Tides and Currents - Station Observations and Predictions
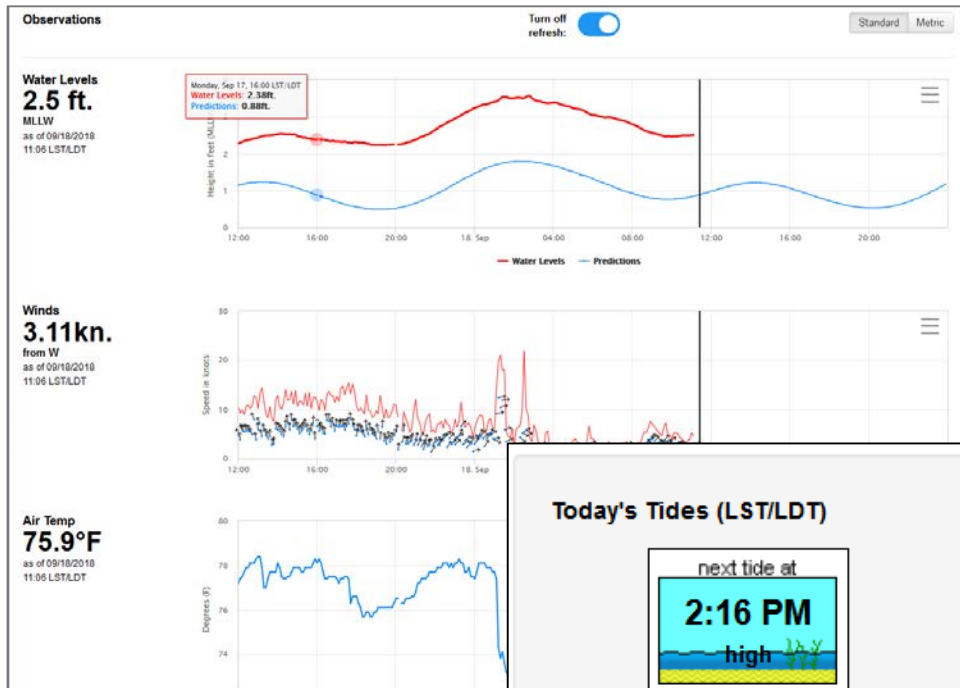
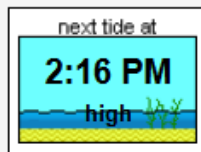https://tidesandcurrents.noaa.gov/

October 4, 2018

Armin Pruessner and Paul Bradley
NOAA/NOS/CO-OPS

What Data Are Your Users Interested In?

Current Predictions

Real-Time Observations

Tide Predictions

Operational Forecast/Model Data

NOAA's CENTER for OPERATIONAL OCEANOGRAPHIC PRODUCTS and SERVICES

Different Users and Product Needs

Navigation

Possible Focus:
Plots and Data for Specific Product

Recreation

Possible Focus:
Integrated App with all Data

Commercial Software

Possible Focus:
Data via APIs

Many other users with varying requirements

Center for Operational Oceanographic Products and Services (CO-OPS)
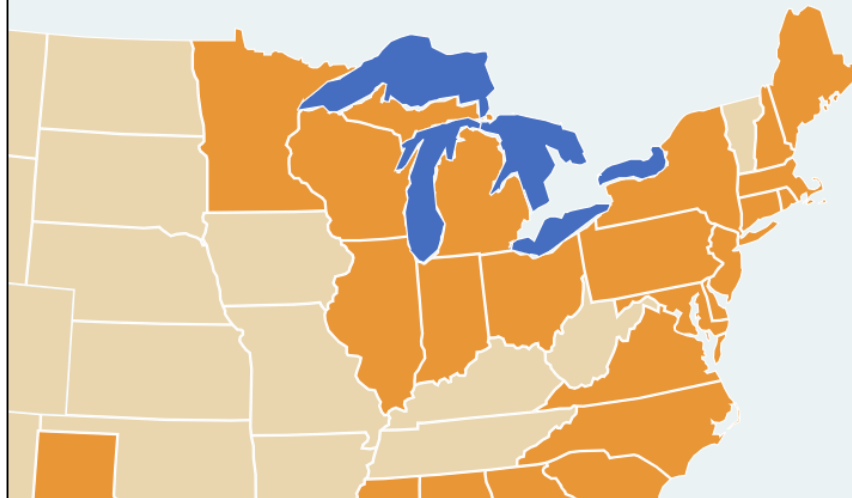
https://tidesandcurrents.noaa.gov/

CO-OPS is the authoritative source for

- accurate, reliable, and timely water-level and current measurements

We support:

