The National Tidal Datum Epoch (NTDE)

Rising Tides & Changing Waters

Alexis Sluder
Communications & Outreach Specialist, IBSS Corp
NOAA Center for Operational Oceanographic Products & Services

Alaska Geospatial Summit | October 25, 2023

National Tidal Datum Epoch (NTDE): *What is it?*

- A specified time period used to collect tidal data at coastal water level stations
- Spans 19 years to encompass the longest lunar cycle *(Metonic Cycle)*
- Used to generate tidal datums and bench mark sheets
- Provides a nationally consistent network of tidal datums

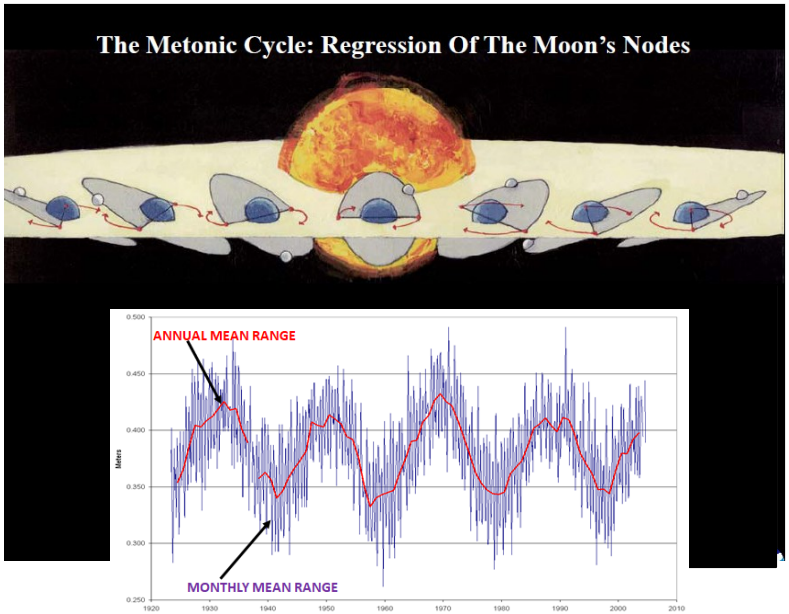


Image caption: The Metonic Cycle and the time between peaks. This time period is roughly equal to 19 years and is the basis for defining the NTDE.

More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/

NTDE: *History & Future*

- NTDE was first established in 1941
  - *First Epoch: 1941 - 1959*
  - *Second Epoch: 1960 - 1978*
  - *Third Epoch: 1983 - 2001*
  - *Fourth Epoch: 2002 - 2020 (planned)*
- The existing NTDE spans 1983-2001
- The future NTDE will span 2002-2020
- NTDE is updated every 20-25 years
- The planned release date for the new NTDE is sometime after ~2026

