



2021 Alaska Coastal & Ocean Mapping Summit

Agency Mapping Updates

December 1st, 2021 | Virtual

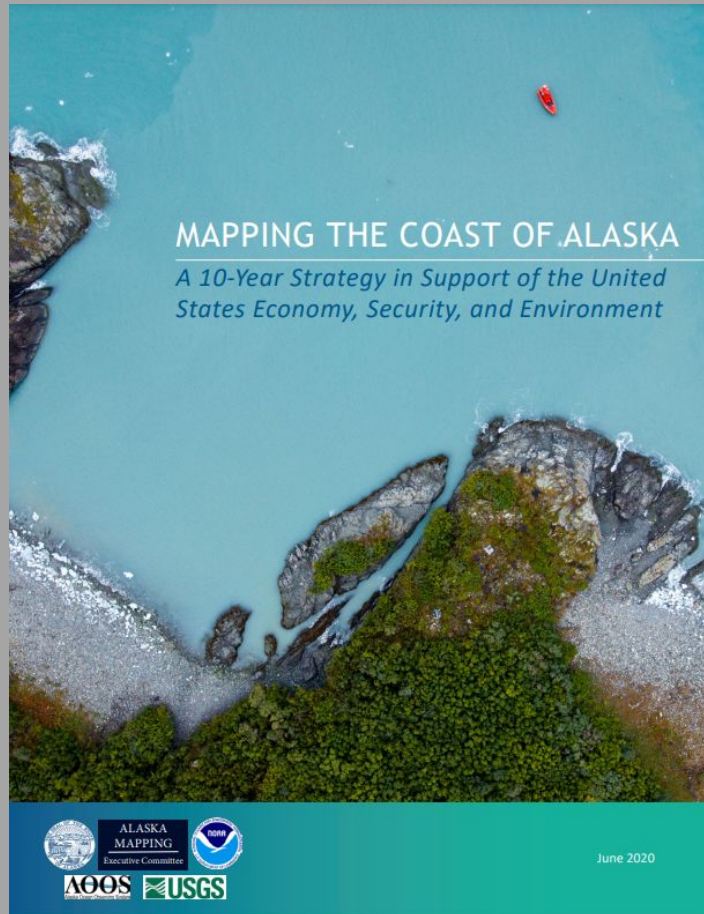


ALASKA COASTAL MAPPING STRATEGY DATA ACQUISITION DASHBOARD

Hillary Palmer - Coordinator

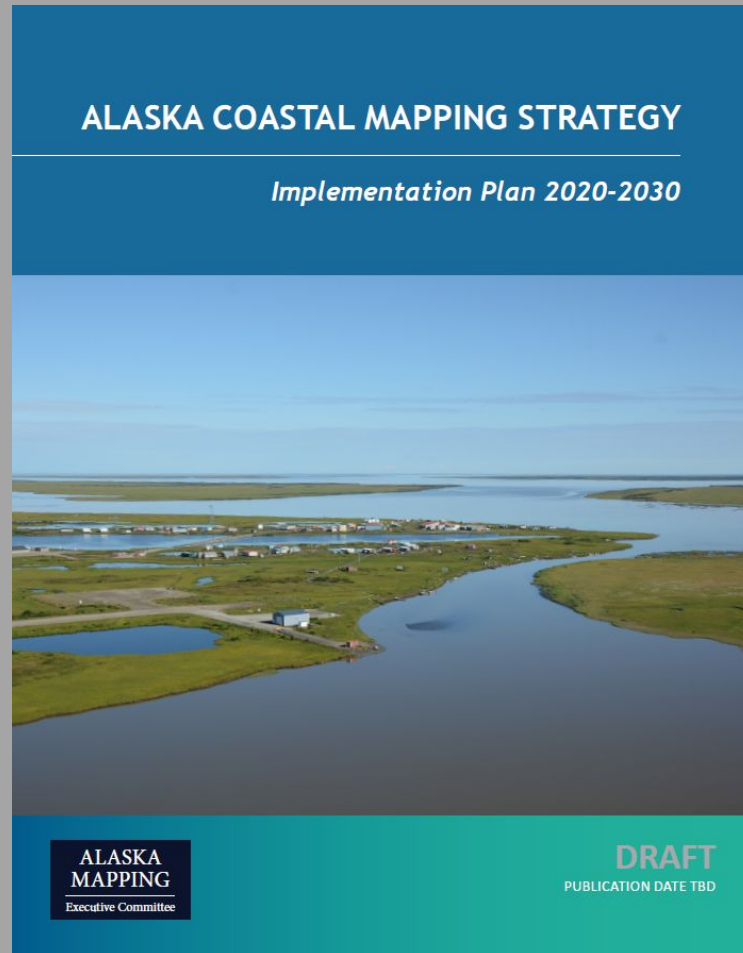
December 1st, 2021

Strategy for Mapping Alaska's Coastline



1. Build on existing mapping partnerships to meet Alaska's coastal mapping needs
2. Expand coastal data collection to deliver the priority geospatial products stakeholders require
3. Leverage innovation in mapping technology development
4. Conduct strategic communications to promote widespread stakeholder engagement

Coastal Mapping Implementation Plan

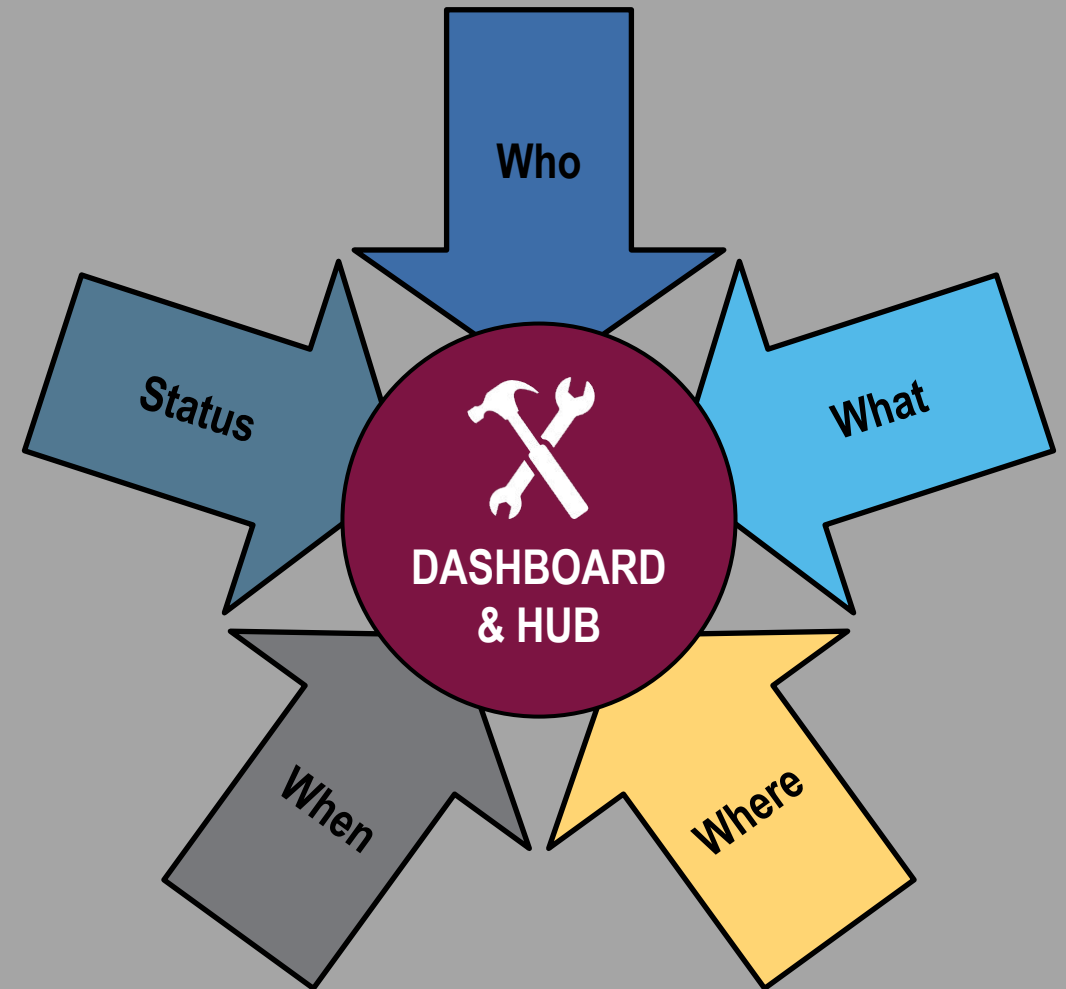


- Elevation data – topography & nearshore bathymetry
- Orthorectified imagery
- Shoreline Vector at MHW, MLLW
- Positional control required for accuracy

We need some tools & a place to keep them!

- Facilitate inter-agency coordination
- Identify cost-share opportunities
- Promote situational awareness
 - Existing data
 - Future data collection plans
- Track our progress

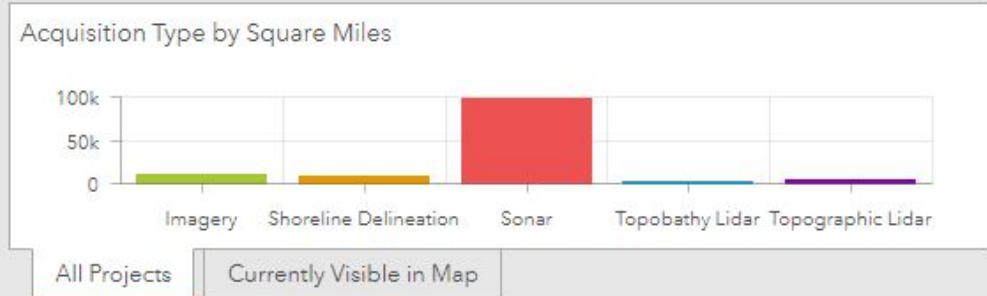
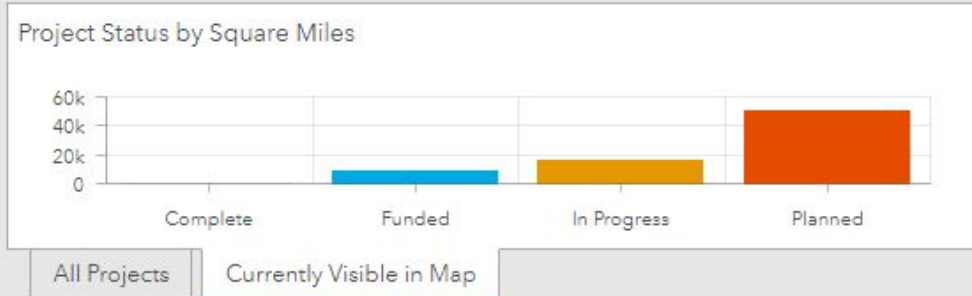
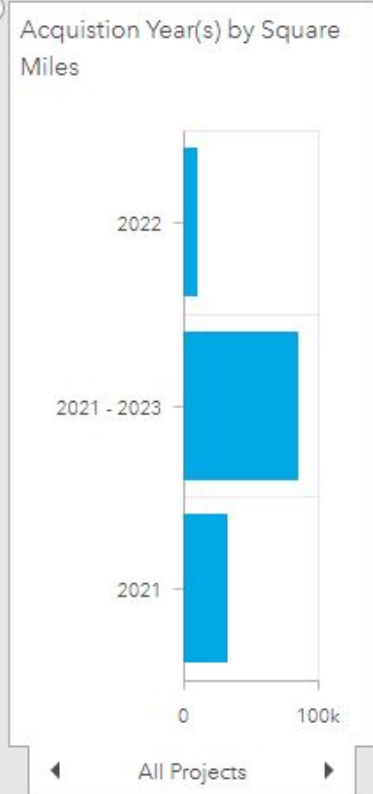
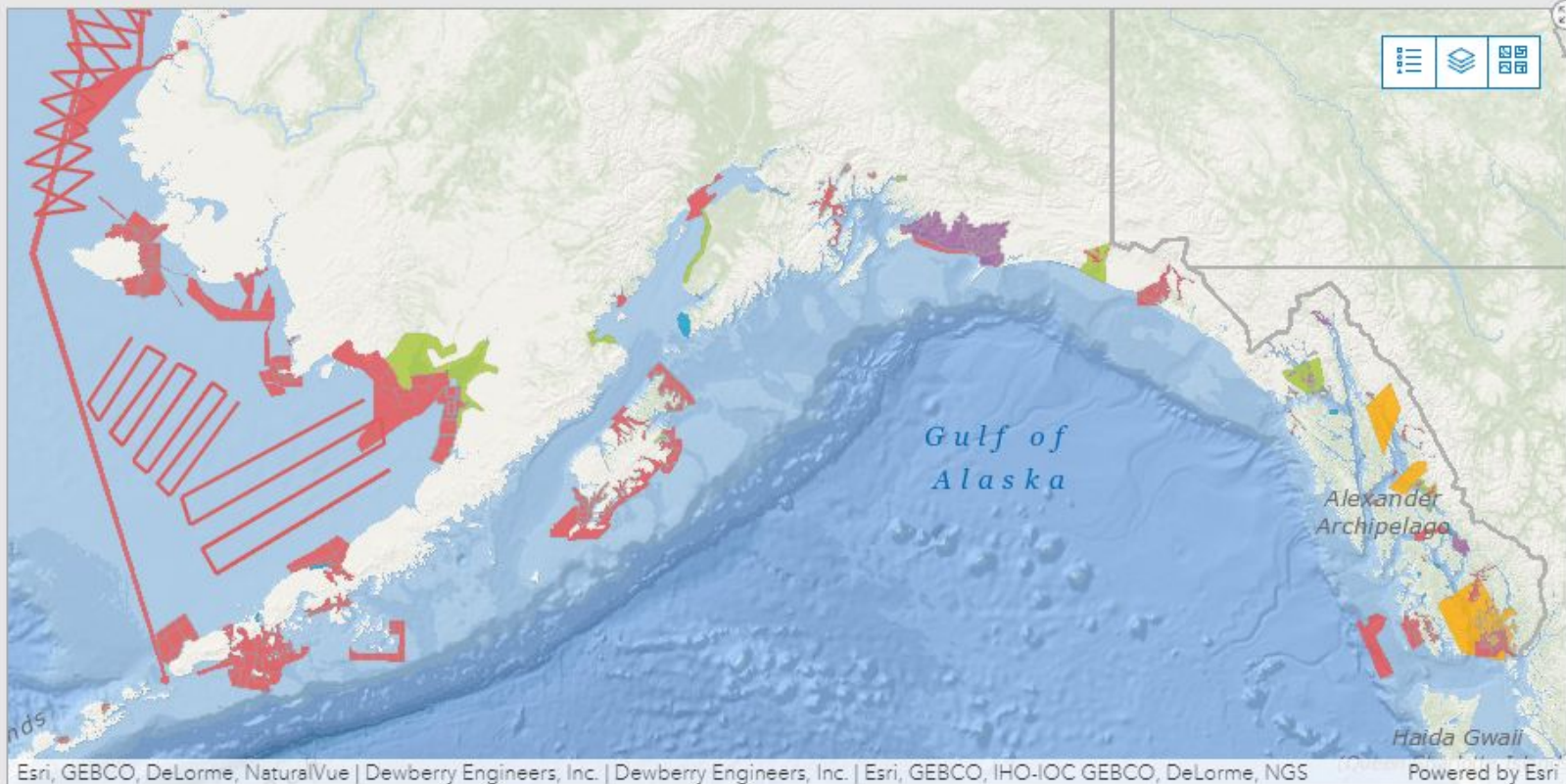
<https://alaska-coastal-mapping-strategy-dewberry.hub.arcgis.com/>



Alaska Data Acquisition Dashboard

Acquisition Type

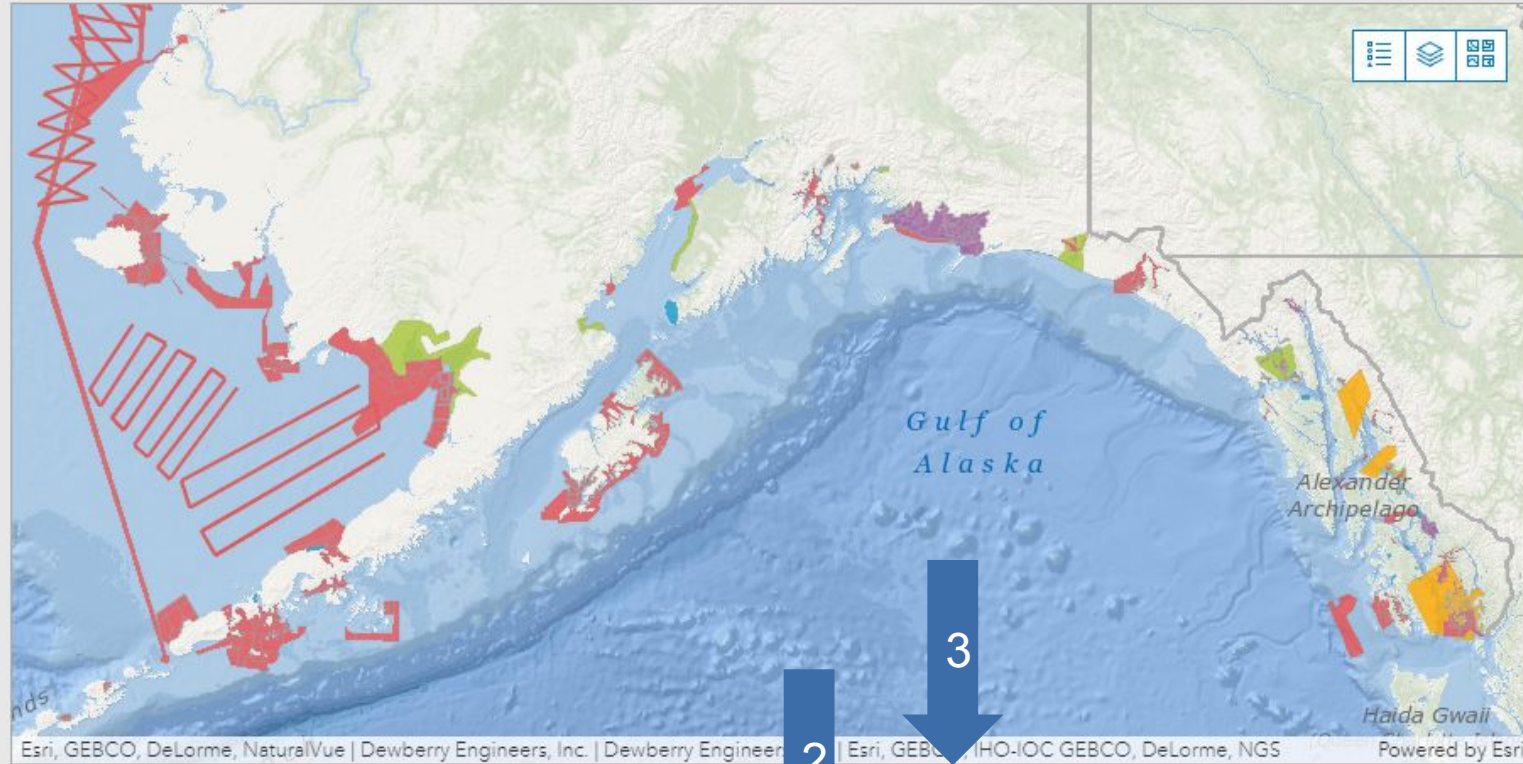
- Imagery
- Shoreline Delineation
- Sonar
- Topobathy Lidar
- Topographic Lidar



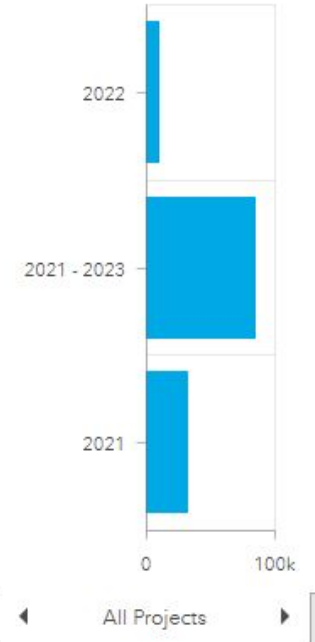
Alaska Data Acquisition Dashboard

Acquisition Type

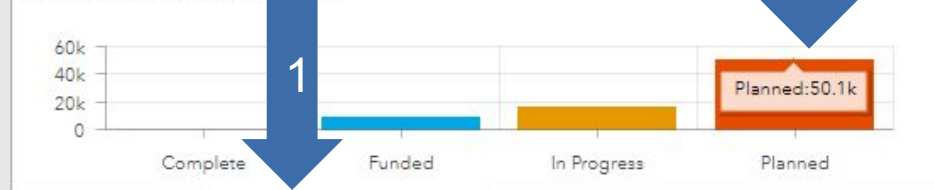
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Acquisition Year(s) by Square Miles

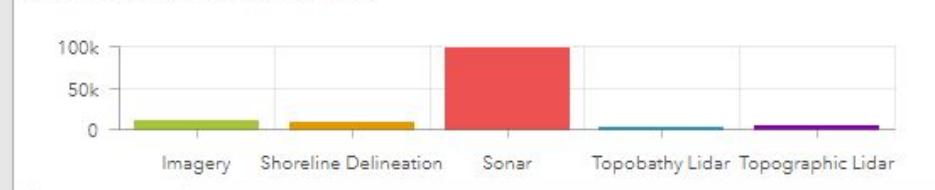


Project Status by Square Miles



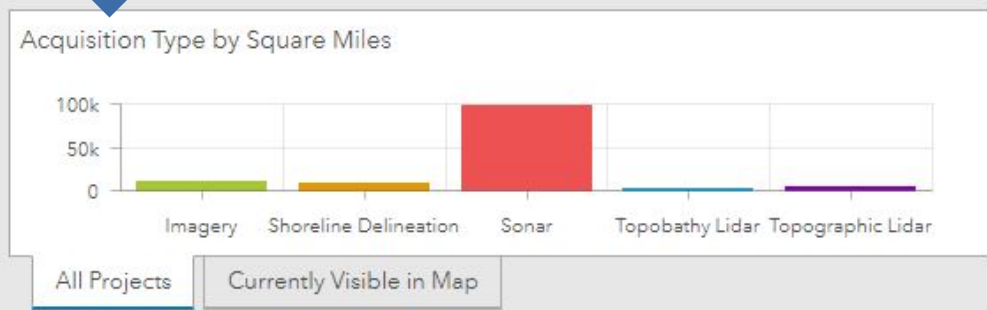
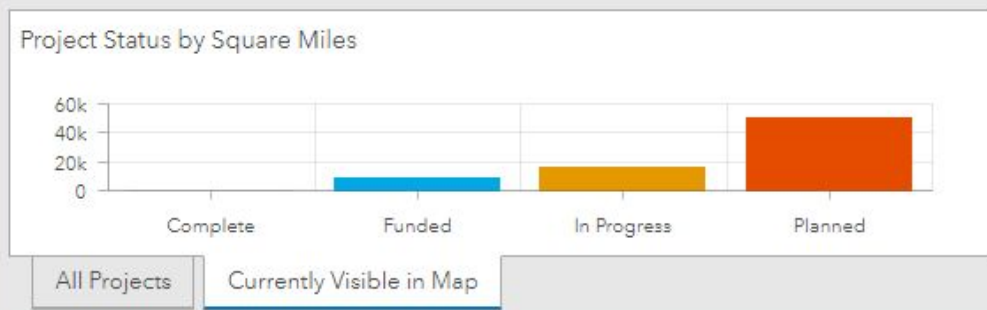
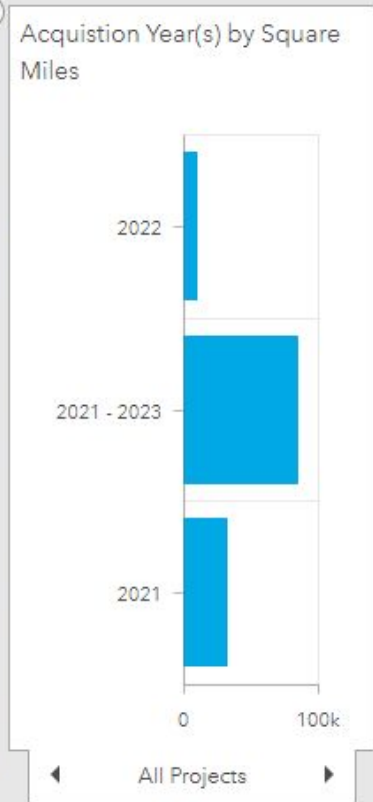
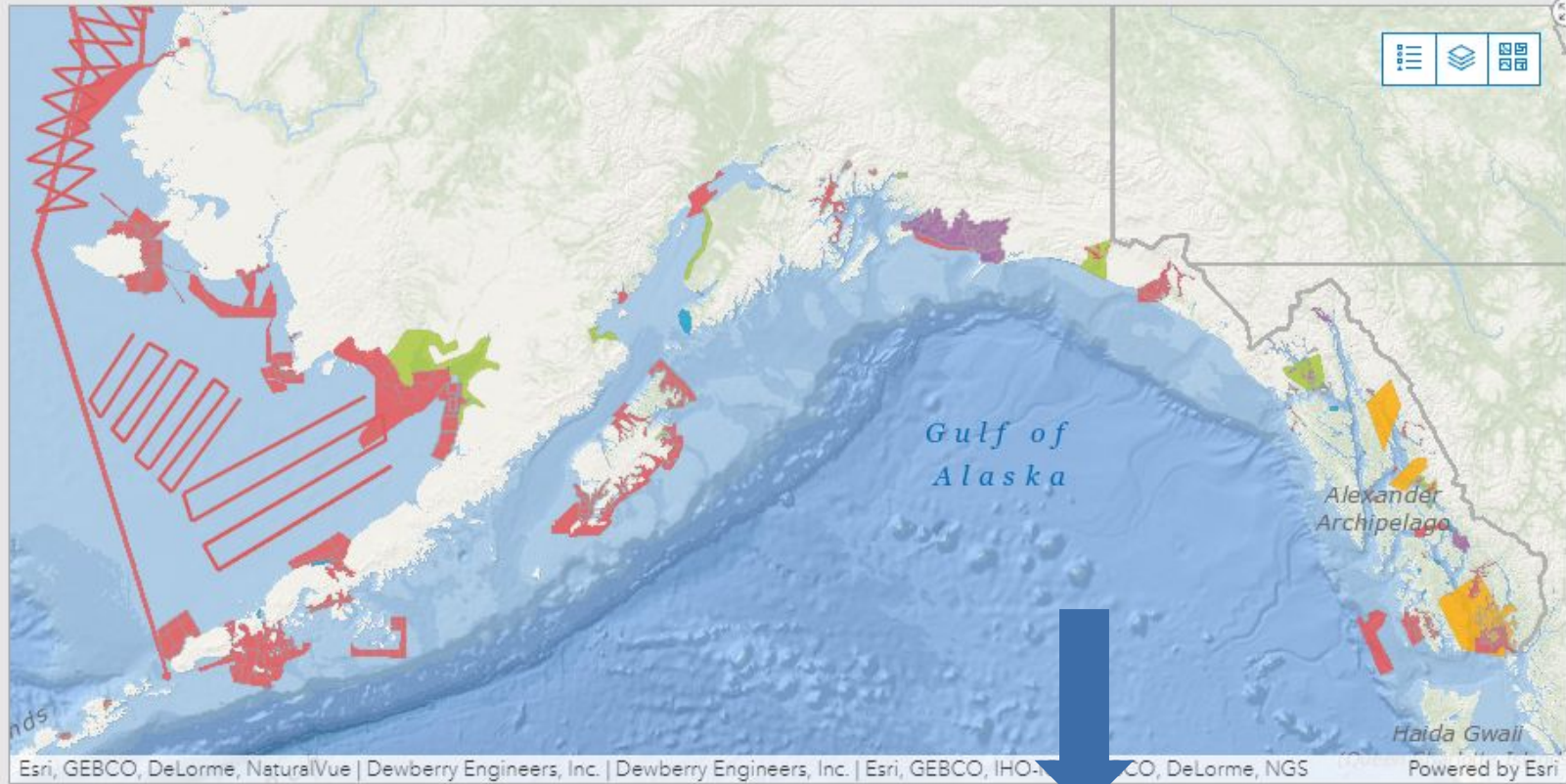
All Projects | **Currently Visible in Map**