- safe and efficient maritime commerce
- sound coastal management
- recreation

CO-OPS Data Statistics
https://tidesandcurrents.noaa.gov/

Data at Thousands of Locations

Real-time and Historic Data Along US Coasts and Great Lakes

Water Levels (6min)	> 300 Stations
Water Levels (1min)	> 200 Stations
Currents (Water Velocity)	> 60 Stations
Meteorological	> 300 Stations

Tide and Tidal Current Predictions:

Tide Predictions	3,200 Stations
Current Predictions	4,000 Stations

Data API: 10 million requests / day

☆	🌐	dataretrieval	115 req/s
☆	🌐	mdapi-0.6	67.1 req/s
☆	🌐	ioos-dif-sos	8.6 req/s
☆	🌐	axis	7.6 req/s
☆	🌐	thredds	6.6 req/s

Total Requests ▾ 363k total (101 req/s)

Hits   Errors
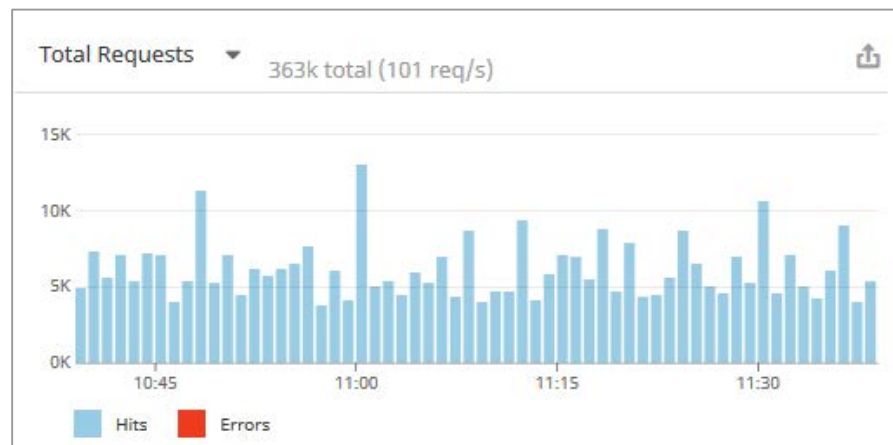
Data and Plotting (Water Levels)
https://tidesandcurrents.noaa.gov/

Data and Plotting (Met.)
https://tidesandcurrents.noaa.gov/

NOAA/NOS/CO-OPS
Winds at 8574680, Baltimore, Fort McHenry, Patapsco River MD
From 2018/09/17 00:00 GMT to 2018/09/18 23:59 GMT

· **Winds** — **Gusts**

NOAA/NOS/Center for Operational Oceanographic Products and Services

NOAA/NOS/CO-OPS
Air Temperature at 8574680, Baltimore, Fort McHenry, Patapsco River MD
From 2018/09/17 00:00 GMT to 2018/09/18 23:59 GMT

NOAA/NOS/Center for Operational Oceanographic Products and Services

Date	Time (GMT)	Wind Speed (kn)	Wind Dir (deg)	Wind Gust (kn)	Air Temp (°F)	Baro (mb)	Humidity (%)
2018/09/20	00:00	5.25	27	6.22	80.6	1014.5	-
2018/09/20	00:06	5.44	23	6.41	80.4	1014.5	-
2018/09/20	00:12	4.28	23	6.41	80.4	1014.7	-
2018/09/20	00:18	3.89	31	5.05	80.2	1014.8	-
2018/09/20	00:24	4.86	43	5.44	80.1	1014.9	-
2018/09/20	00:30	5.25	42	6.61	80.2	1014.9	-

