Oceans of Data: Data Management and IOOS

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Data
Management
Framework
management
activities
National
EDM
EDMC
users
may
access
Cloud
Directive
Office
datasets
Center
standards
quality
preserved
projects
Federal
Centers
Spring
Earth
Technology
services
Principles
public
Users
groups
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Council
Digital
Usage
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include
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Silver
System
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Science
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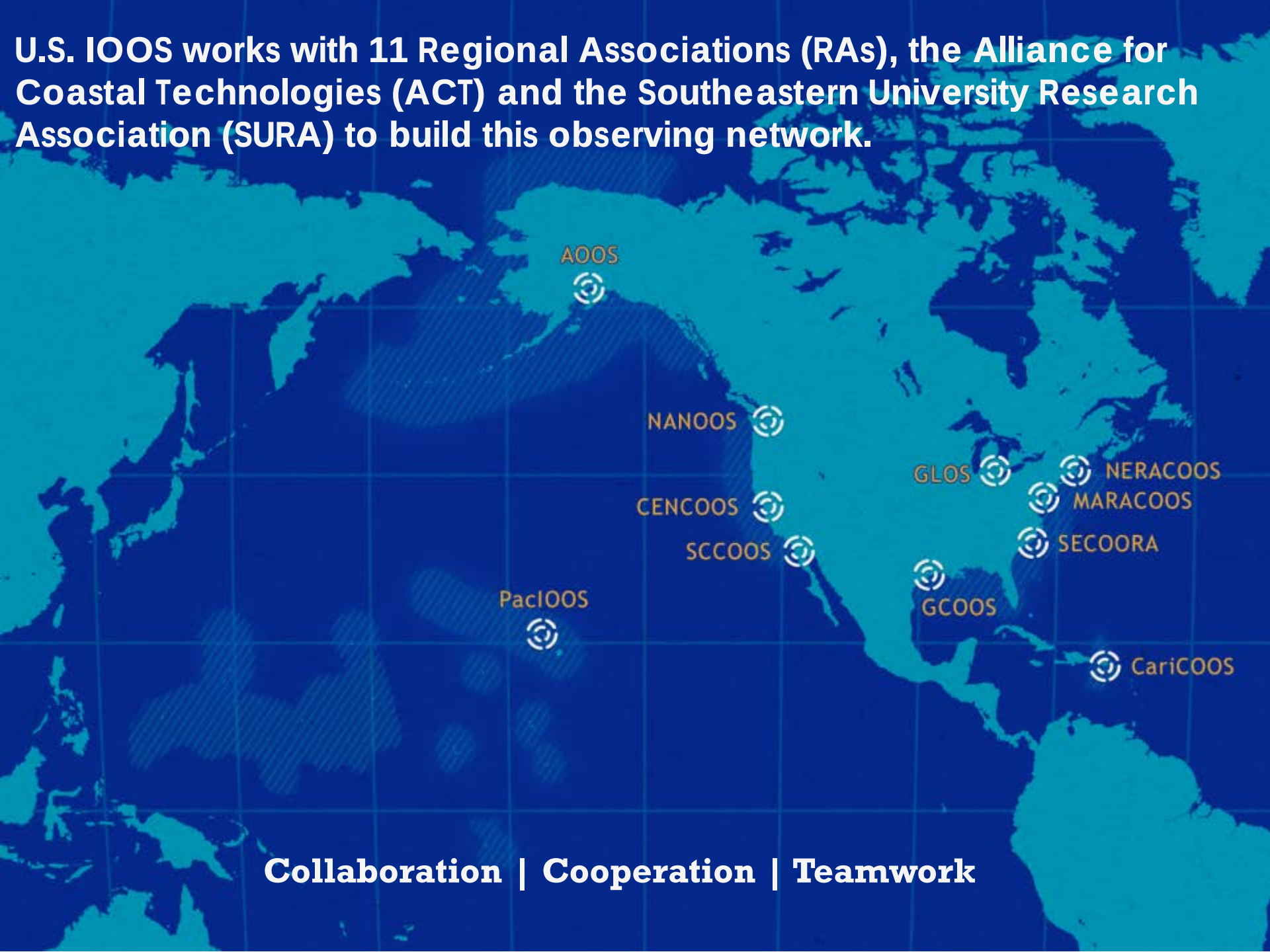
Usage
resources
project
include
Framework
metadata
agency
discoverable

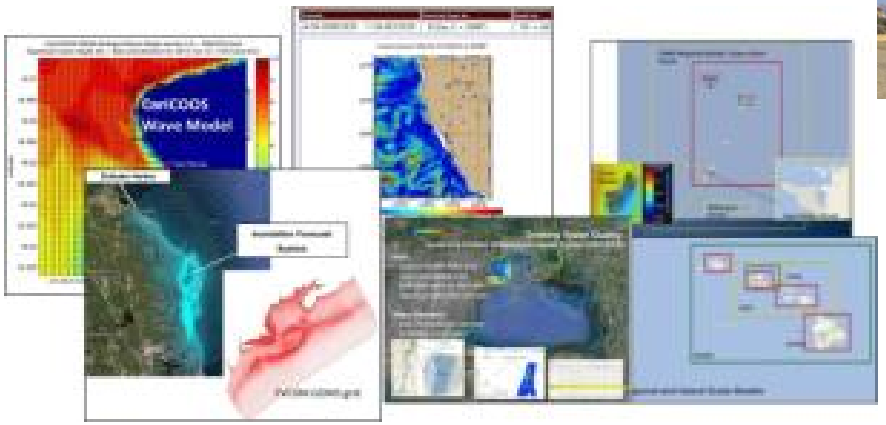
U.S. IOOS works with 11 Regional Associations (RAs), the Alliance for Coastal Technologies (ACT) and the Southeastern University Research Association (SURA) to build this observing network.



Collaboration | Cooperation | Teamwork

IOOS observing platforms and models

- Buoys
- Gliders
- High Frequency radar (HFR)
- Animal telemetry
- Shore stations
- Models



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IOOS Data are BIG data

Petabytes of Open Data

32,000
stations

119,515 sensors
sensors

37
national sensor networks

42,000,000
sensor observations
Per week

Data management provides the integrating platform www.ioos.us

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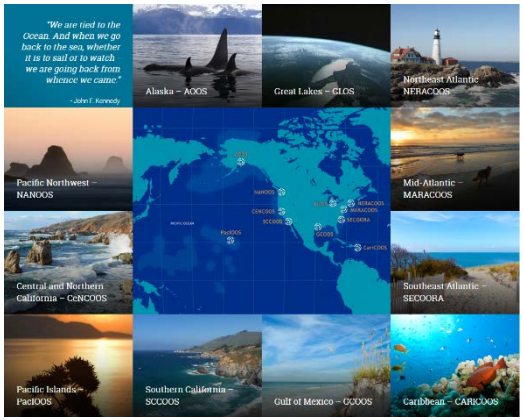
Core Data Management Capacities for RAs

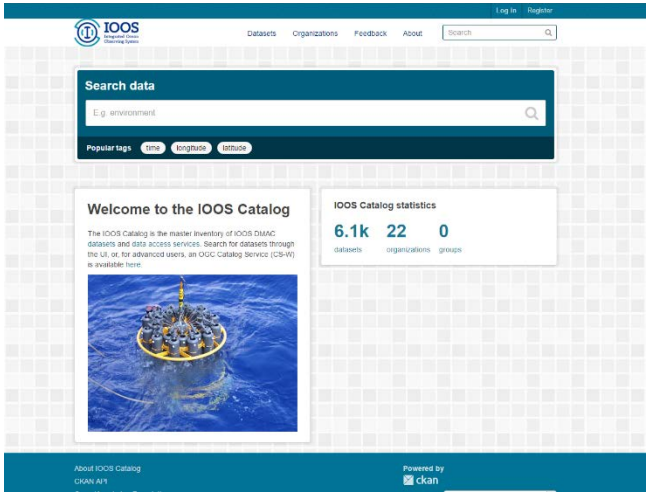
- Open Data Sharing – free, timely, metadata, machine readable
- Data management planning and coordination – resources, planning/data management plans, community
- Provision of data to the Global Telecommunication System (GTS) – route to operational forecasting centers
- Data access services – Catalog, OPeNDAP for gridded, WMS, SOS/OPeNDAP/THREDDS for point data, ERDDAP
- Catalog registration – metadata, attribution
- Common data formats – netCDF, CSV, points/polygons/GIS
- Metadata standards – ISO 19115, SensorML, Darwin core
- Storage and archiving – NCEI, DataONE
- Ontologies, vocabularies, common identifiers – in progress
- Considerations for Long-term Operations – long-term support