Acquisition Type by Square Miles



All Projects | **Currently Visible in Map**

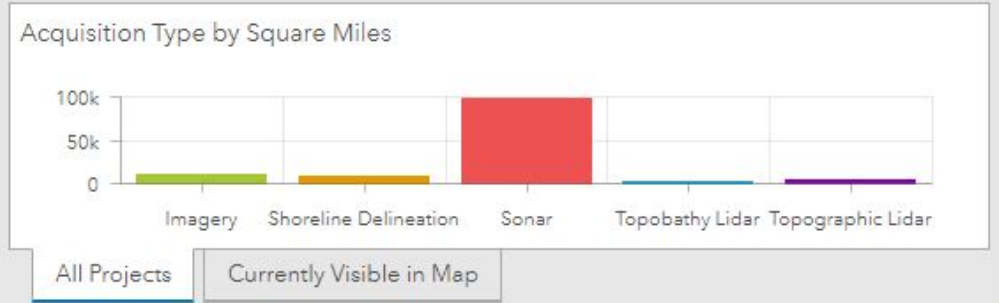
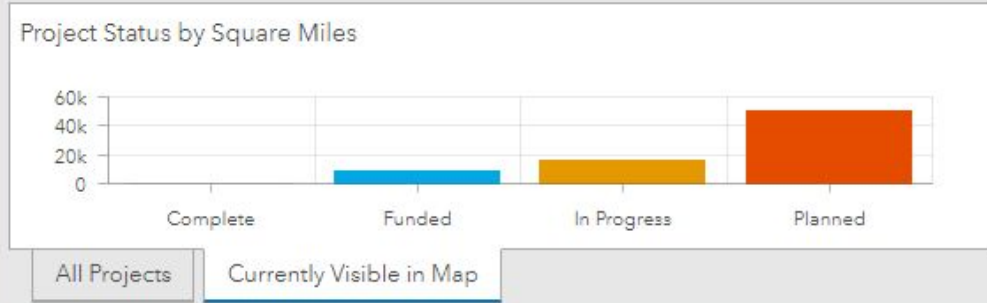
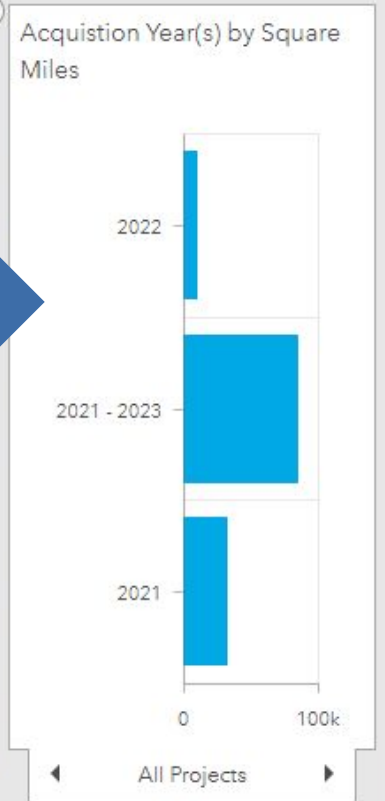
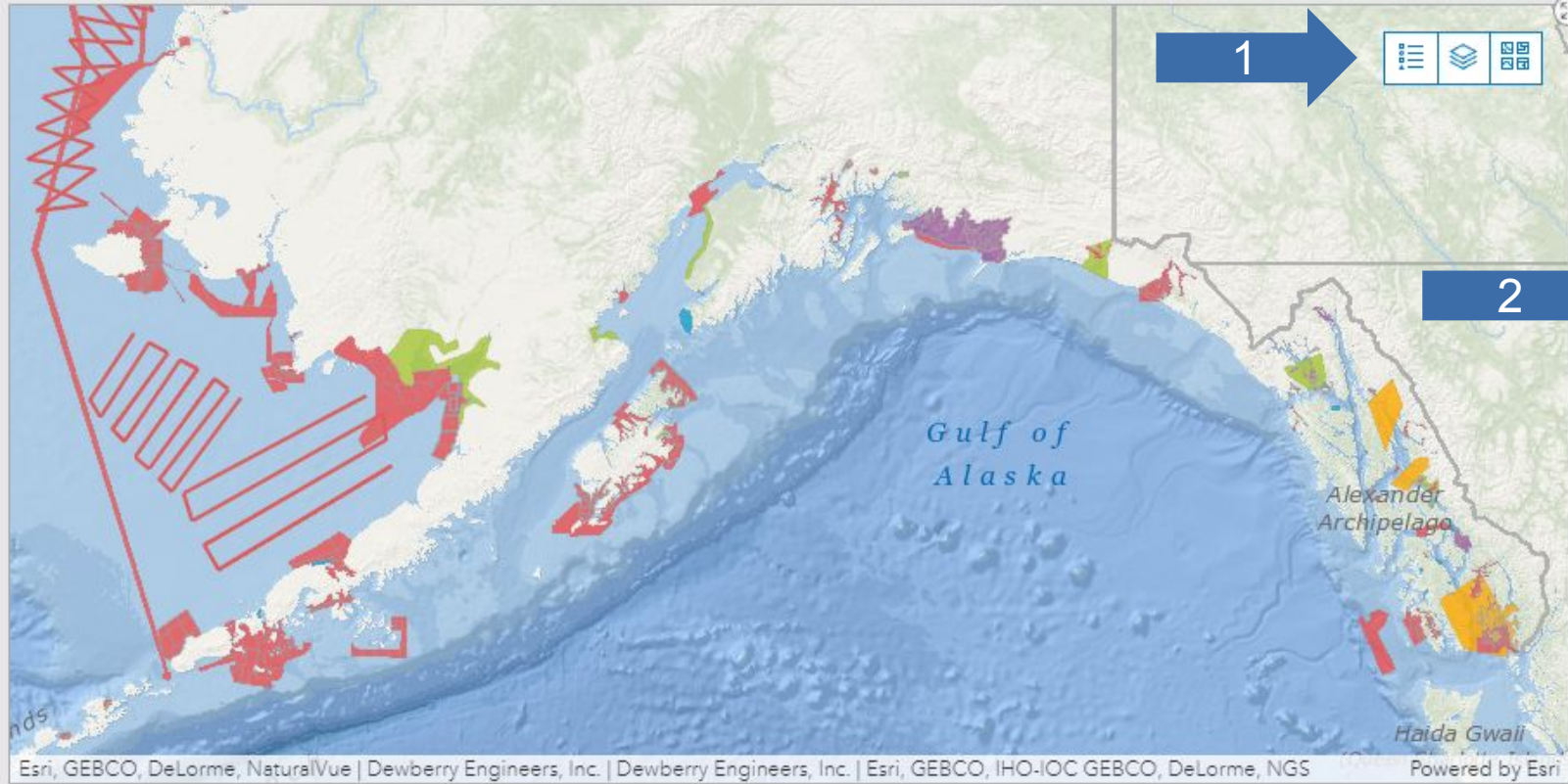
Alaska Data Acquisition Dashboard



Alaska Data Acquisition Dashboard

Acquisition Type

- Imagery
- Shoreline Delineation
- Sonar
- Topobathy Lidar
- Topographic Lidar



We want more!


- Bigger map
- More data filtering options
- Answer complex questions
 - Fields: Agency, Data Type, Status, Year, POC

Introducing the [Alaska Coastal Data Acquisition Web Map!](#)
and ArcGIS Hub site!

Featured on both
the Dashboard page
&
Resources page

Group Filter Widget

Agency = NOAA
Data Type = Sonar
Status = In Progress



Alaska Coastal Mapping Initiative

Priorities **Dashboard** Milestones **Resources** Newsfeed


Acquisition type

Project areas are also classified according to the type of technology used to acquire data. Examples are Imagery, Topographic Lidar, Topobathy Lidar, Sonar, and Shoreline Vector.

- **Imagery** can be collected by satellite or by cameras mounted to airplanes.
- **Topographic Lidar** is collected by mounting Lidar sensors to airplanes, yielding elevation data for the land surface below.
- **Topobathy Lidar** is collected by airplane mounted lidar sensors that use a green laser to penetrate shallow, clear waters in addition to the land surface.
- **Sonar** is collected by sensors mounted to boats (crewed or uncrewed) which result in underwater landscape data.
- **Shoreline Vector** is a linear feature that depicts the approximate shoreline. This dataset is used to represent Alaska's vast coastline.

It is challenging for sonar equipment to obtain data in shallow waters, so topobathy lidar is a helpful tool to bridge the elevation data gap between lidar (on land) and sonar (under sea) capabilities. The Alaska Coastal Mapping Strategy will leverage a combination of data acquisition types in order to obtain seamless coastal elevation.

Data Acquisition Map




Alaska Coastal Mapping Initiative

Alaska Coastal Data Acquisition

A web mapping application showing all the planned, funded, in progress, and complete coastal mapping activities for Alaska,...

Coastal Mapping Regions



Alaska Coastal Mapping Initiative

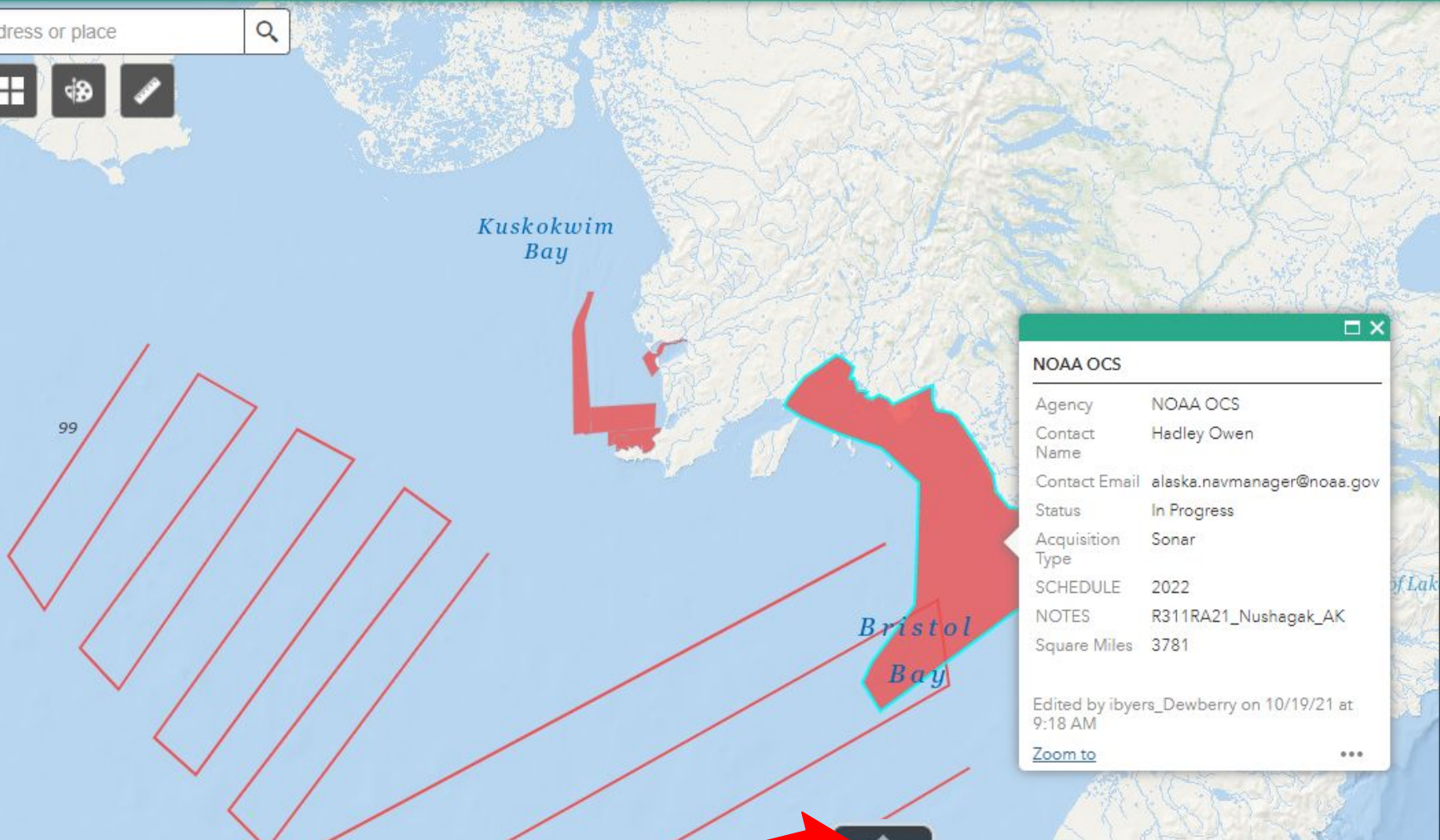
Alaska Coastal Mapping Regions

A common operating picture for referencing Alaska's coastal and nearshore mapping regions and nomenclature.



Find address or place

Map navigation controls: Home, Full Screen, Rotate, Measure, and a search icon.



NOAA OCS	
Agency	NOAA OCS
Contact Name	Hadley Owen
Contact Email	alaska.navmanager@noaa.gov
Status	In Progress
Acquisition Type	Sonar
SCHEDULE	2022
NOTES	R311RA21_Nushagak_AK
Square Miles	3781
Edited by ibyers_Dewberry on 10/19/21 at 9:18 AM	
Zoom to	

Filter

Filter by Data Acquisition Field

Agency is
NOAA OCS

Technology Type is
Sonar

Status is
In Progress

- From Filter Pane
- Use drop-down menus
- Select Criteria
- Pan and zoom on map
- Click features to see attribute information

Attribute table control

Benefits of Open Data

- Anyone with ArcGIS Pro can copy the Service URL and view it with their own private data assets or data needs
https://services.arcgis.com/mXosPCpkF9n8TYTE/arcgis/rest/services/Alaska_Coastal_Data_Acquisition/FeatureServer
- Anyone with a free AGOL account can leverage the geospatial features & attribution for further analysis/visualization
- Also shared to SeaSketch
- Potential for Public-Private Partnerships

Other new resources...

Interactive Map Gallery

Click on a map below to open in full screen and interact with the data!

Funding Partnership Opportunities

See what agencies are collecting data (lidar, sonar, imagery...etc), where they are collecting it, and when they plan to collect it by using Data Acquisition Map.



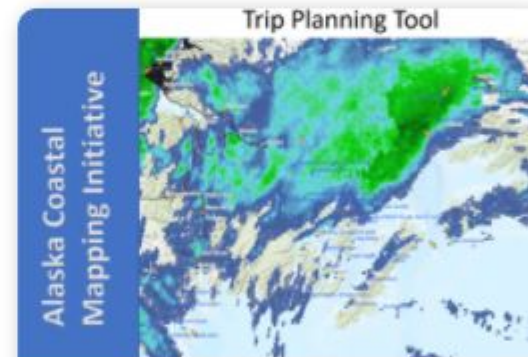
Alaska Coastal Jurisdictions

This application displays administrative boundary and jurisdictional information fro...



Alaska Coastal Morphology and Wave Exposure Map

A web mapping application that contains data displaying coastal morphology classification,...



Alaska Coastal Mapping Trip Planning Tool

This web application includes the extents of existing shoreline vectors, tide gauge network,...



Alaska Coastal Data Acquisition

A web mapping application showing all the planned, funded, in progress, and...

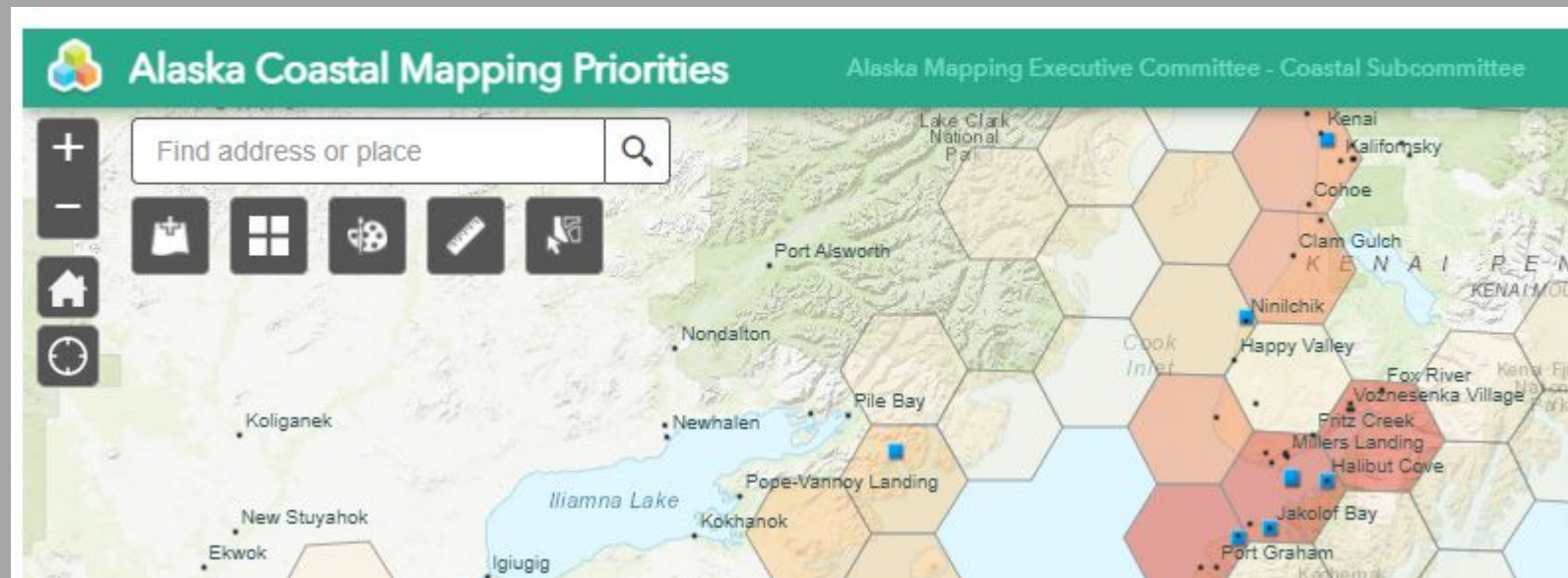
Other new resources...

Determining Coastal Mapping Priority Areas

What parts of Alaska's coast get mapped first? What are the specific mapping needs of the community? To help answer these questions and more, a detailed survey was conducted in 2019 to help ensure data collection efforts met the broadest user needs possible and were conducted in the most efficient manner. The StoryMap shown below outlines survey parameters and the results.

Read the final report recently published on June 28th, 2021.

[2019 Alaska Coastal Mapping Prioritization Survey - Final Report](#)



Other new resources...

StoryMap Gallery

Click on a story map below to interact and learn!

Implementation Plan Milestones

The objectives and program milestones shown below will guide the implementation of the 10-year effort to map Alaska's coastal and nearshore areas. Progress made on these milestones will be revised frequently so please check back often for updates!

Objective	Milestone	Due Date	Interval	Status
1.0 Build on Existing Mapping Partnerships to Meet Alaska's Coastal Mapping Needs				
1.1 Establish a Team for Alaska Coastal Mapping Implementation				
1.1.1	Create a Coastal Subcommittee (CS); co-chairs identified; meetings held on regular basis; AMEC reporting procedures established	Dec-2020		Complete
1.1.2.1	Convene Alaska Coastal Mapping Summit	Dec-2020	Annual	Complete
1.1.2.2	Stakeholder input integrated into draft IP	Dec-2020		Complete
1.1.2.3	Coastal Mapping Summit Summary notes and follow-up actions released	Jan-2021	Annual	Complete
1.1.3.1	Draft ACMS IP submitted to AMEC for review	Dec-2020		Complete
1.1.3.2	Draft ACMS IP published for public comment	Oct-2021		In Progress

Upcoming Webinars

[NOAA Science Seminar Series](#)

Other new resources...

Are You Trying to Find Existing Data?

Check out these helpful resources:

NOAA's Digital Coast

U.S. Interagency Elevation Portal

State of Alaska Geoportal

USGS's The National Map

Alaska DGGs Elevation
Portal

AOOS Ocean Data Explorer

Other new resources...

Get Involved!

Whether you'd like to share your coastal data collection plans in hopes of finding a funding partner, or you'd just like to be added to our list for receiving email updates, we'd love to have your participation.

[Alaska Coastal Data Acquisition Plans](#)

Share your elevation, bathymetry, or imagery data collection plans with the group. Thank you for your collaboration!

[Share Your Data Acquisition Plans Here](#)

[Register for Alaska Coastal Mapping Updates](#)

This survey allows interested parties to voluntarily register to receive important project updates by email.

[Subscribe Here](#)



Photos by Susan Sommer

Thank you!

Hillary Palmer – Coordinator
hpalmer@Dewberry.com



Alaska DGGS Mapping Update

Jaci Overbeck, Alaska Coastal Hazards Program Manager

December 1st, 2021 | Virtual



State of Alaska Coastal Mapping Report

2021 Alaska Coastal Mapping Summit

Alaska Coastal Hazards Program

Coastal Hazards Assessments

- Erosion Exposure Assessment
- Stakes for Stakeholders: Community-Based Erosion Monitoring
- National Coastal Resilience Fund Flood Assessments

In order to assess hazards, you must have the baseline data:

- Western Alaska photogrammetric digital surface models and orthoimagery (2015)
- UAV operations and training (tribal and borough collaborations)
- Bathymetry crowd source data (AOOS/NOAA Hydroball)
- Water level sensors (AOOS)
- Lidar

We are collecting!

Much more than hazards...

- Co-chair, Alaska Mapping Executive Committee Coastal Subcommittee
- Co-chair, Alaska Geospatial Council Coastal & Ocean Technical Working Group
- Chair, Alaska Water Level Watch

We are coordinating!



DGGS graduate intern Roberta Glenn works with Native Village of Wainwright IGAP Coordinator Cheryl Panik to install erosion monitoring sites.

2021 Summer Field Mapping

Yukon-Kuskokwim Delta

Tribal Collaborations using Bureau of Indian Affairs Tribal Resilience Program

- Napakiak
- Kotlik
- Alakanuk

Tasks

- UAV imagery/DSM
- Ground control
- Single-beam bathymetry
- Historical flood markers
- Lidar at Napakiak

Flood assessments will be made available at:

<https://dqgs.alaska.gov/pubs/id/30573>

Baseline data available from:

<https://dqgs.alaska.gov/pubs/>

PHOTOGRAMMETRY-DERIVED ORTHOIMAGERY AND ELEVATION FOR NAPAKIAK, ALASKA, COLLECTED JUNE 30, 2021
Richard M. Buzard, Jessica E. Christian, and Jacquelyn R. Overbeck
Raw Data File 2021-20

Report of Investigation 2021-1B Napakiak

COASTAL FLOOD IMPACT ASSESSMENTS FOR ALASKA COMMUNITIES—NAPAKIAK
Richard M. Buzard, Jacquelyn R. Overbeck, Katie Y. Miller, and Jessica E. Christian



Photo from airplane looking at Napakiak in August 2021. Photo: Alaska Division of Geological & Geophysical Surveys.



Location map of survey area with ortho

It has not been reviewed for technical conformity to the editorial standards of

SOURCES
OPHYSICAL SURVEYS

Published by
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
2021



UAF graduate student and DQGS volunteer Jessica Christian measures the height of a local high water mark indicator in Alakanuk, Alaska to contribute to documenting historical flood events.



2021 Summer Field Mapping

State of Alaska ASTAR Coastal Hazards Project

Conduct baseline mapping in North Slope communities where gaps exist to support flood and erosion mapping. 2021 started in Wainwright as well as tidal datum collections in Point Lay.

Wainwright

- Coastal elevation profiles with permafrost probe
- Beach sediment sampling
- Single-beam bathymetry
- Community-based erosion monitoring installation

Other Efforts

- USGS 3DEP lidar 2019
- JALBTCX topobathy lidar 2021
- Coast survey bathymetry



Boat operator with the Olgoonik Corporation Blair Patkotak and Jaci Overbeck, DGGs, tow the hydroball for single-beam bathymetry collection.



Getting Data into the Hands of Users

Community flooding, erosion, and permafrost risk assessment status

Use the dropdown in the top right to view data. Type or Select Community **Shaktoolik**

Shaktoolik

General Information

Population 226

Geographic coastal

Setting

Statewide Threat Assessment

Community Shaktoolik

Flood Group 1

Erosion Group 1

Permafrost Group 3

Combined Group 1

Map for Search Results

Showing 1

Shaktoolik

Community Shaktoolik

Flood 1

Esri, GEBCO, DeLorme, ...

This map only flashes the result of the search in the top right. You must select a community using the search in the top right.

Baseline Data

Historical Complete

Aerial Imagery:

Time Period: 1950, 1980, 2004, 2015

Date 2020

Completed:

Source: DGGS

Link:

Modern Complete

Imagery:

Date: 2015, 2019, 2021

Note: fixed-wing

Source: DGGS, USACE

Link: [Ortho](#)

Topography: Complete

Date: 2015, 2021

Note: photogrammetric DSM, topobathy lidar

Source: DGGS, USACE

Link: [DSM](#)

Bathymetry: Complete

Date: 2021

Source: USACE

Note: topobathy lidar

Link:

First Floor Recommended

Elevation Survey:

Monitoring

Coastal In progress

Elevation

Profile Status:

Date 2011, 2019

Source SOA

Link [ACPT](#)

Community Pending

Based Erosion or Flood Monitoring

Date

Source BIA

Link

Water Level Data

More information at [Alaska Water Level Watch](#)

NOAA None

Real-Time Water Level ID

Alternative GNSS-R

Water Level Activity

Status Recommended

Date

Source

NOAA

Tide

Risk Assessment

Historical Complete

Shoreline

Change Rate:

Date: 2020

Source: Denali Commission

Link: [Shoreline Change Report](#)

Historical Flood Assessment:

Date: 2021

Source: AOOS

Link:

Baseline Erosion Complete

Forecast:

Date: 2021

Source: Denali Commission

Link: <https://dggs.alaska.gov/pubs/id/30672>

Hydrodynamic Flood Model:

In progress

Engineering Assessment

Engineering Recommended

Analysis:

Date:

Source:

Link:

Accessible from:
<https://dggs.alaska.gov/hazards/coastal/>

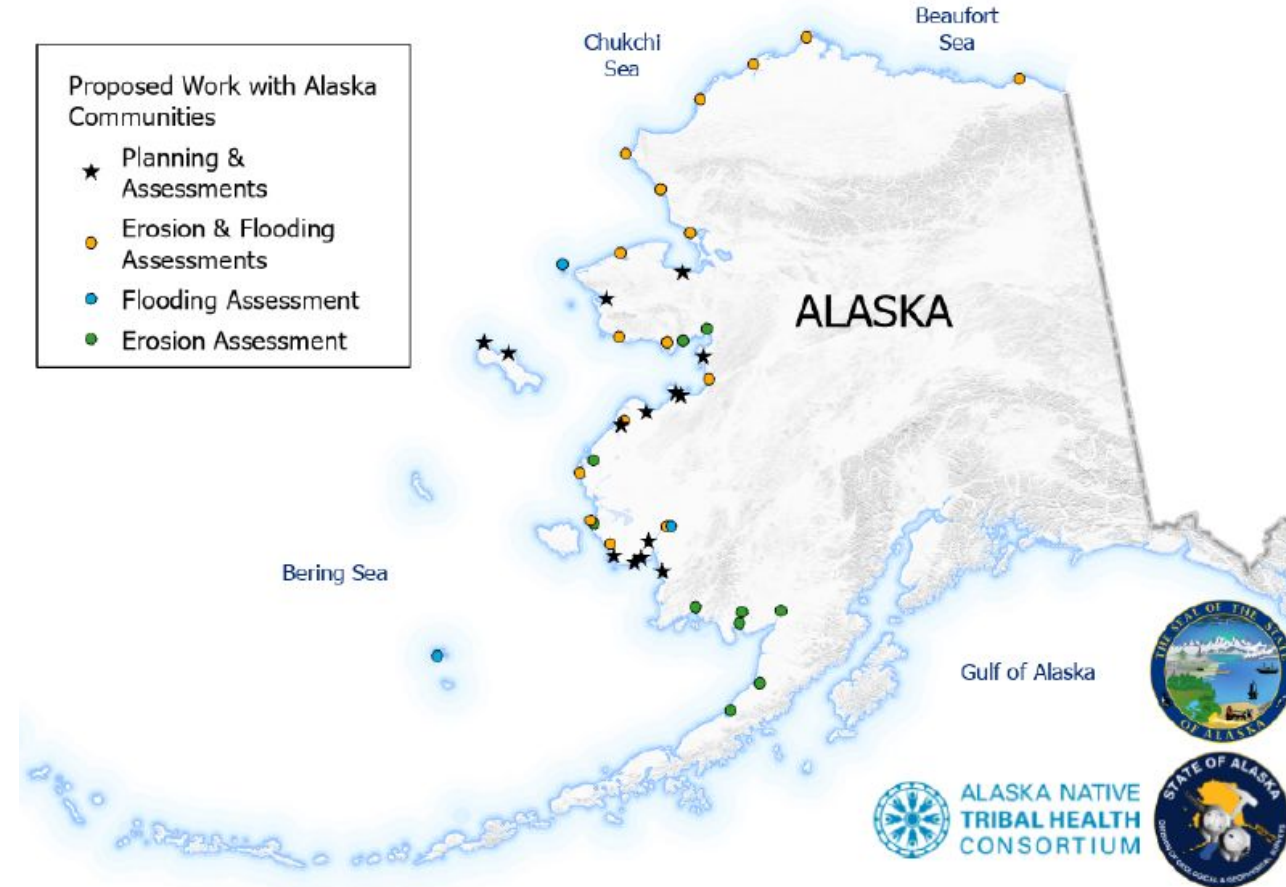
Direct Link:
<https://soa-dnr.maps.arcgis.com/apps/opstdashboard/index.html#/ba8ebf93adec4b6d9f601e2d59179fdd>

National Coastal Resilience Fund

Building Capacity and Conducting Coastal Risk Assessments in Remote Alaska Native Communities

Collaboration between AK DGGs, ANTHC, and AK DCRA.