NOAA's CENTER for OPERATIONAL OCEANOGRAPHIC PRODUCTS and SERVICES

Historical Data Inventory

https://tidesandcurrents.noaa.gov/

Data Inventory for 8574680 Baltimore, Fort McHenry

Verified hourly heights water level data from July 1, 1902

CO-OPS Data Portal / APIs

Home / Products / Web Services

🖥 Web Services

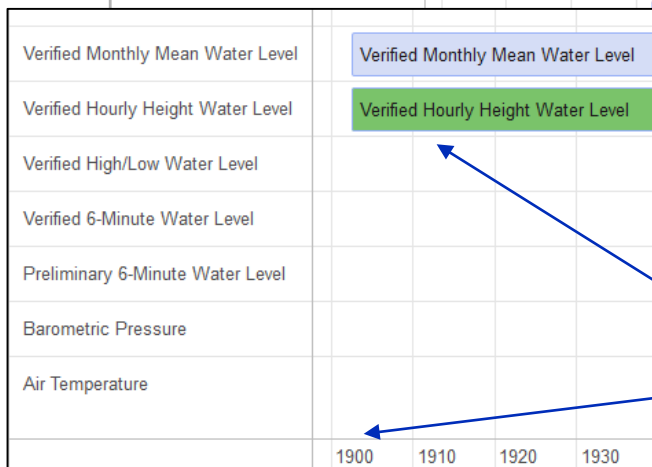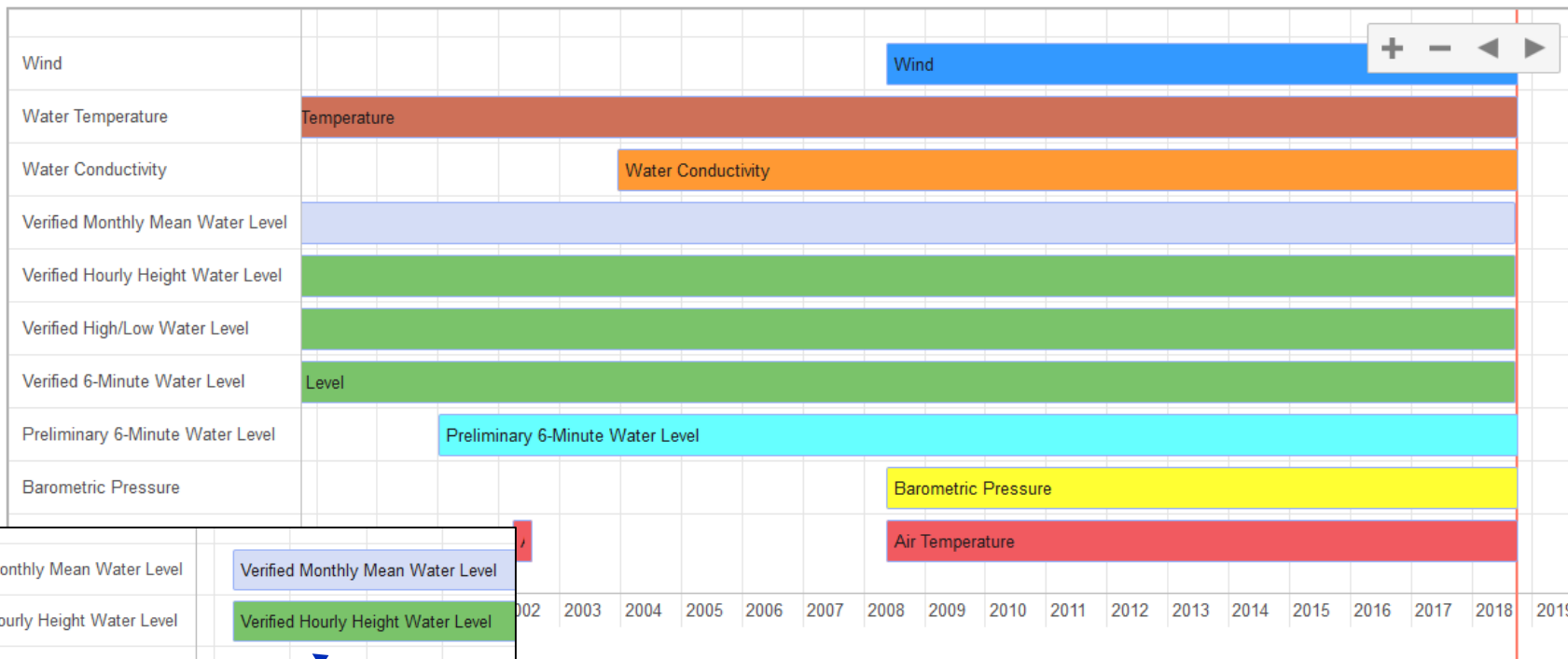We provide our data to customers who want to use it in their own applications. These services enable manual or automated machine-to-machine data, model, and product retrievals. Data can be downloaded in multiple formats, such as CSV, XML, KML, NetCDF, JSON, TXT, and DODS.

To prevent numerous large data requests slowing data access through the internet services; all internet data services have limits on the amount of data which can be retrieved per request. These limits are based on the interval of data requested.

- 6-Minute Interval data is limited to 30 days of data
- Hourly Interval data is limited to 1 year of data
- High/Low data is limited to 1 year of data
- Monthly Means data is limited to 200 years

CO-OPS Data API - The CO-OPS Application Programming Interface (API) for data retrieval can be observations and predictions from CO-OPS stations.

SOAP Web Services - CO-OPS SOAP Web Services were developed using industry standards. Ea service is offered with a sample request, sample response and sample Java Client code to our user work with seamlessly connecting to the services and to retrieve the data of interest.

ERDDAP (Environmental Research Division's Data Access Program) - A data server that gives you way to download subsets of scientific datasets in common file formats and make graphs and maps provides Data Access Forms (web pages) which help users create the OPeNDAP (Open-source Pr Data Access Protocol) compliant requests.