Discover and Access Data



Regional Portals: 11 RA portals integrate data at a local level and provide tailored products for stakeholders

Sensor Map: a 2 week cache of real-time observations from 108 providers



Catalog: Provides search capabilities across IOOS datasrouces

Blizzard 2016: CBOFS winds at 1/23 17:00 EST. Time-series of model output and buoy observations (1/20 - 1/23)

EDS: Visualize and access model hindcast/forecast information and compare to observations

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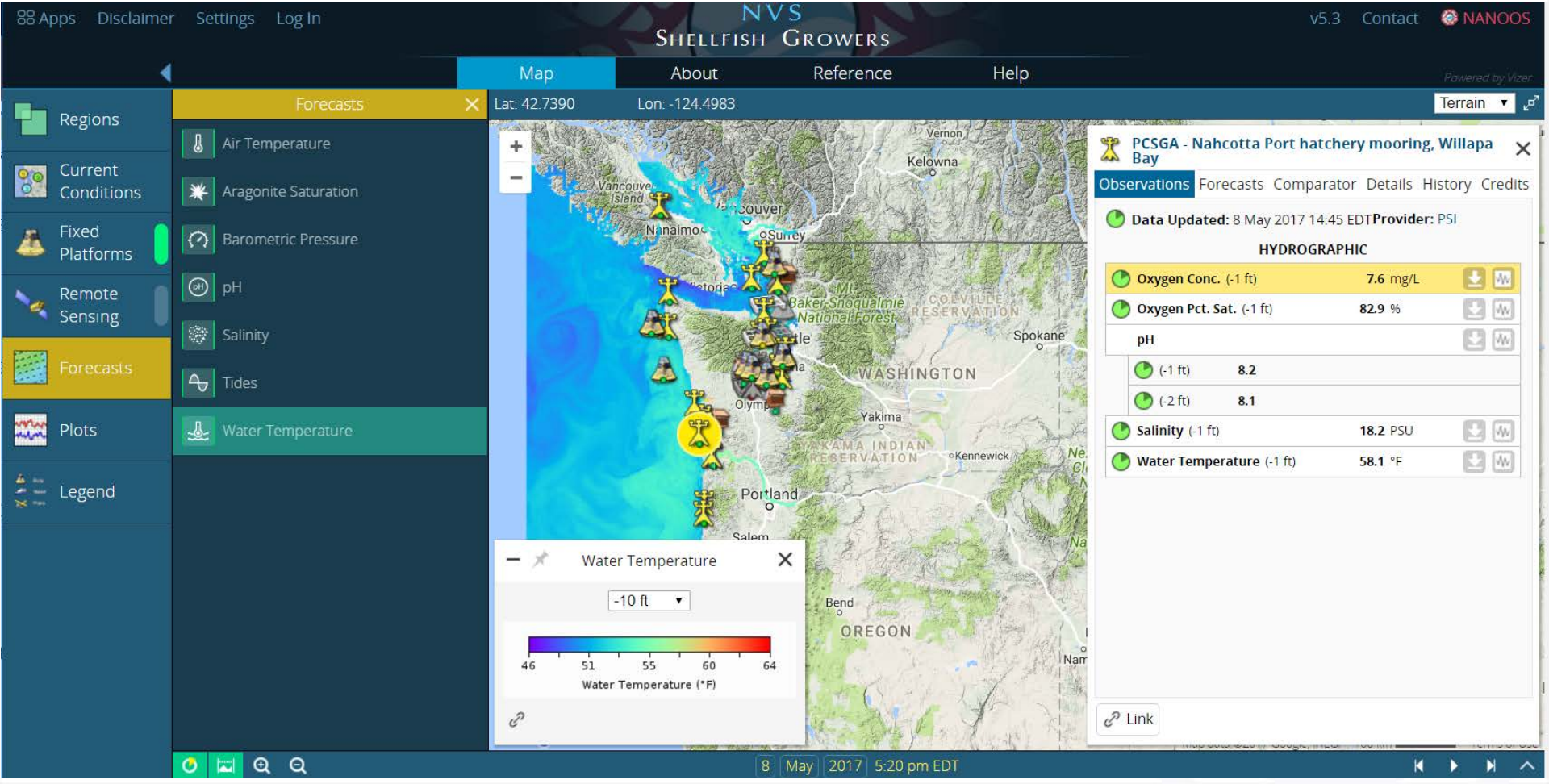
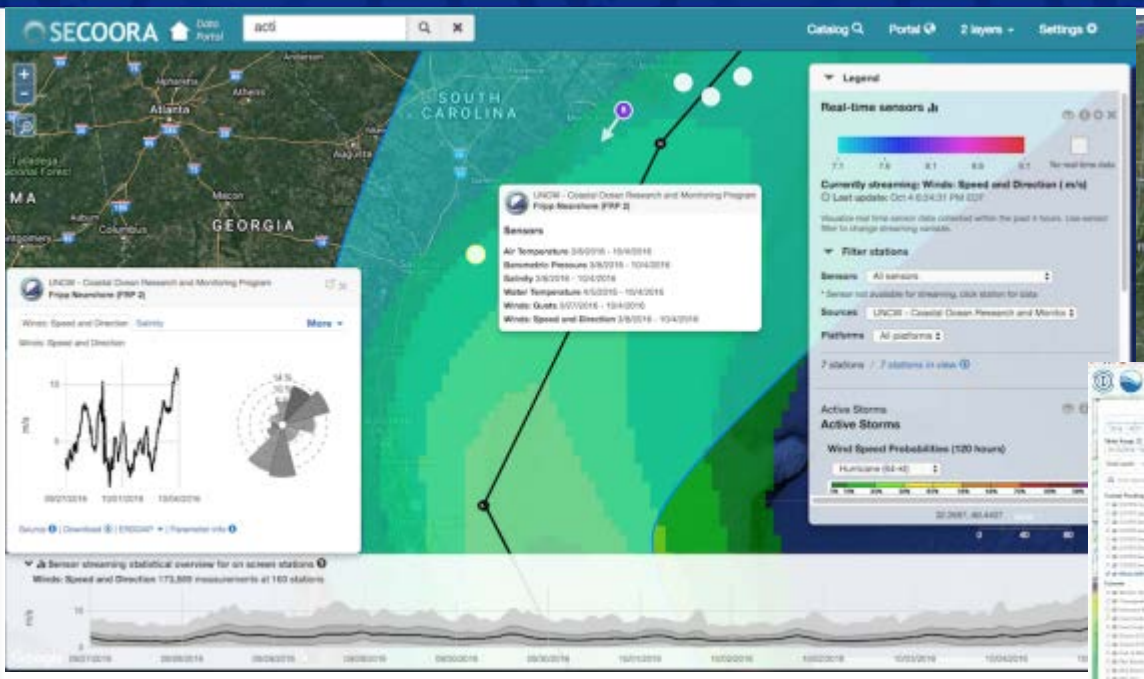
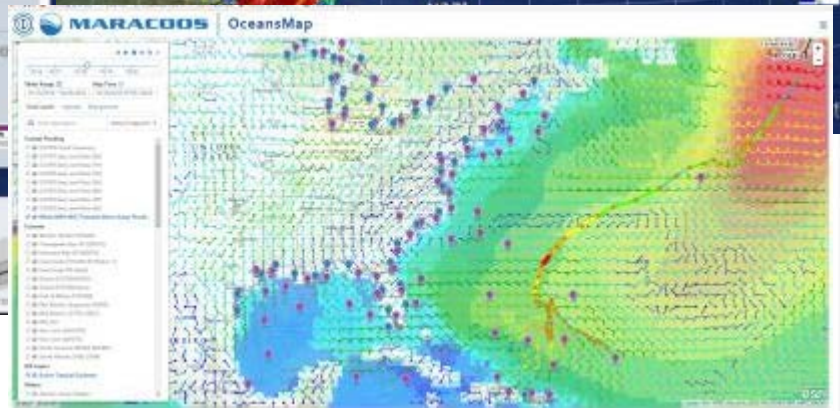
Integrating Data: nvs.nanoos.org/ShellfishGrowers