- Proposed Work with Alaska Communities
- ★ Planning & Assessments
 - Erosion & Flooding Assessments
 - Flooding Assessment
 - Erosion Assessment



Andrew Herbst, DGGS, sets up a base station for lidar collections around the Kuskokwim Delta.

Match to this project conducted in 2021 along with **Lidar at 3** communities (Kipnuk, Kwigillingok, and Tuntutuliak).

Community outreach team has begun identifying community collaborators.

Alaska Water Level Watch

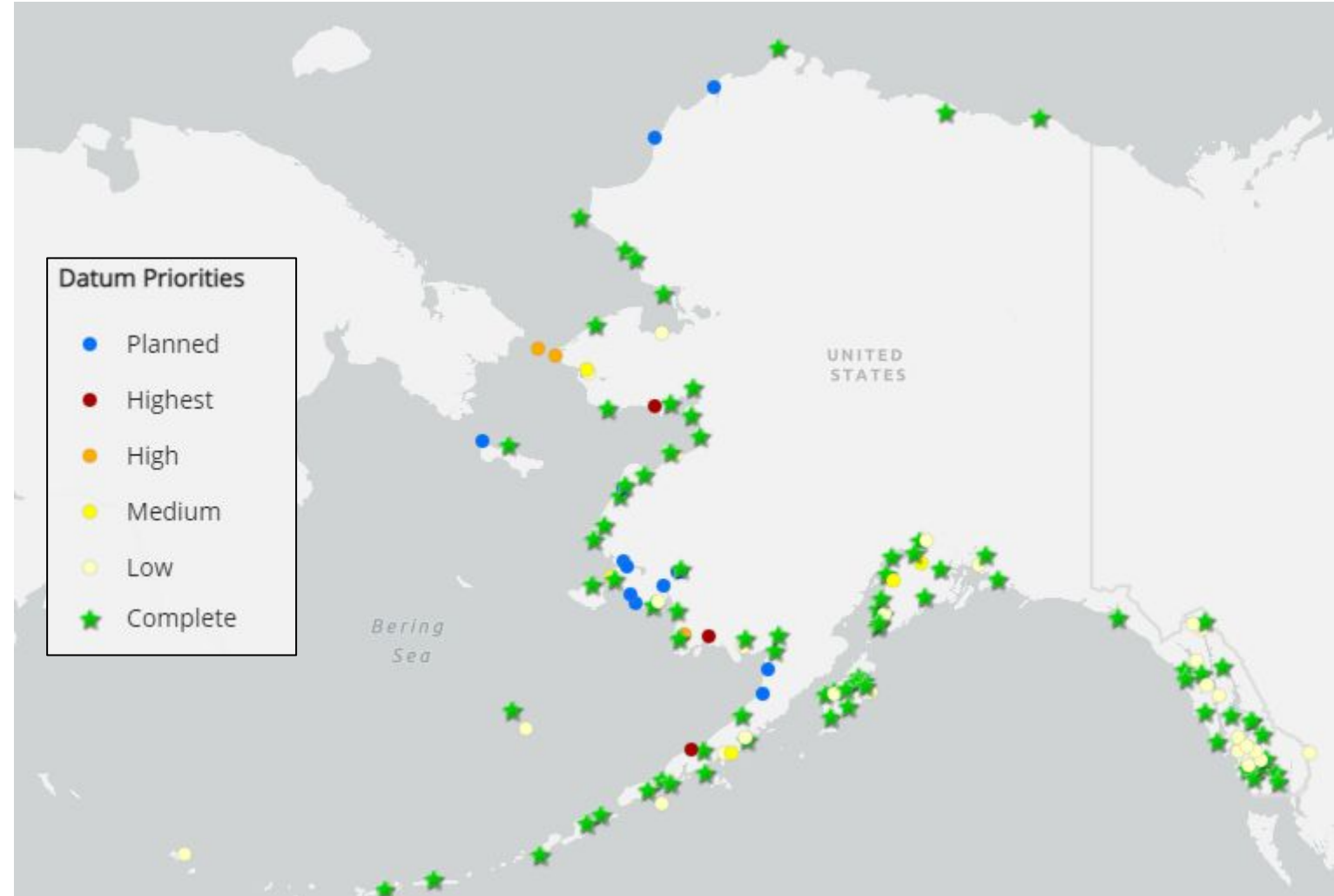
Without VDatum, at least every community should have a datum conversion from water level to land.

Planned and Recently Completed
State of Alaska – Point Lay and Wainwright

NOAA Office of Coastal Management—Gambell, Homer, Kwigillingok, Cheforvak, Kipnuk, Newtok/Mertarvik.

NOAA Office of Coast Survey—Bristol Bay sites.

Tidal Datums from Short-term Occupations



This map is updated at <https://arcg.is/Xf4j9>

Alaska Water Level Watch

In support of the NWLON, partner stations help fill gaps in real-time water level monitoring.

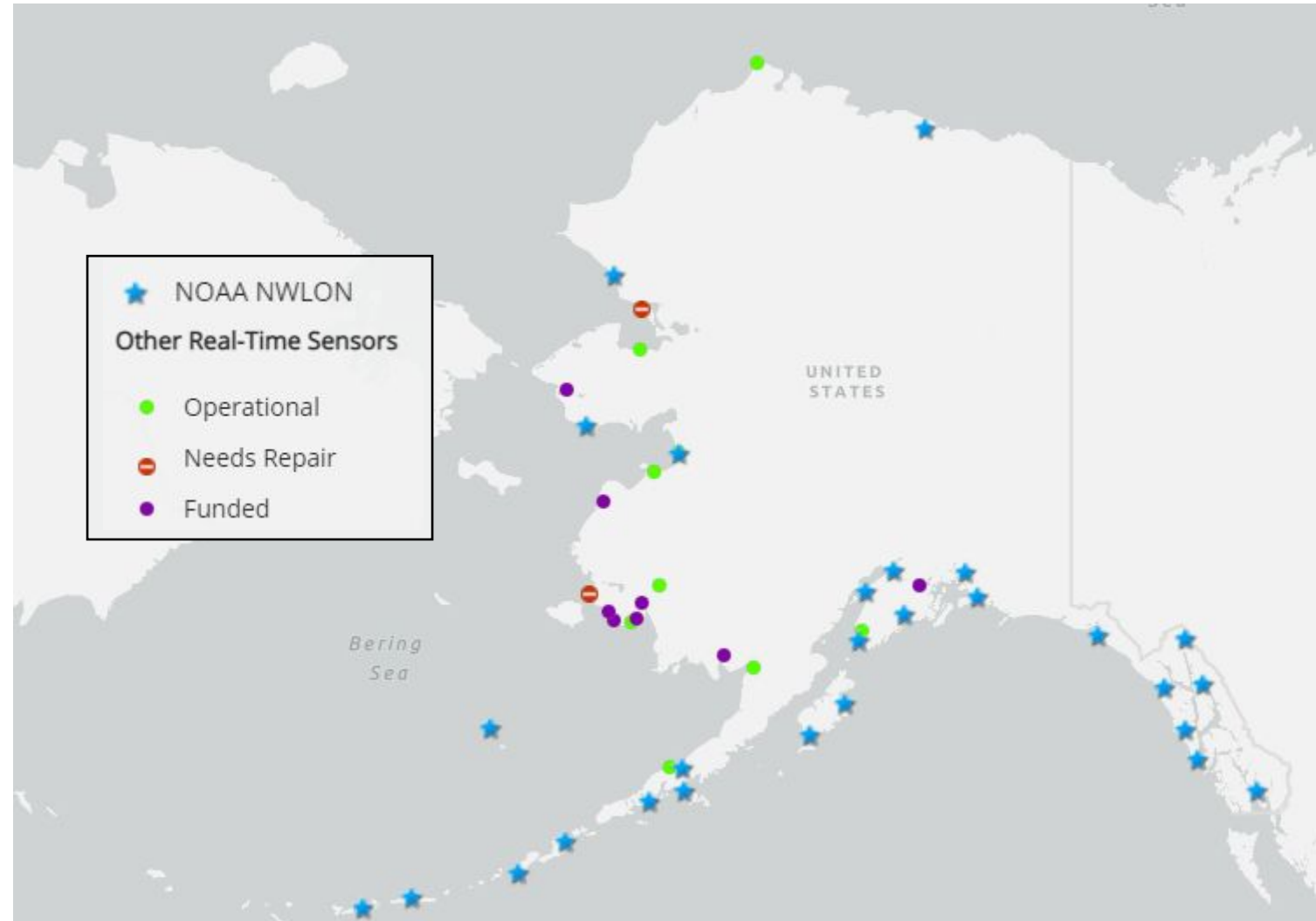
2021 Updates Funded through the Alaska Ocean Observing System

- Dillingham coming online soon
- Kwigillingok iGage installation
- Deering iGage repair
- Nelson Lagoon iGage repair
- Utqiagvik GNSS-R installation



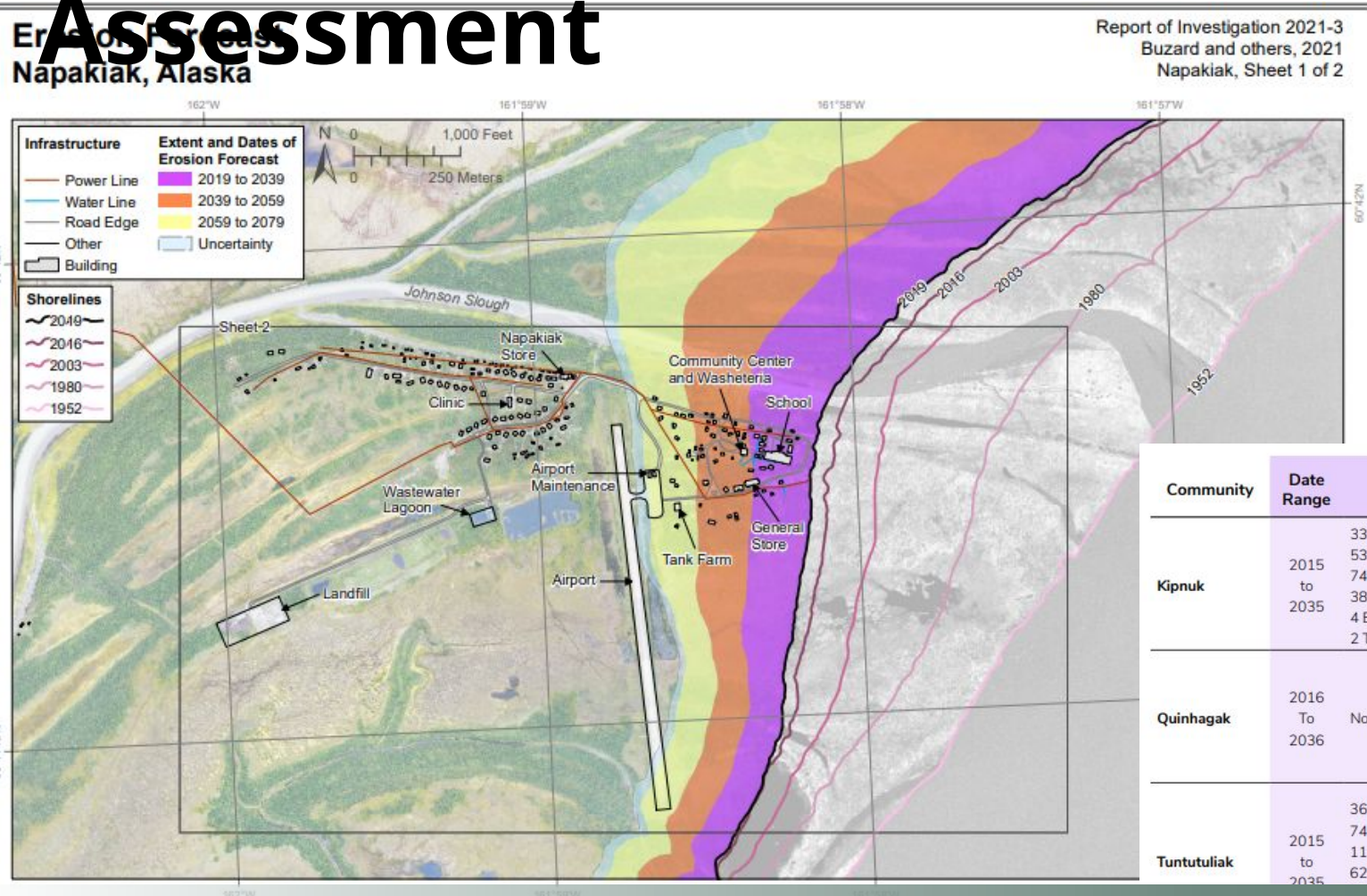
This map is updated at <https://arcg.is/Xf4j9>

Real-time Water Level Sensors



Using Data to Create Products: Erosion

Assessment



Community	Date Range	Quantity of Exposed Infrastructure	Date Range	Quantity of Exposed Infrastructure	Date Range	Quantity of Exposed Infrastructure	Other
Kipnuk	2015 to 2035	333 LF Power Line	2035 to 2055	768 LF Power Line	2055 to 2075	837 LF Power Line	n/a
		537 LF Fuel Line		340 LF Fuel Line		210 LF Fuel Line	
Quinhagak	2016 To 2036	741 LF Road & Boardwalk	2036 to 2056	1,781 LF Road & Boardwalk	2056 to 2076	79 LF Water Line	Floodplain 32 Buildings 3,398 LF Power 1,123 LF Water 8,071 LF Road 1 City Dock
		38,850 SF Barge Landing		3,480 SF Barge Landing		1,928 LF Road & Boardwalk	
Tuntutuliak	2015 to 2035	4 Buildings	2035 to 2055	9 Buildings	2055 to 2075	17 Buildings	n/a
		2 Tank Facilities		1 Tank Facility		17 Buildings	
Tuntutuliak	2015 to 2035	367 LF Power Line	2035 to 2055	400 LF Power Line	2055 to 2075	505 LF Power Line	n/a
		74 LF Fuel Line		245 LF Fuel Line		199 LF Fuel Line	
Tuntutuliak	2015 to 2035	110 LF Water Line	2035 to 2055	331 LF Water Line	2055 to 2075	362 LF Water Line	n/a
		622 LF Boardwalk		1,466 LF Boardwalk		946 LF Boardwalk	
Tuntutuliak	2015 to 2035		2035 to 2055	23,256 SF Barge Landing	2055 to 2075	145,237 SF Barge Landing	n/a

2022 Digital Coast Fellowship

Harnessing Energy on Alaska Coastal Mapping Initiatives to Support Resilient Coastal Communities

Bolster communication networks with Alaskan stakeholders to map 66,000 miles of rugged coastline, seeking engagement, inclusion, and equity among growing local, tribal, state, federal, and private partnerships which enhance data sharing and access.

House within Alaska Geospatial Council and National States Geographic Information Council. Once fellow selection process completed, start August 2022.



Applications due January 21:

<https://coast.noaa.gov/fellowship/digitalcoast.html>



VDatum Update

Stephen White, NOAA RSD

December 1st, 2021 | Virtual

VDatum

Vertical Datum Transformation Tool

Stephen A. White

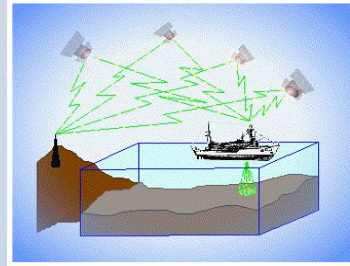
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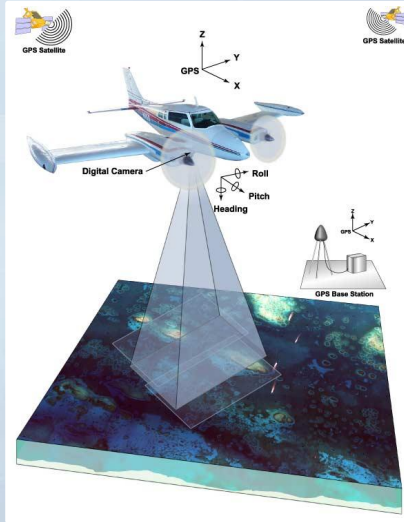
National Oceanic and Atmospheric Administration

What Vertical Datum is My Data in?

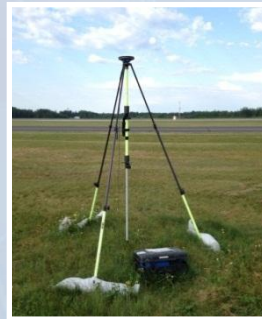
Ellipsoidal Datums



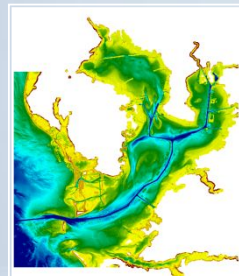
RTK-GPS vertical
referencing
Hydrographic Surveys



Lidar



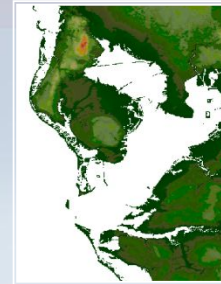
GPS



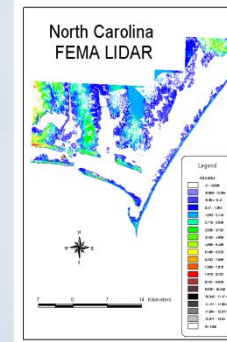
NOAA Bathymetry
(MLLW)



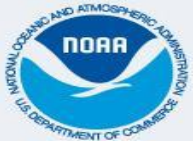
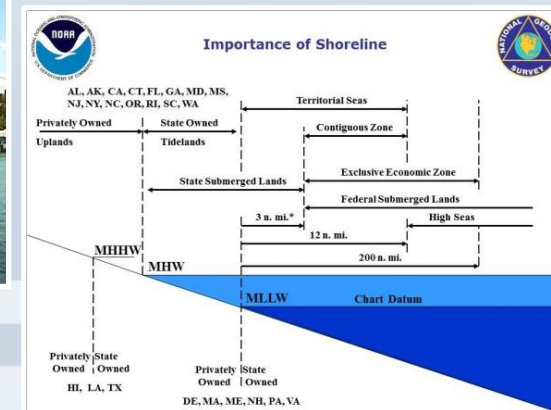
Orthometric Datums



USGS
Topography



Tidal Datums



All elevation data is referenced to a vertical datum.

BUT there are a many different vertical datums in use around the nation

Relationship of vertical datums for Tampa Bay:

86.39 ft	WGS 84 (G873)	26.33 m
81.33 ft	NAD 83 (86)	24.79 m
0.792 ft	MHHW	0.241 m
0.409 ft	MHW	0.125 m
0.0 ft	NAVD 88	0.0 m
-0.535 ft	LMSL	-0.163 m
-0.850 ft	NGVD 29	-0.259 m
-1.495 ft	MLW	-0.456 m
-1.919 ft	MLLW	-0.585 m

For elevation data sets to be blended together they must be referenced to same vertical datum.

ITRF,
WGS 84,
NAD 83 (NSRS)



Ellipsoid Datums

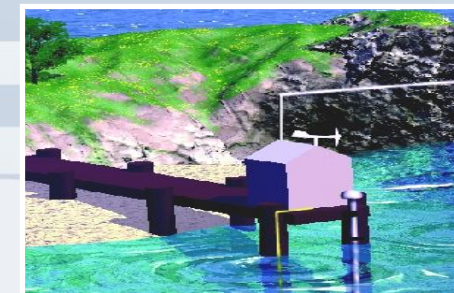
NAVD 88,
NGVD 29

Orthometric Datums



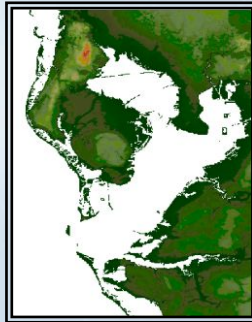
MHHW, MHW,
MTL, DTL,
LMSL,
MLW, MLLW

Tidal Datums

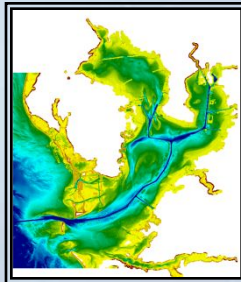


Development and Use of VDatum

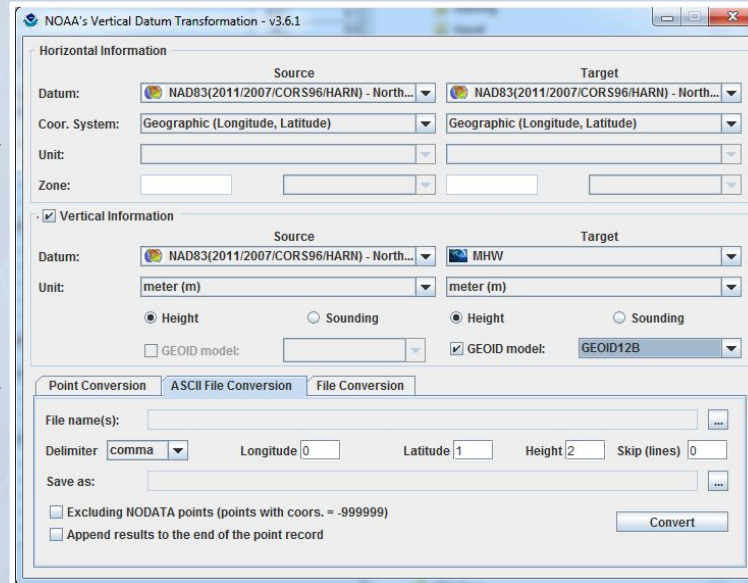
Mapping the Land-Sea Interface:
VDatum converts elevation data (heights and soundings) among different vertical datums



USGS Topography

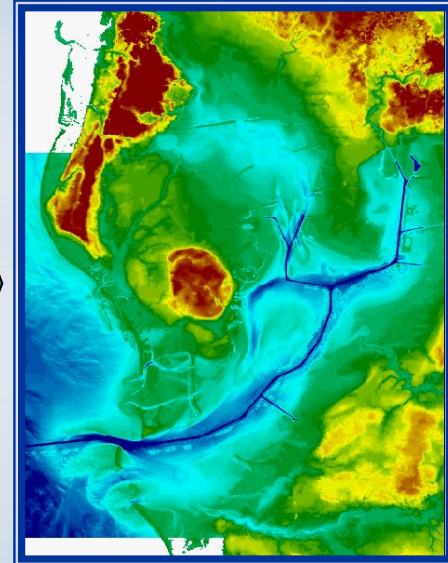


NOAA Bathymetry



The screenshot shows the NOAA's Vertical Datum Transformation - v3.6.1 application window. It is divided into several sections:

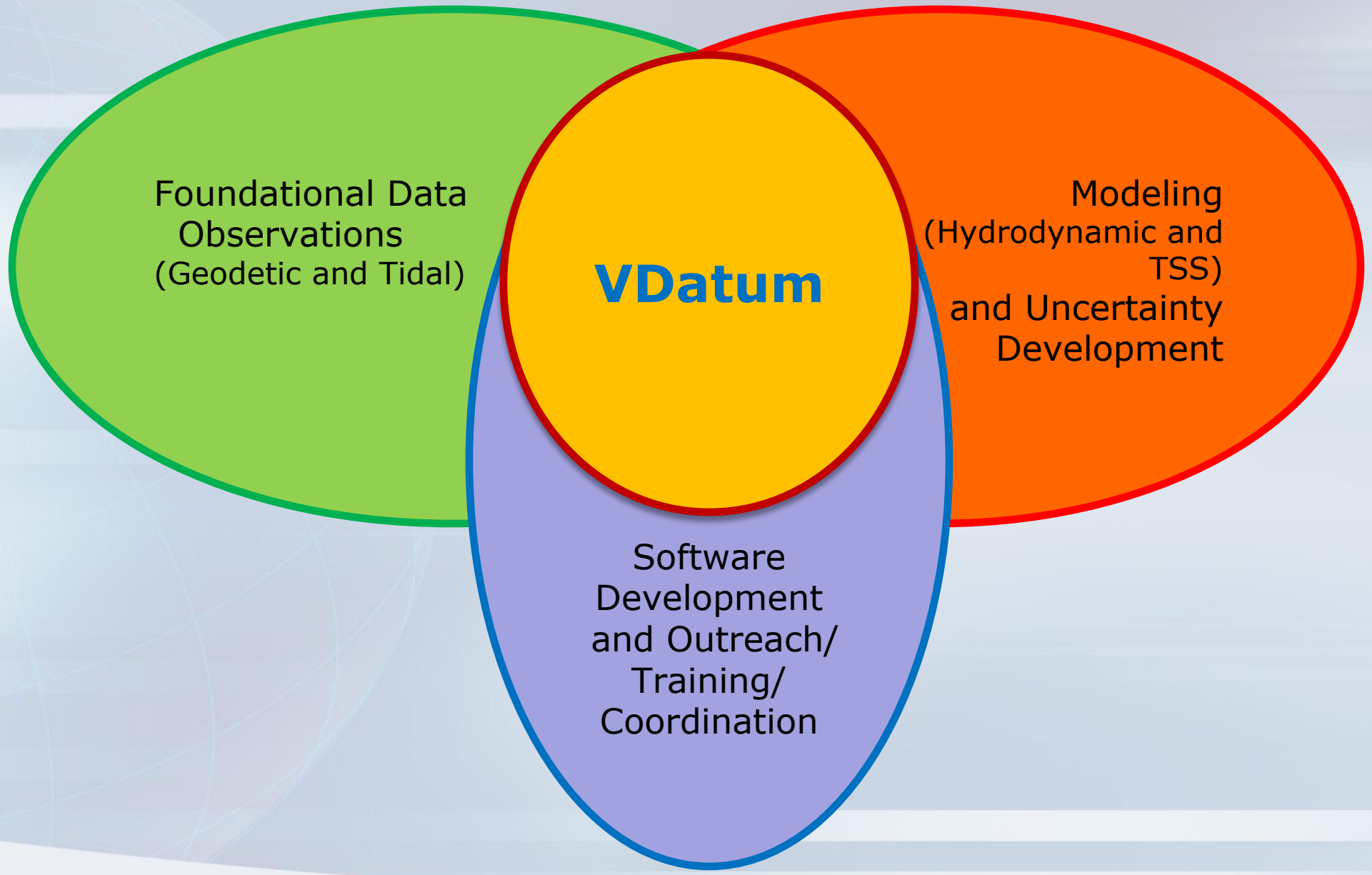
- Horizontal Information:** Source and Target datums are both set to NAD83(2011/2007/CORS96/HARN) - North... The coordinate system is Geographic (Longitude, Latitude) for both. Units and zones are empty.
- Vertical Information:** The 'Vertical Information' checkbox is checked. Source datum is NAD83(2011/2007/CORS96/HARN) - North... and the target is MHW. Units are set to meter (m). Source is set to Height and target is also set to Height. The GEOID model is set to GEOID12B.
- Conversion Options:** There are tabs for Point Conversion, ASCII File Conversion, and File Conversion. The File Conversion tab is active.
- File Conversion Settings:** File name(s) is empty. Delimiter is set to comma. Longitude, Latitude, Height, and Skip (lines) are all set to 0. Save as is empty.
- Options:** There are checkboxes for 'Excluding NODATA points (points with coords. = -999999)' and 'Append results to the end of the point record', both of which are unchecked.
- Buttons:** A 'Convert' button is located at the bottom right.



VDatum is a Java application developed jointly by :

- National Geodetic Survey (NGS)
- Office of Coast Survey (OCS)
- Center for Operational Oceanographic Products & Services (CO-OPS)





VDatum Website: vdatum.noaa.gov

(Version 4.3, September 22, 2021)

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

VERTICAL DATUM TRANSFORMATION

INTEGRATING AMERICA'S ELEVATION DATA

Home About VDatum Download Online Docs & Support Contact Us

Welcome to VDatum!

VDatum is a free software tool being developed jointly by NOAA's National Geodetic Survey (NGS), Office of Coast Survey (OCS), and Center for Operational Oceanographic Products and Services (CO-OPS). VDatum is designed to vertically transform geospatial data from a variety of tidal, orthometric and ellipsoidal vertical datums - allowing users to convert their data from different horizontal/vertical references into a common system and enabling the fusion of diverse geospatial data in desired reference levels.

Download

Download the newest VDatum (v3.6.1) and its datasets.

Animated tutorial!