CO-OPS Sensor Observational Service (SOS) - Provides data retrieval of the latest observations an single station and for a "collection" of stations, and in multiple data formats. Historical data also ava

THREDDS (Thematic Real-time Environmental Distributed Data Services) - The THREDDS server al access data sets of interest in ASCII and Binary formats through the OPeNDAP protocol. The user can view and download NetCDF model data or sub-samples of it.

Stations Listing - A web application to retrieve a list of active National Water Level Observation Netv stations. Each station provides station metadata and sensors real-time status and configuration. Th is also available as an XML format on a station by station basis or as a whole network of stations. F lists of active tidal current stations, meteorological/physical oceanographic stations, active water lev harmonic stations, and datums stations are available as part of the SOAP and SOS web services.

GIS Data Portal - Provides public access to CO-OPS stations and derived data products in the form of GIS services, including public ArcGIS Server REST Services.

Multiple APIs to retrieve data:

- Real-time latest data
- Data products (predictions, etc.)
- Historical data (date/time ranges)
- Various formats (CSV, XML, JSON, etc.)
- Metadata (location, data available).
- Data updates automatically
- Easily integrate in applications

Data Retrieval API (Water Levels)

https://tidesandcurrents.noaa.gov/api/

Web Services   x

The following web service calls were used in the retrieval of CO-OPS' data for this page:

Datums: /mdapi/latest/webapi/stations/8573364   `XML` `JSON` `CSV`
/datums.json&units=english&format=json

Water Levels: /api/datagetter?product=water_level&   `XML` `JSON` `CSV`
application=NOS.COOPS.TAC.WL&begin_date=20170926&
end_date=20170927&datum=MLLW&station=8573364&
time_zone=GMT&units=english&format=json

Tide Predictions: /api/datagetter?product=predictions&   `XML` `JSON` `CSV`
application=NOS.COOPS.TAC.WL&begin_date=20170926&
end_date=20170927&datum=MLLW&station=8573364&
time_zone=GMT&units=english&interval=&format=json

All data is served via the CO-OPS Data API.

Options for
8573364 Tolchester Beach, MD ▼

Units
Feet ▼

From:
Sep ▼   26 ▼   2017

Timezone
GMT ▼

To:
Sep ▼   27 ▼   2017

Datum ❓
MLLW ▼

📋 Hide Data Listing

Data Listing

📋 Web Services   ⬇ Export to CSV   ⤢

Date	Time (GMT)	Predicted (ft)	Preliminary (ft)	Verified (ft)
2017/09/26	00:00	1.151	1.768	-
2017/09/26	00:06	1.183	1.788	-
2017/09/26	00:12	1.215	1.827	-
2017/09/26	00:18	1.247	1.88	-
2017/09/26	00:24	1.28	1.919	-
2017/09/26	00:30	1.312	1.949	-
2017/09/26	00:36	1.345	1.975	-
2017/09/26	00:42	1.377	2.018	-
2017/09/26	00:48	1.409	2.044	-
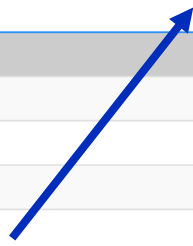
Retrieve Station Locations

Stations and Their Sensors Listing
Click on the green spheres to retrieve today's data

View stations information as **XML** Legend : ● = Sensor disseminating data ● = Sensor stopped by CORMS

Station Names and IDs	Water Level	Water Temp	Air Temp	Air Pressure	Winds	Conductivity	Humidity	Air Gap	Visibility
Nawiliwili 1611400	●	●	●	●	●				
Honolulu 1612340	●	●	●	●					
Mokuoloe 1612480	●	●	●	●					
Kahului, Kahului Harbor 1615680	●	●	●	●					
Kawaihae 1617433	●	●	●	●					
Hilo, Hilo Bay, Kuhio Bay 1617760	●	●	●	●					
Sand Island, Midway Islands 1619910	●	●	●	●					

```
<stations xsi:schemaLocation="https://opendap.co-ops.nos.noaa.gov/stations/xml_
  <station name="Nawiliwili" ID="1611400">
    <metadata>
      <location>
        <lat>21.9544</lat>
        <long>-159.3561</long>
        <state>HI</state>
      </location>
      <date_established>1954-11-24</date_established>
    </metadata>
    <parameter name="Water Level" sensorID="A1" DCP="1" status="1"/>
    <parameter name="Winds" sensorID="C1" DCP="3" status="1"/>
    <parameter name="Air Temp" sensorID="D1" DCP="3" status="1"/>
    <parameter name="Water Temp" sensorID="E1" DCP="1" status="1"/>
    <parameter name="Air Pressure" sensorID="F1" DCP="3" status="1"/>
  </station>
  <station name="Honolulu" ID="1612340">
    <metadata>
      <location>
        <lat>21.3067</lat>
        <long>-157.867</long>
```

NOAA's CENTER for OPERATIONAL OCEANOGRAPHIC PRODUCTS and SERVICES

CO-OPS Operational Forecast Data
(THREDDS Server)
https://opendap.co-ops.nos.noaa.gov/thredds/catalog.html

Access to Operational Forecast System

CO-OPS makes available a THREDDS data server, open-source application software from Unidata, to serve CO-OPS NetCDF model data. The THREDDS server allows users to access data sets of interest in ASCII and Binary formats through OPeNDAP. The users of this application can view and download NetCDF model data or sub-samples of it. Please visit CO-OPS THREDDS server home page for more information.

