

# Best Practices for Model/Data Preservation at NOAA/NCEI

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with Scott Cross, and Rost Parsons  
NCEI (Previously NODC and NCDDC)

NGI, NAVO, NCEP & NCEI

# Improve Access to Ocean Nowcasts/ Forecasts

**NOMADS: Inspiration for OceanNOMADS**

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**NOMADS**

National Operational Model Archive & Distribution  
System

- NCEP, NCEI, and GFDL initiated
- Real-time and retrospective access to NOAA operational atmospheric model output

<http://nomads.ncep.noaa.gov/>

NGI, FNMOC, NCEP & NCEI

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# NGI, NAVO, NCEP & NCEI

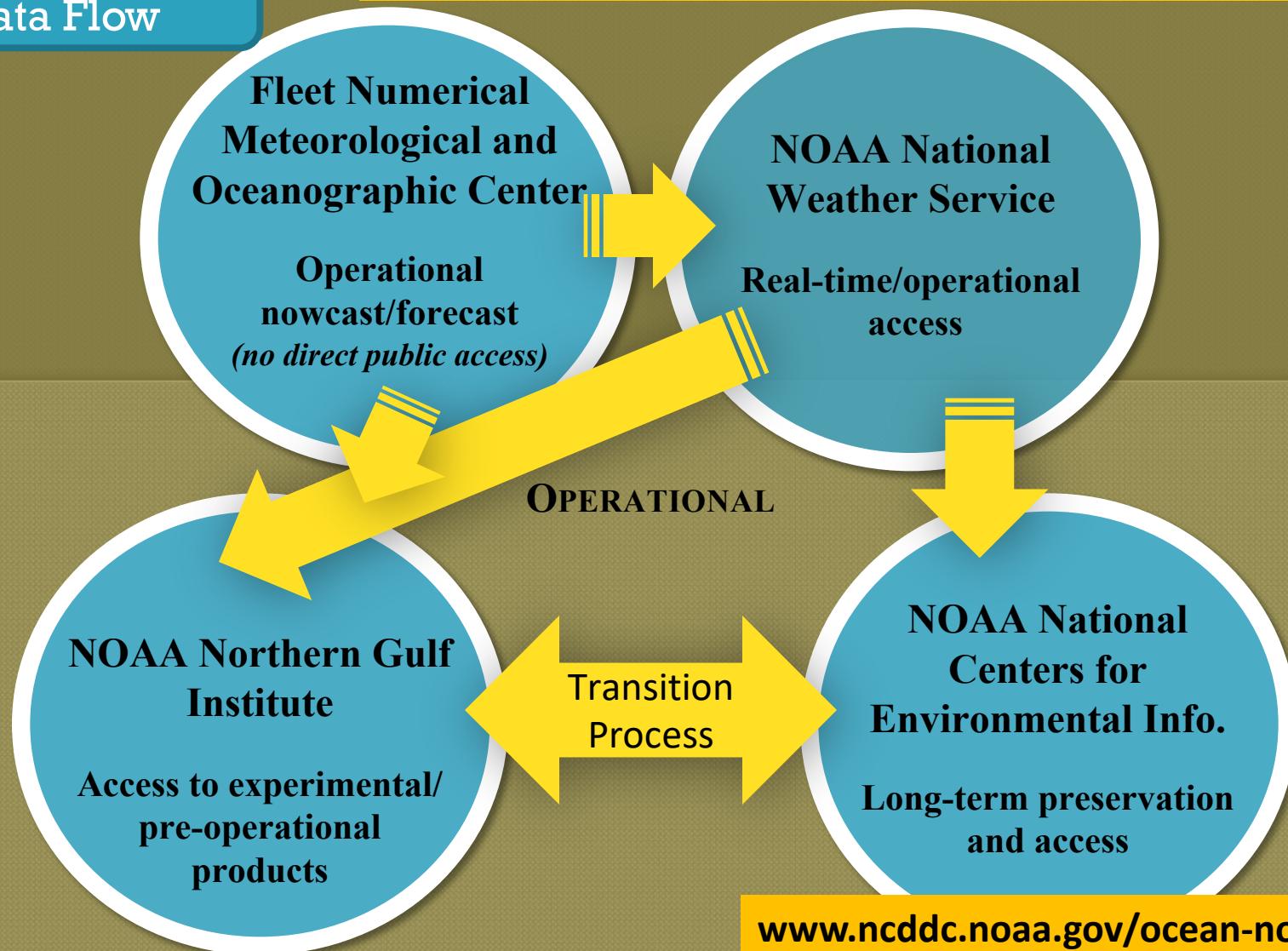
## Improve Access to Ocean Nowcasts/ Forecasts