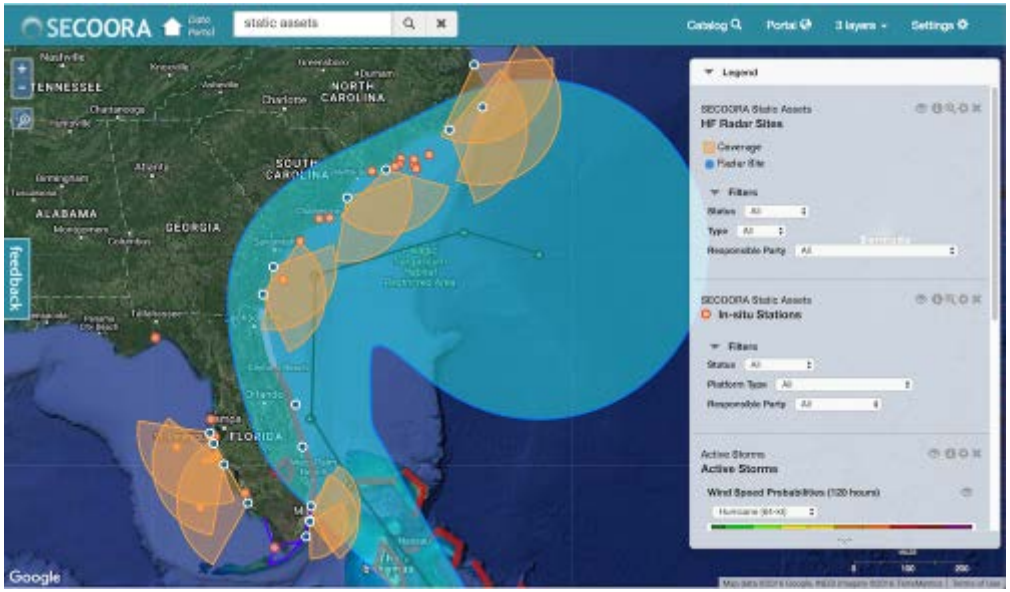
- Regional to National
- Standards based
- Custom portals
- Federal and non-Federal sources
- Data downloadable



Regional Association: Hurricane Response

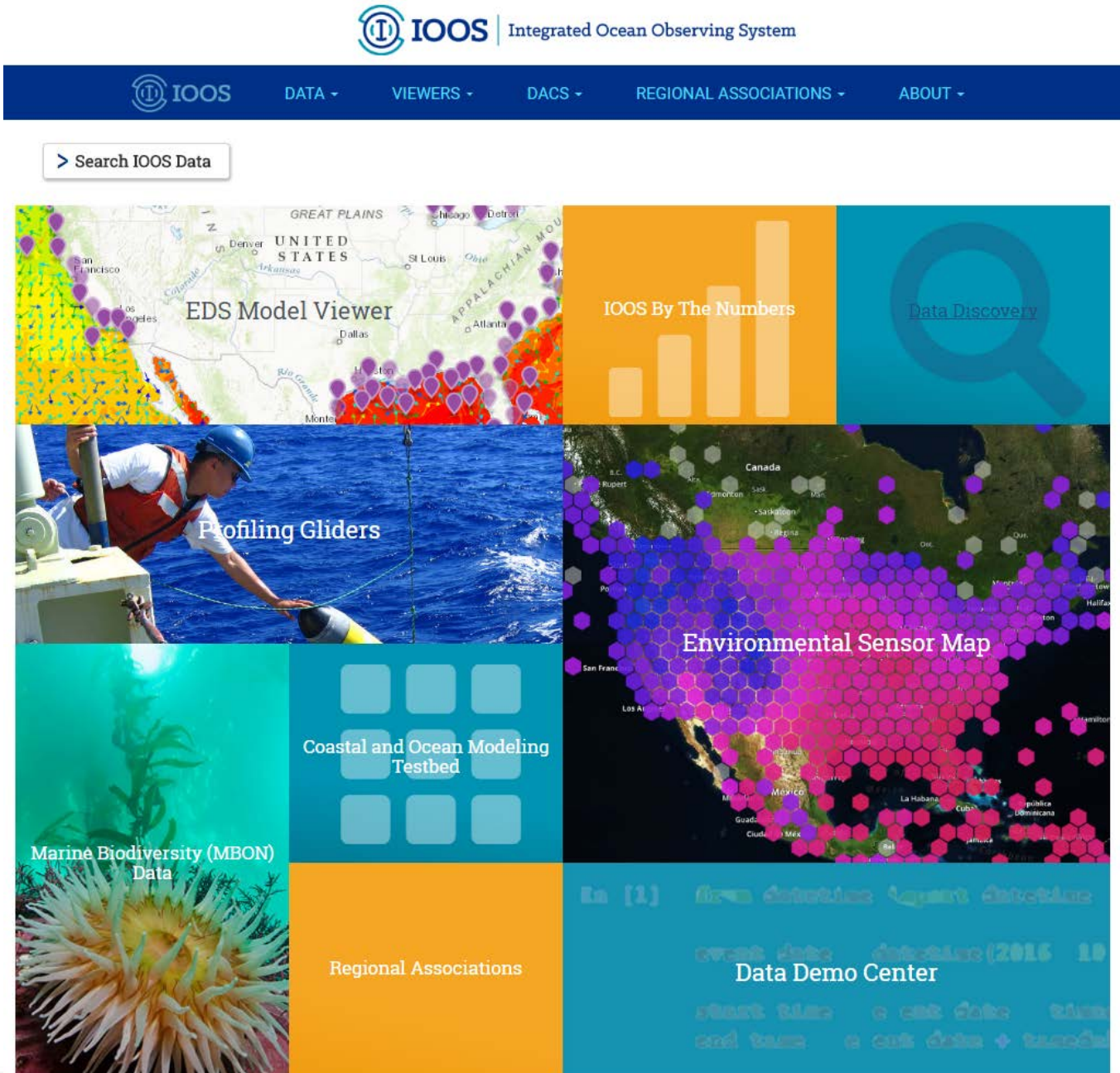






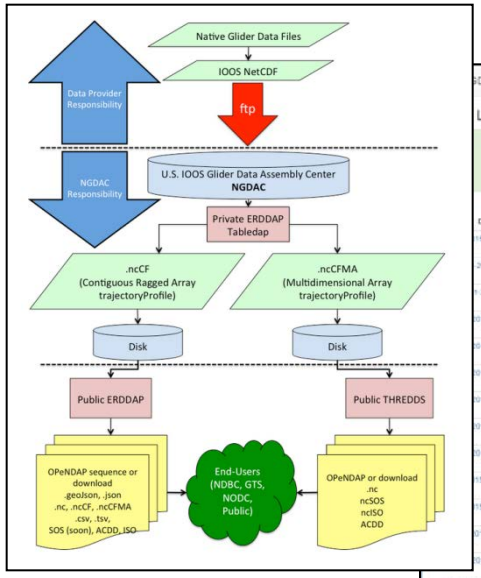
IOOS.US

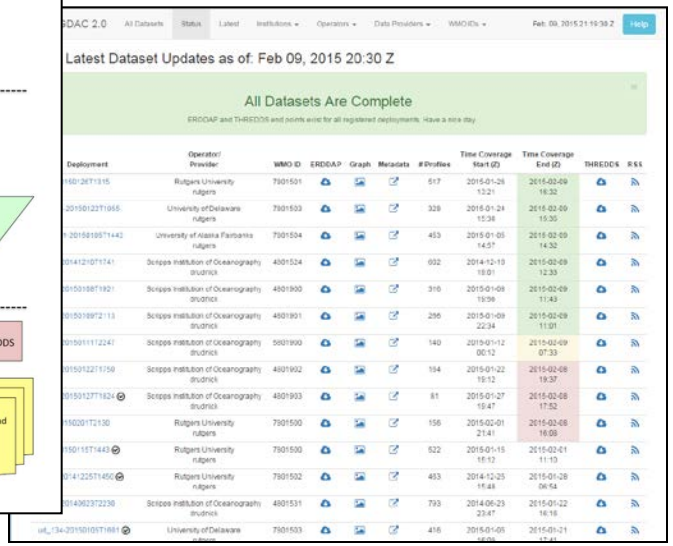
- **Data Discovery** via the Catalog
- **Serving observational data** via the Env. Sensor Map
- **Serving model data** via EDS Model Viewer
- **Standards** for data and metadata – netCDF, ISO 19115, etc.
- **Data services** – ERDDAP, SOS, THREDDS etc.
- **Web pages**
- **Infrastructure and tools** for common use