Catalog http://opendap.co-op

Dataset

📁 NOAA CBOFS NetCDF Files Catalog/

📁 NOAA CBOFS_DEV NetCDF Files Catalog/

📁 NOAA CREOFS NetCDF Files Catalog/

📁 NOAA DBOFS NetCDF Files Catalog/

📁 NOAA LEOFS NetCDF Files Catalog/

📁 NOAA LEOFS.v1 NetCDF Files Catalog/

📁 NOAA LHOFS NetCDF Files Catalog/

📁 NOAA LMOFS NetCDF Files Catalog/

📁 NOAA LOOFS NetCDF Files Catalog/

📁 NOAA LSOFS NetCDF Files Catalog/

📁 NOAA NEGOFS NetCDF Files Catalog/

📁 NOAA NGOFS NetCDF Files Catalog/

📁 NOAA NWGOFS NetCDF Files Catalog/

Download model data:

- Access to all OFS model data
- Data in NetCDF files
- Data archived

CO-OPS GIS Data Portal / APIs
https://tidesandcurrents.noaa.gov/gis-data-portal/

CO-OPS GIS Data Portal Map Services and Applications

Published GIS Services
CO-OPS public GIS services allowing data to be used for desktop mapping and other GIS applications.

CO-OPS Stations Map Service (WMS, WFS, Feature Service)
CO-OPS Stations Map Service is the spatial data from present and historical oceanographic and meteorological data collected by NOAA's Center for Operational Oceanographic Products and Services. Layers served are active water level stations, historic water level stations, active currents stations, historic currents stations, all meteorological stations, conductivity stations, and water temperature stations collected by CO-OPS at various locations around the USA and it's territories.

MapService: https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Observatio
FeatureService: https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Obser

CO-OPS Products Map Service (WMS, WFS, Feature Service)
CO-OPS Products map service is the spatial data for products that are derived fro
meteorological data collected by the NOAA's Center for Operational Oceanograph
published benchmarks, benchmarks, sea level trends, water level constituents, e:
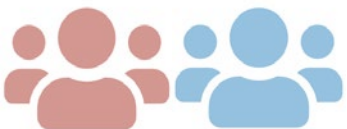level predictions processed at CO-OPS at various stations around the USA and it

MapService: https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Observatio
FeatureService: https://idpgis.ncep.noaa.gov/arcgis/rest/services/NOS_Obser
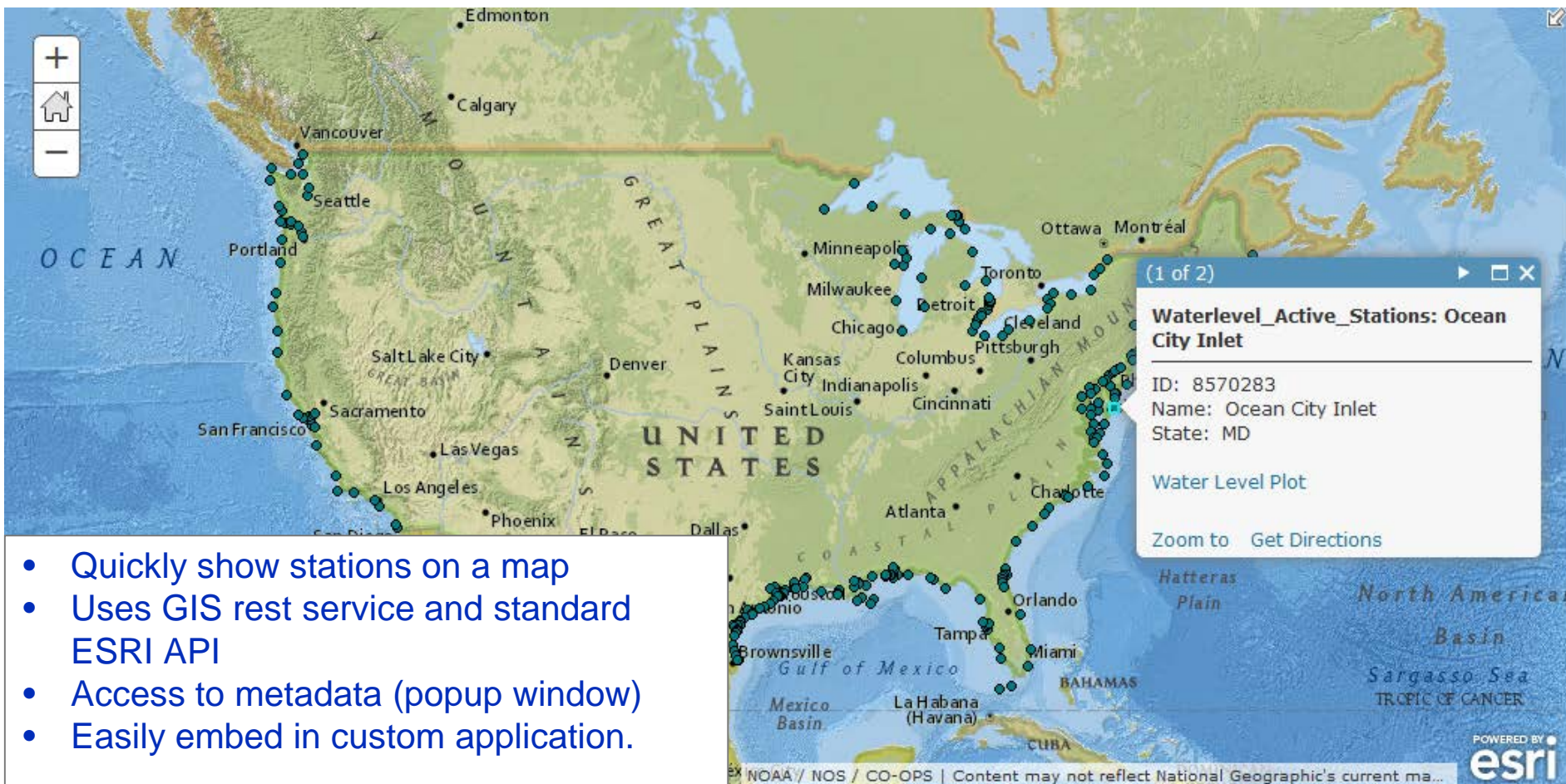
GIS REST Services:

- ESRI MapService / FeatureServices
- Access to stations and products
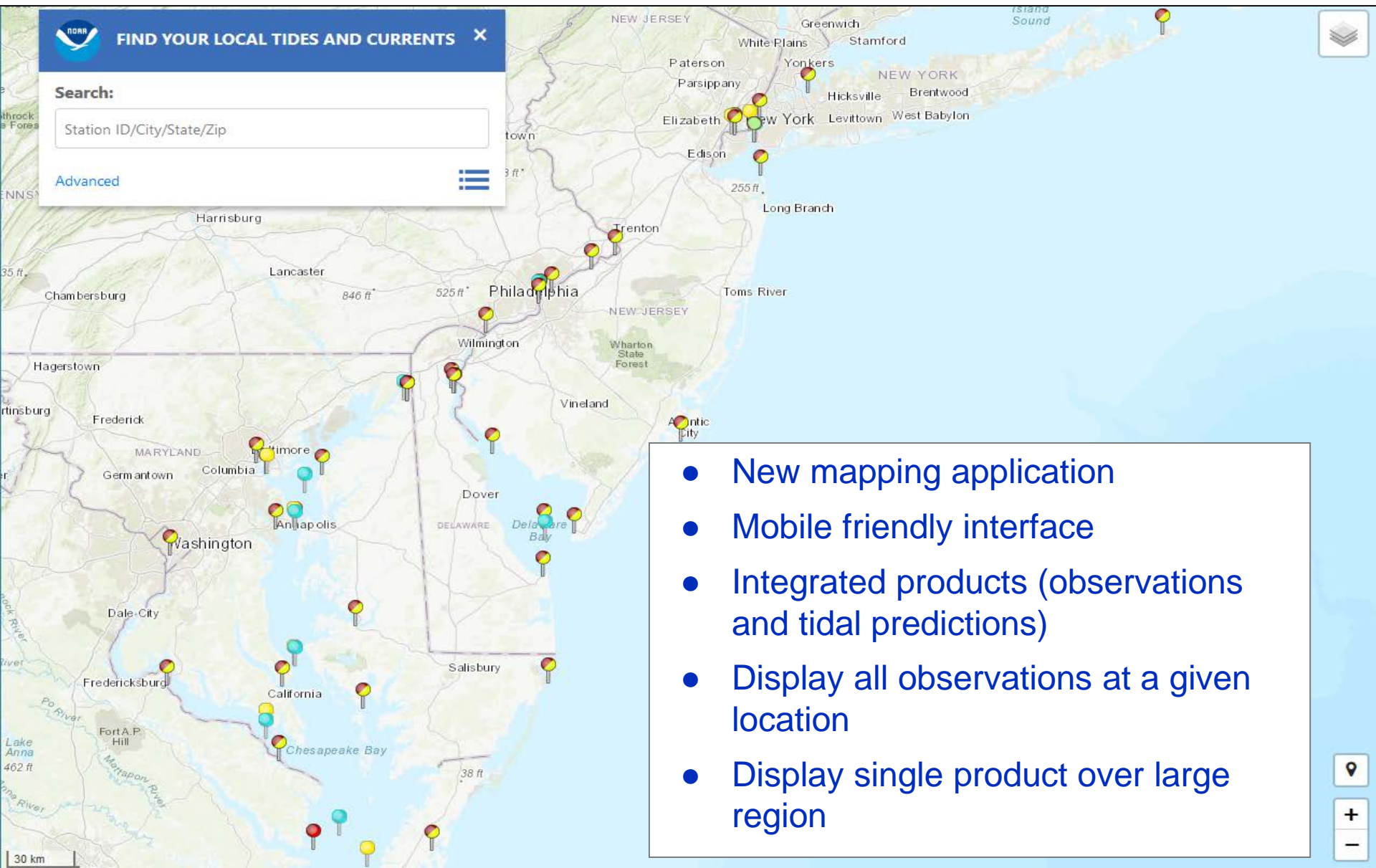- Use within webapps
- Use within GIS desktop software