### OceanNOMADS

#### OceanNOMADS

- Navy/NCEP/NGI/NODC (now NCEI) partnership
- Real-time and retrospective access to Navy and NOAA selected operational & pre-operational ocean model output
- Web service graphics for quick look at retrospective data
- Currently Serves several models, including:
  - Atmospheric Models
  - Ocean Models (both real-time and climate)
  - Ecosystem Models

<https://www.ncdc.noaa.gov/data-access/model-data/ocean-nomads>



[www.ncddc.noaa.gov/ocean-nomads](http://www.ncddc.noaa.gov/ocean-nomads)

R&D

[www.northerngulfinstitute.org/edac/ocean\\_nomads.php](http://www.northerngulfinstitute.org/edac/ocean_nomads.php)

LONG-TERM ACCESS

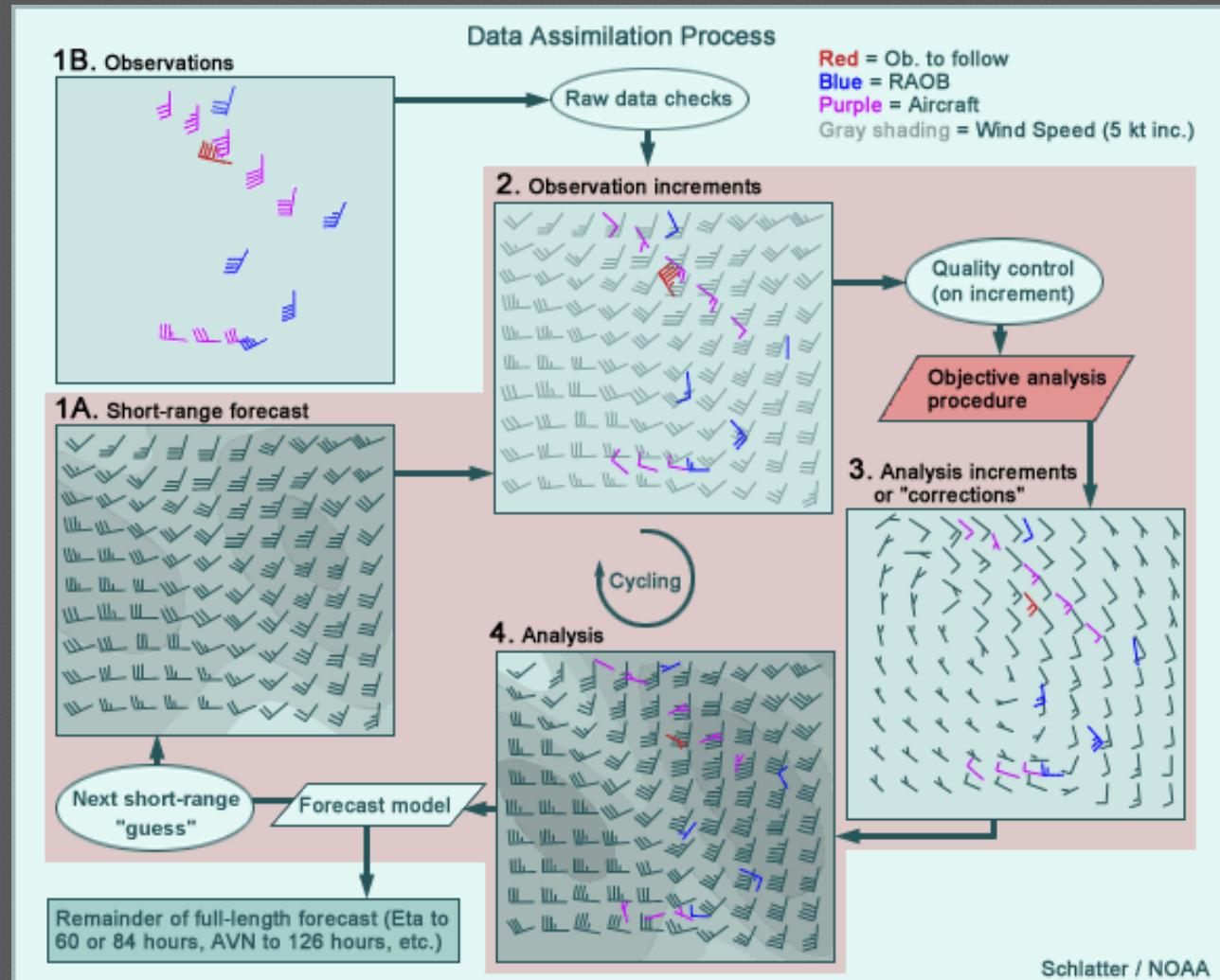
Statistical  
combination of  
observations  
with short-term  
model forecast

