Serves L3 & L2	Yes: Serves L3 & L2	No: Only L3
Output Formats	No: Original format	No: Original format	Yes: Convert to many formats (.csv, .json, .nc, .mat, etc.)

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Find Data with the CoastWatch Central Search Tool

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Expand menu Find Data

Product Search Tool

CoastWatch Data Portal

Home

Welcome to NOAA CoastWatch

NOAA CoastWatch exists to help people access and use global and regional satellite data for ocean and coastal applications. Our satellite data products and services can support research, resource management, and decision-making on topics such as understanding, managing and protecting ocean and coastal resources and for assessing impacts of environmental change in ecosystems, weather, and climate. Data, algorithms, and images presented on STAR websites are intended for experimental use only and are not supported on an operational basis ([Disclaimer details](#)).




Search Data Products


CoastWatch Data Portal


Training Portal

HTTPS Workflow: Downloading Data

1st Objective: Download a single NetCDF file from an HTTPS Server

- 1 Specify HTTPS file URL
- 2 Create local download directory
- 3 Download the NetCDF file
- 4 Save it locally

HTTPS Workflow: Automating Downloads

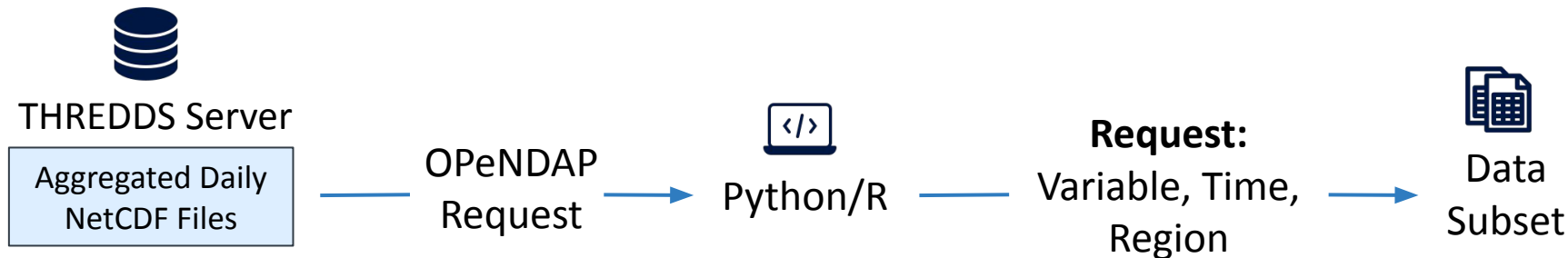
2nd Objective: Download many files without selecting them

- 1 Specify the years and months to download
- 2 Scrape the HTTPS directory listing for available NetCDF files
- 3 Filter file URLs by desired year and month
- 4 Download and organize them into folders automatically

What is OPeNDAP?

OPeNDAP (Open-source Project for a Network Data Access Protocol) is a web service that provides remote access to scientific datasets.

Instead of downloading NetCDF files, OPeNDAP allows Python, R, and other applications to open datasets directly from the THREDDS server without downloading the entire collection.



THREDDS Workflow: Remote Data Access

1st Objective: Access an aggregated dataset remotely

- 1 Open the dataset using the OPeNDAP endpoint
- 2 Explore the dataset dimensions, variables, attributes, etc.

We are able to access the data without downloading!

THREDDS Workflow: Working with the Data

2nd Objective: Retrieve only the data needed for analysis

- 1 Subset the dataset by variable, time, and region
- 2 Visualize the data with an animation
- 3 Save the subset as a local NetCDF file

Tutorial Time!

Find the [HTTPS](#) and [THREDDS](#) Tutorials on the [CoastWatch Training Website](#).

Which Access Method Fits Your Workflow?

If you want to:

Download many NetCDF files



HTTPS

Access many files as one dataset,
Subset by variable, region & time,
Read directly into R/Python



THREDDS via OPeNDAP

Access many files as one dataset,
Subset by variable, region & time,
Read directly into R/Python,
Multiple file formats



ERDDAP

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Acknowledgements

West Coast Node & PolarWatch

- Dale Robinson
- Cara Wilson
- Sunny Hospital
- Jonathan Sherman

CW Central

- Veronica Lance
- Michael Soracco

SWFSC

- Roy Mendelssohn

**All instructors, participants, and hosts of the satellite
course trainings!**



UC SANTA CRUZ



Questions?

Find Data with the CoastWatch Central Search Tool

Sea level Anomaly and Geostrophic Currents, multi-mission, global, optimal interpolation, gridded

The NOAA Laboratory for Satellite Altimetry's (LSA) sea surface height team produces 0.25-degree longitude/latitude Level-3 sea level anomaly (SLA) daily datasets by applying optimal interpolation to along-track satellite observations over the global ocean from a constellation of radar altimeter missions. These grids are produced with near-real time (3-5 hour latency) data. Geostrophic Currents are produced from the SLA and are included in the dataset.