The VDatum Demonstration Project in Tampa Bay, Florida

NOAA Bathymetry USGS Topography

Vertical Datum Transformation

Features

VDatum software is written in Java, so it runs on Mac OS X, Unix, VMP, and Windows. Where available and uncertainties are established, VDatum supports the conversions among following:

- Coordinate Systems:** Geographic, UTM, State Plane Coordinates (SPC), and geocentric (ECEF)
- Horizontal Datums:** NAD27, NAD83(1986), and NAD83(HARN); and ellipsoidal datums such as ITRF, WGS84, and NAD83 serializations
- Vertical Datums:**
 - Ellipsoidal Datums:** NAD83, WGS84, ITRF88, ITRF89, ITRF90, NEOS 90, PNEOS 90, ITRF91, ITRF92, SIO/MIT 92, ITRF93, ITRF94, ITRF96, ITRF97, IGS97, ITRF2000, IGS00, IGB00, ITRF2005, IGS05, ITRF2008, IGS08, WGS84(transit), WGS84(G730), WGS84(G873), WGS84(G1150), WGS84(G1674), NAD83(PACP00), NAD83(MARP00)
 - Orthometric Datums:** NAVD88, NGVD29, PRVD02, VIVD09, ASVD02, GUV04, NMVD03, HAWAII EGM2008, EGM1996, and EGM1984
 - Tidal Datums:** MLLW, MLW, LMSL, DTL, MTL, MHW, LWD, and MHHW
 - IGLD85
- GEOID models:** GEOID12B, GEOID12A, GEOID09, GEOID06 (Alaska only), GEOID03, GEOID99, and GEOID96
- EGM models:** EGM2008, EGM1996, and EGM1984
- Supported file format:** text(ASCII), LIDAR(.LAS) version 1.0 to 1.2, ESRI ASCII Raster(.ASC), and ESRI 3D shapefile

NOAA's Vertical Datum Transformation - v3.6.1

Horizontal Information

Source Target

Datum: NAD83(2011/2007/CORS96(HARN)) - North... NAD83(2011/2007/CORS96(HARN)) - North...

Coor. System: UTM (Easting, Northing) UTM (Easting, Northing)

Unit: meter (m) meter (m)

Zone: 18 18

Vertical Information

Source Target

Datum: NAD83(2011/2007/CORS96(HARN)) - North... MHW

Unit: meter (m) meter (m)

Height Sounding Height Sounding

GEOID model: GEOID model: GEOID12B

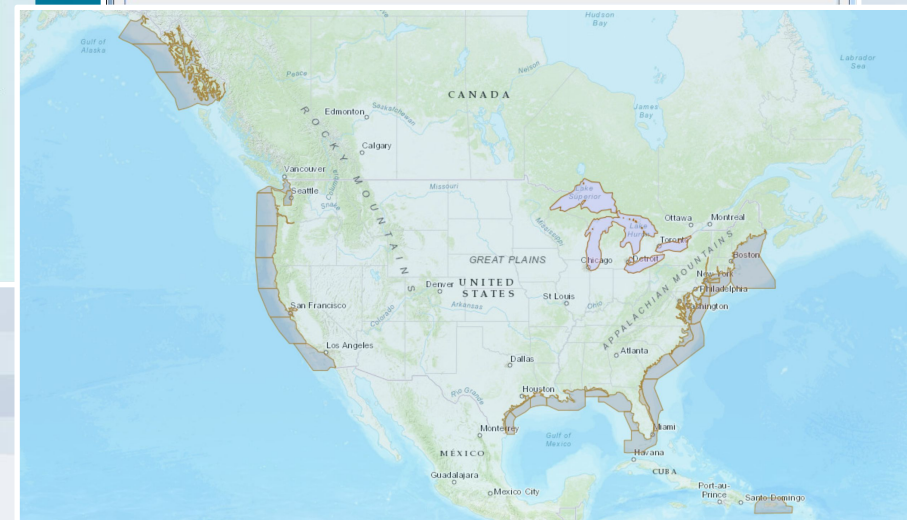
Point Conversion ASCII File Conversion File Conversion

Input **Output**

Easting: [] Convert Easting: [] File Report to DMS

Northing: [] Reset Northing: [] Vertical Uncertainty

Height: [] DMS Height: []



National Oceanic and Atmospheric Administration

VDatum: Interfaces

VDatum API Documentation

VDatum API Documentation describes how to use the APIs and includes code samples.

JSON - Tidal API

- Response Elements
- Request URL
- Request parameters
- Sample URL requests and responses

Response Elements

Element	Description
src_horizontal_frame	Source Horizontal Reference Frame.
src_vertical_frame	Source Vertical Reference Frame.
src_vertical_unit	Source Vertical Unit.
src_vertical_geoid	Source Vertical GEOID model.
src_lon	Source Longitude.
src_lat	Source Latitude.
src_height	Source Height.
tar_horizontal_frame	Target Horizontal Reference Frame.
tar_vertical_frame	Target Tidal Frame.
tar_vertical_unit	Target Vertical Unit.
tar_vertical_geoid	Target Vertical GEOID model.
tar_lon	Target Longitude.
tar_lat	Target Latitude.
tar_height	Result Target Height.

Request URL

[https://vdatum.noaa.gov/vdatumweb/apitidal/?lon=\[&lat\]\[&height\]\[&s_h_frame\]\[&s_v_frame\]\[&s_v_unit\]\[&s_v_geoid\]\[&t_v_frame\]\[&t_v_unit\]](https://vdatum.noaa.gov/vdatumweb/apitidal/?lon=[&lat][&height][&s_h_frame][&s_v_frame][&s_v_unit][&s_v_geoid][&t_v_frame][&t_v_unit])

VDatum Command-line User Guide

On This Page

- Point Conversion
- File Conversion

This User Guide describes how to run VDatum version 3.x without the graphical user interface.

Once you download VDatum software and its transformation grids, your computer is ready to transform geospatial data among several horizontal and vertical datums.

General syntax:

- For running VDatum with the graphical user interface:
`java -jar vdatum.jar`
- For help:
`java -jar vdatum.jar -help`
- For converting without GUI:
`java -jar VDatum.jar <georeferencing_parameters> [<point_conversion>] [<file_conversion>]`

Georeferencing Parameters

Syntax:

`horz:<source horizontal datum>[:<coordinate system>:<units>:<zzone>] [vert:<source vertical datum>[:<unit>[:<height/sounding>[:<geoid>]]]] [ohorz:<target horizontal datum>[:<coordinate system>:<units>:<zzone>] [overt:<target vertical datum>[:<unit>[:<height/sounding>[:<geoid>]]]]`

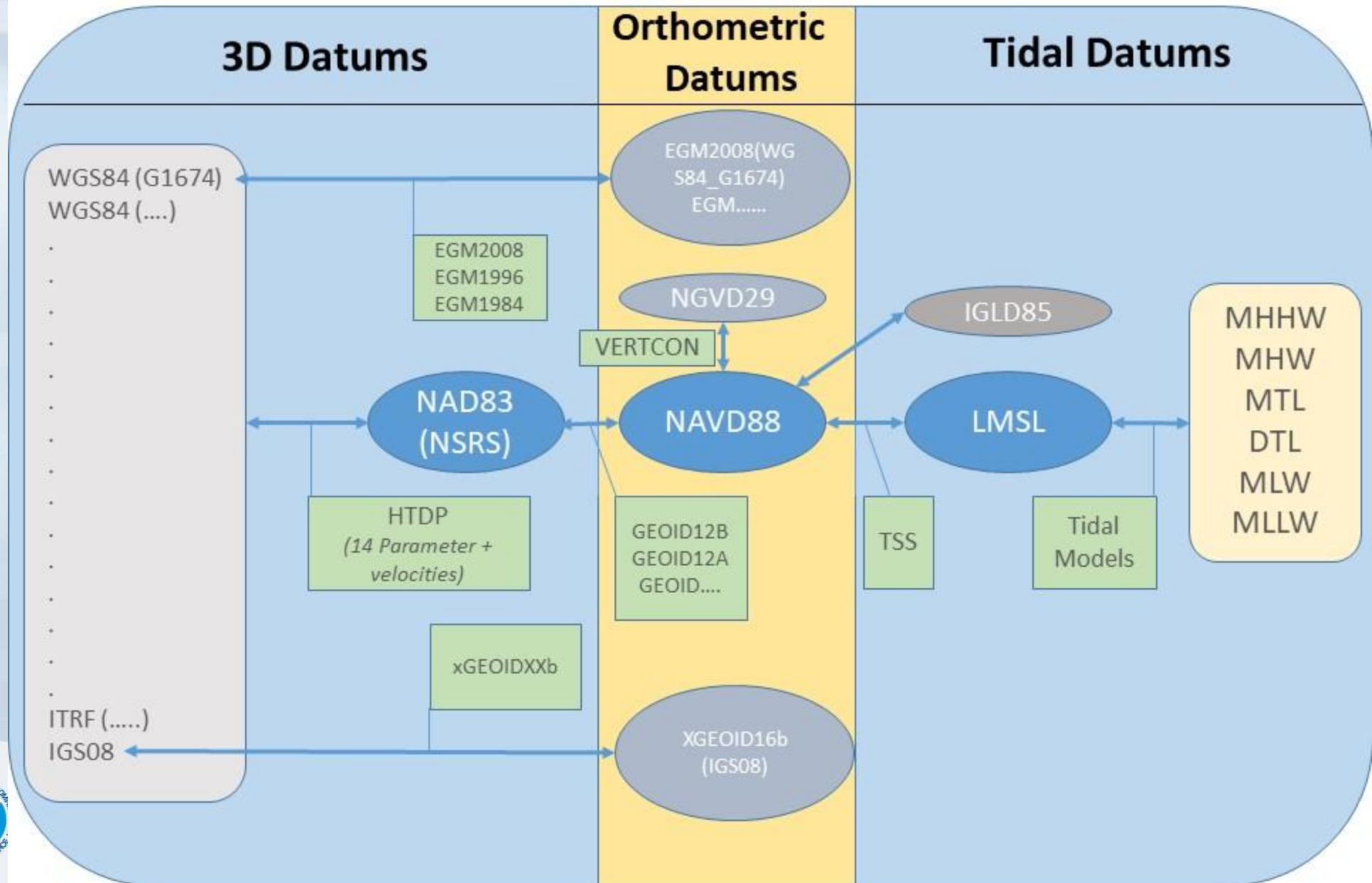
where:

Parameter	Description
ihorz	Provides details about horizontal information of the source data.
ivert	Provides details about vertical information of the source data. If omitted, the transform is considered to be 2-dimension.
ohorz	Provides details about target horizontal information. If omitted, result will be horizontally referenced in NAD83, geographic coordinates. When specify ohorz:ihorz , results are considered to be horizontally referenced exactly as source. This is especially for LIDAR conversion with source and target data are in State Plane coordinate system.
overt	Provides details about vertical information of the source data. If omitted, the transform is considered to be 2-dimension.
<coordinate system>	Either geo , utm , spc or xyz , corresponding to geographic coordinates, UTM coordinates, State Plane coordinates or geocentric coordinates. If omitted, the geographic coordinate system with horizontal coordinates in degrees (i.e., geo:deg) are used.

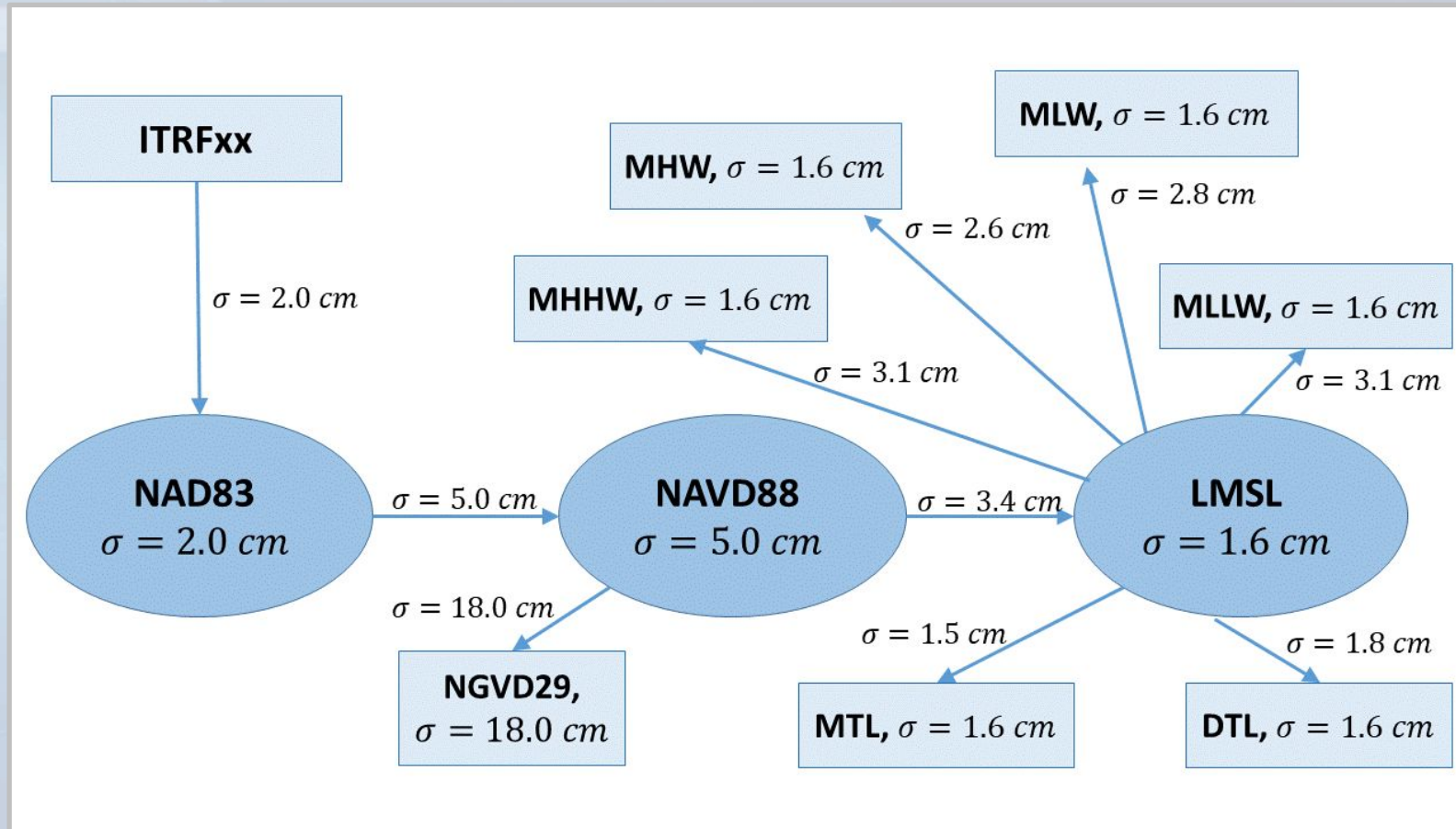


National Oceanic and Atmospheric Administration

Vertical Datum Transformation “Roadmap”



VDatum Uncertainty Modeling



See: vdatum.noaa.gov/docs/est_uncertainties.html



What's Next: *Strategic Priorities*

- Create Consistency between Regional Models
- Reducing Regional Model Uncertainty to <10cm
- Increasing Coverage
- Next Generation TSS Model (utilizing gravimetric GEOID transformation roadmap) – ***GNSS on Tidal Benchmarks***
- Spatially Varying Uncertainty
- Software Development

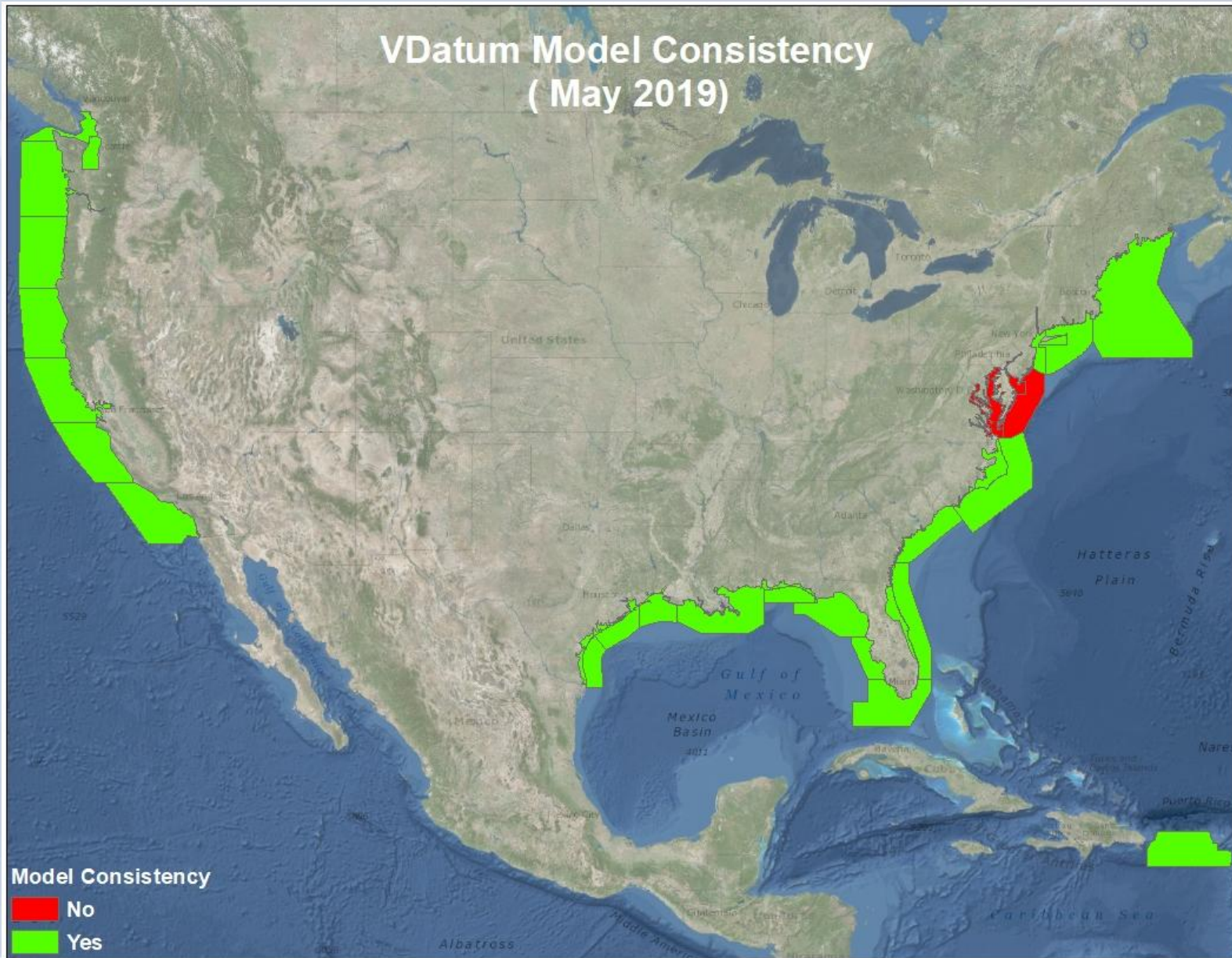


VDatum Needs for Alaska

- **Foundational Data needs to be acquired before model development can be initiated:**
 - **Water Level Observations** (with GNSS ellipsoidal ties)
 - **Geodetic GNSS Ellipsoidal Observations** on tidal benchmarks at historical Water Level Observation sites throughout the state
- **Model Development**
 - Processing, Ingestion, and Publication of Water Level and Geodetic Observations for NOAA acceptance into development.
 - Hydrodynamic Development and Simulations (Tidal Datums)
 - Topography of the Sea Surface Development (TSS)
 - Spatially Varying Uncertainty Development
 - Software Integration
- **Iterative Version Development (Future)**
 - As we learn what issues present themselves after model development and uncertainty analysis, additional data (Bathymetry, Shoreline, Foundational Water Level and Geodetic Data needs) maybe needed for an iterative approach to revisions for enhanced coverage and decrease of uncertainties for users needs.

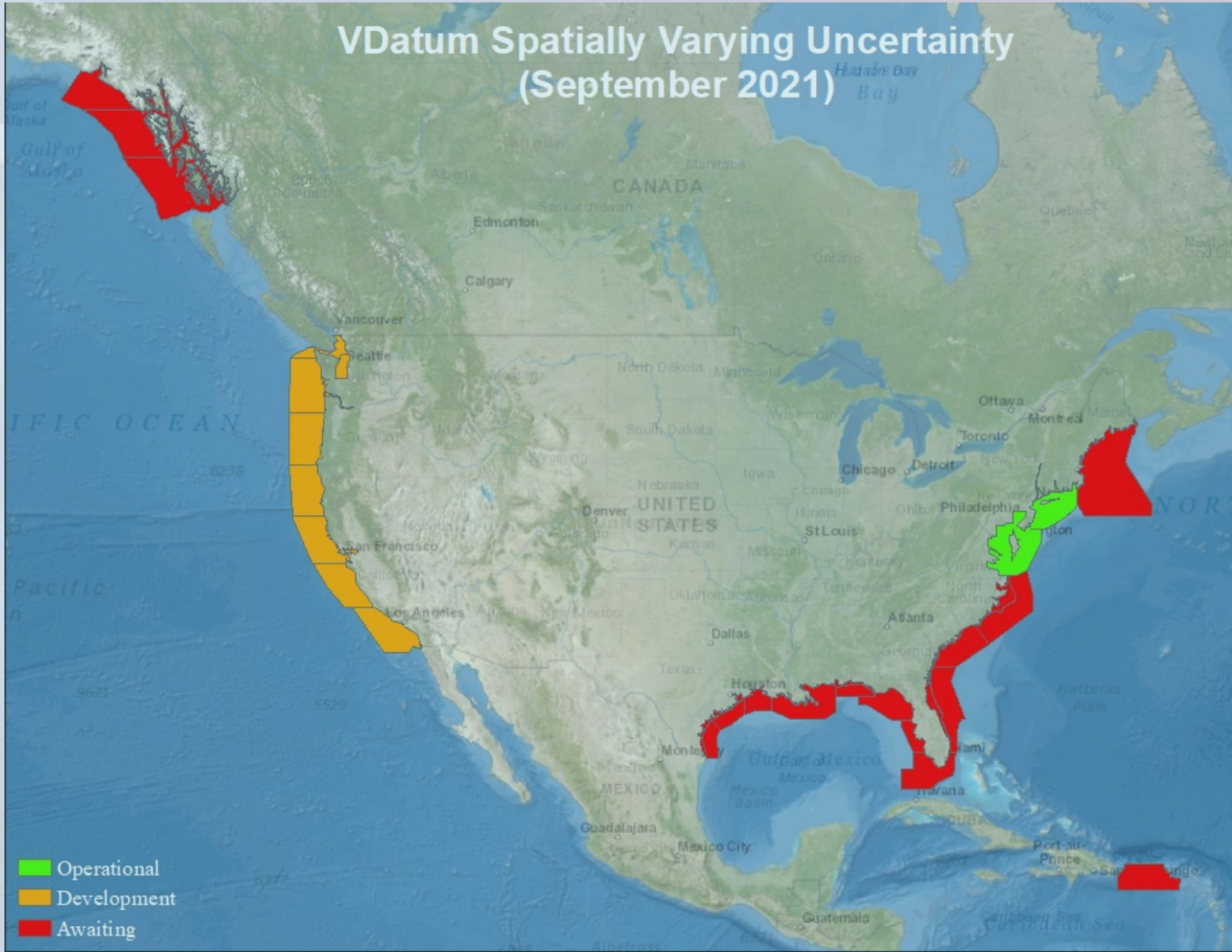


VDatum Model Consistency (May 2019)



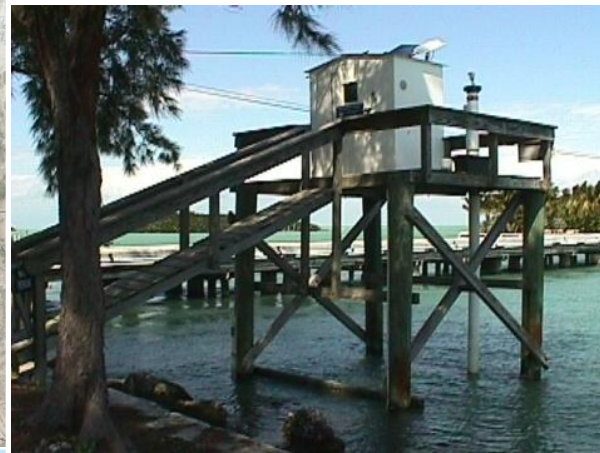
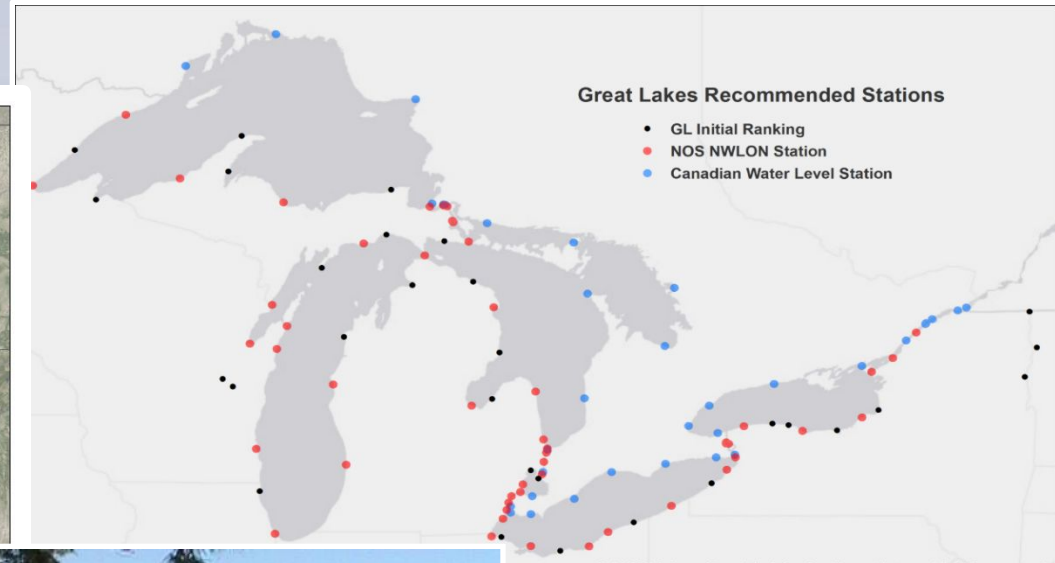
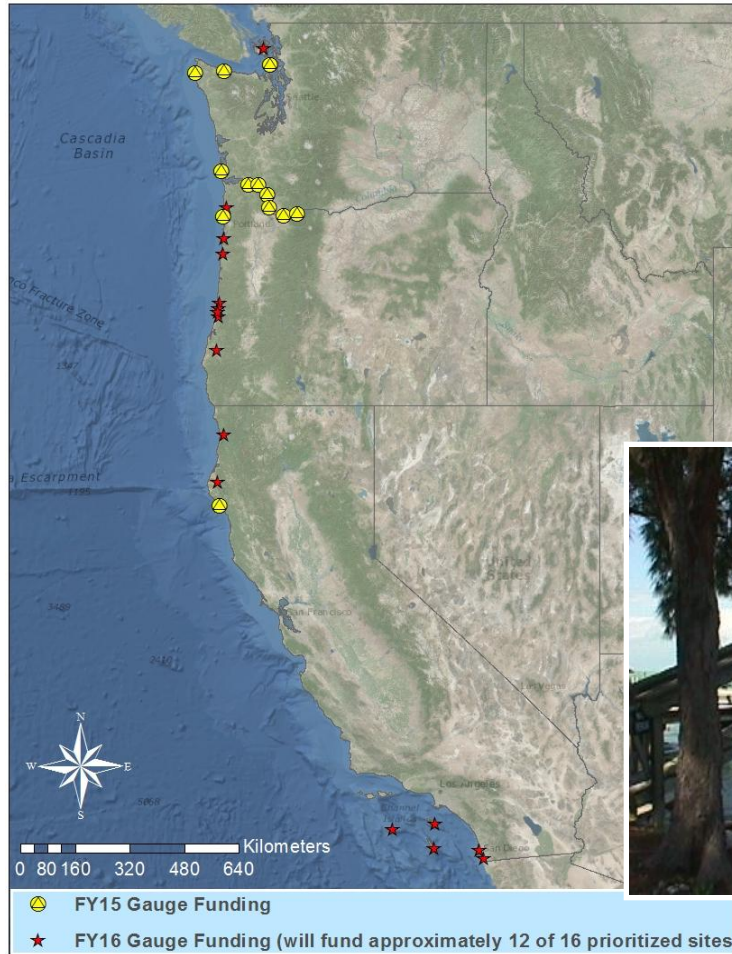
National Oceanic and Atmospheric Administration

VDatum Spatially Varying Uncertainty (September 2021)