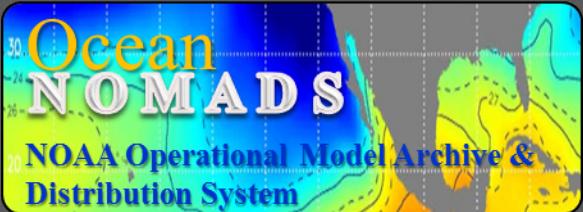
3DVar  
4DVar  
LETKF  
EnKF  
Hybrids

Yesterday's  
forecast is the  
background for  
tomorrows  
analysis

It's all in the  
covariances...

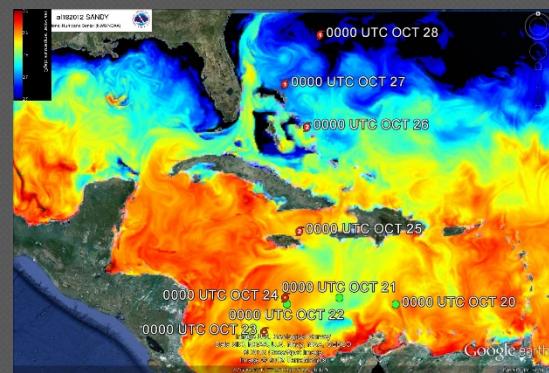
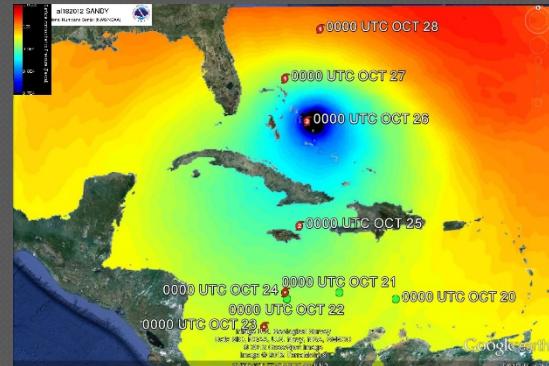
# data assimilation





# Applications:

- Ecosystem models:
  - Whole-ecosystem trophic models
    - (Mass, salt, temp fluxes)
  - Biogeochemical submodels
  - Larval transport
    - (Currents)
  - Habitat suitability
    - (T, S, currents)
- Regional or local ocean models
  - Boundary conditions
  - Comparison, ensemble production
- Emergency response\*
  - NOAA OR&R Hazmat
  - USCG SAR



OceanNOMADS: AMSEAS  
Sandy Example:

Sfc. Pressure & SST Evolution

26 October 2012

# Global Ocean Forecast System (GOFS 3.1) based on HYCOM 1/12° horizontal resolution, 41 vertical layers. GOFS 3.5 1/25°

 **NOAA** NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Formerly the National Climatic Data Center (NCDC)... [more about NCEI](#) »

Home Climate Information Data Access Customer Support Contact About  

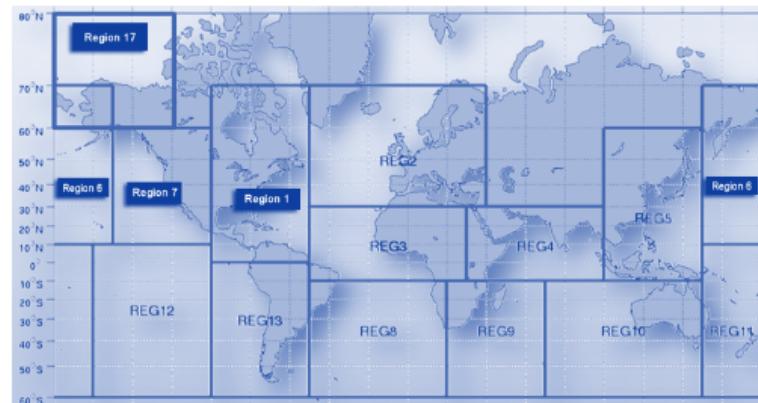
Home > Data Access > Model > Datasets > The Fleet Numerical Meteorology and Oceanography Center (FNMOC) Global Hybrid Coordinate Ocean Model (HYCOM)