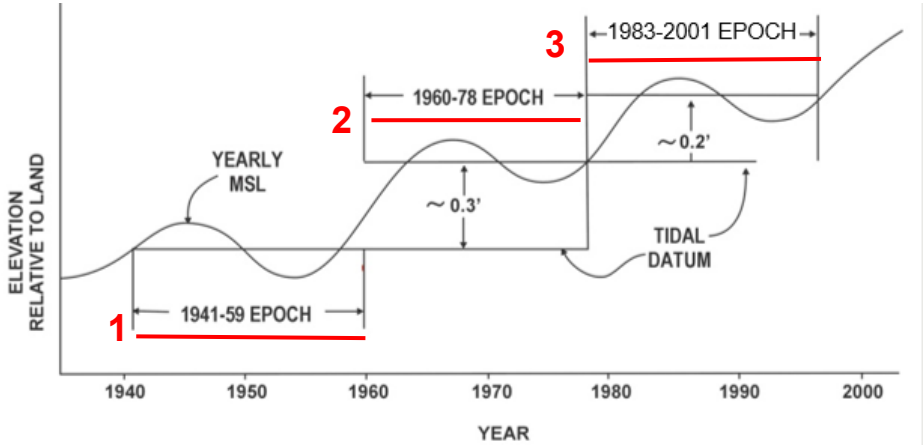
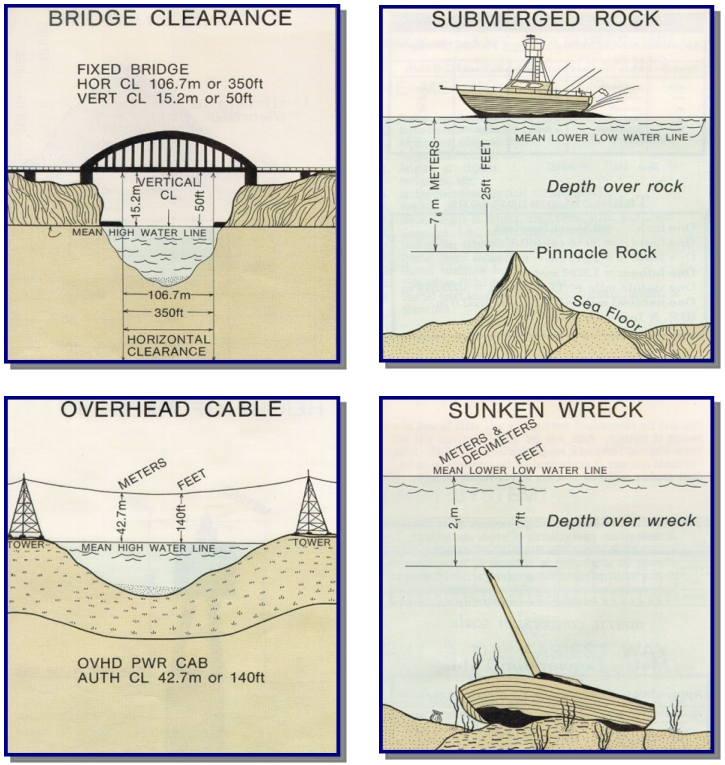


Image caption: Chart showing past and current National Tidal Datum Epochs and the update schedule. The upcoming NTDE is not shown but work for this update is currently underway.

More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/

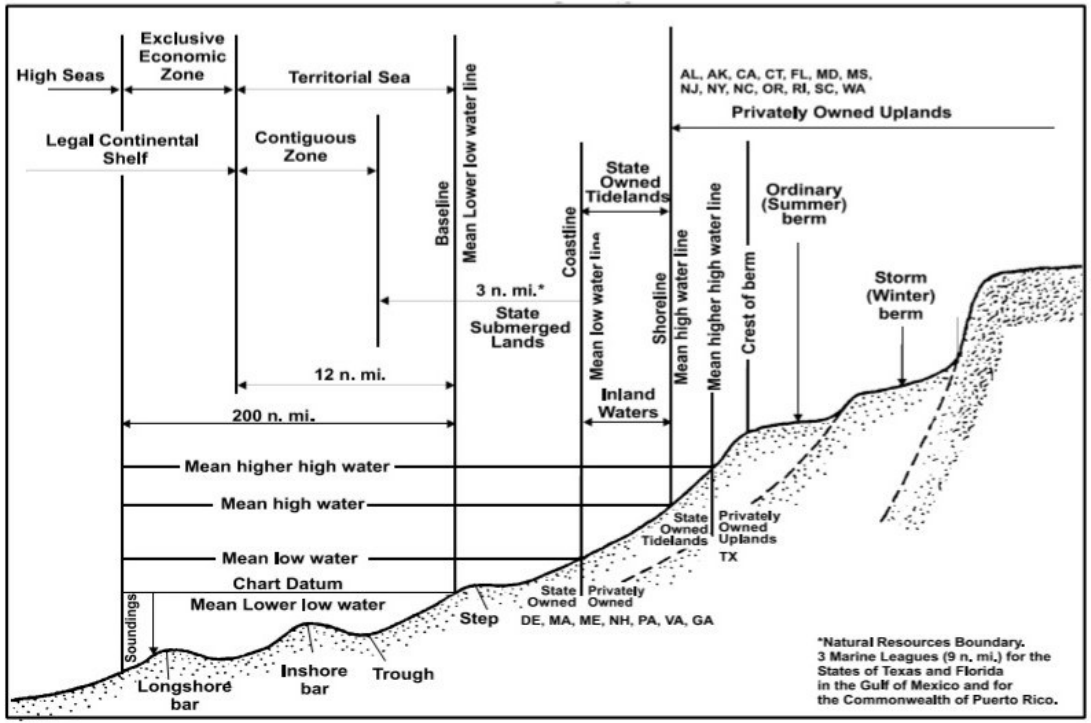
Why the Update?