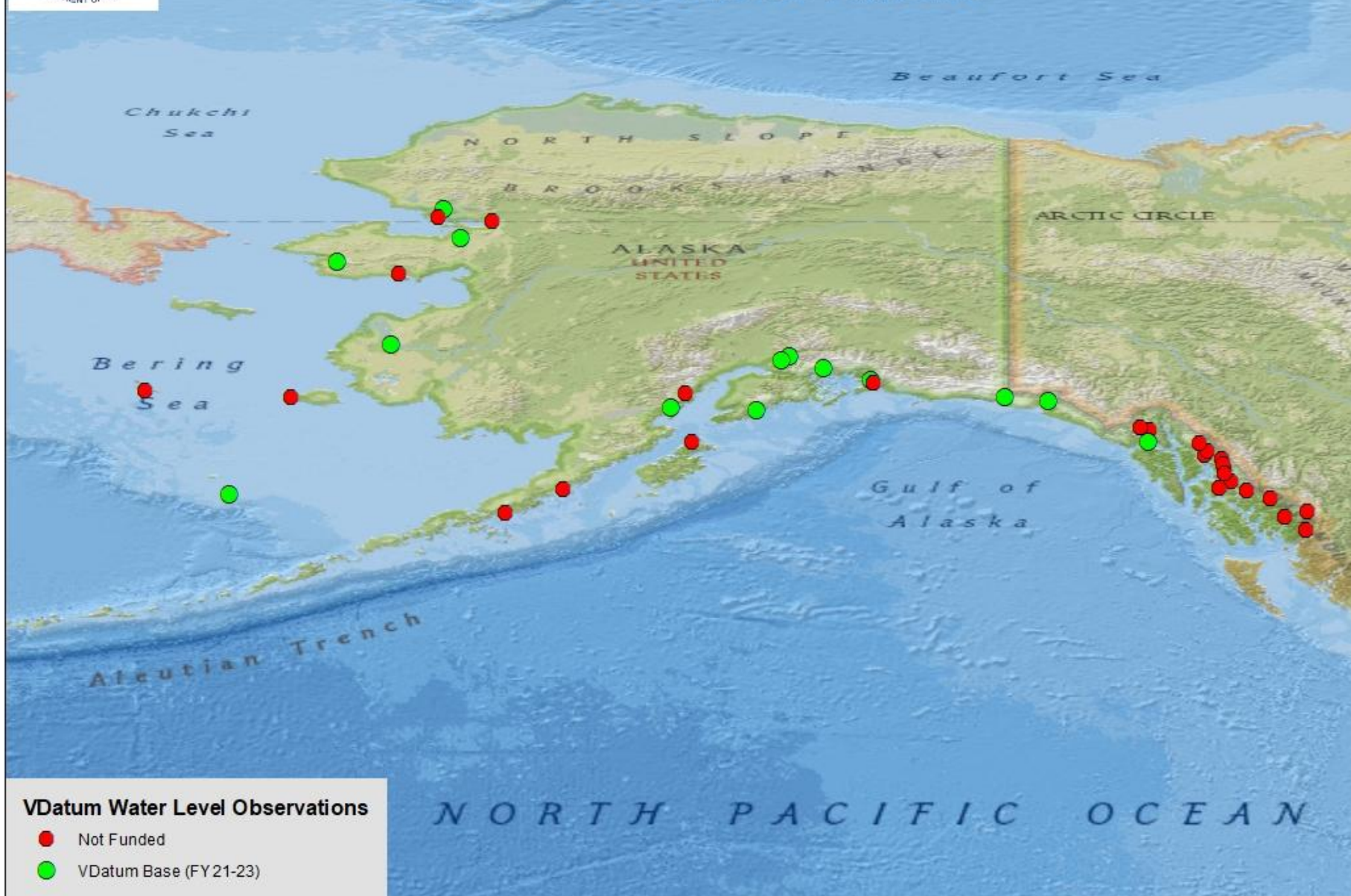
National Oceanic and Atmospheric Administration

Foundational Data: Tidal





VDatum Prioritized List of 40 Water Level Observations

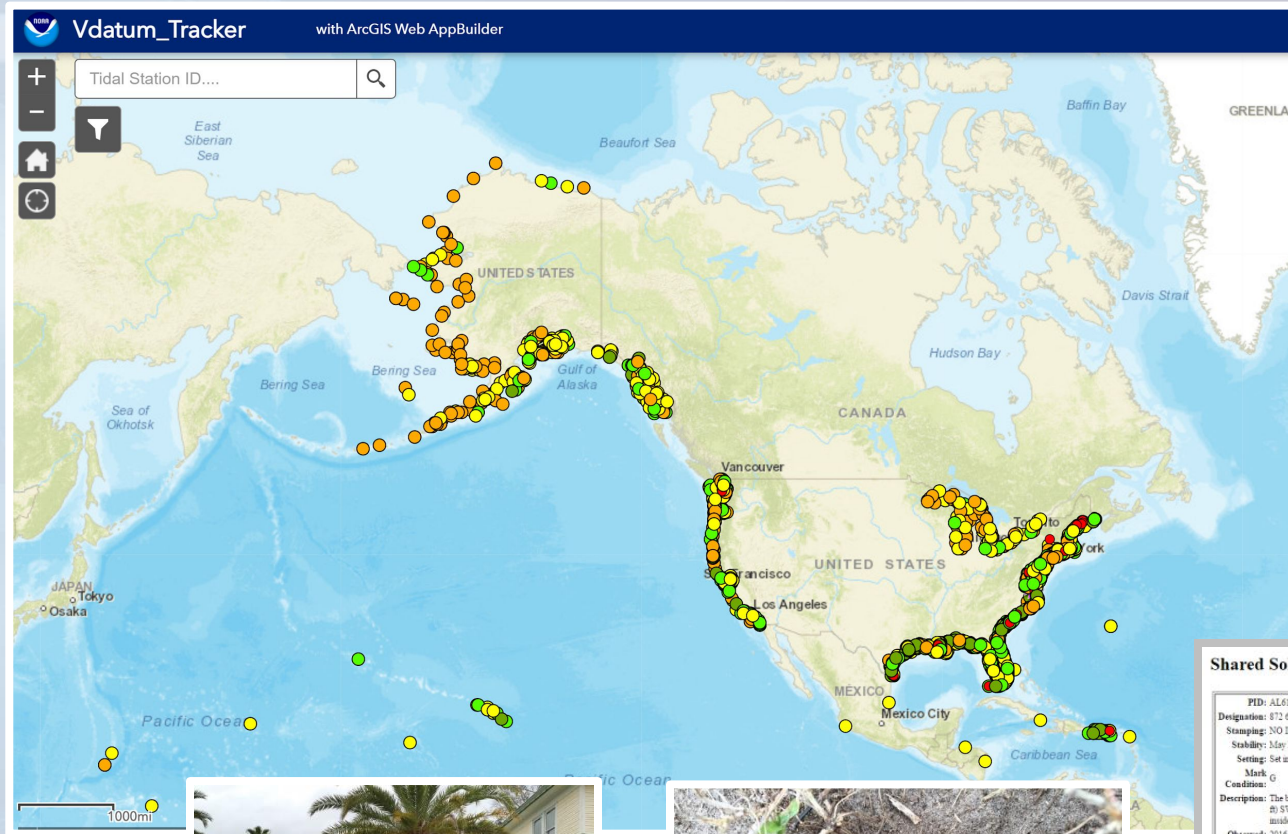


VDatum Water Level Observations

- Not Funded
- VDatum Base (FY 21-23)



Foundational Data: Geodetic



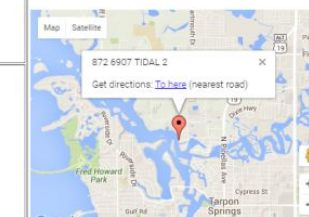
Shared Solution

PID: AL6199
 Designation: 872 6907 TIDAL 2
 Stamping: NO II
 Stability: May hold commonly subject to ground movement
 Setting: Set in top of concrete monument
 Mark: G
 Condition: G
 Description: The bench mark is a disk set in the top of a concrete monument, 3.66 m (12.0 ft) SW of the SW corner of the Bradley's two story frame house, located at the inside corner of sidewalk, below the grass.
 Observed: 2016-02-06T16:08:00Z [See Also 1293](#)
 Source: OPUS - page 1209.04



REF FRAME	NAD_83(2011)	EPOCH	2010.0000	SOURCE	NAVD83 (Computed using GEOID12B)	UNITS	m	SET PROFILE	DETAILS
LAT:	28° 9' 34.27151"				0.012 m	UTM 17	SPC 90Z(FL W)		
ELL HT:	-23.168				0.005 m				
NORTHING:	3116136.433m				124655.519m				
EASTING:	326489.766m				-0.36206031"				
CONVERGENCE:					0.99997158				
POINT SCALE:					1.00001121				
COMBINED FACTOR:					0.99997522				
ORTHO HT:	1.932				0.040 m				

CONTRIBUTED BY
[stephen a white](#)
 National Geodetic Survey

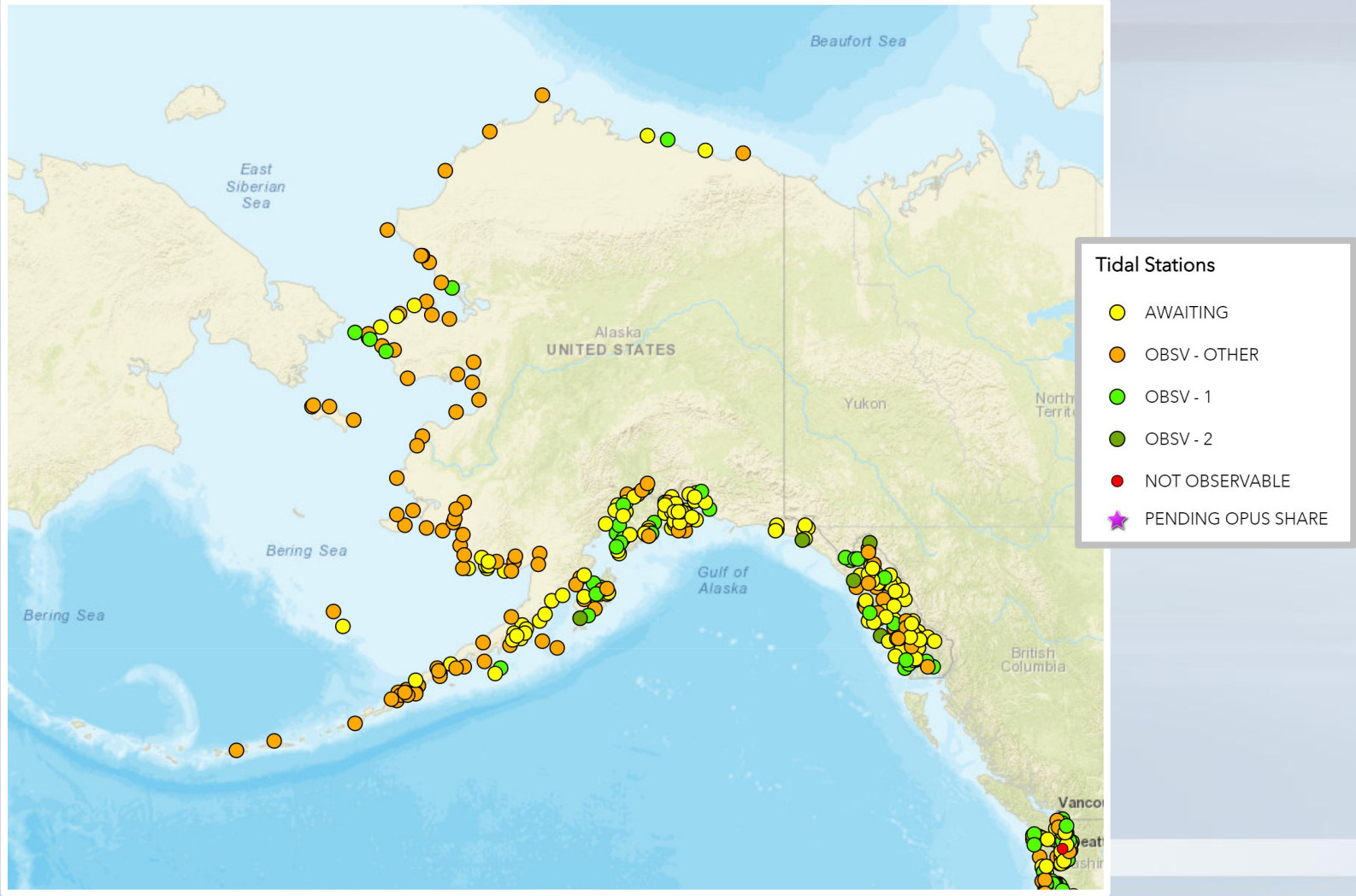


The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the info

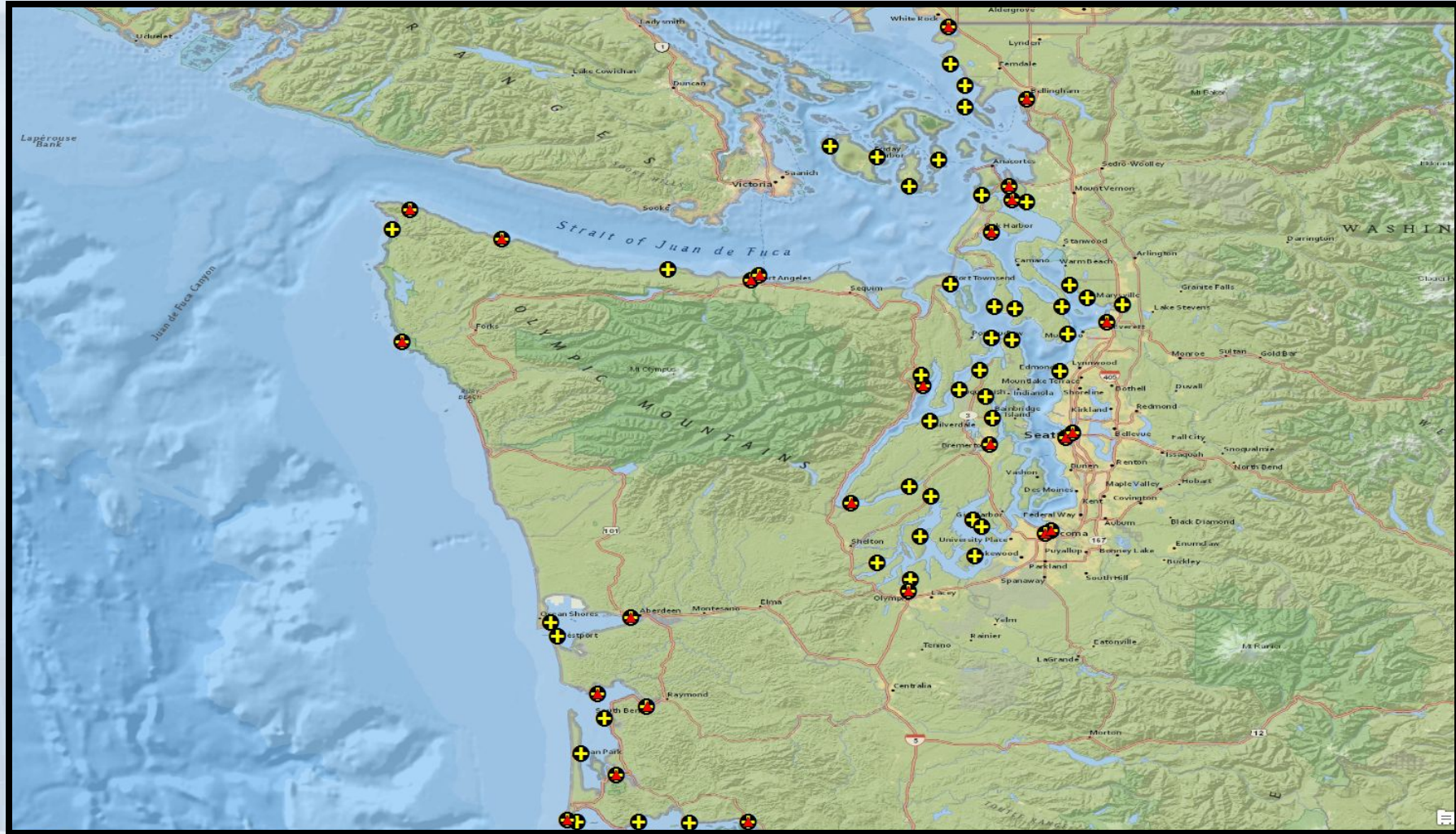


National Oceanic and Atmospheric Administration

Foundational Data: Geodetic

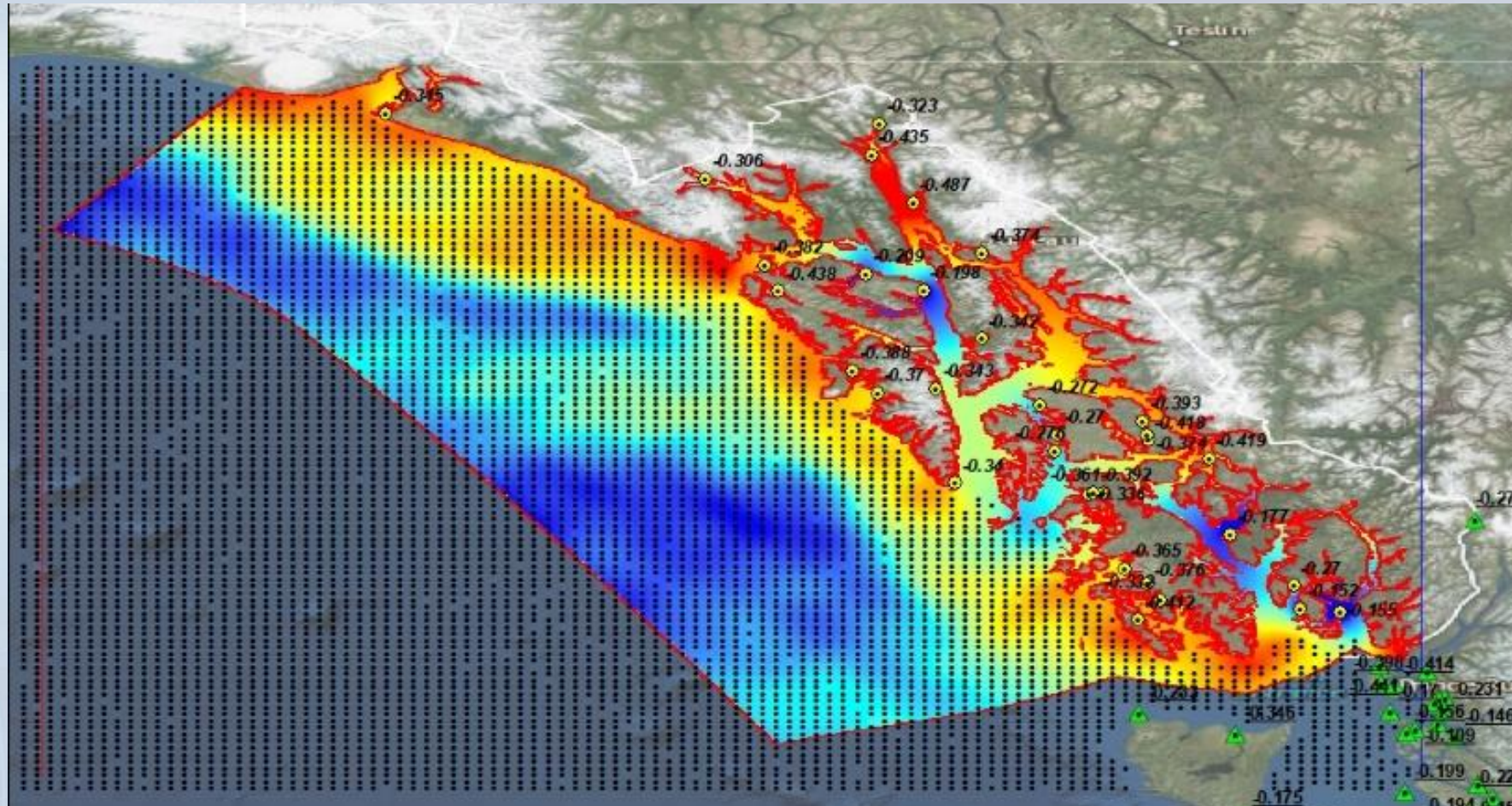


Hydrodynamic vs. TSS Modeling



National Oceanic and Atmospheric Administration

Southeast Alaska (Released 2019)



National Oceanic and Atmospheric Administration

Spatially Varying Uncertainty

(Phase 2: Transition to Operations)

Table 2. The regression equations and parameters for estimating uncertainties in tidal datums for Mean Low Water (from Bodnar, 1981)

$$S1M = 0.0068 \text{ ADLWI} + 0.0053 \text{ SRGDIST} + 0.0302 \text{ MNR} + 0.029$$

$$S3M = 0.0043 \text{ ADLWI} + 0.0036 \text{ SRGDIST} + 0.0255 \text{ MNR} + 0.029$$

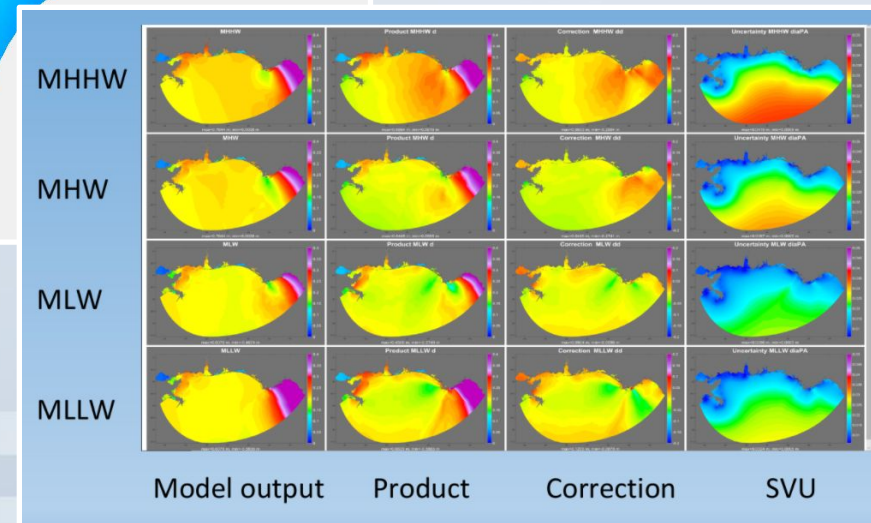
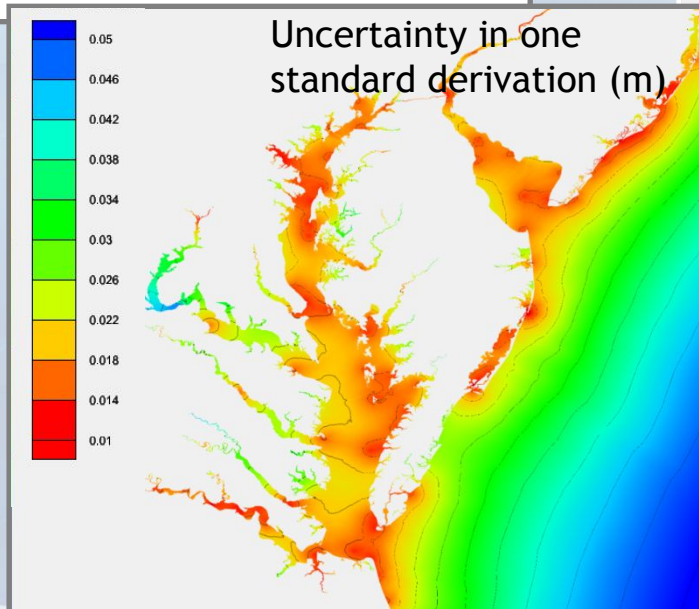
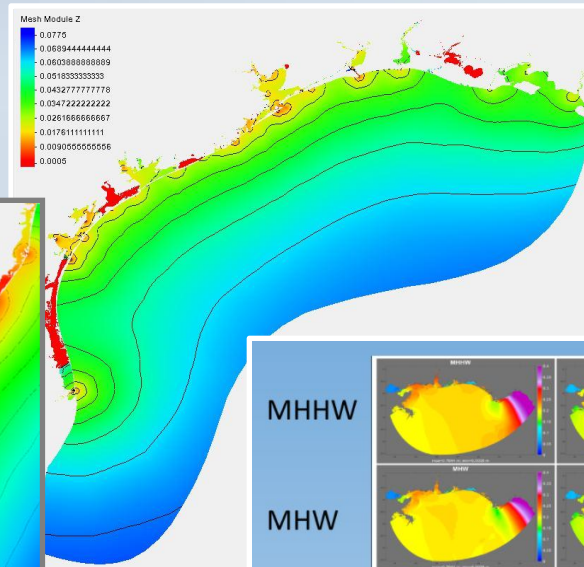
$$S6M = 0.0019 \text{ ADLWI} + 0.0023 \text{ SRGDIST} + 0.0207 \text{ MNR} + 0.030$$

$$S12M = 0.0045 \text{ SRSMN} + 0.128 \text{ MNR} + 0.025$$

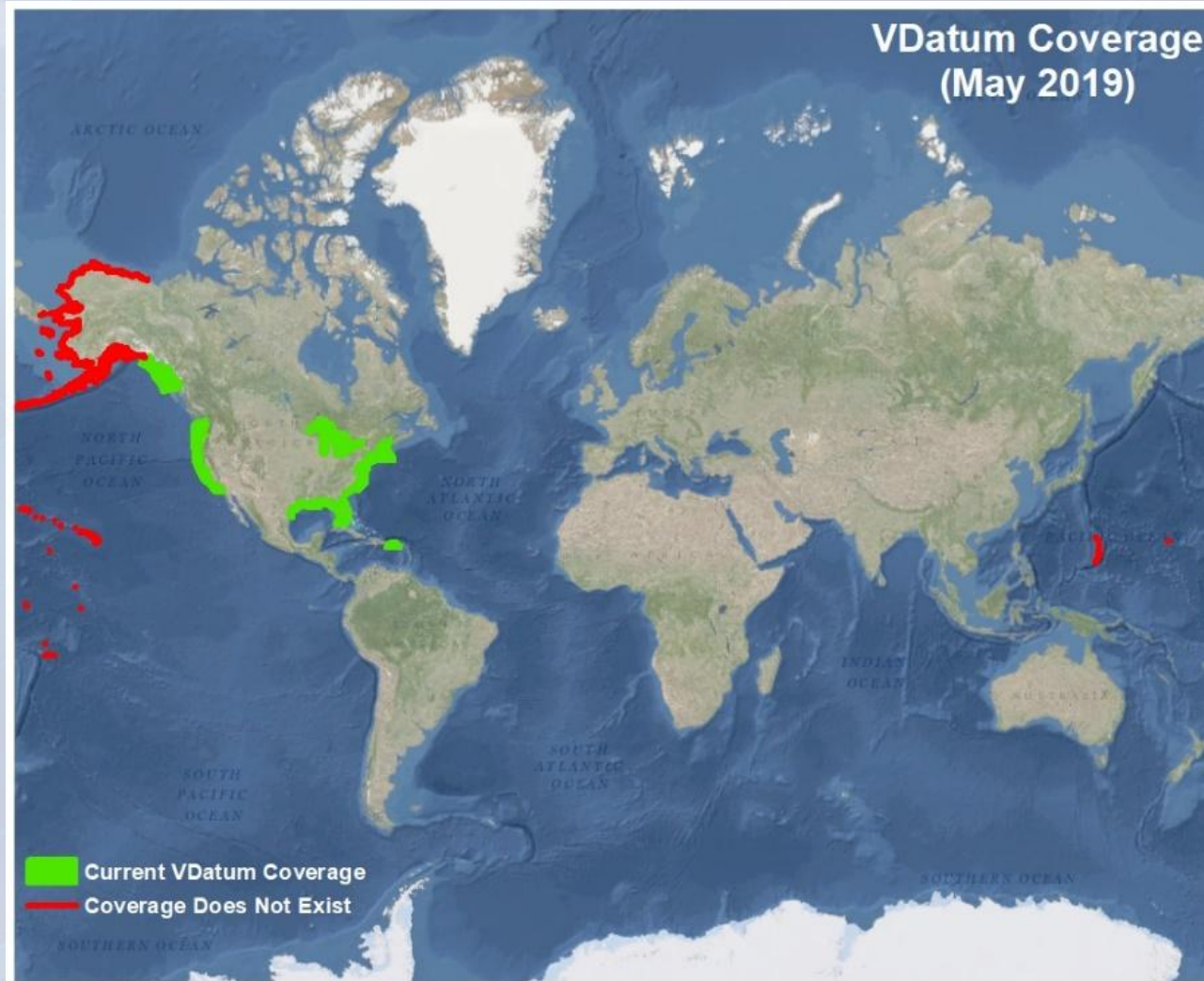
Where:

S is the standard deviation (in feet).
 M is the number of months of subordinate station observation.
 $ADLWI$ is the absolute time difference of the Low Water Intervals between control and subordinate stations (in hours).
 $SRGDIST$ is the square root of the geographic distance between control and subordinate stations (in nautical miles).
 MNR is a mean range ratio that is defined as the absolute value of the difference in mean range between control and subordinate stations divided by the mean range of tide at the control station (using range values in feet), and
 $SRSMN$ is the square root of the sum of the mean ranges at the control and subordinate stations (in feet).