Quick Links

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  - [CMIP5](#)
  - [GDAS](#)
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  - [GFS](#)
  - [HYCOM](#)

## The Fleet Numerical Meteorology and Oceanography Center (FNMOC) Global Hybrid Coordinate Ocean Model (HYCOM)

The Fleet Numerical Meteorology and Oceanography Center (FNMOC) global-scale operational ocean prediction system is based on the Hybrid Coordinate Ocean Model (HYCOM). This system provides 4-day forecasts at 3-hour time steps, updated at 00Z daily. Navy Global HYCOM has a resolution of 1/12 degree in the horizontal and uses hybrid (isopycnal/sigma/z-level) coordinates in the vertical. The output is interpolated onto a regular 1/12-degree grid horizontally and 40



HYCOM regions. Regions that we serve have their names on a dark background.

HYCOM: hybrid (ALE) time varying vertical coordinate. Isopycnals in the deep stratified ocean, z-coordinates in unstratified ocean (including mixed layer) and sigma coordinates in shallow water.

## Regional Ocean Models based in Navy Coastal Ocean Model (NCOM)

Product	Scale	POR	Model Cycle	Output Time Step	Access
AmSeas, Recent	1/30°	2013-04-05-Present	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D
AmSeas, Prior	1/36°	2010-05-08-2013-04-04	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D
U.S. East, Recent	1/30°	2013-04-05-Present	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D
U.S. East, Prior	1/36°	2009-11-19-2013-04-04	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D
U.S. East, Earliest	1/36°	2009-02-08-2009-11-18	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D
Alaska	1/30°	2015-04-13-Present	1 day	3 hours	TDS agg, TDS files, ERDDAP 2D, ERDDAP 3D

NCOM: static sigma-z vertical coordinate system  
Resolution ranges from 100's m to 3 km (typically)

# ERDDAP Server (Environmental Research's Div. Data Access Program)

## ERDDAP

ERDDAP is a data server that gives you a simple, consistent way to download subsets of scientific datasets in common file formats and make graphs and maps. This particular ERDDAP installation has oceanographic data (for example, data from satellites and buoys).

### Easier Access to Scientific Data

Our focus is on making it easier for you to get scientific data.

#### Different scientific communities have developed different types of data servers,

for example, OPeNDAP, WCS, SOS, OBIS, and countless custom web pages with forms. Each is great on its own. Without ERDDAP, it is difficult to get data from different types of servers:

- Different data servers make you format your data request in different ways.
- Different data servers return data in different formats, usually not the common file format that you want.
- Different datasets use different formats for time data, so the results are hard to compare.

**ERDDAP unifies the different types of data servers so you have a consistent way to get the data you want, in the format you want.**

- **ERDDAP acts as a middleman between you and various remote data servers.**

When you request data from ERDDAP, ERDDAP reformats the request into the format required by the remote server, sends the request to the remote server, gets the data, reformats the data into the format that you requested, and sends the data to you. You no longer have to go to different data servers to get data from different datasets.

- **ERDDAP offers an easy-to-use, consistent way to request data: via the OPeNDAP standard.**

Many datasets can also be accessed via the Web Map Service (WMS).

- **ERDDAP returns data in the common file format of your choice.**

ERDDAP offers all data as .html table, ESRI .asc and .csv, Google Earth .kml, OPeNDAP binary, .mat, .nc, ODV .txt, .csv, .tsv, .json, and .xhtml. So you no longer have to waste time and effort reformatting data.

- **ERDDAP can also return a .png or .pdf image with a customized graph or map.**

- **ERDDAP standardizes the dates+times in the results.**

Data from other data servers is hard to compare because the dates+times often

## Start Using ERDDAP: Search for Interesting Datasets

- [View a List of All 173 Datasets](#)

- **Do a Full Text Search for Datasets**

- **Search for Datasets by Category**

Datasets can be categorized in different ways by the values of various metadata attributes. Click on an attribute ([cdm\\_data\\_type](#), [institution](#), [loos\\_category](#), [keywords](#), [long\\_name](#), [standard\\_name](#), [variableName](#)) to see a list of categories (values) for that attribute. Then, you can click on a category to see a list of relevant datasets.