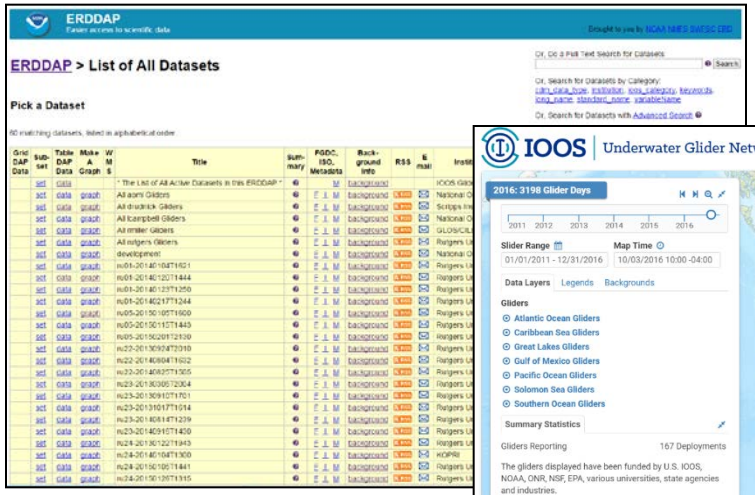


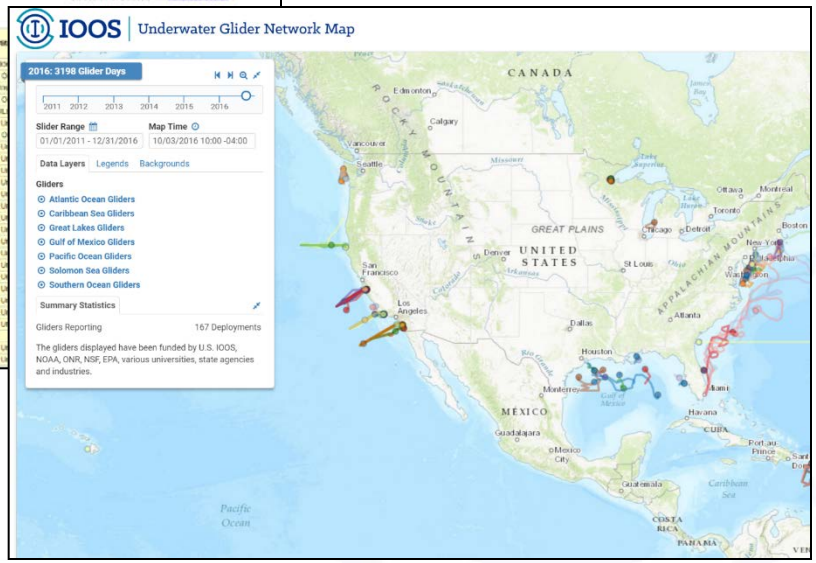
Glider Data Assembly Center (DAC)

- National standards to ease exchange of data from regional glider operators
- Real-time distribution to non-federal and federal partners (GTS)
- Archiving (NCEI)
- QC processing
- Share data







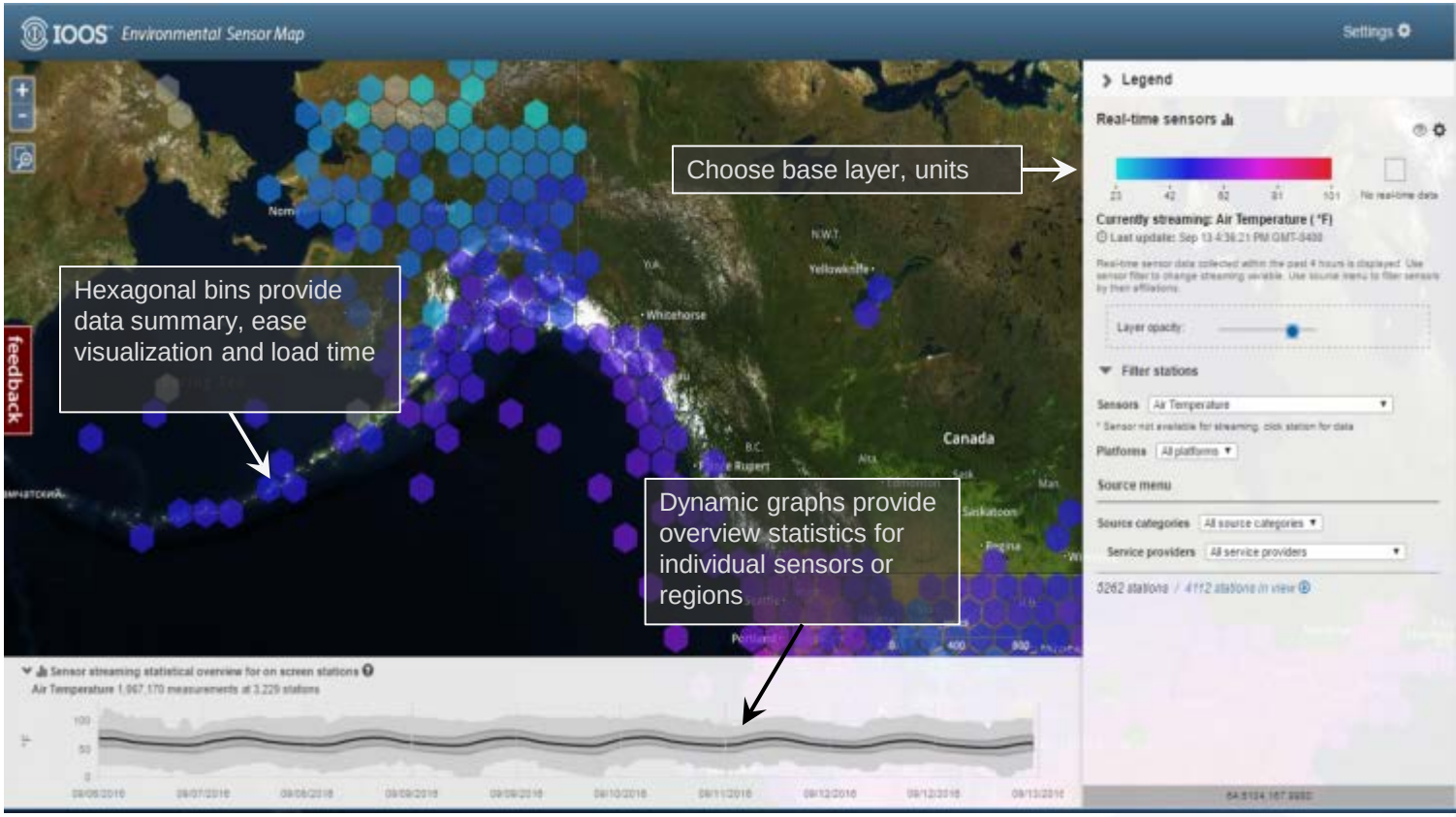


IOOS Glider Network Whitepaper: http://www.ioos.noaa.gov/glider/strategy/glider_network_whitepaper_final.pdf

Glider DAC: https://gliders.ioos.us/

Environmental Sensor Map

- Integrates regional, national, and global real-time data (past 4 hours) across the IOOS enterprise – federal and nonfederal sources. (~32,000 stations, 119,515 sensors)