Data Access	Product Overview	Product Details	Documentation	Citation
Data Tool Links	CoastWatch Data Portal CoastWatch Near Real-Time Search			
Sample Filenames	1-day: rads_global_nrt_sla_20170313_20170314_000.nc			
HTTPS	https://coastwatch.noaa.gov/data/pub0015/coastwatch/rads/sla/			
THREDDS	https://coastwatch.noaa.gov/thredds/socd/coastwatch/catalog_coastwatch_altimetry.html			
ERDDAP	https://coastwatch.noaa.gov/erddap/search/index.html?page=1&itemsPerPage=1000&searchFor=SLA			

Accessing Data from the HTTPS Server

Contents of <https://www.star.nesdis.noaa.gov/data/pub0015/coastwatch/rads/sla/2024/>

STAR File Share / Image Browser
Click on image links to preview

Show entries

Search:

Type	Filename	Size
Parent Directory		-
hash.md		
	rads_global_nrt_sla_20240101_20240102_001.nc	
	rads_global_nrt_sla_20240102_20240103_001.nc	
	rads_global_nrt_sla_20240103_20240104_001.nc	
	rads_global_nrt_sla_20240104_20240105_001.nc	44K
	rads_global_nrt_sla_20240105_20240106_001.nc	2.9M
	rads_global_nrt_sla_20240106_20240107_001.nc	2.9M
	rads_global_nrt_sla_20240107_20240108_001.nc	2.9M
	rads_global_nrt_sla_20240108_20240109_001.nc	2.9M
	rads_global_nrt_sla_20240109_20240110_001.nc	2.9M
	rads_global_nrt_sla_20240110_20240111_001.nc	2.9M
	rads_global_nrt_sla_20240111_20240112_001.nc	2.9M
	rads_global_nrt_sla_20240112_20240113_001.nc	2.9M
	rads_global_nrt_sla_20240113_20240114_001.nc	2.9M
	rads_global_nrt_sla_20240114_20240115_001.nc	2.9M
	rads_global_nrt_sla_20240115_20240116_001.nc	2.9M
	rads_global_nrt_sla_20240116_20240117_001.nc	2.9M
	rads_global_nrt_sla_20240117_20240118_001.nc	2.9M
	rads_global_nrt_sla_20240118_20240119_001.nc	2.9M
	rads_global_nrt_sla_20240119_20240120_001.nc	2.9M

Accessing Data from TDS (THREDDS) via OPeNDAP

Action:

Data URL:

Global Attributes:

Conventions: CF-1.6
title: Daily merged sea surface height anomalies from altimetry
ncei_template_version: NCEI_NetCDF_Grid_Template_v2.0
institution: NOAA/NESDIS Center for Satellite Applications and Research

Variables:

☐ **crs:** 32 bit Integer

crs =

comment: This is a container variable that describes the grid_mapping used by the data in this file. This variable does not contain any data; only information about the geographic coordinate system.
grid_mapping_name: latitude_longitude
inverse_flattening: 298.257

☐ **longitude:** Array of 32 bit Reals [longitude = 0..1439]

longitude:

standard_name: longitude
long_name: Longitude
units: degrees_east
axis: X
valid_min: -179.875

☐ **latitude:** Array of 32 bit Reals [latitude = 0..719]

latitude:

standard_name: latitude
long_name: latitude
units: degrees_north
axis: Y
valid_min: -89.875

THREDDS Web Map Service (WMS)

THREDDS includes a Web Map Service (WMS) that streams rendered satellite imagery directly into mapping applications. We have a Python and R tutorial that demonstrates how to:

- Stream satellite imagery
- Build interactive Leaflet maps
- Overlay in situ observations

Available here on the CoastWatch Training Website.

If someone asks about the other service on TDS

OPeNDAP: For direct binary data array slicing inside code.

OGC WMS (Web Map Service): Renders the raw data array instantly into a map image (PNG/JPEG) to overlay directly in GIS software like QGIS or ArcGIS.

OGC WCS (Web Coverage Service): Allows users to request raw gridded data mapped to specific geographic coordinate projections.

NetCDF Subset Service (NCSS): A simple REST API to subset data using spatial bounding boxes and time ranges.

HTTP: THREDDS *also* includes a standard HTTP file server wrapper if a user genuinely wants to download the entire physical

Accessing Data with ERDDAP

Accessing data from ERDDAP is covered in our introductory satellite course. If you are unfamiliar or you'd like to learn more, visit our [training website](#) for:



[Tutorials](#)



[Presentations](#)