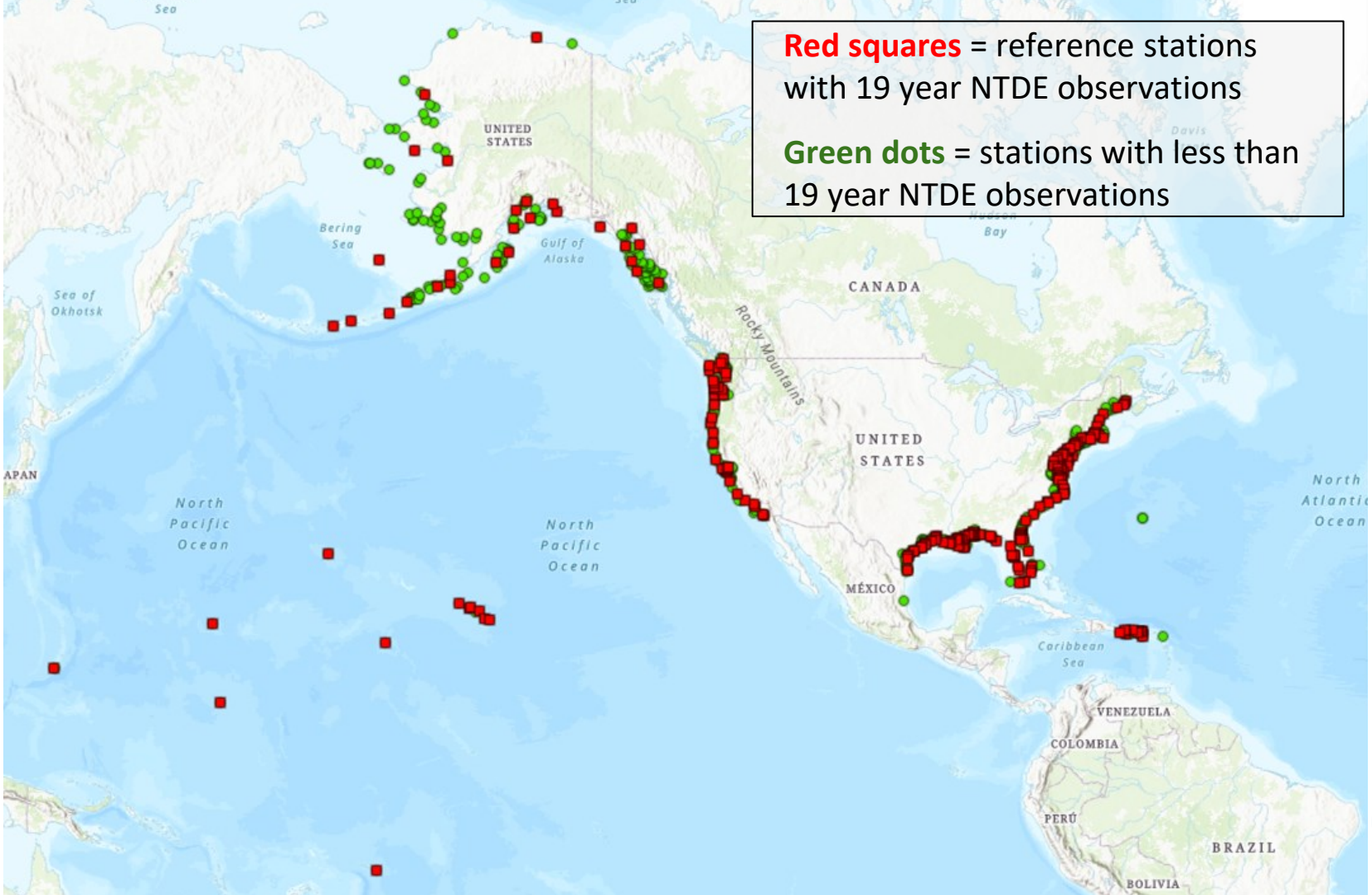
- 19-year time period needs to be shifted occasionally
- The current 83-01 NTDE will soon be shifted to 02-20 to account for recent relative sea level change
- Updating the NTDE requires computing new tidal datums for the 2000+ stations
- The anticipated release of the new NTDE is currently around 2026