2017

- Enhanced Visualizations
- New data sets (Argo, OceanSITES, Bio Geo Chem/OA)
- Brokered API access to underlying data

sensors.ioos.us

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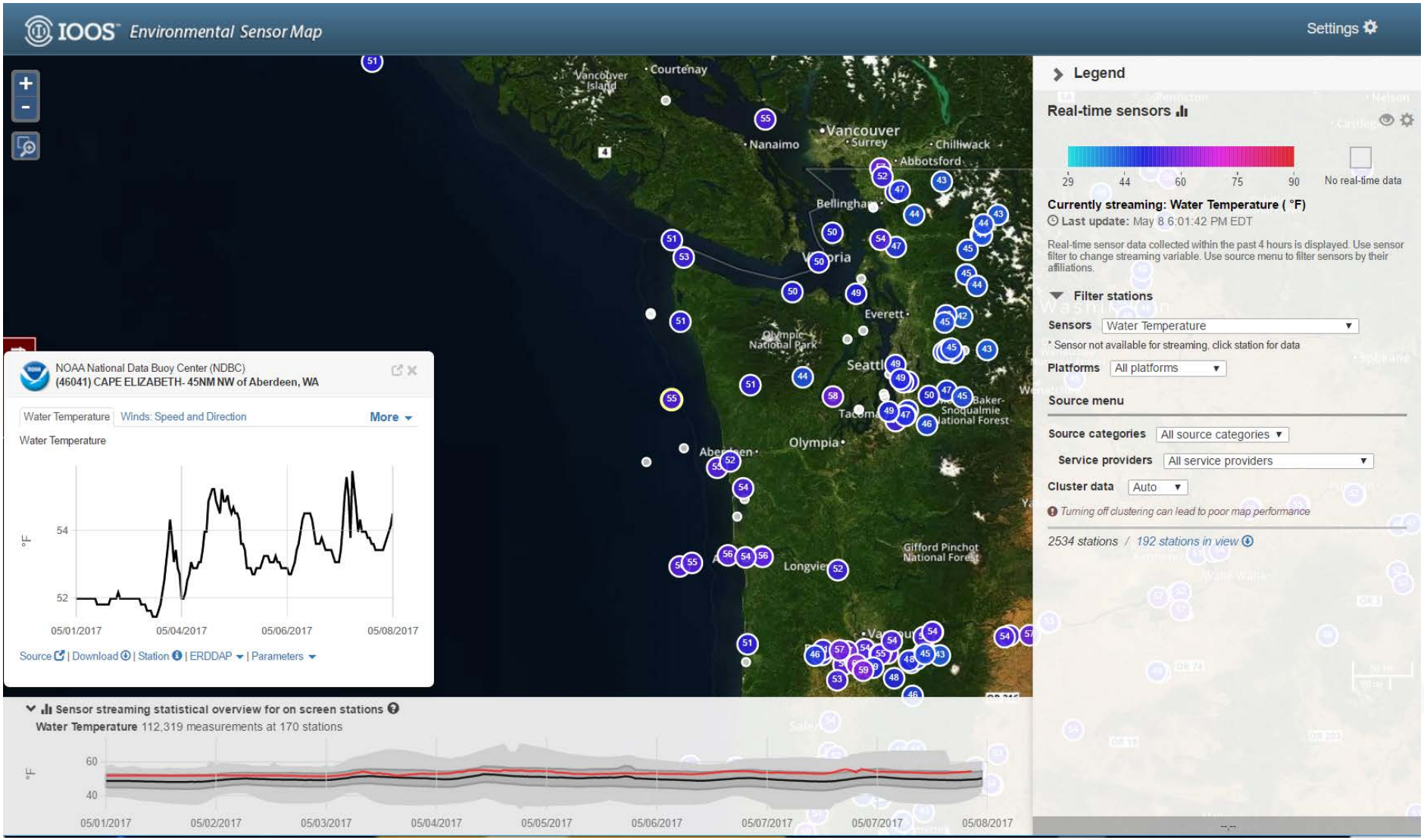
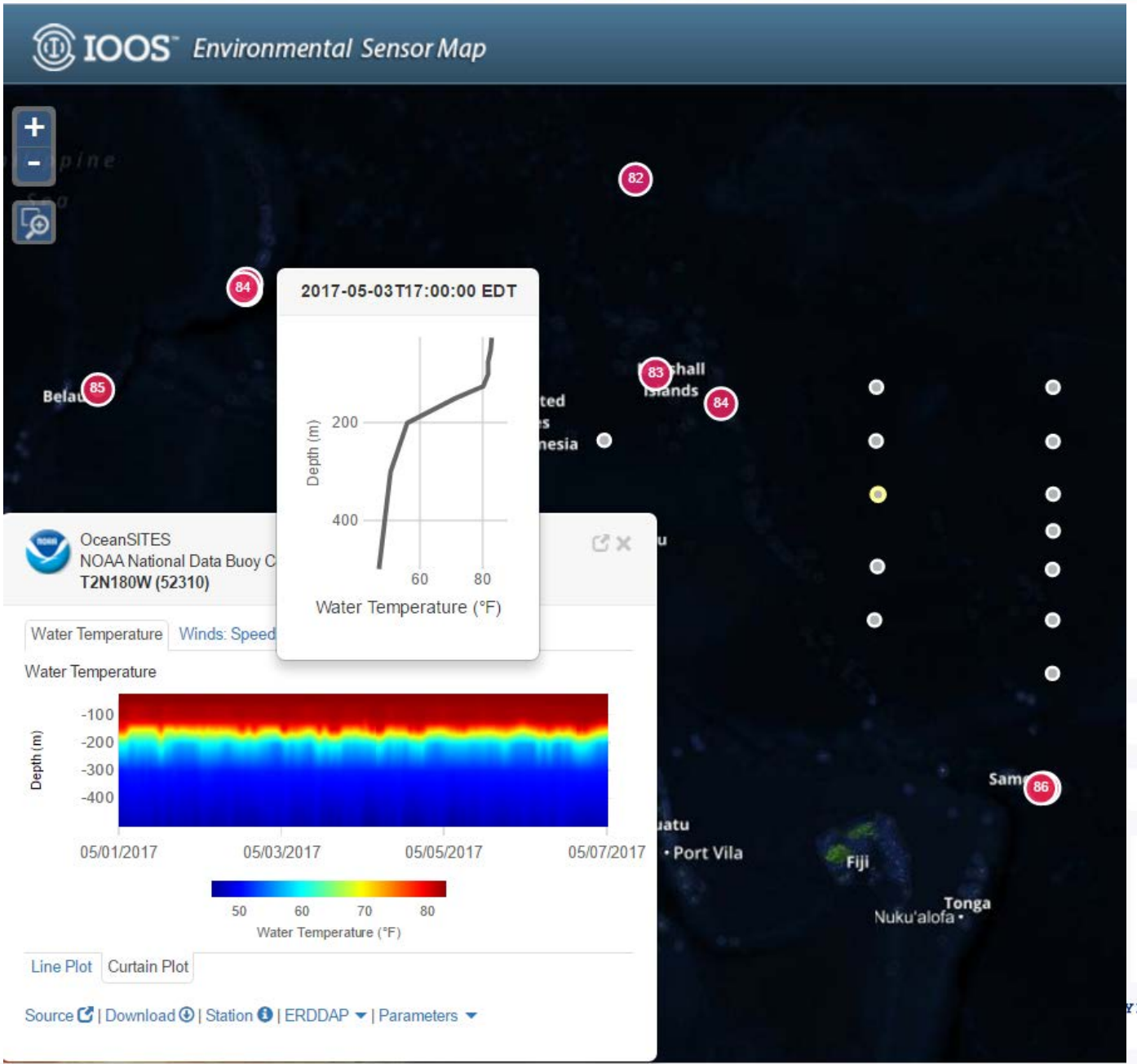
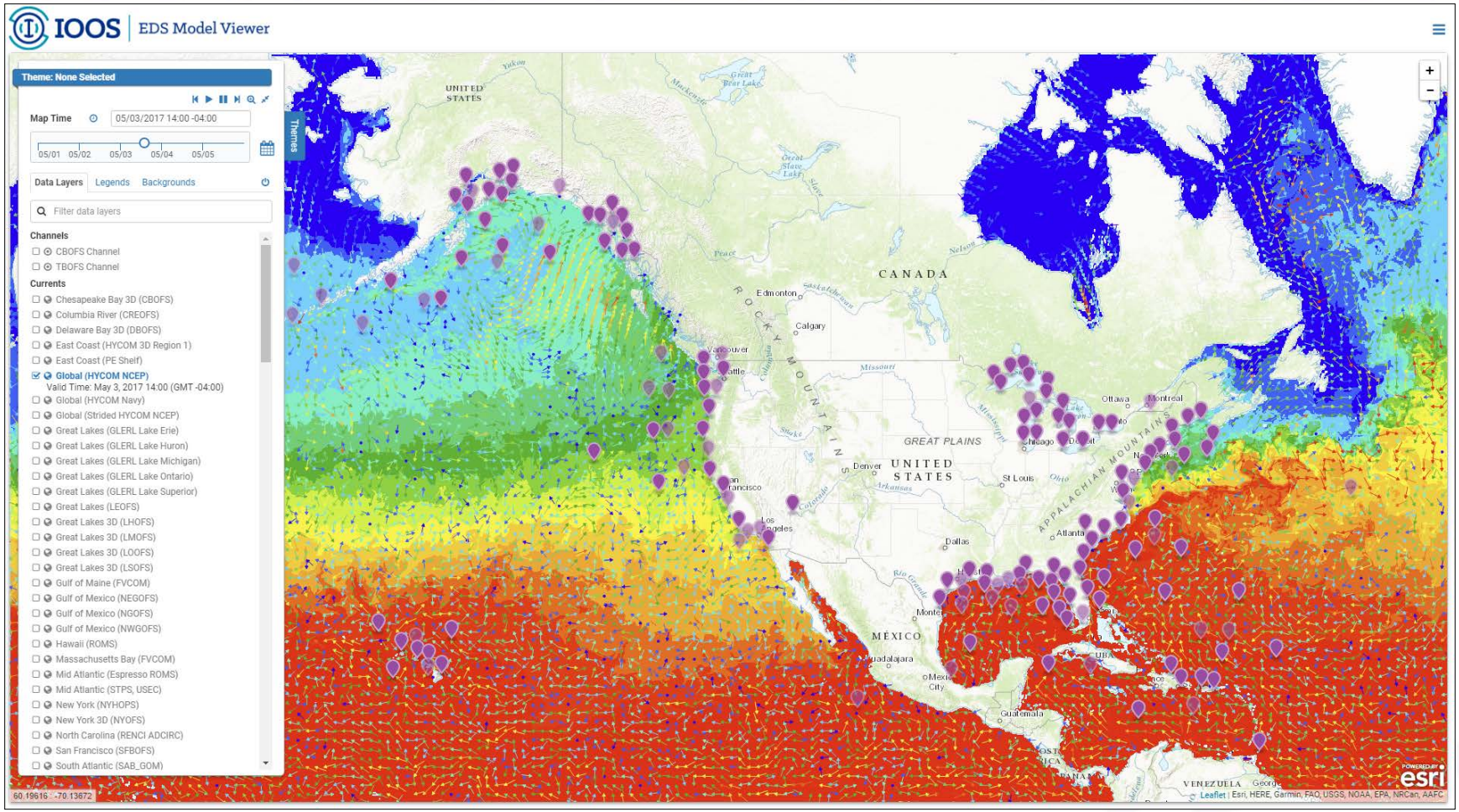
Buoy or station data