Mapping Via GIS Service
(Active Water Level Stations)

- Quickly show stations on a map
- Uses GIS rest service and standard ESRI API
- Access to metadata (popup window)
- Easily embed in custom application.

(1 of 2)

Waterlevel_Active_Stations: Ocean City Inlet

ID: 8570283
Name: Ocean City Inlet
State: MD

Water Level Plot

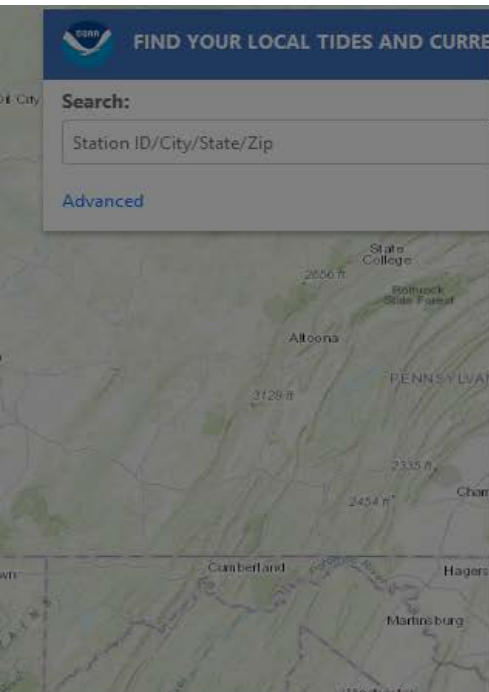Zoom to   Get Directions

POWERED BY esri

New CO-OPS Map

- New mapping application
- Mobile friendly interface
- Integrated products (observations and tidal predictions)
- Display all observations at a given location
- Display single product over large region