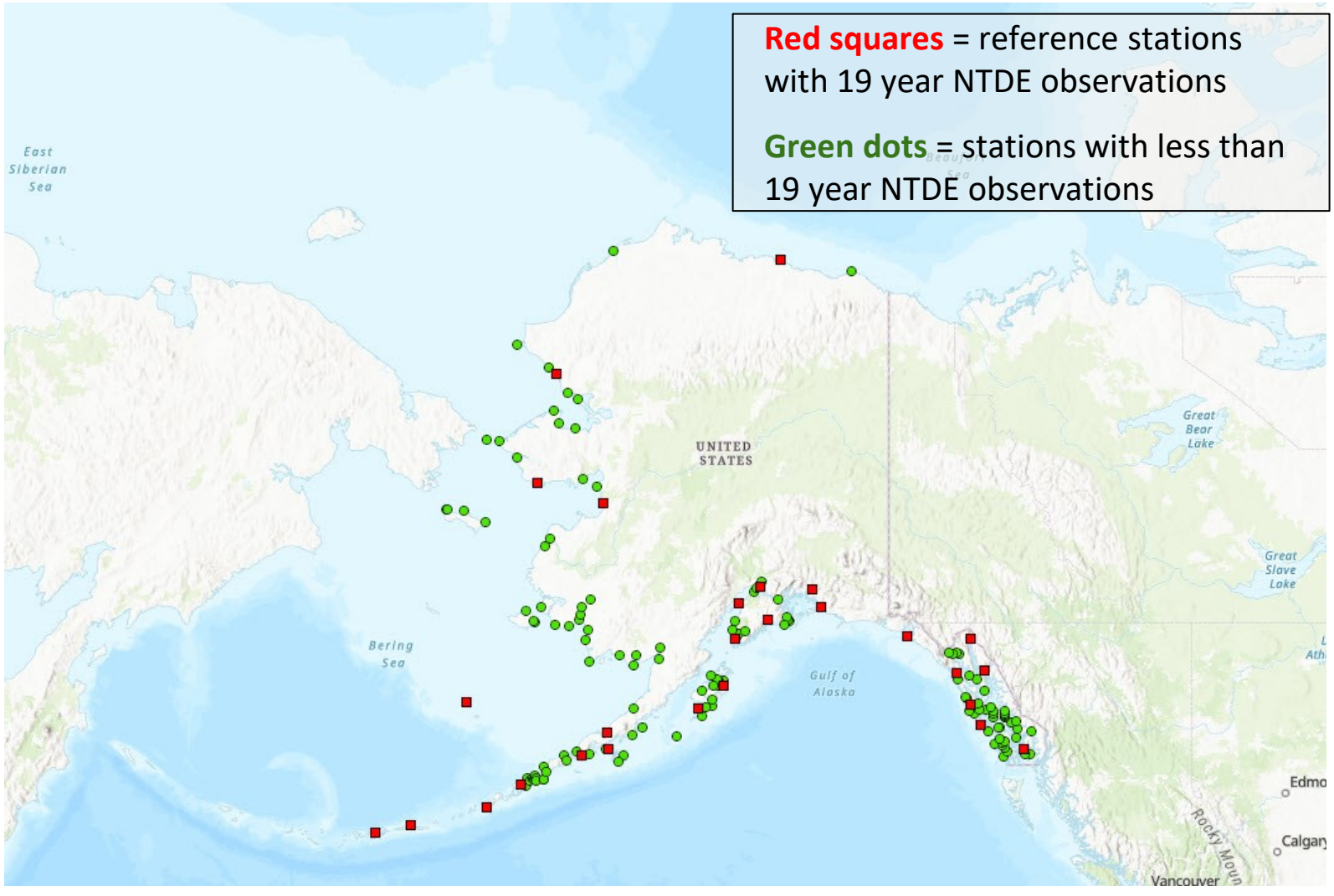
More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/