Mooring data



IOOS Model Viewer: eds.ioos.us



- View and analyze model output and supplemental observations.
- Modeled currents, water temperature, salinity, water level, winds, waves
- Observed data: NDBC, CDIP buoys; CO-OPS water level and NERRS water quality stations, High Frequency Radar surface currents stations
- Aggregates data spatially and temporally
- **Data access: THREDDS server**

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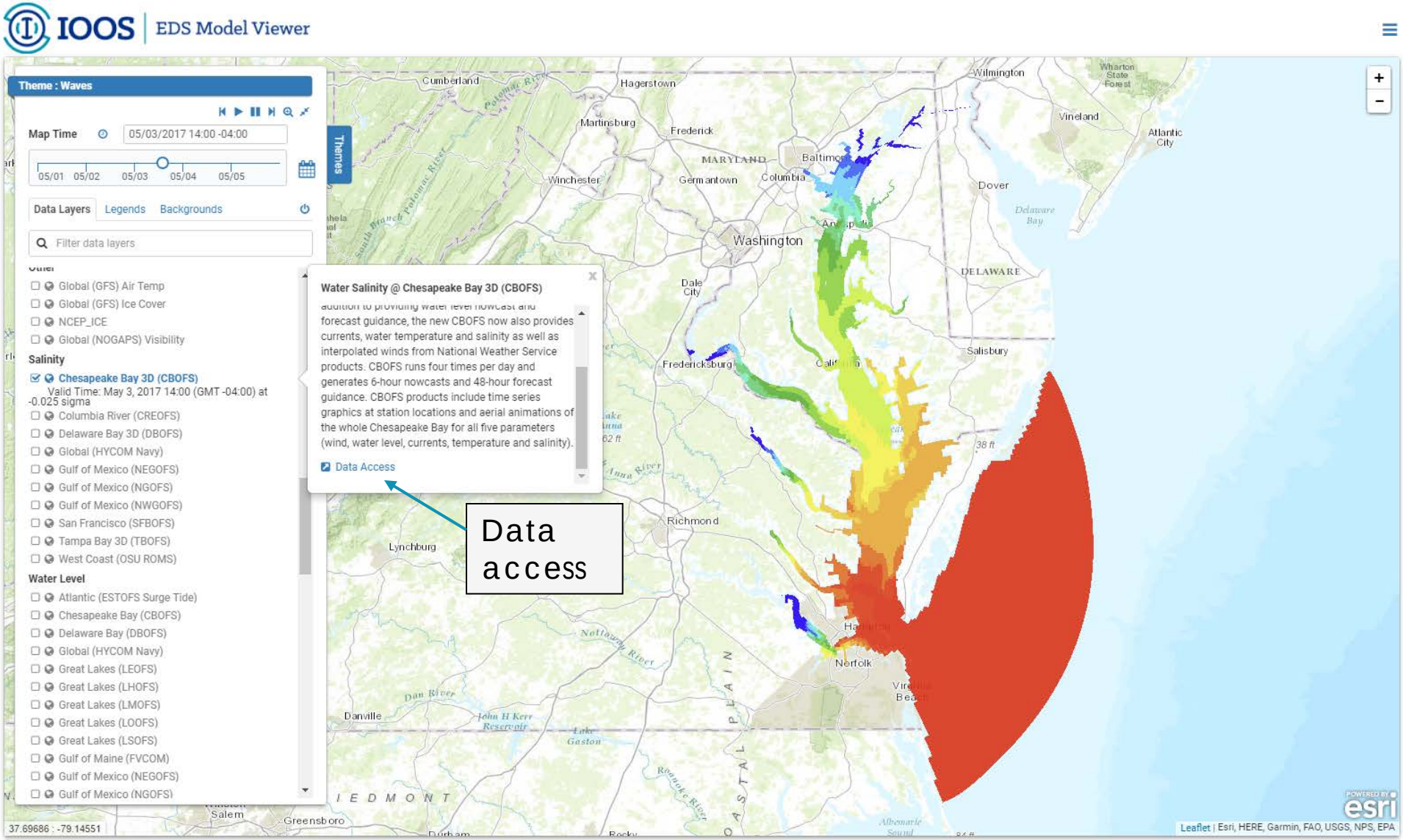
(i) (Information) icon



Data access: THREDDS

Catalog http://data.oceansmap.com/thredds/catalog/EDS/NOS_CBOFS_3D/catalog.html

Dataset	Size	Last Modified
NOS_CBOFS_3D		--
nos_cbofs_3d2017050500.nc	71.00 Mbytes	2017-05-03T16:21:10Z
nos_cbofs_3d2017050423.nc	71.00 Mbytes	2017-05-03T16:20:31Z
nos_cbofs_3d2017050422.nc	71.00 Mbytes	2017-05-03T16:19:45Z
nos_cbofs_3d2017050421.nc	71.00 Mbytes	2017-05-03T16:19:03Z
nos_cbofs_3d2017050420.nc	71.00 Mbytes	2017-05-03T16:18:17Z
nos_cbofs_3d2017050419.nc		2017-05-03T16:17:27Z
nos_cbofs_3d2017050418.nc		2017-05-03T16:16:50Z
nos_cbofs_3d2017050417.nc		2017-05-03T16:16:11Z
nos_cbofs_3d2017050416.nc		2017-05-03T16:15:32Z
nos_cbofs_3d2017050415.nc		2017-05-03T16:14:45Z
nos_cbofs_3d2017050414.nc		2017-05-03T16:14:11Z
nos_cbofs_3d2017050413.nc		2017-05-03T16:13:32Z
nos_cbofs_3d2017050412.nc		2017-05-03T16:12:56Z
nos_cbofs_3d2017050411.nc		2017-05-03T16:12:21Z
nos_cbofs_3d2017050410.nc		2017-05-03T16:11:45Z
nos_cbofs_3d2017050409.nc		2017-05-03T16:11:13Z
nos_cbofs_3d2017050408.nc		2017-05-03T16:10:33Z
nos_cbofs_3d2017050407.nc		2017-05-03T16:09:49Z
nos_cbofs_3d2017050406.nc		2017-05-03T16:08:56Z
nos_cbofs_3d2017050405.nc	71.00 Mbytes	2017-05-03T16:08:12Z
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nos_cbofs_3d2017050322.nc	71.00 Mbytes	2017-05-03T16:03:17Z
nos_cbofs_3d2017050321.nc	71.00 Mbytes	2017-05-03T16:02:43Z