- **Search for Datasets with [Advanced Search](#)**



- **Search for Datasets by Protocol**

Protocols are the standards which specify how to request data.

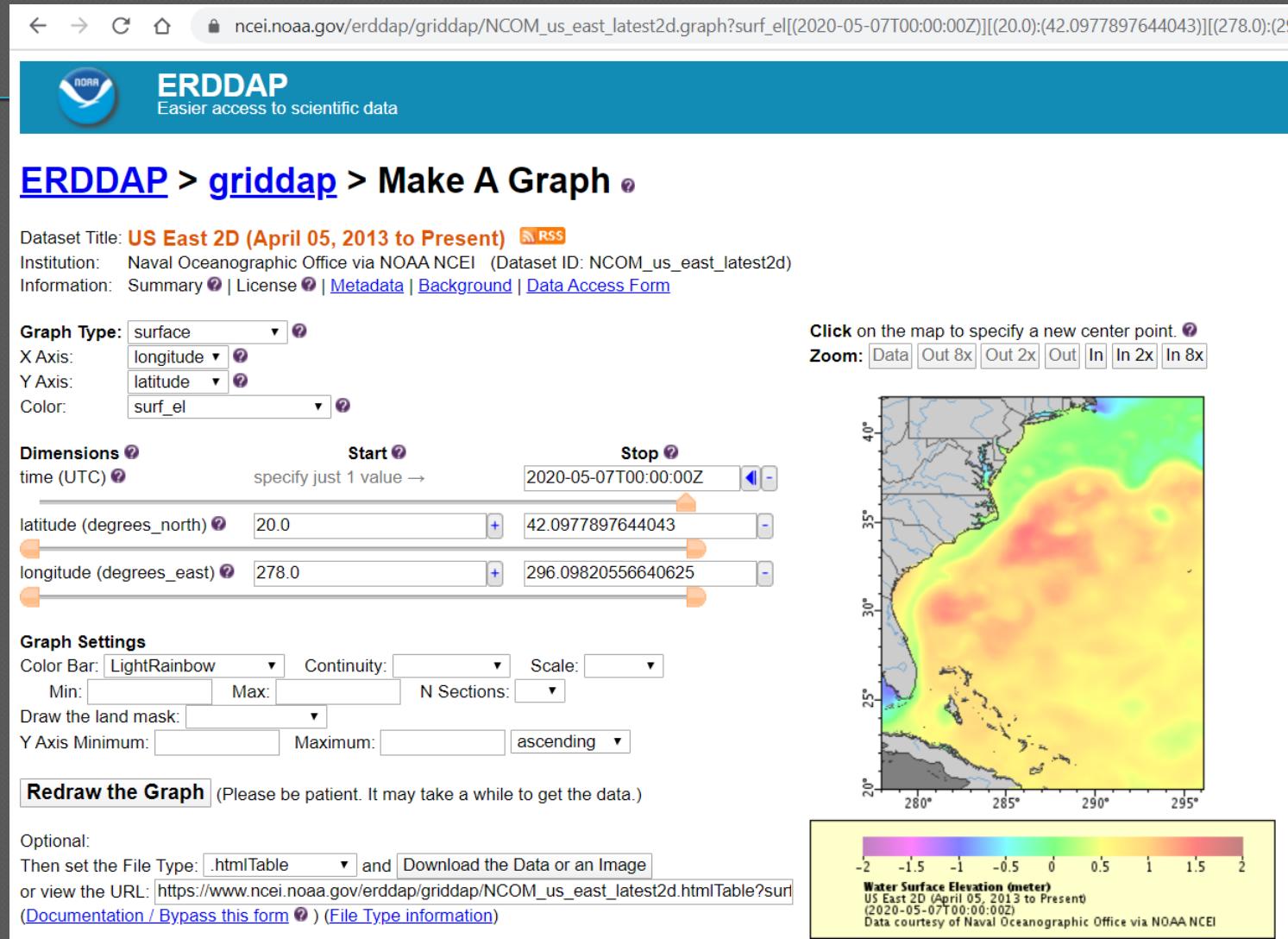
Different protocols are appropriate for different types of data and for different client applications.