Who Uses Datums?



More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/


Red squares = reference stations with 19 year NTDE observations
Green dots = stations with less than 19 year NTDE observations
UNITED STATES
Bering Sea
Gulf of Alaska
Sea of Okhotsk
CANADA
Rocky Mountains
UNITED STATES
North Pacific Ocean
North Pacific Ocean
MÉXICO
Caribbean Sea
VENEZUELA
COLOMBIA
PERÚ
BRAZIL
BOLIVIA
North Atlantic Ocean


Red squares = reference stations with 19 year NTDE observations
Green dots = stations with less than 19 year NTDE observations
East Siberian Sea
UNITED STATES
Great Bear Lake
Great Slave Lake
Bering Sea
Gulf of Alaska
Edmo
Calgary
Vancouver

Modified Procedure Importance

NTDE updated every 20-25 years

8518750 The Battery, New York

- 2.83 +/- 0.09 mm/yr
  - ~14.15 mm in 5 years
  - ~ 56.6 mm in 20 years

9414290 San Francisco, California

- 1.89 +/- 0.19mm/yr
  - ~9.45 mm in 5 years
  - ~37.8 mm in 20 years

MP updated every 5 years

8761724 Grand Isle, Louisiana

- 9.07 +/- 0.47 mm/yr
  - ~45.35 mm in 5 years
  - ~181.4 mm in 20 years

9452400 Skagway, Alaska

- 17.59 +/- 0.56mm/yr
  - ~87.95mm in 5 years
  - ~ 351.8mm in 20 years

What Will Change?

- New bench mark sheets and new tidal datums
  - Higher in areas of terrestrial subsidence & global sea level rise
  - Lower: in areas of terrestrial uplift & global sea level rise: SE AK
- Existing tidal datums and bench mark will still be available online as “superseded datums”
- Updated tidal datum reference values will appear in/on:
  - NOAA PORTS
  - CO-OPS water level webpages
  - NOAA Forecast Systems
- Downstream products that reference the existing NTDE tidal datums and bench mark sheets will change
  - Example: data products that are disseminated to the National Weather Service