Initial TDS Installation

THREDDS Data Server

Catalog http://data.oceansmap.com/thredds/catalog/EDS/NOS_CBOFS_3D/catalog.html

Dataset: NOS_CBOFS_3D/nos_cbofs_3d2017050500.nc

- *Data size:* 71.00 Mbytes
- *ID:* EDS/NOS_CBOFS_3D/nos_cbofs_3d2017050500.nc

Access:

1. **OPENDAP:** /thredds/dodsC/EDS/NOS_CBOFS_3D/nos_cbofs_3d2017050500.nc
2. **ISO:** /thredds/iso/EDS/NOS_CBOFS_3D/nos_cbofs_3d2017050500.nc

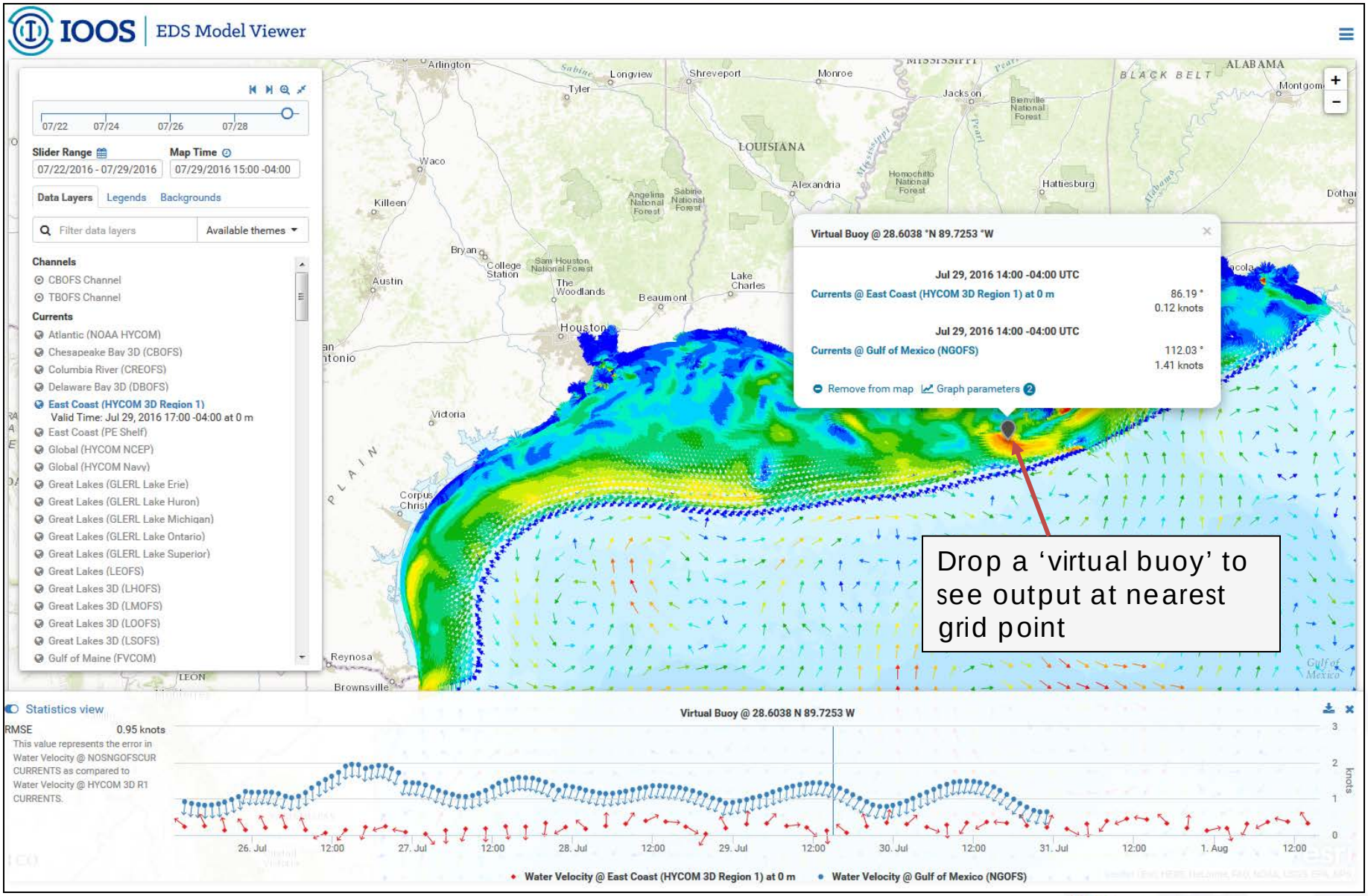
Dates:

- 2017-05-03T16:21:10Z **(modified)**

Viewers:

- NetCDF-Java ToolsUI (webstart)

Model vs Model: surface currents



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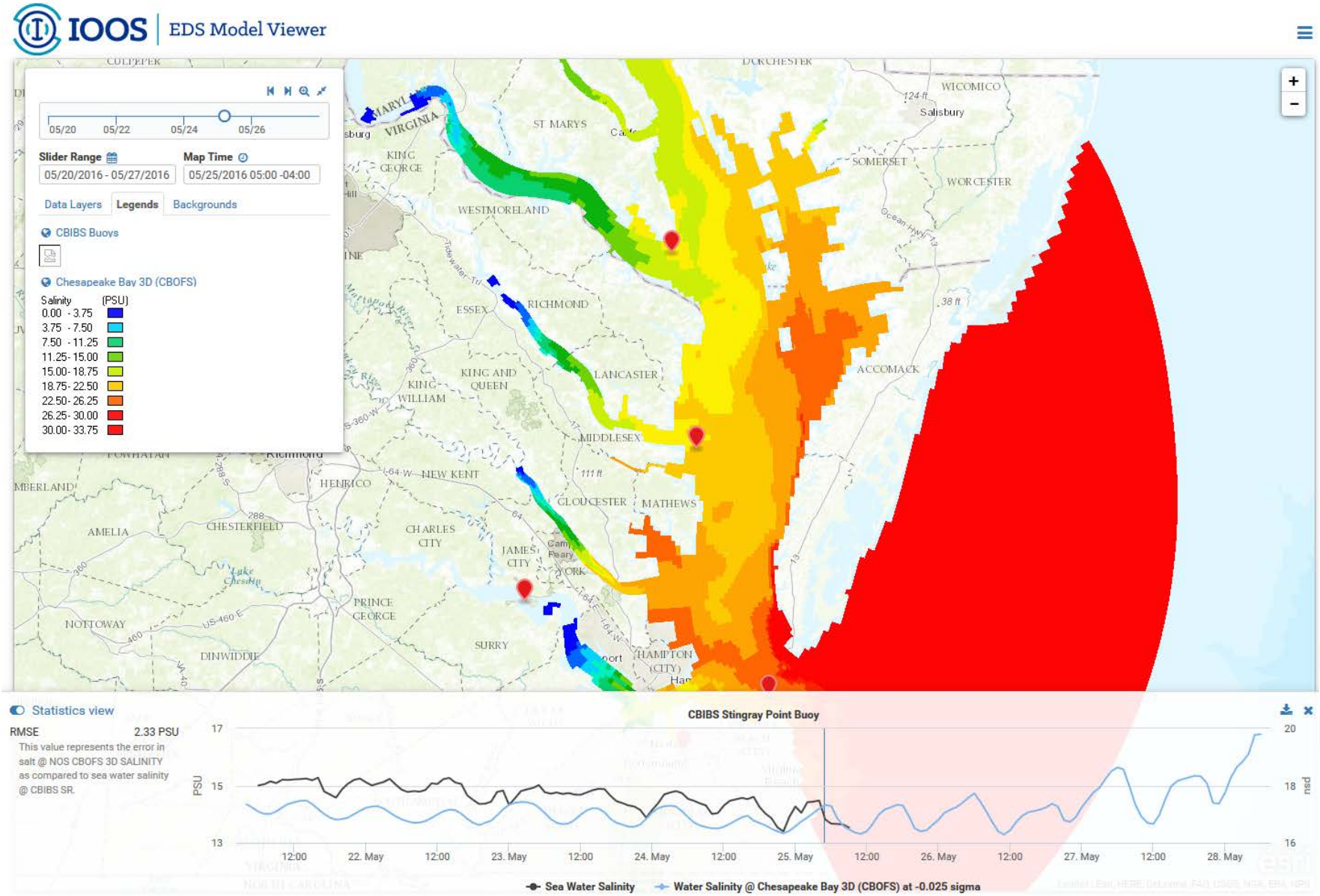
Model vs Obs: Salinity