- Statistical data assimilation is used to blend model results and data, also providing the associated uncertainty.



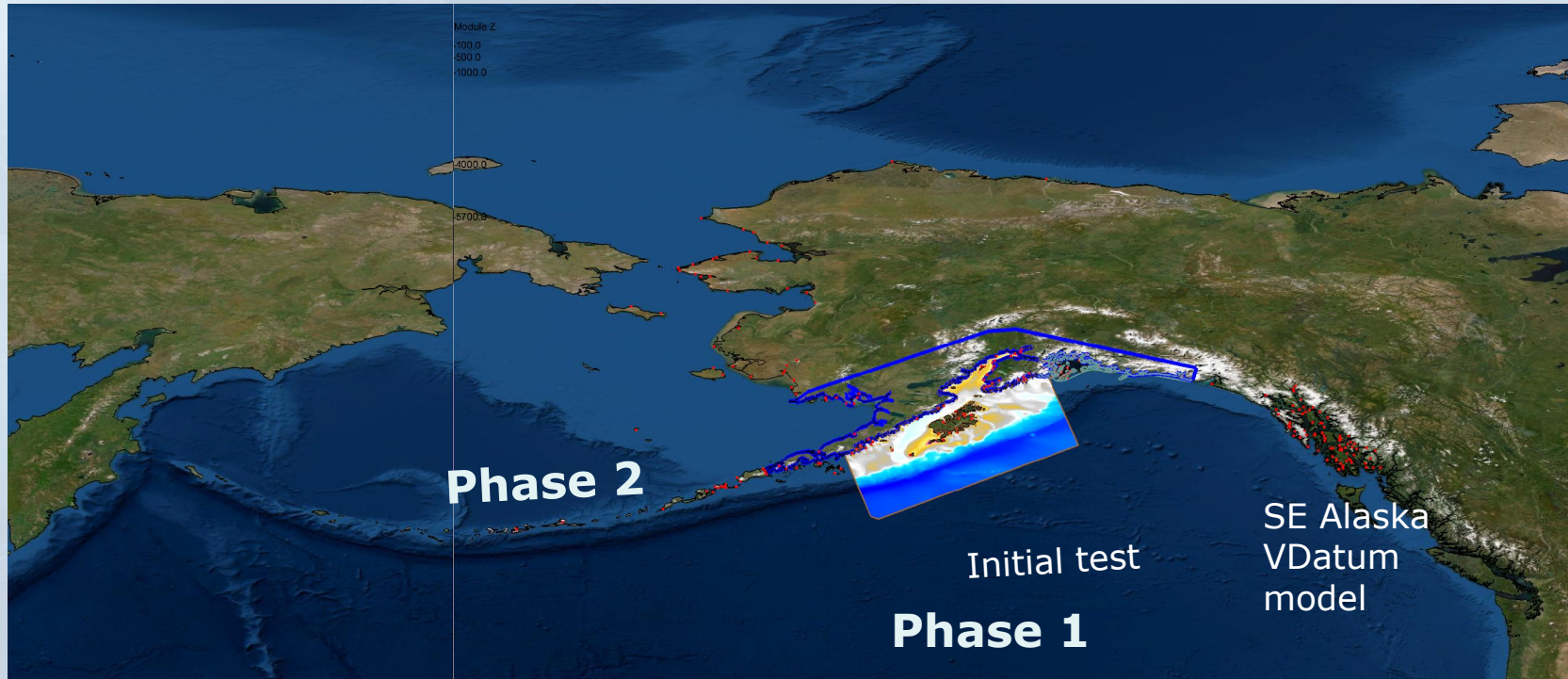
Transition to Regional Modeling Approach



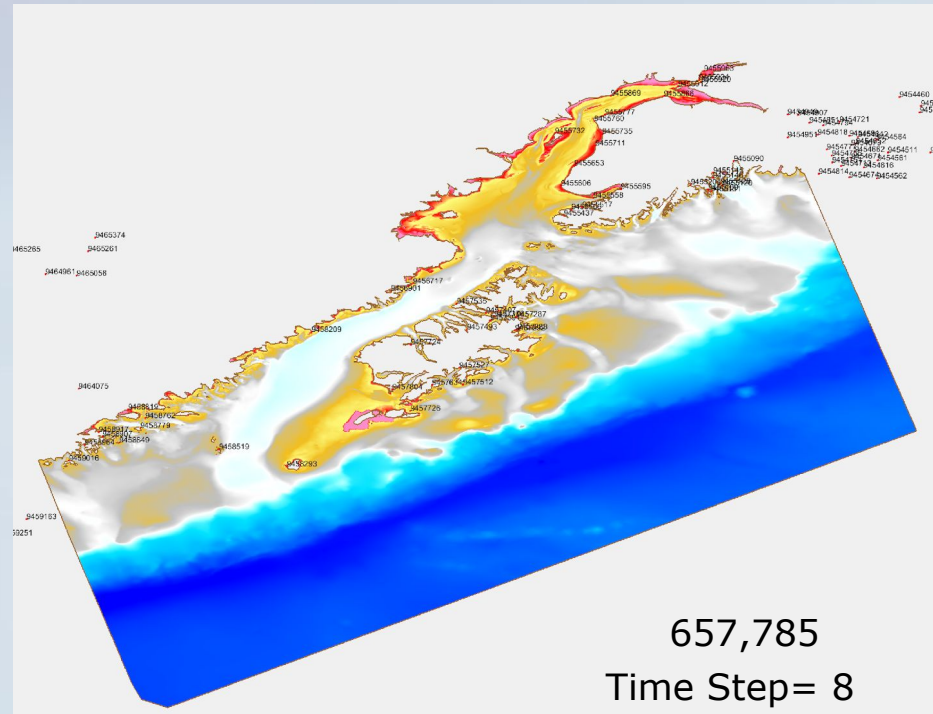
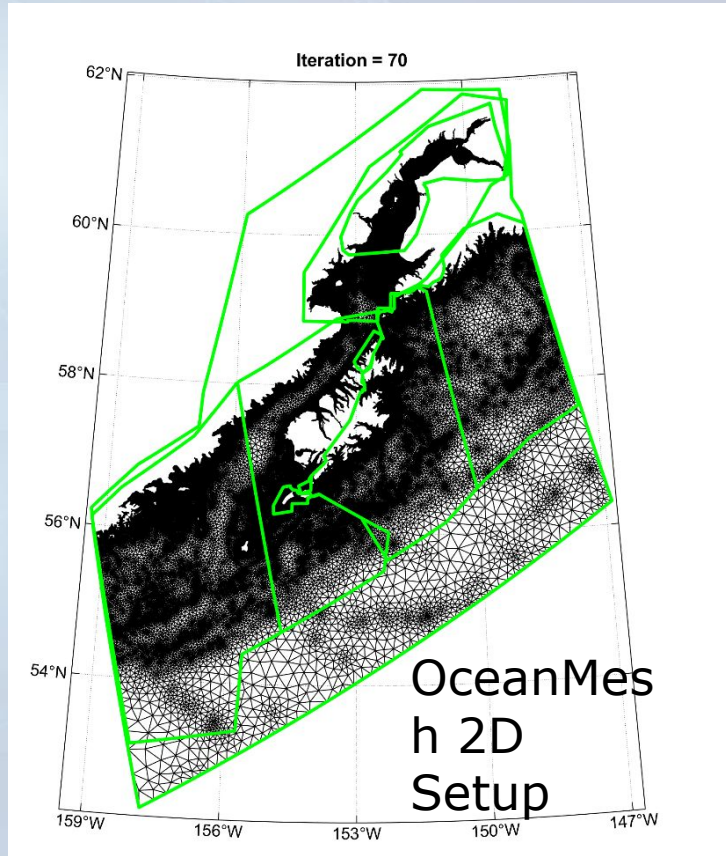
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Alaska VDatum Initial Model Testing

Cook Inlet and Kodiak Island



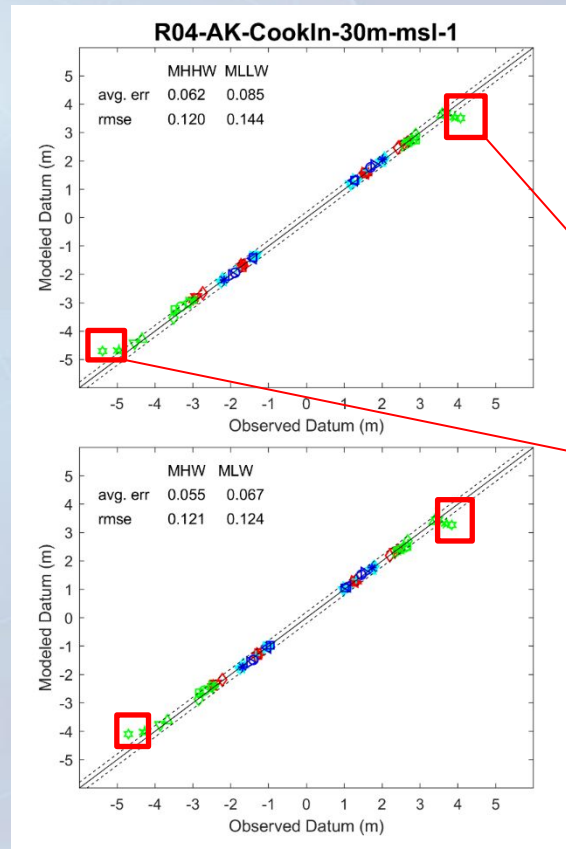
Mesh Development



min_el = 15-30 m;
max_el_ns = 120 m;
dt = 4 sec



Model Validation with 44 CO-OPS tide stations



		obs/mode/error				obs/model			
		MHHW	MLLW (cm)	;		MHW	MLW		
1	9455090	155	156	2	-170-165	-4	126	127	-127-126
2	9455120	155	156	0	-170-165	-5	127	127	-128-125
3	9455128	154	157	3	-168-166	-2	127	128	-127-127
4	9455145	155	158	3	-169-171	3	127	129	-128-130
5	9455146	155	158	3	-170-177	7	127	129	-128-132
6	9455151	155	157	2	-170-166	-4	128	128	-128-127
7	9455159	157	159	2	-170-168	-2	129	130	-130-129
8	9455204	158	159	2	-173-166	-7	131	131	-131-128
9	9455437	242	247	5	-274-266	-8	220	219	-223-219
10	9455500	259	260	1	-291-280	-11	234	232	-240-232
11	9455517	260	263	3	-293-283	-10	235	235	-242-236
12	9455558	265	267	1	-297-286	-10	240	238	-246-239
13	9455595	269	271	3	-300-291	-9	244	242	-249-243
14	9455606	265	267	2	-296-289	-7	240	240	-243-239
15	9455653	270	271	1	-313-301	-12	249	245	-254-247
16	9455711	281	274	-7	-332-314	-18	261	248	-270-256
17	9455732	261	253	-7	-310-300	-10	237	229	-250-242
18	9455735	288	275	-13	-348-323	-25	265	250	-283-264
19	9455760	282	275	-7	-344-328	-16	260	252	-279-267
20	9455777	291	295	4	-351-343	-8	269	273	-285-281
21	9455866	359	363	5	-435-428	-6	338	340	-367-363
22	9455869	288	293	5	-351-352	2	267	271	-285-288
23	9455912	367	366	-1	-454-443	-11	345	343	-387-377
24	9455920	387	355	-31	-502-468	-34	365	333	-433-402
25	9455934	392	354	-37	-495-468	-27	370	332	-427-401
26	9455963	407	351	-56	-539-470	-68	384	327	-470-410
27	9456717	200	203	4	-222-218	-4	176	176	-173-173
28	9456901	199	204	5	-220-220	0	174	177	-172-175
29	9457283	130	131	1	-135-135	-0	101	103	-101-103
30	9457287	131	135	4	-141-138	-2	105	106	-106-106
31	9457292	130	132	2	-137-134	-3	103	103	-104-103
32	9457376	159	167	7	-185-180	-5	131	136	-134-132
33	9457391	139	144	5	-146-147	1	112	115	-111-113
34	9457407	195	193	-2	-222-215	-6	169	165	-168-166
35	9457493	206	208	2	-225-225	-0	179	180	-175-178
36	9457512	117	118	1	-132-132	-1	99	98	-98-96
37	9457527	119	120	2	-135-134	-1	99	100	-98-98
38	9457535	204	207	3	-224-222	-2	178	178	-174-176
39	9457634	118	119	2	-134-133	-1	99	99	-98-97
40	9457724	202	205	4	-218-220	3	173	177	-168-174
41	9457726	126	131	5	-141-144	3	108	110	-103-105
42	9457804	170	177	8	-188-194	6	145	151	-140-149
43	9458209	179	185	7	-198-203	6	153	158	-149-157
44	9458293	127	132	6	-141-141	0	101	105	-95-97

Knik Arm stations

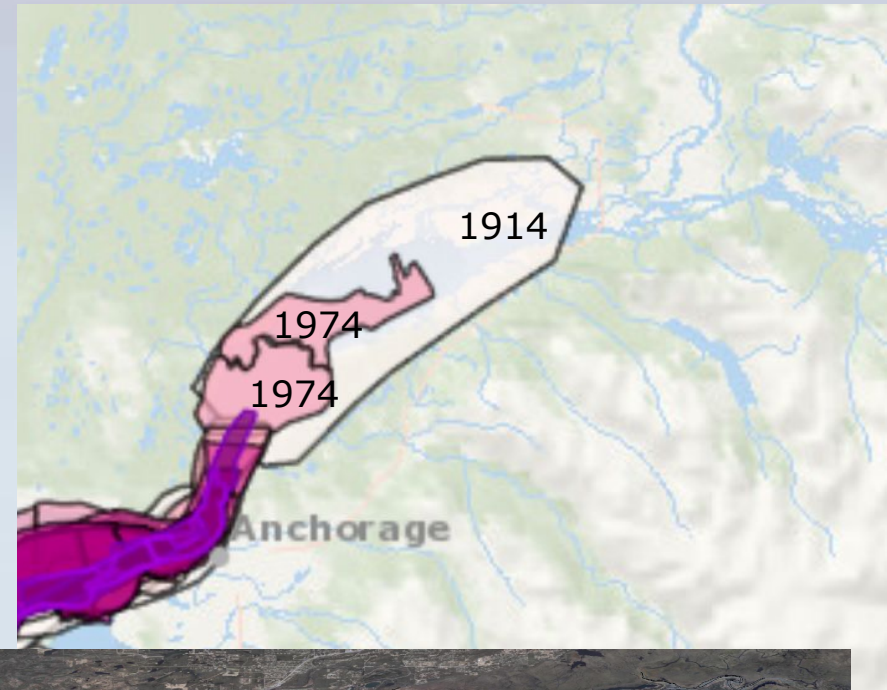


Bathymetry Data Sources

NOS BAGs Data Coverage (high quality data)

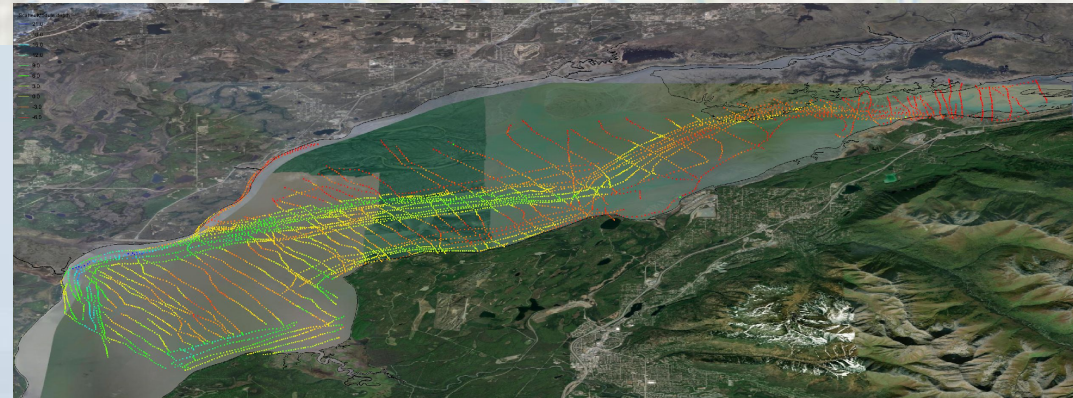


Old Point Bathy survey Data



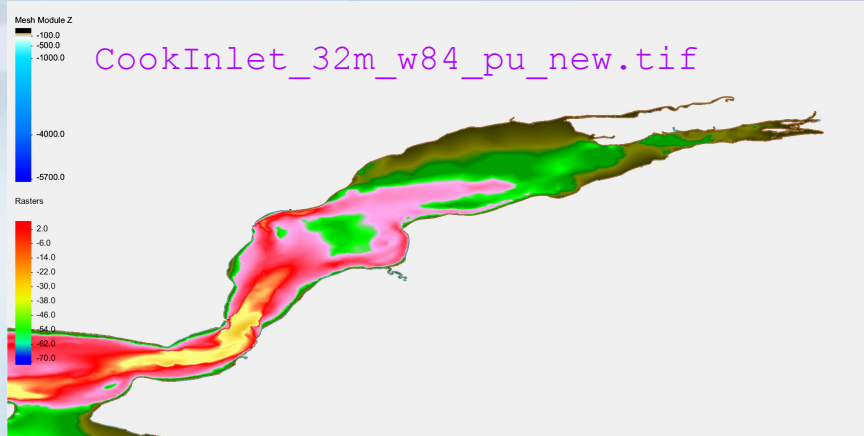
1914 Bathy survey data

It doesn't match the satellite image nor CUSP shoreline.

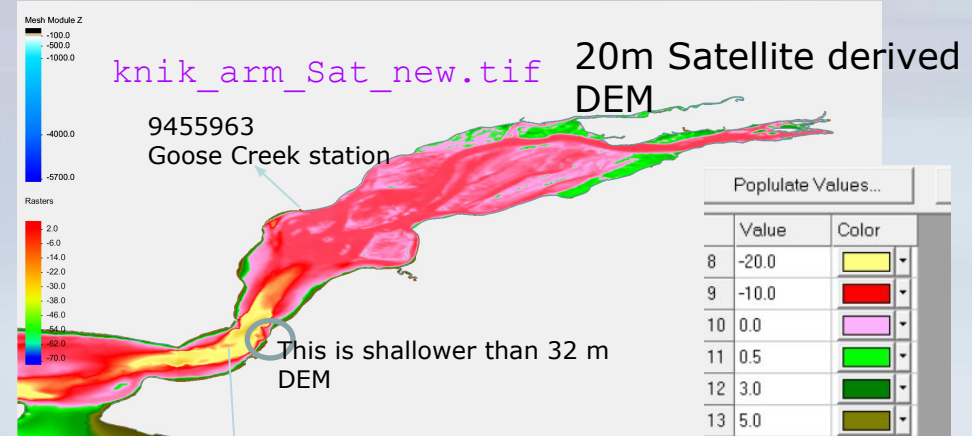


National Oceanic and Atmospheric Administration

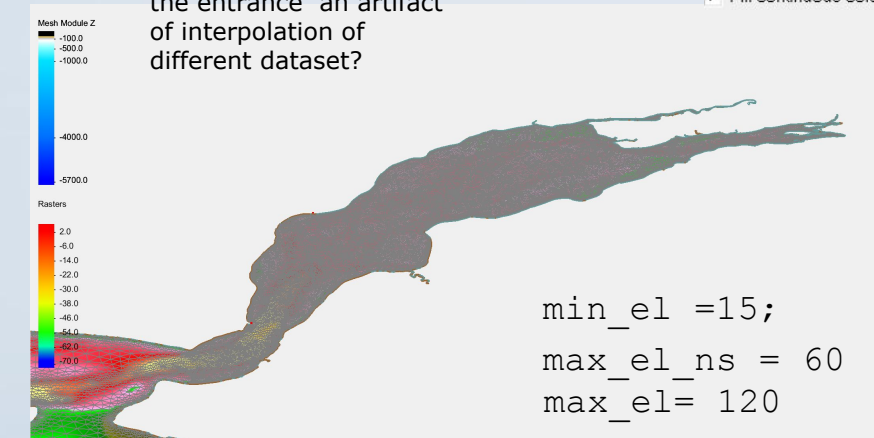
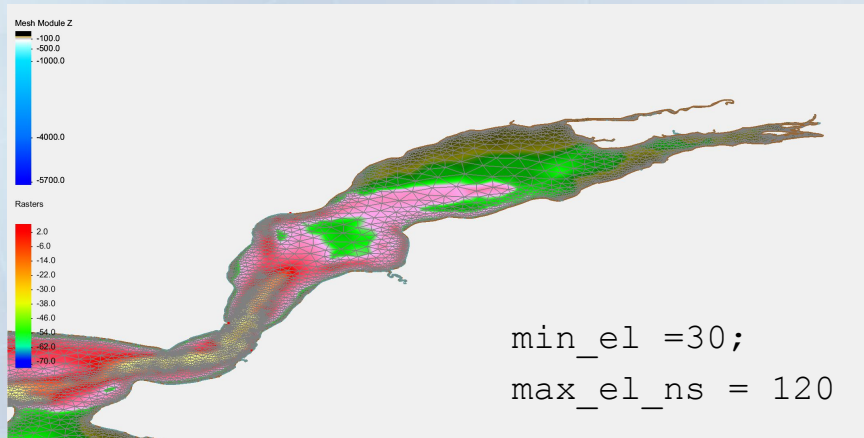
Run 04



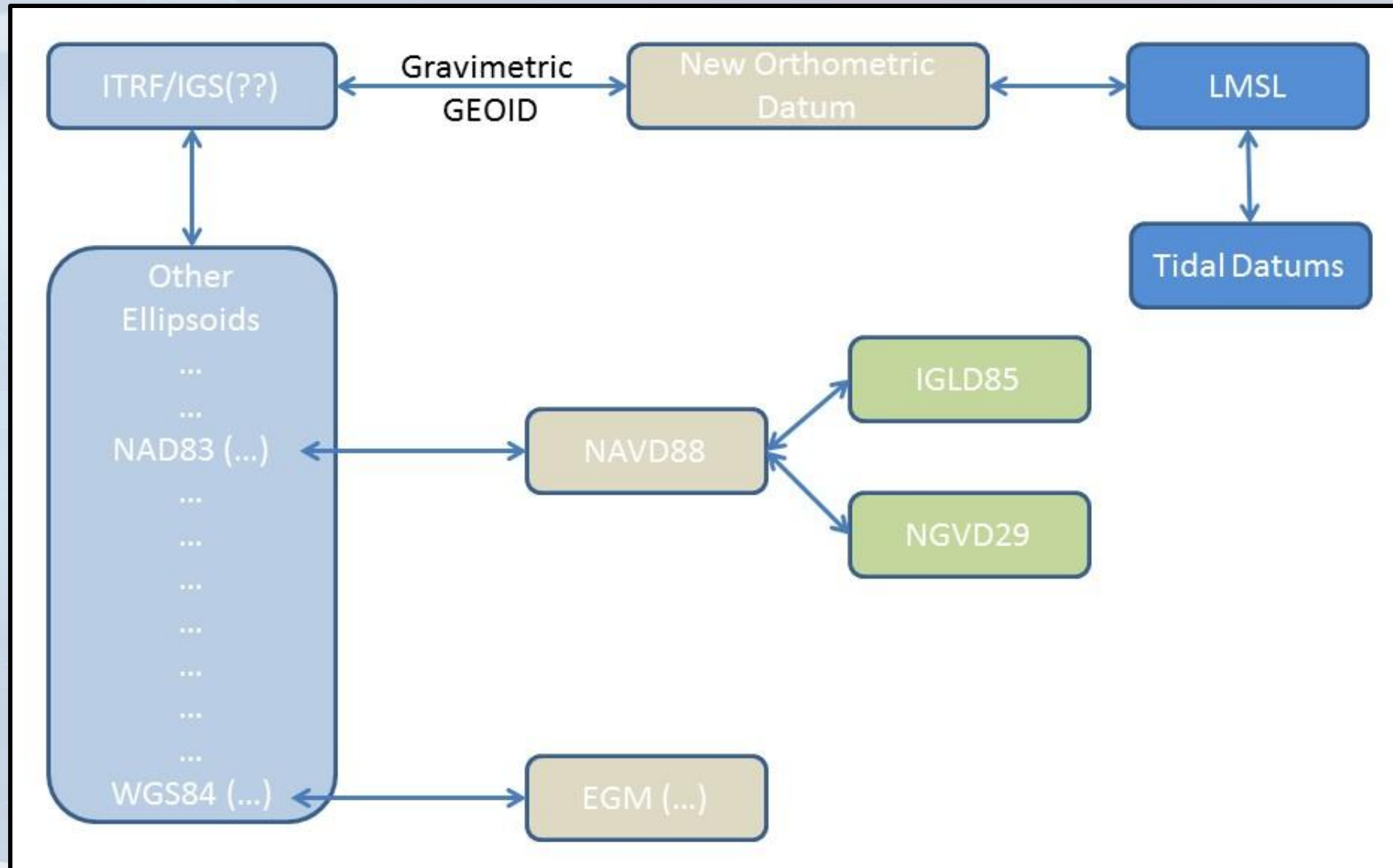
Run 05



Is this shallow feature at the entrance an artifact of interpolation of different dataset?



VDatum: Updated NSRS



VDatum: Preparing for an *Updated NSRS*

SE Alaska

When transforming in the Southeast Alaska regional model and traversing to Local Mean Sea Level (LMSL) or other Tidal Datums, it is important to understand the transformation roadmap differs from that of other currently supported VDatum regional models. You will notice that the Target Horizontal reference frame automatically changes to IGS08 when selecting LMSL or a Tidal Datum as the source or target vertical datum while in Alaska. The reason for this is that our roadmap traverses through IGS08, then utilizes xGEOID17b, and then into LMSL with the Topography of the Sea Surface (TSS) and then to tidal datums. All other VDatum regional models traverse through NAD83 and then to NAVD88 utilizing a NGS Hybrid GEOID.

Sample Scenario:

NOAA's Vertical Datum Transformation - v4.2

* Region: Alaska

Horizontal Information

Source Target

Reference Frame: NAD83(2011) IG S08 - use ITRF 2008

Coor. System: Geographic (Longitude, Latitude) Geographic (Longitude, Latitude)

Unit: [] []

Zone: [] []

Vertical Information

Source Target

Reference Frame: NAVD 88 MHW

Unit: meter (m) meter (m)

Height Sounding Height Sounding

GEOID model: GEOID12B GEOID model: xGEOID17B

Point Conversion ASCII File Conversion File Conversion

Input Output

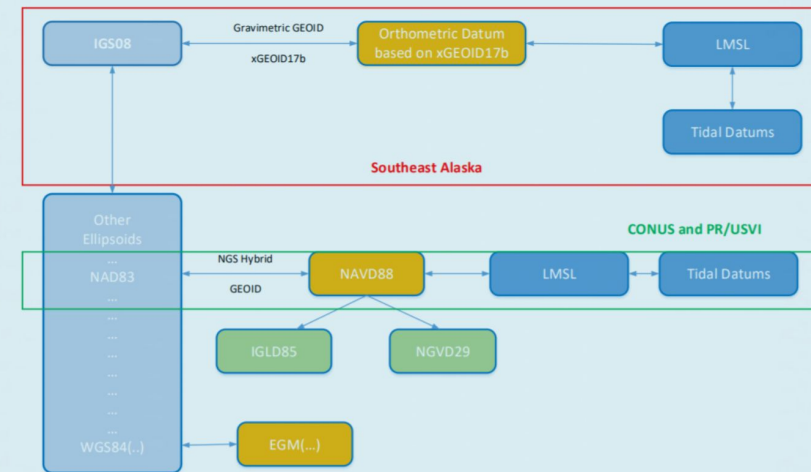
Latitude: 58.3019 Convert Latitude: 58.3019012474 File Report to DMS

Longitude: -134.4197 Reset Longitude: -134.4197255146

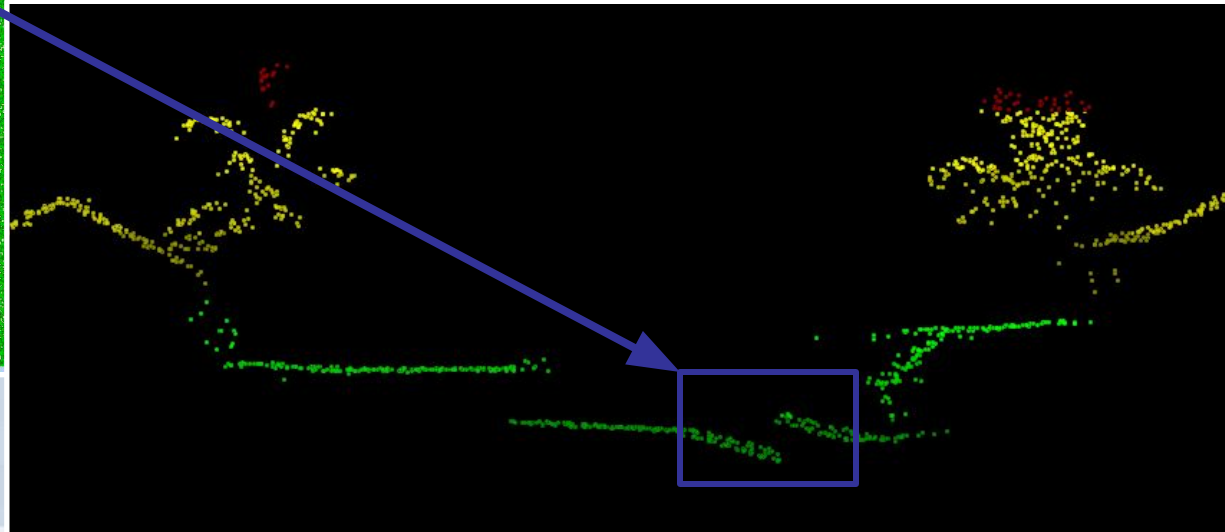
Height: 0.0 DMS Height: -3.544 Vertical Uncertainty: (+/-) 0.1378659 meter

Vertical_Area: AKglacier00_8301:2:0

SEAK Tidal Vertical Datum Transformation "Roadmap" shows the difference from CONUS & PR/USVI Tidal roadmap.