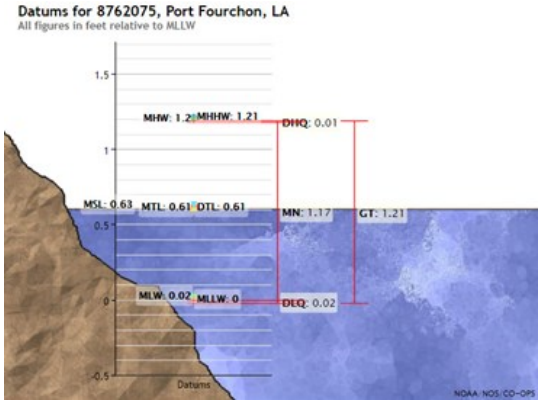
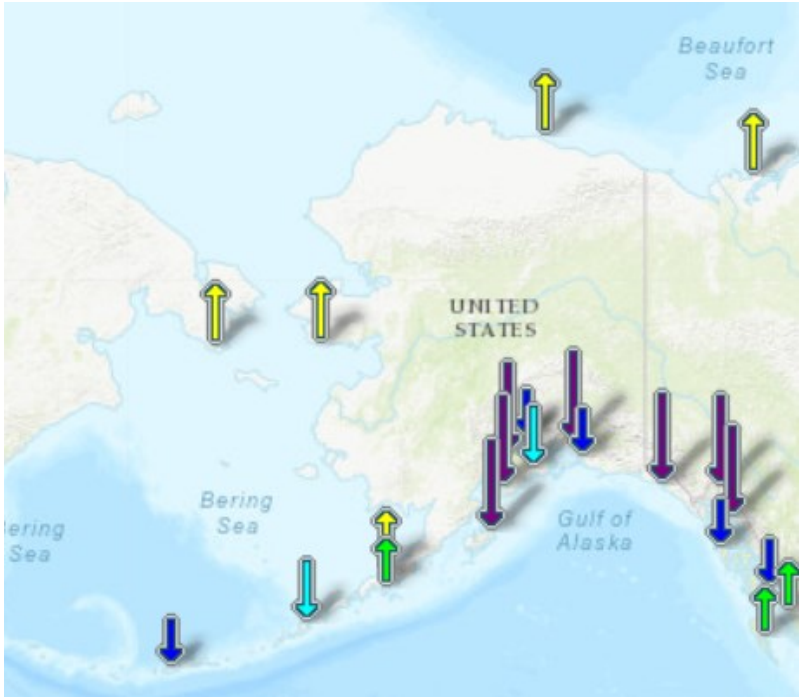


Image caption: This graphic shows currently accepted tidal datums at the Port Fourchon water level station in LA. Heights depicted will change when the new NTDE is launched.

More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/

- Expected changes moving to the new Epoch vary greatly across Alaska
- Northern AK will have Mean Sea Level (MSL) increases around 0.1 ft
- Southern AK MSL changes will range from increases around 0.1 ft to decreases around 0.5 ft
- Goal is to update all currently published tidal datums
- Includes datums that use the 5-yr modified procedure for anomalous land movement



Relative Sea Level Trends

mm/yr (feet/century)

Above 9 (Above 3)	6 to 9 (2 to 3)	3 to 6 (1 to 2)	>0 to 3 (0 to 1)	-3 to 0 (-1 to 0)	-6 to -3 (-2 to -1)	-9 to -6 (-3 to -2)	Below -9 (Below -3)

Will this impact you?

- Coastal boundary definition for public/private lands
- Coastal habitat restoration
- Water level regulation, forecasting, monitoring of long-term sea level trends
- Engineering/design for coastal infrastructure projects related to transportation & power facilities
- Construction and maintenance of coastal structures
- Economic viability and safety of navigation, including charts, ports, harbors, channel dredging

If yes, follow these steps:

- ❑ *Check to see if your organization uses any products or services that reference NOAA's tidal datums and bench mark sheets*
- ❑ *Ensure these products and services are able, or will be able, to automatically pull the new data from the CO-OPS website*
- ❑ *Confirm that you know where to find the new NTDE information and superseded previous NTDE products (on the CO-OPS website)*

What Now?

- Ensure that you have documented all ***metadata***
  - NOAA will be creating transformation tools to allow you to convert between the two EPOCH elevations
- Plan for the change to ensure that your elevation and designs are built to account for the coming changes
- Details on what the product will look like + specific timeframe will be available as this update progresses
- Feedback opportunities on the update

More Information: https://tidesandcurrents.noaa.gov/datum-updates/ntde/

Thank you!

CO-OPS *(Tides & Currents)* **Website**

https://tidesandcurrents.noaa.gov/datum-updates/

Email Contact

Alexis Sluder

alexis.sluder@noaa.gov