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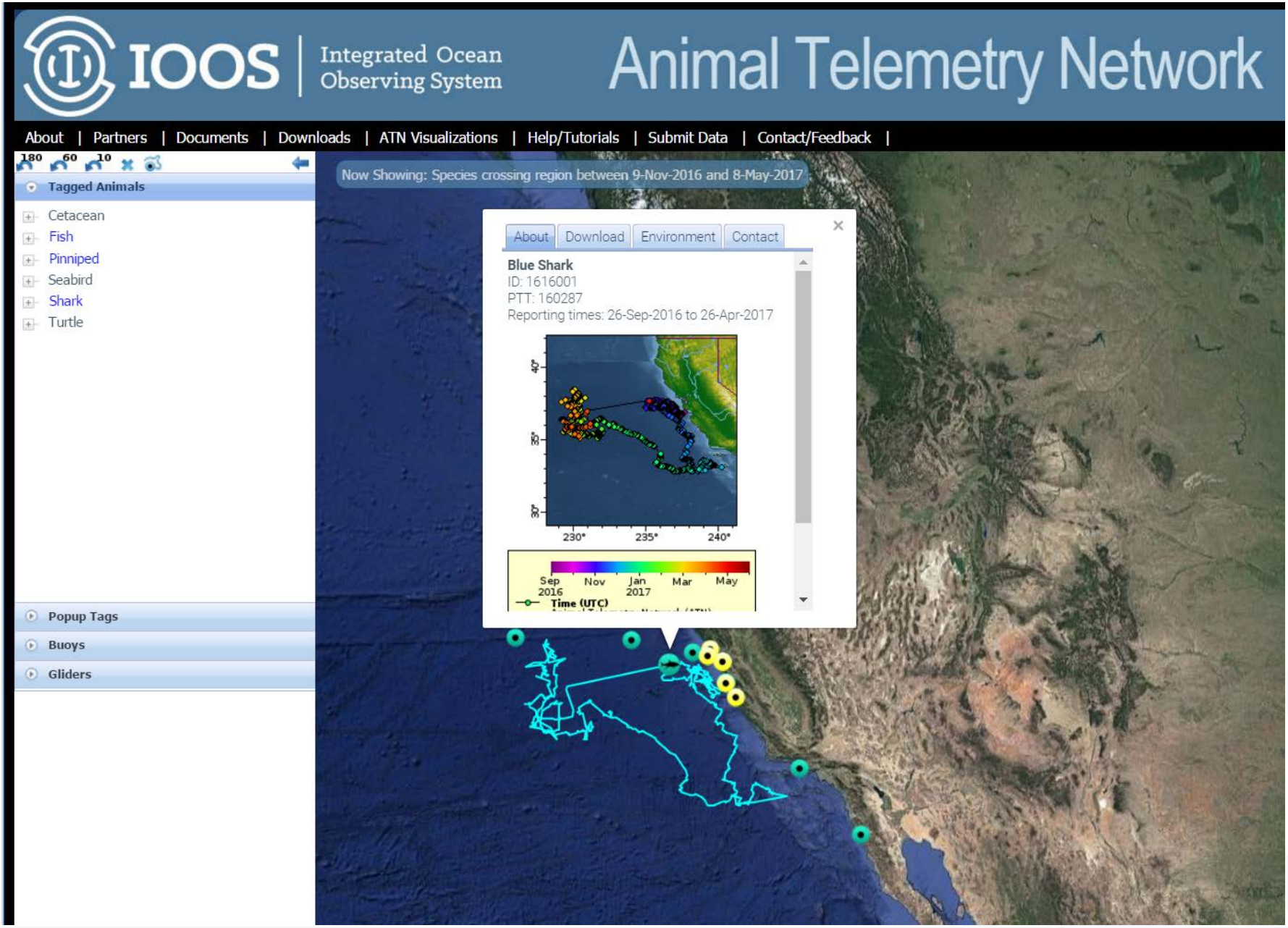
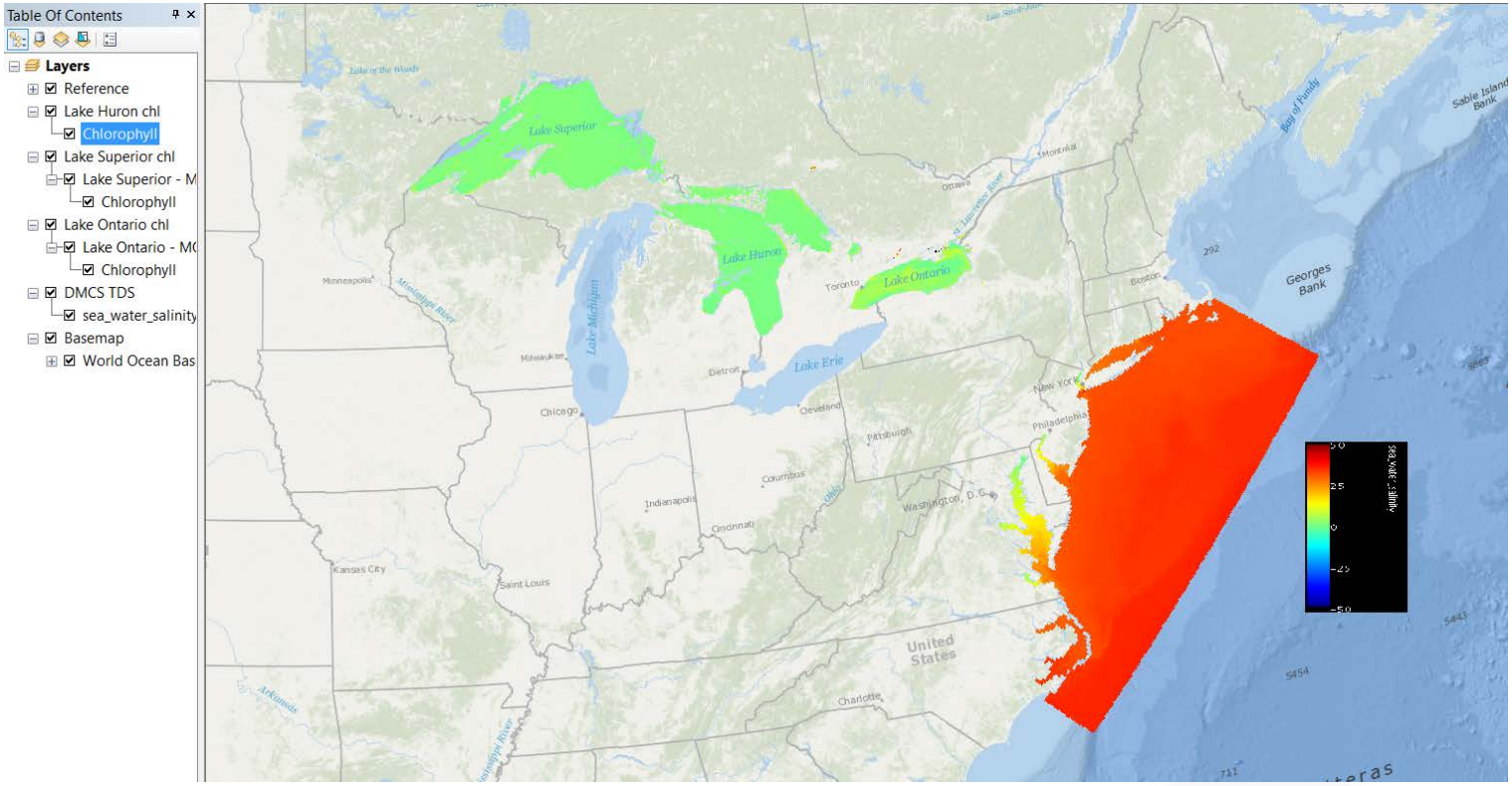
Mobile platform – instrumented animals



https://data.ioos.us/dataset?res_format=WMS

IOOS data in ArcGIS via services

IOOS data via
- THREDDS
- WMS
- WCS
- ERDDAP
- Sensor Observation Service (SOS)



- Environmental Data Connector - data served by OPeNDAP, THREDDS, ERDDAP, IOOS SOS and also local files. http://coastwatch.pfel.noaa.gov/EDC/index.html
- IOOS Catalog – https://data.ioos.us/dataset?res_format=WMS

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Questions?

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