Protocol	Description
<a href="#">griddap datasets</a>	Griddap lets you use the OPeNDAP hyperslab protocol to request data subsets, graphs, and maps from gridded datasets (for example, satellite data and climate model data). <a href="#">griddap documentation</a>
<a href="#">tabledap datasets</a>	Tabledap lets you use the OPeNDAP constraint/selection protocol to request data subsets, graphs, and maps from tabular datasets (for example, buoy data). <a href="#">tabledap documentation</a>
<a href="#">"files" datasets</a>	ERDDAP's "files" system lets you browse a virtual file system and download source data files. <b>WARNING!</b> The dataset's metadata and variable names in these source files may be different than elsewhere in ERDDAP!

## Also:

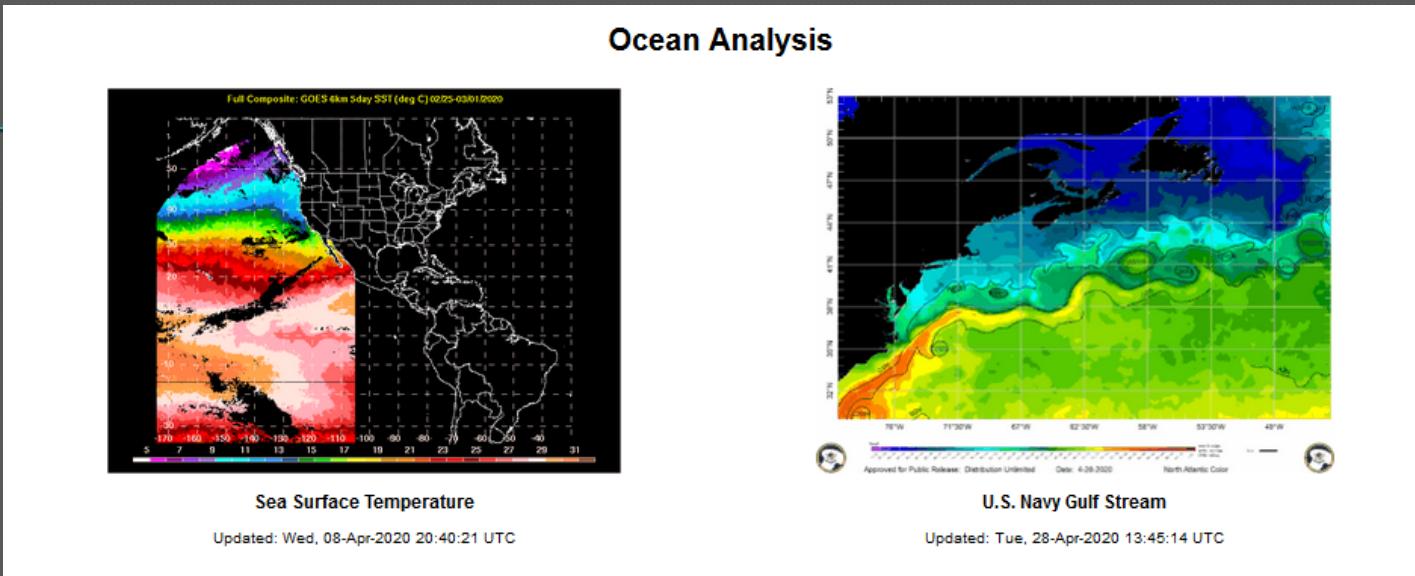
- **THREDDS**
- **FTP**
- **HTTPS**
- **AIRS**

# ERDDAP Server (Environmental Research's Div. Data Access Program)



Allows gridding, subdomains, graphics, etc.

# Ocean Analyses and Forecast Products



**What we save:** Whatever the modeling groups send us, although we only save analyses (continuous time series) but not forecasts.

Temperature, Salinity, u,v, velocity components, geopotential, etc.  
Frequency can range from 3-hourly to daily snapshots to daily means.

<https://ocean.weather.gov/OceanProd.php>

# Archival process:

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- For larger (TB scale) or repeating datastreams:
  - Advanced Tracking and Resource tool for Archive Collections (ATRAC)
  - <https://www.ncdc.noaa.gov/atrac/index.html>
  - Prepare and submit a Request to Archive form
  - Appraisal process will consider costs, if any
- For smaller/one-off datasets:
  - Send2NCEI web application
  - <https://www.nodc.noaa.gov/s2n/>
- Archive retention schedule:
  - >= 5 yrs for atmospheric models
  - >= 75 yrs for ocean models

<https://www.ncei.noaa.gov/archive#submitting>

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# Questions?

Please check out:

[https://www.ncdc.noaa.gov/  
data-access/model-data/ocean-nomads](https://www.ncdc.noaa.gov/data-access/model-data/ocean-nomads)