New CO-OPS Map
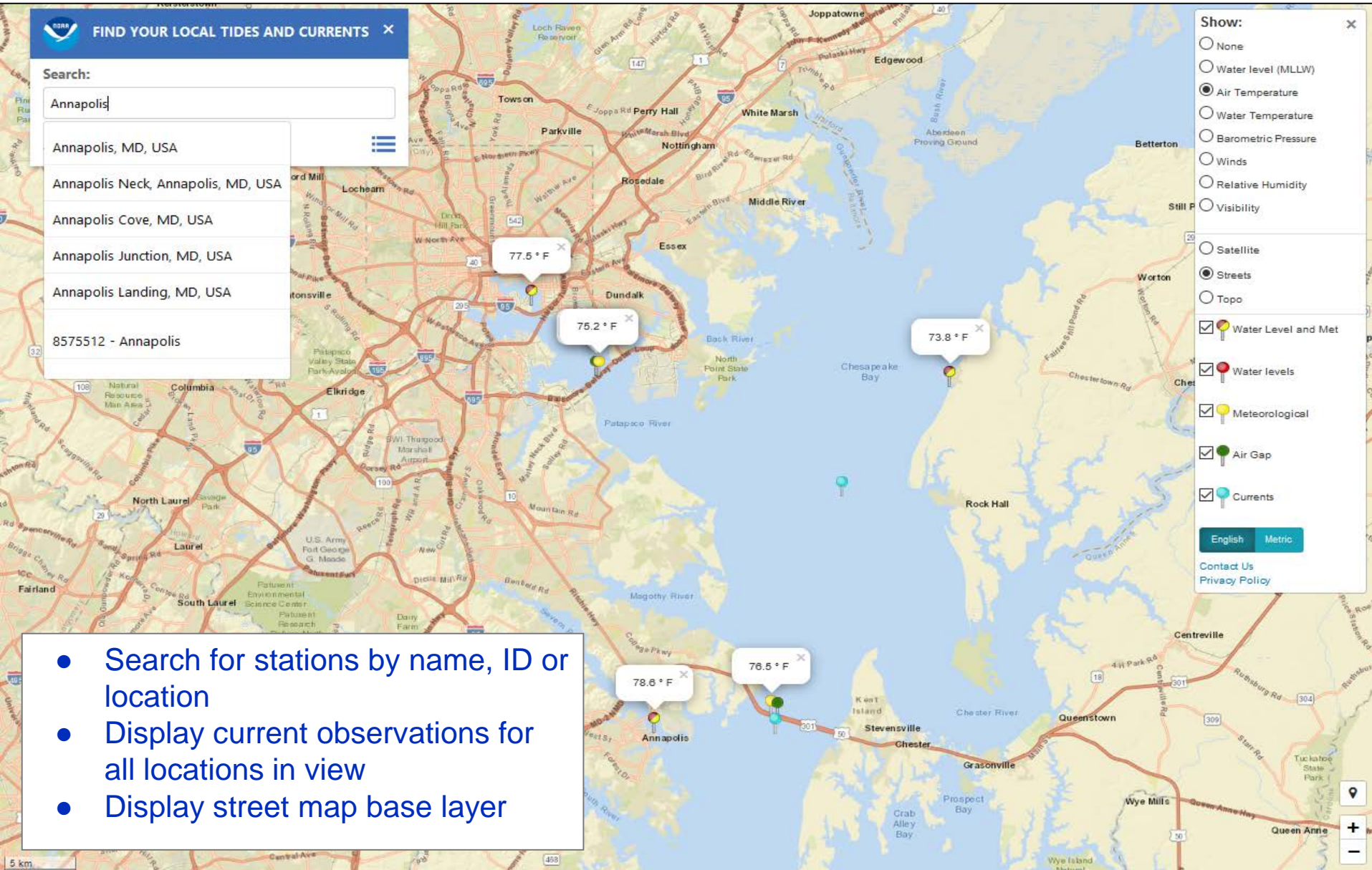

Single location dashboard:

- Present observations
- Tidal predictions
- Plotting
- Auto-refresh
- Local alerts
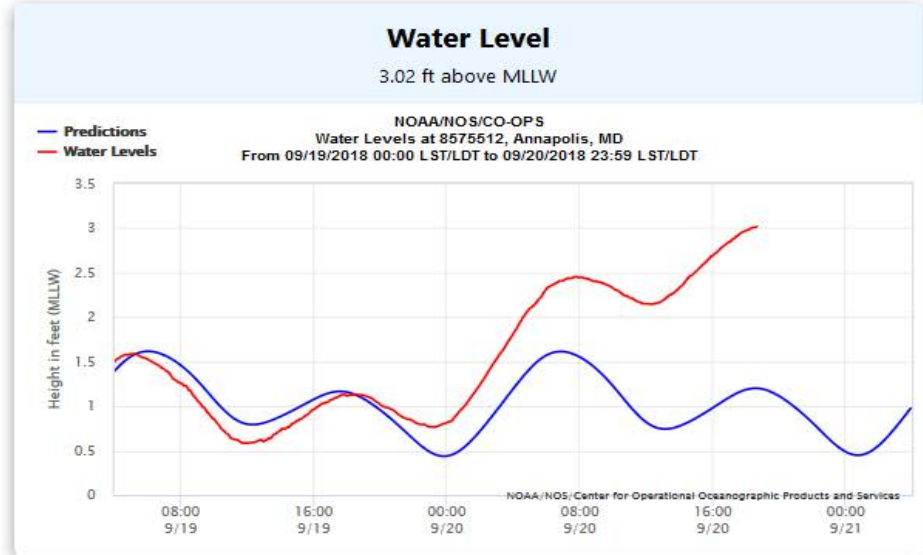
New CO-OPS Map

- Search for stations by name, ID or location
- Display current observations for all locations in view
- Display street map base layer

We Want to Hear from You

Navigation

Recreation

Commercial Software

How do you use our data?

What data requirements do you have?

What are your visualization requirements?

How can we better support your oceanographic data needs?

Data and Products for Different Users

- Real-time and derived oceanographic data at thousands of locations
- All data available via various APIs
- Easily retrieve metadata
- Easily embed data in custom web applications
- Easily access data in desktop applications

CO-OPS Web Services:

https://tidesandcurrents.noaa.gov/web_services_info.html

CO-OPS GIS Data Portal:

https://tidesandcurrents.noaa.gov/gis-data-portal/

CO-OPS THREDDS Server (Modeling Data):

https://opendap.co-ops.nos.noaa.gov/thredds/catalog.html

Point of Contact: Armin Pruessner@noaa.gov