Point Cloud Discrepancies



There should not be a crack in the bottom of pool !!



National Oceanic and Atmospheric Administration

Applying the new GEOID incorrectly

4-6 Degree sloping beach



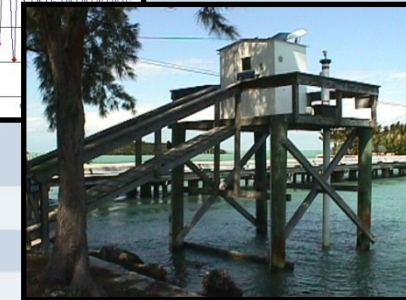
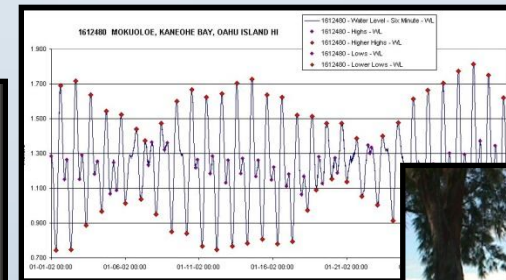
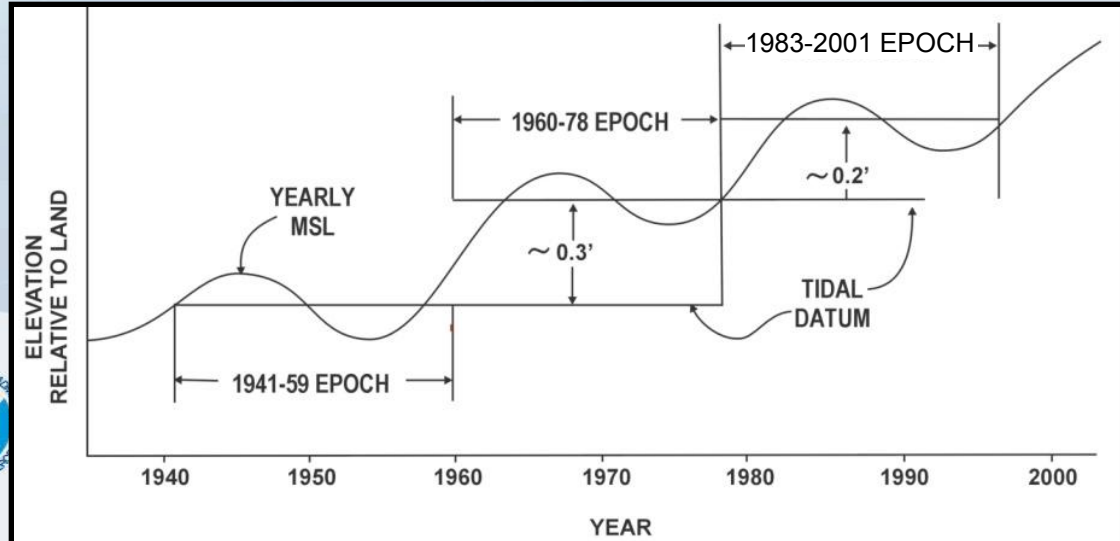
National Oceanic and Atmospheric Administration

National Tidal Datum Epoch (NTDE)

Anticipated release 2025 time frame

Next NTDE will be computed on period of (2002-2020)

- Official time period of tidal observations that are used for primary datum calculations
 - Time it takes the Earth, Moon, & Sun to complete an epoch tidal cycle
 - 19 year time period (Current NTDE is 1983-2001)
 - Considered for revision every ~20-25yrs
 - Includes the longest period tidal variations (*18.6 year node cycle*)
 - Averages out seasonal fluctuations
 - Provides a nationally consistent tidal datum network by accounting for seasonal and apparent environmental trends in sea level that affect the accuracy of tidal datums



Thank You!

Contact Information:

Email: [*vdatum.info@noaa.gov*](mailto:vdatum.info@noaa.gov)

Website: <http://vdatum.noaa.gov>

Stephen White

Email: stephen.a.white@noaa.gov

Phone: (240) 533-9588



National Oceanic and Atmospheric Administration



NOAA Remote Sensing Division

Stephen White

December 1st, 2021 | Virtual



NGS Coastal Mapping Program

Shoreline, Imagery, and Nearshore Bathymetry

Stephen White
Remote Sensing Division
National Geodetic Survey



National Oceanic and Atmospheric Administration

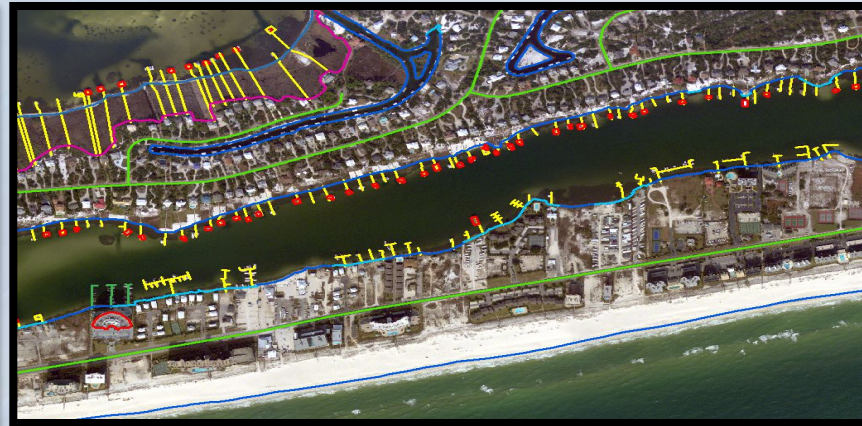
National Geodetic Survey

Mission: Define, maintain and provide access to the National Spatial Reference System.

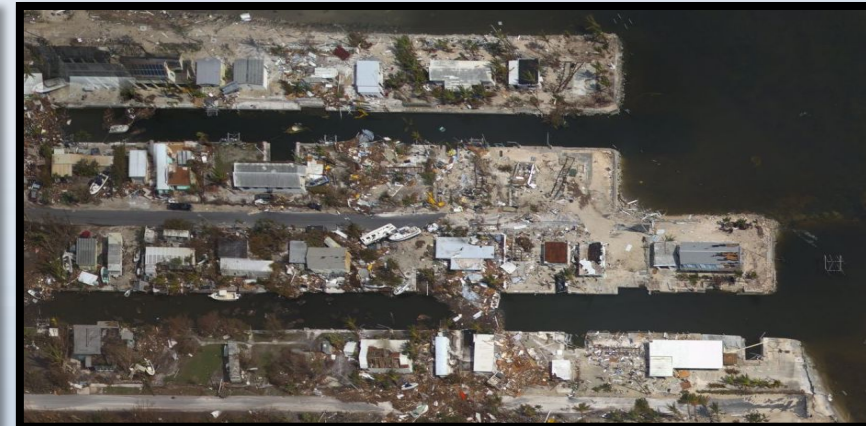
RSD Primary Programs:



Aeronautical Survey
Program



Coastal Mapping
Program

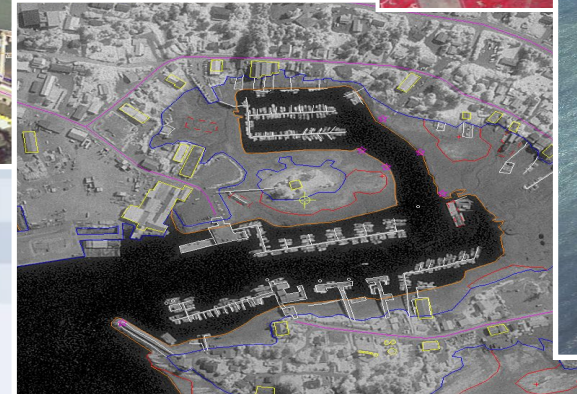


Emergency Response

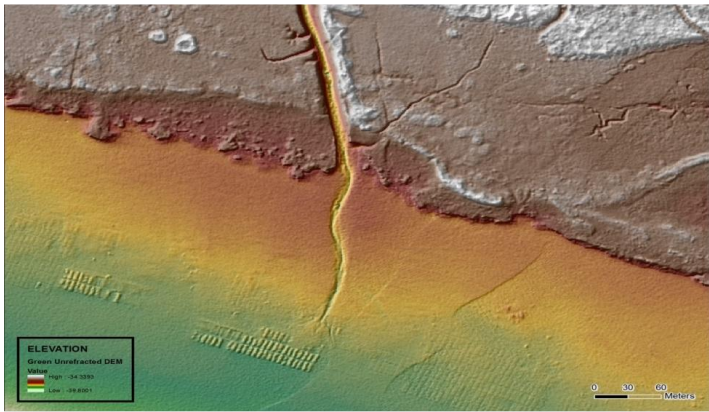
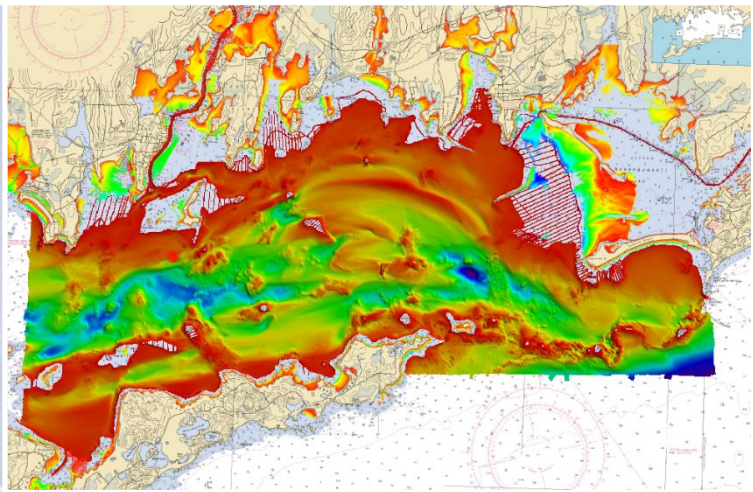
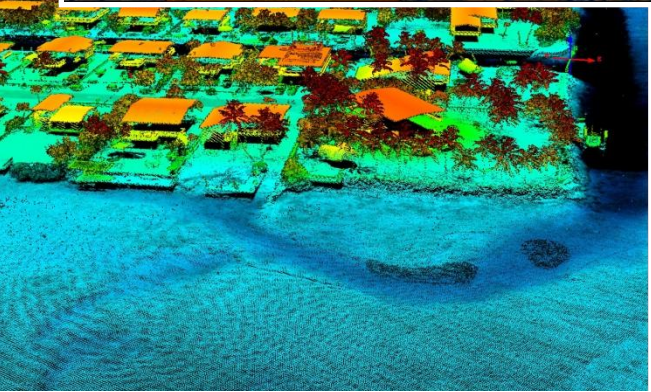
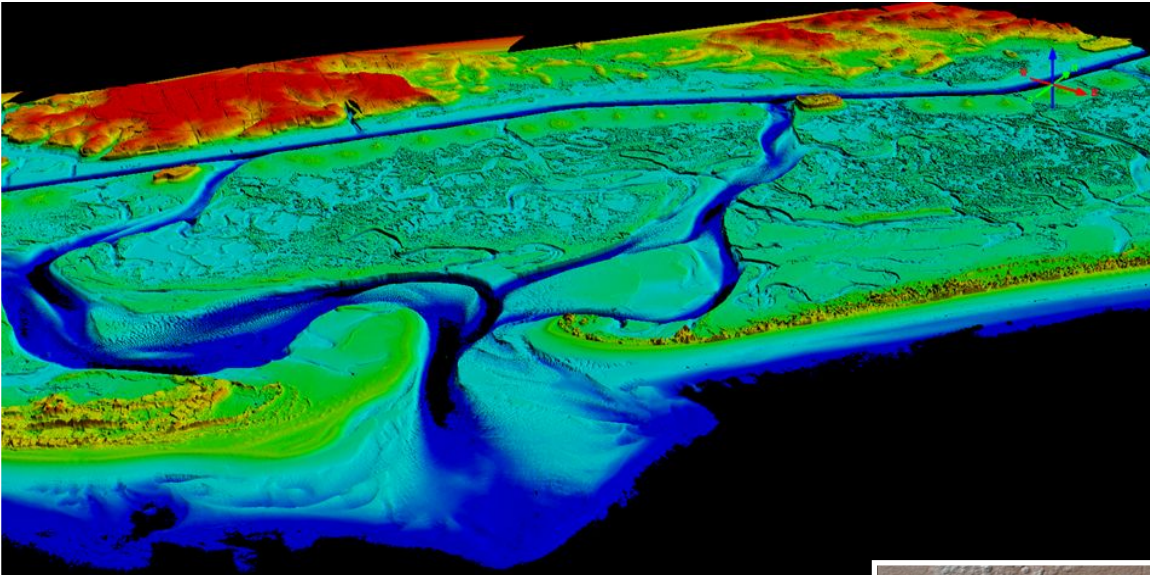


The RSD Coastal Mapping Program

- A congressional mandate to conduct remote sensing surveys of coastal regions of the United States and its possessions for demarcating the nation's legal coastline.
- **Goals:**
 - Provide the Nation With Accurate, Consistent, Up-to-Date National Shoreline
 - Acquire Nearshore Elevation Data
- **Sources:**
 - Lidar
 - Digital Cameras
 - High Resolution Satellites
 - UAS

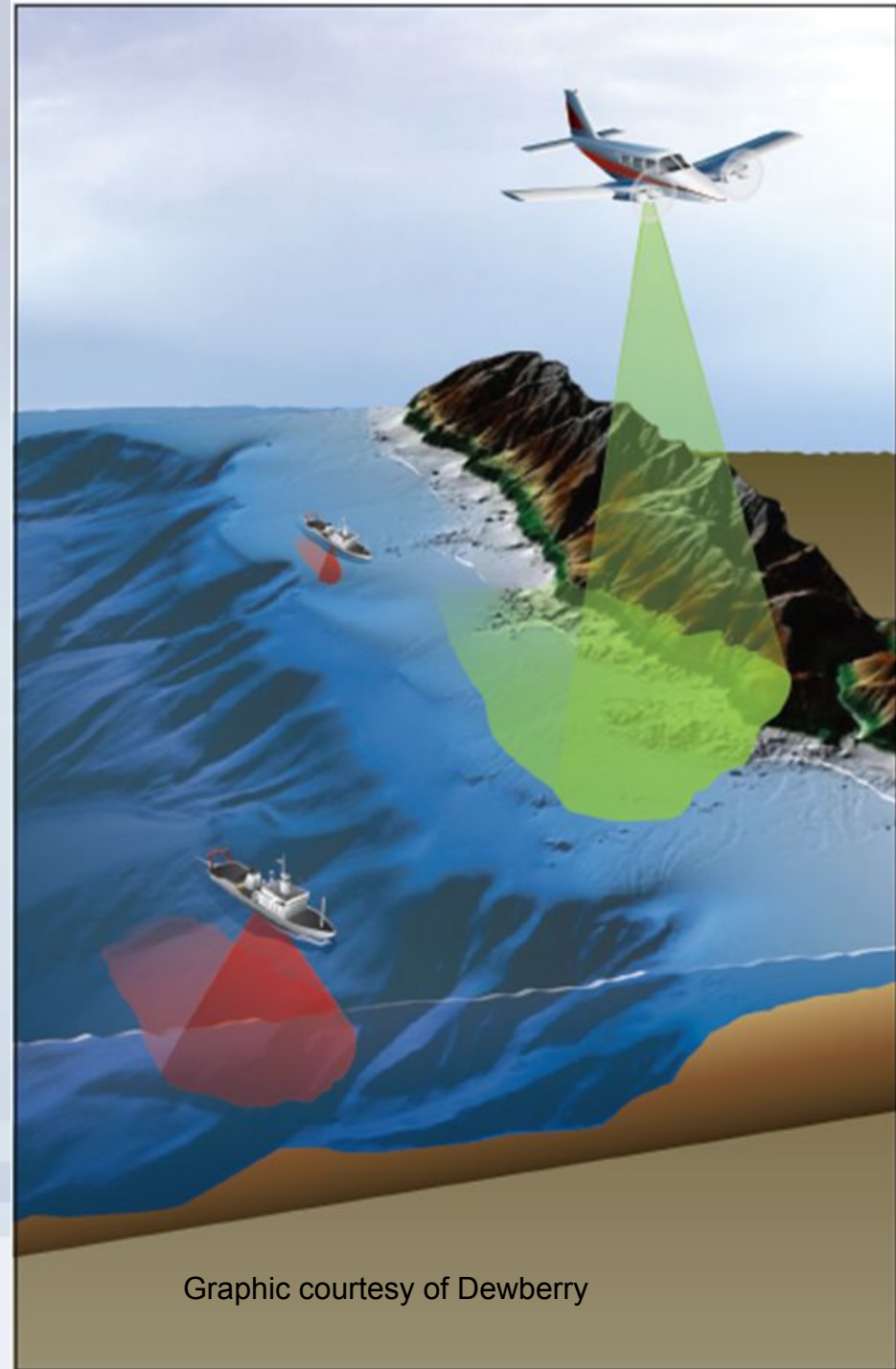


NGS's Topobathy lidar data



Support of Hydrographic Surveys

- RSD collects nearshore topobathy lidar to the 4m NALL in the year prior to ship ops
- RSD will provide both shoreline and nearshore bathymetry
- Hydro operations will use this data to plan operations and overall situational awareness
- Increases efficiency and safety of launch and ship operations



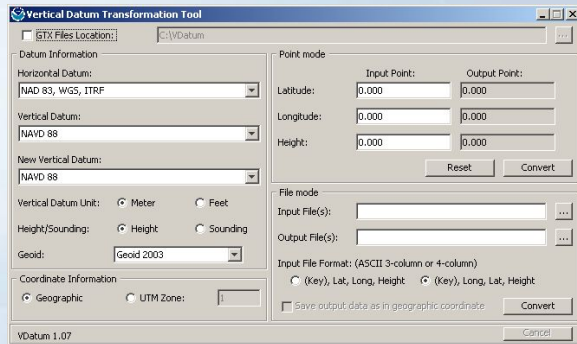
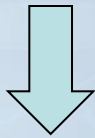
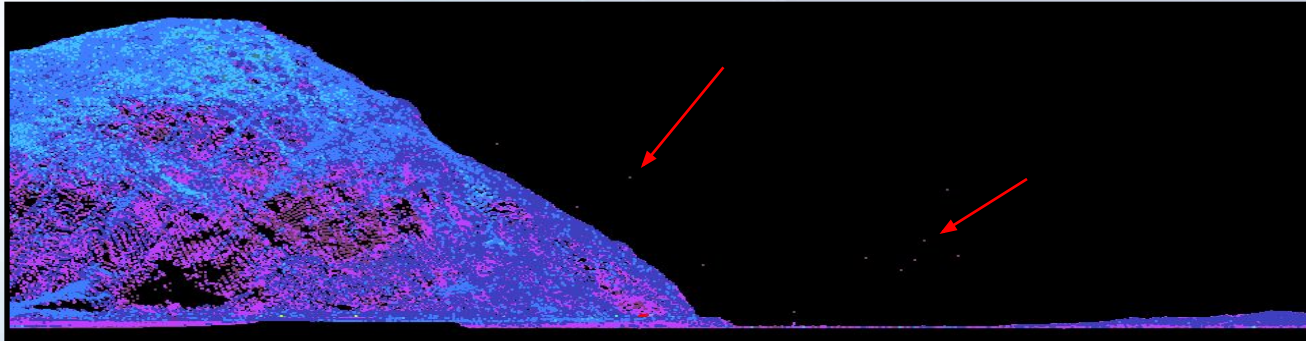
Graphic courtesy of Dewberry



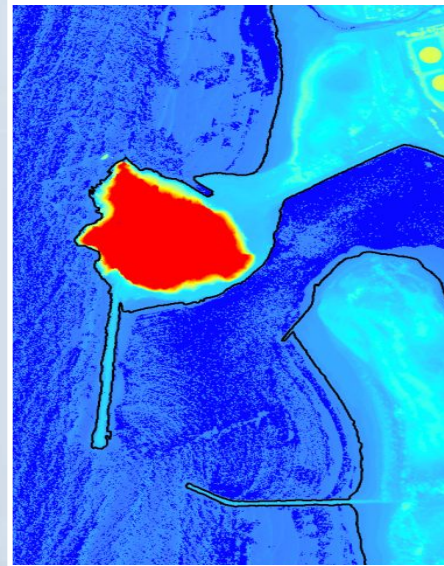
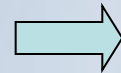
National Oceanic and Atmospheric Administration

Lidar Shoreline Extraction

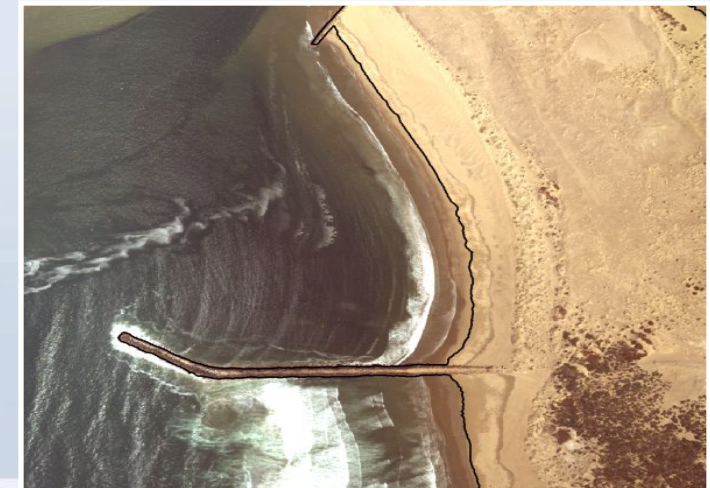
Edit Lidar Point Cloud



VDatum



Contour Shoreline from DEM



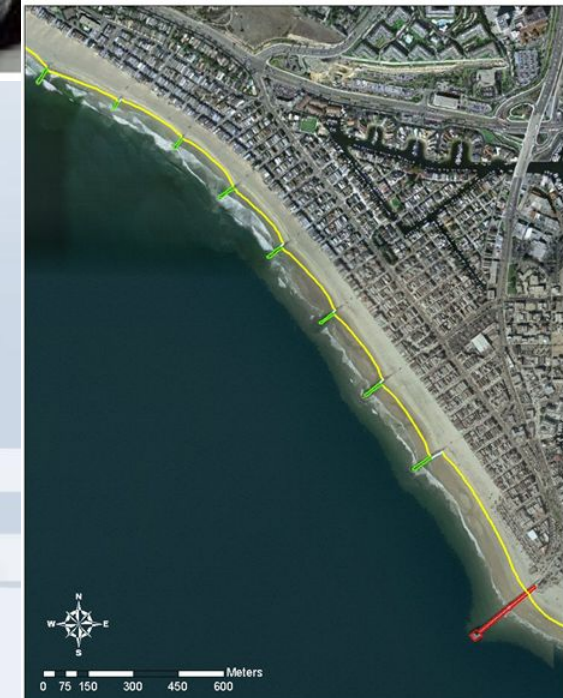
Quality Control & Feature Attribution



Imagery

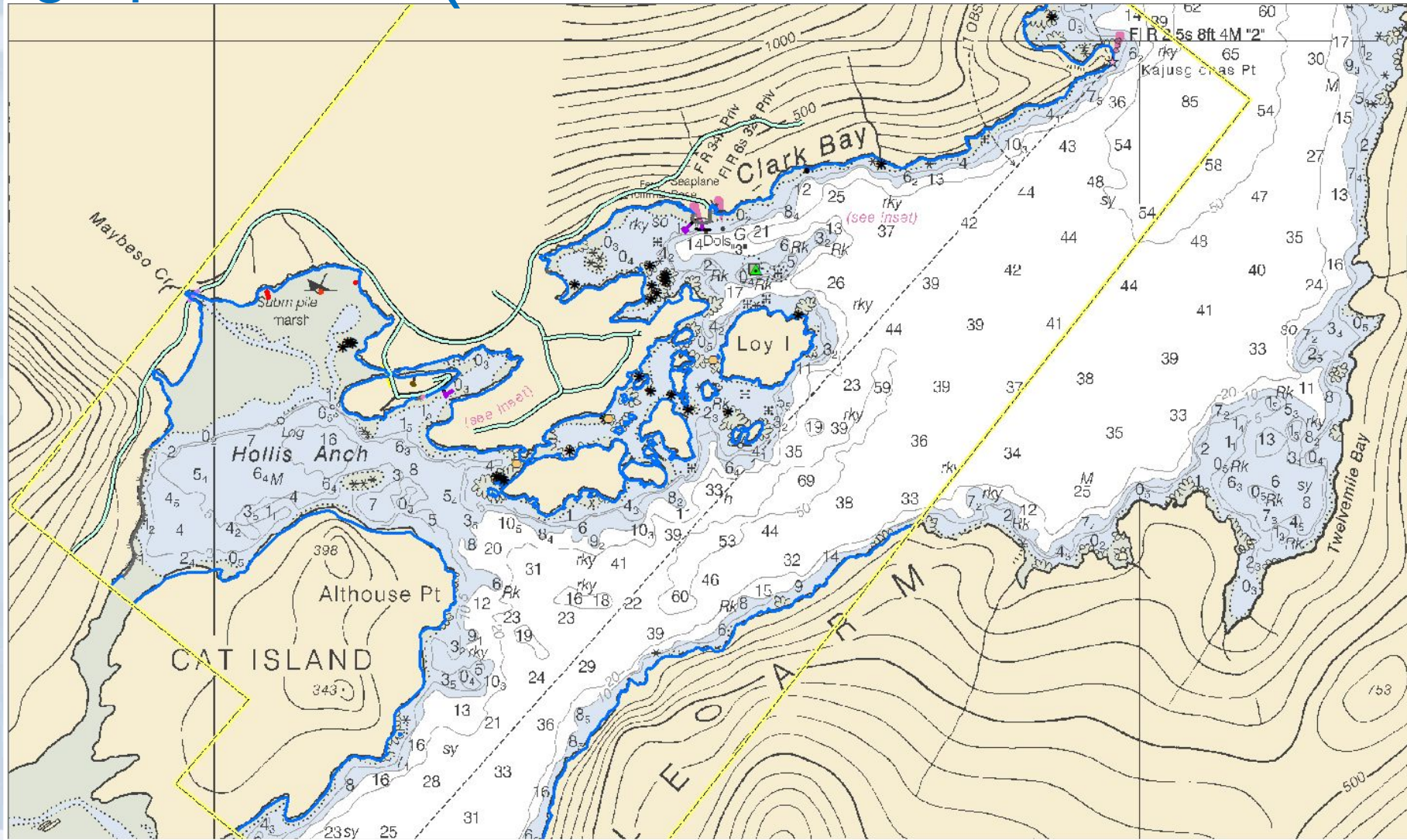
The screenshot shows the ArcMap interface with a map of a coastline. A red line is drawn on the map. The 'Attribute Table' window is open, displaying the following data:

ID	Shape	DATA_SOURCES	FEATURES	EXTRACT	TECH SOLUTION	CLASS	ATTRIBUTE	INFO	HIGH	ACCESS	DATE	SOURCE	ID	TEXT	ME	UN
1	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
2	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
3	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
4	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
5	Point	NA	20	S	0	ALONGSHORE FEATURE	Breakwater Base	0.0	in	Meter	Side	control	3.3	20031001	100	NA
6	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
7	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
8	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
9	Point	NA	20	S	0	ALONGSHORE FEATURE	Breakwater Base	0.0	in	Meter	Side	control	3.3	20031001	100	NA
10	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
11	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
12	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
13	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
14	Point	NA	20	S	0	ALONGSHORE FEATURE	Jetty Base	0.0	in	Meter	Side	control	3.3	20031001	100	NA
15	Point	NA	45	S	0	ALONGSHORE FEATURE	Grain Base	Completed from Office imagery	3.3	20031015	100	NA				
16	Point	NA	47	S	0	ALONGSHORE FEATURE	Grain Control Structures Or Submerged	Completed from Office imagery	3.3	20031015	100	NA				
17	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
18	Point	NA	15	S	0	SHORELINE	Marina Pier Ramp	Completed from Office imagery	3.3	20031015	100	NA				
19	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
20	Point	NA	15	S	0	ALONGSHORE FEATURE	Pier Buoys	Completed from Office imagery	3.3	20031015	100	NA				
21	Point	NA	20	S	0	SHORELINE	Natural Mean High Water	0.0	in	Meter	Side	control	3.3	20031001	100	NA
22	Point	NA	15	S	0	SHORELINE	Marina Pier Ramp	Completed from Office imagery	3.3	20031015	100	NA				



National Oceanic and Atmospheric Administration

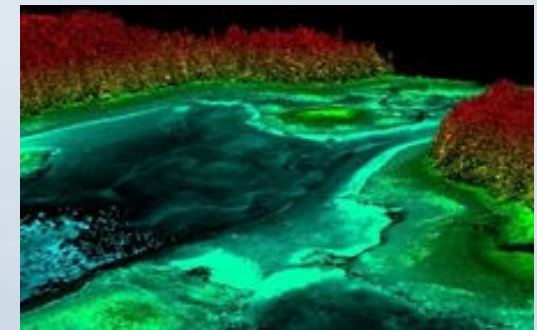
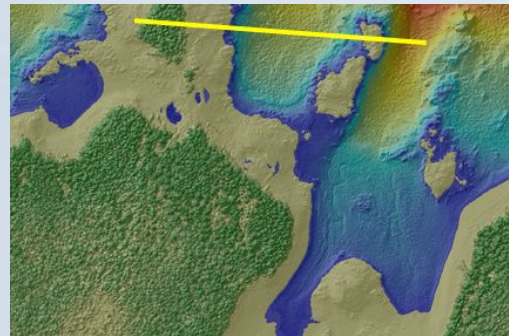
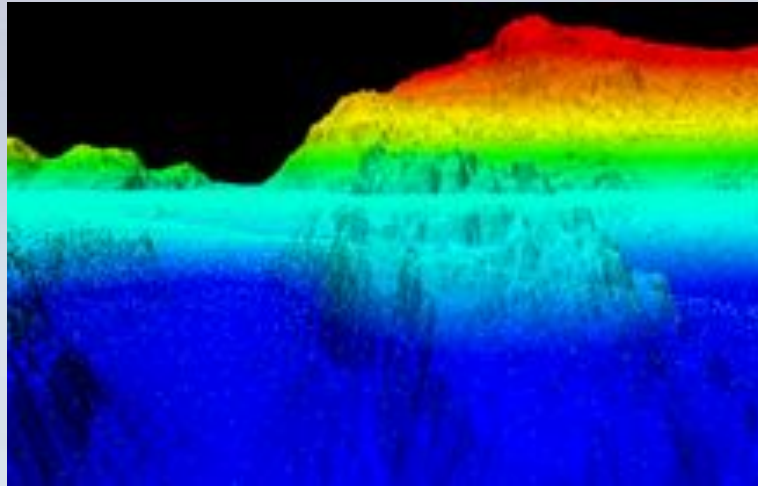
Geographic Cells (Nautical Chart Shoreline)



National Oceanic and Atmospheric Administration

Coastal Mapping Program (CMP): Revillagigedo Channel, AK

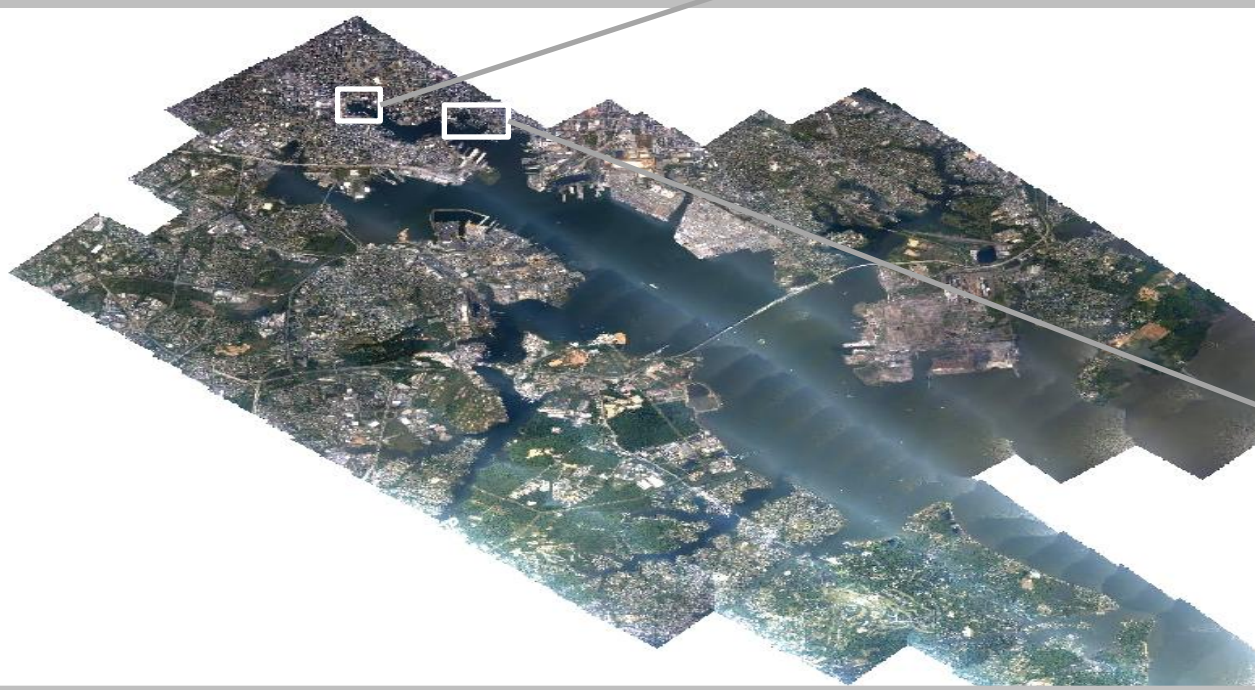
- **Sensors**
 - Leica Chiroptera 4X/Hawkeye 4X (topobathy)
 - Riegl 1560ii (NIR)
 - UltraCam Eagle (4 band Imagery)
- **Acquisition**
 - Initial Area – 6/8/21 – 7/3/21
 - Optional Area – 7/30/21 – 8/2/21
 - Imagery in Optional Area is still pending due to weather
- **Ground Survey**
 - Limited paved/hard ground
 - Access mostly by boat
- **Bathy Penetration**
 - Average depth of extinction ~12 meters
 - Max depths ~16-20+ meters



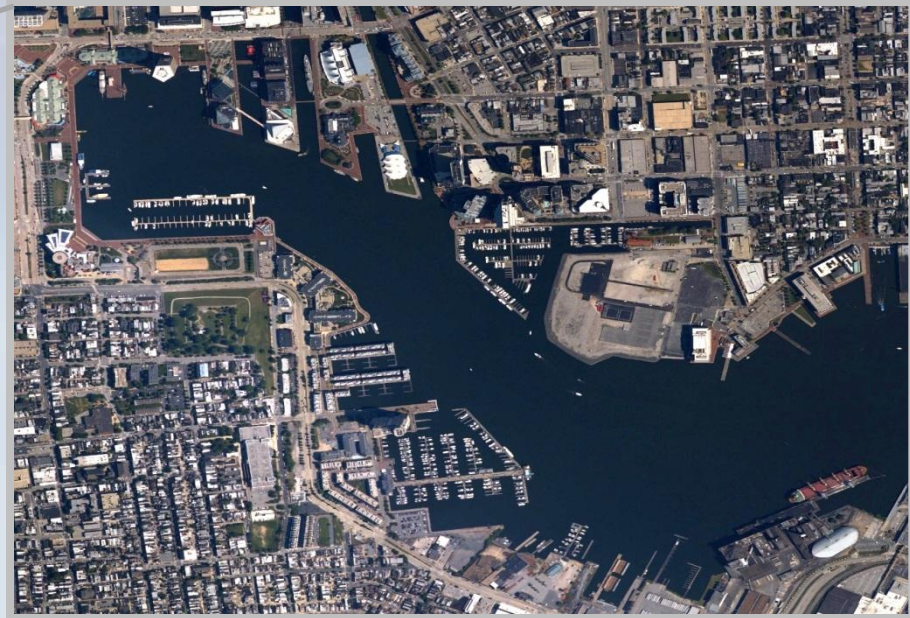
National Oceanic and Atmospheric Administration

NIV5 GEOSPATIAL
powered by QUANTUM SPATIAL

High Resolution Digital Aerial Imagery and Shoreline

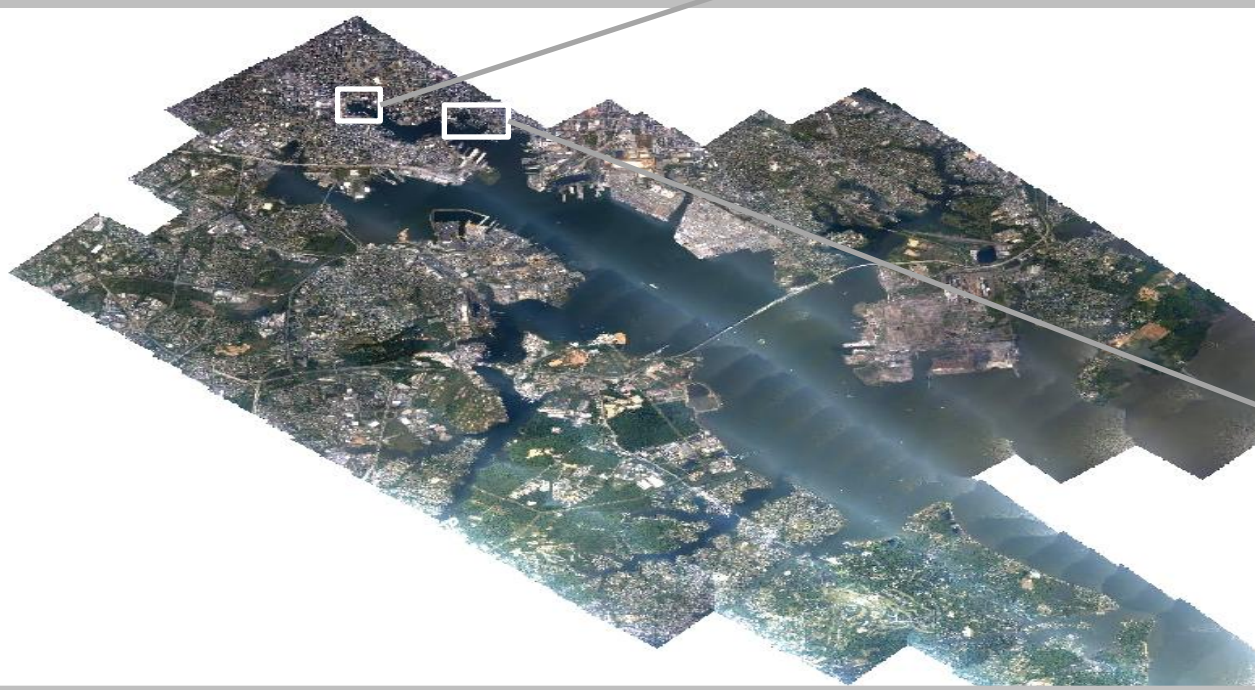


Baltimore, MD



National Oceanic and Atmospheric Administration

High Resolution Digital Aerial Imagery and Shoreline

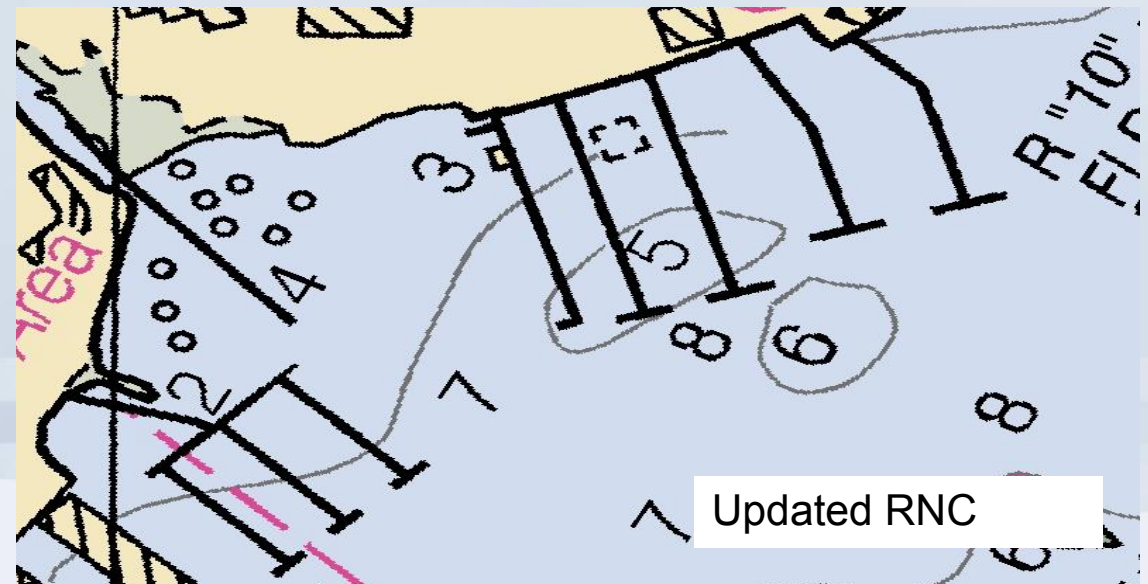
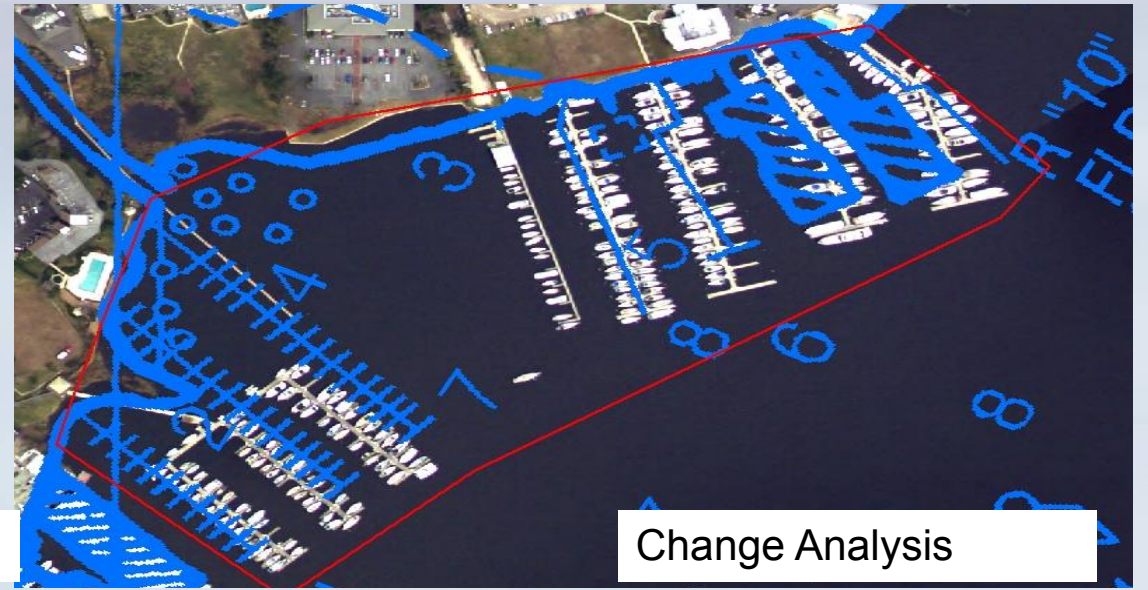
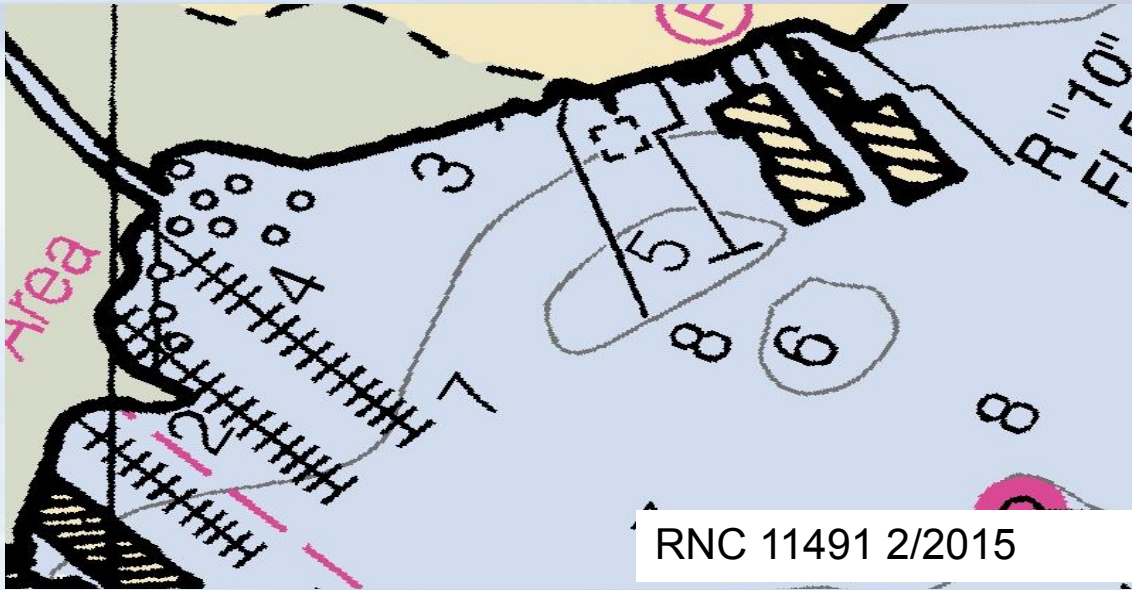


Baltimore, MD

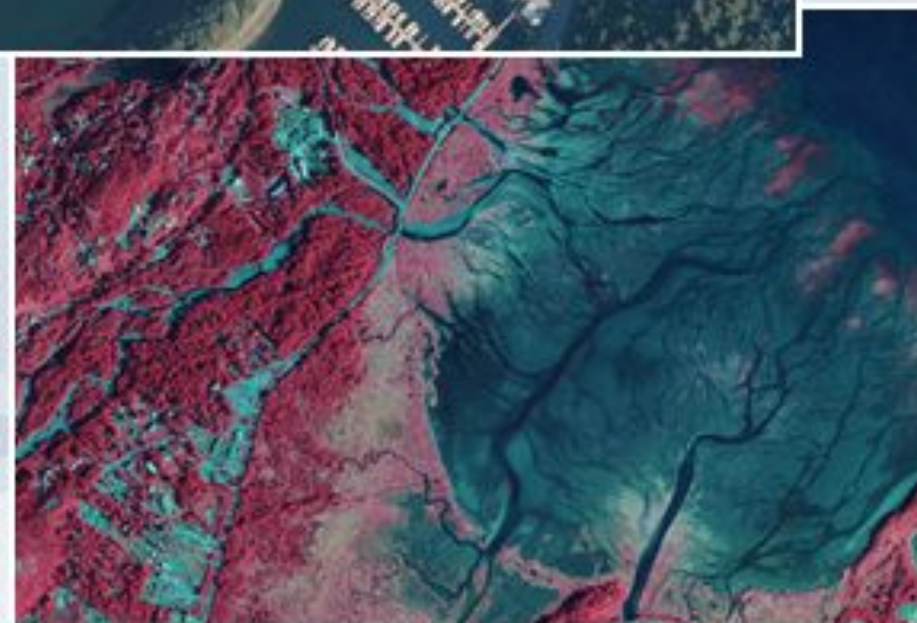
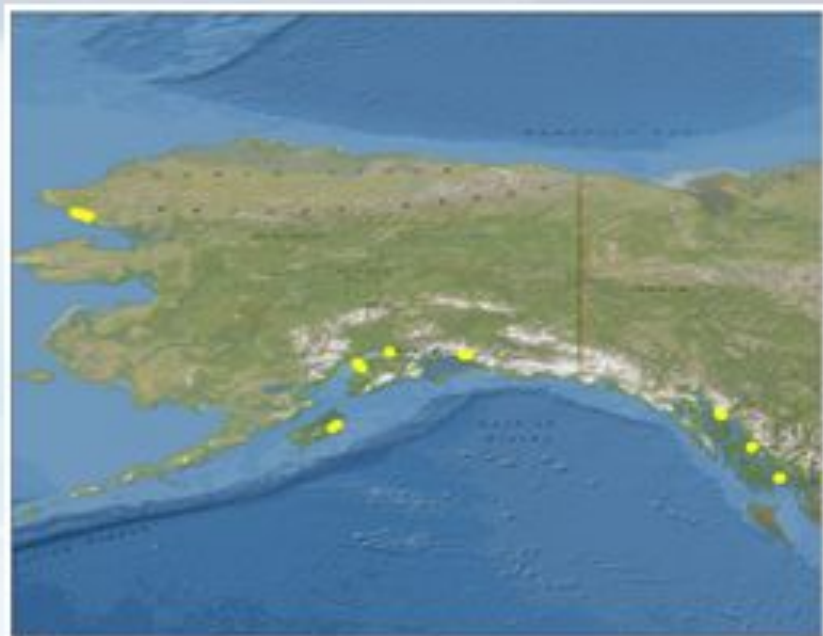


National Oceanic and Atmospheric Administration

Coast and Shoreline Change Analysis Program (CSCAP)



Coastal Shoreline and Change Analysis Program (CSCAP) : Alaska Ports

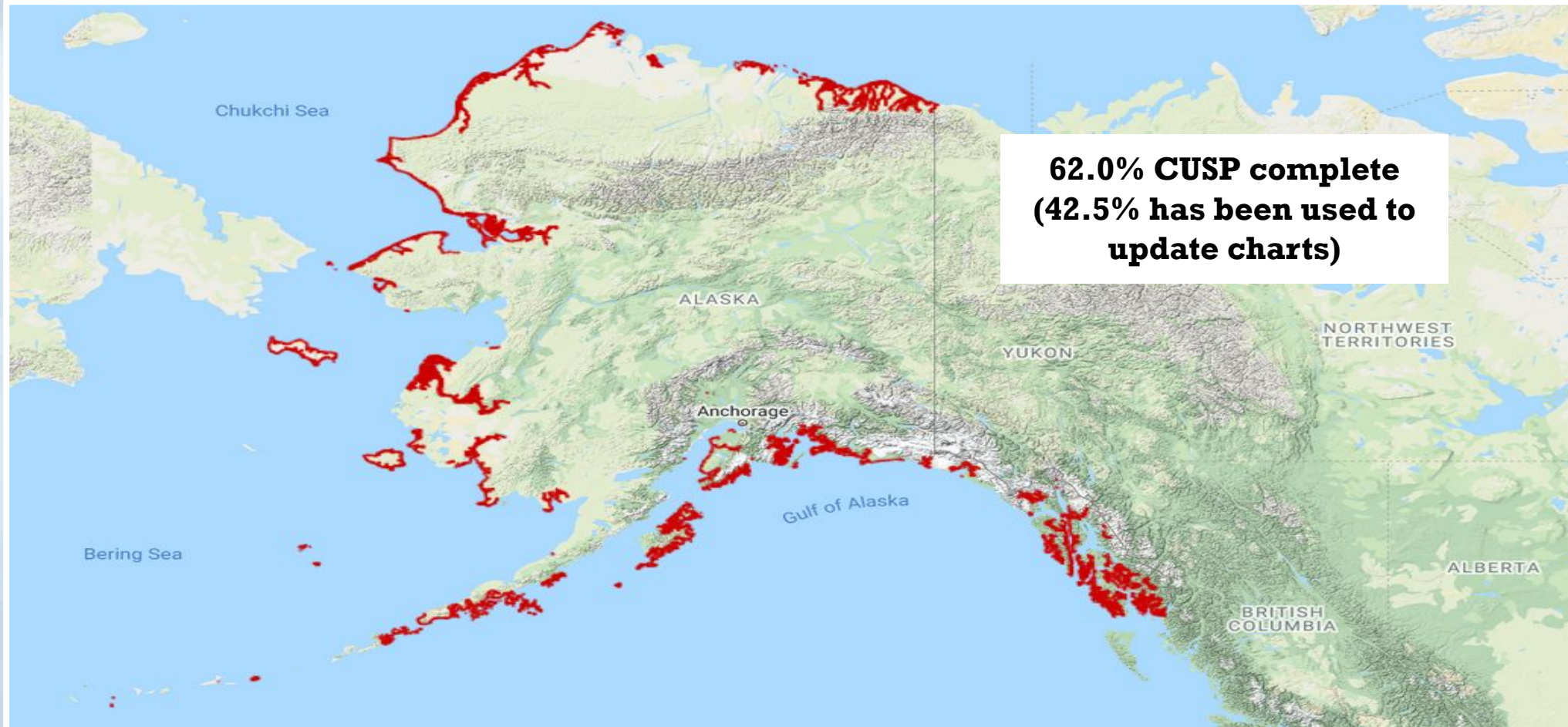


- **Ports:** Anchorage, Juneau, Ketchikan, Kivalina, Kodiak, Nikiski, Kenai, Petersburg, Valdez
- **Imagery:**
 - Stereo and Ortho products
 - 4-band (R,G,B,NIR)
 - 25cm orthos



National Oceanic and Atmospheric Administration

Continually Updated Shoreline Product (CUSP)



<https://www.ngs.noaa.gov/NSDE/>



National Oceanic and Atmospheric Administration

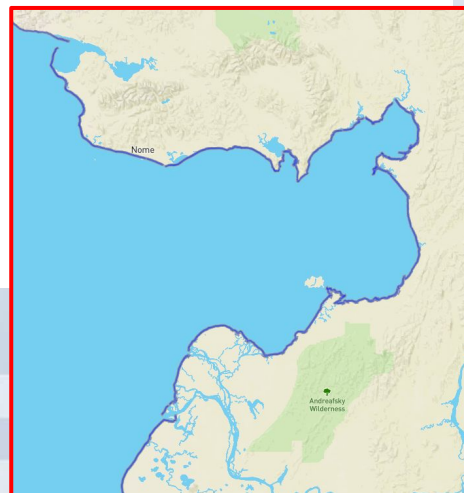
Coastal Semi-Oblique Imagery viewer

https://geodesy.noaa.gov/storm_archive/coastal/viewer/index.html

The screenshot shows the NOAA Coastal Imagery Viewer interface. At the top left is the NOAA logo. The main header reads "Coastal Imagery Viewer" and includes navigation links for "About", "Contact", "Download", and "Tools". A search bar on the right is labeled "Search Address". Below the header, there are two tabs: "2015 Imagery" (selected) and "2016 Imagery". The left pane displays a map of North America with a red rectangle highlighting a coastal area in Alaska. The right pane contains instructions:

Get Started:
Search an address within the acquisition area or zoom in and select a polygon in the left side map pane.
Example address: 3737 Atlantic Ave, Virginia Beach, VA
Mouseover the image in the right side pane to display coordinates in NAD83 (2011) Geographic Latitude / Longitude and U.S. National Grid.

GIS Users:
The image that you download (link in polygon popup) is a GeoTiff and will load as a georeferenced product in a GIS. The data have not been ortho-rectified or fully corrected for topographic relief. Users should download the associated .vrt (Virtual Raster) file. It can be downloaded from the same location by changing the .tif to .vrt.



New Camera System

Digital Sensor System (DSS) V6 (King Air)

- 150MP RGB camera (x2)
- 100MP NIR camera (x2)
- Nadir and Oblique orientations



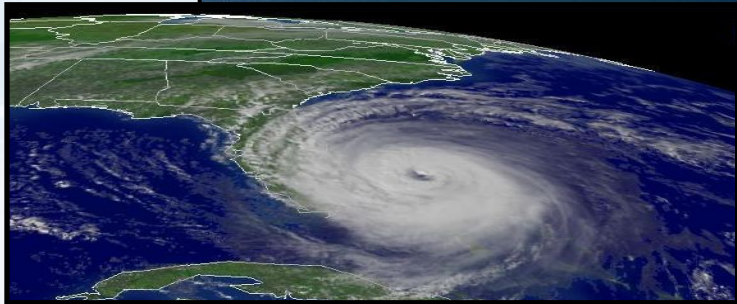
National Oceanic and Atmospheric Administration

Emergency Response



Remotely sensed data is acquired to support NOAA's homeland security and emergency response requirements.

NOAA maintains the capability to provide tools, technology, and expertise in a timely and efficient manner.

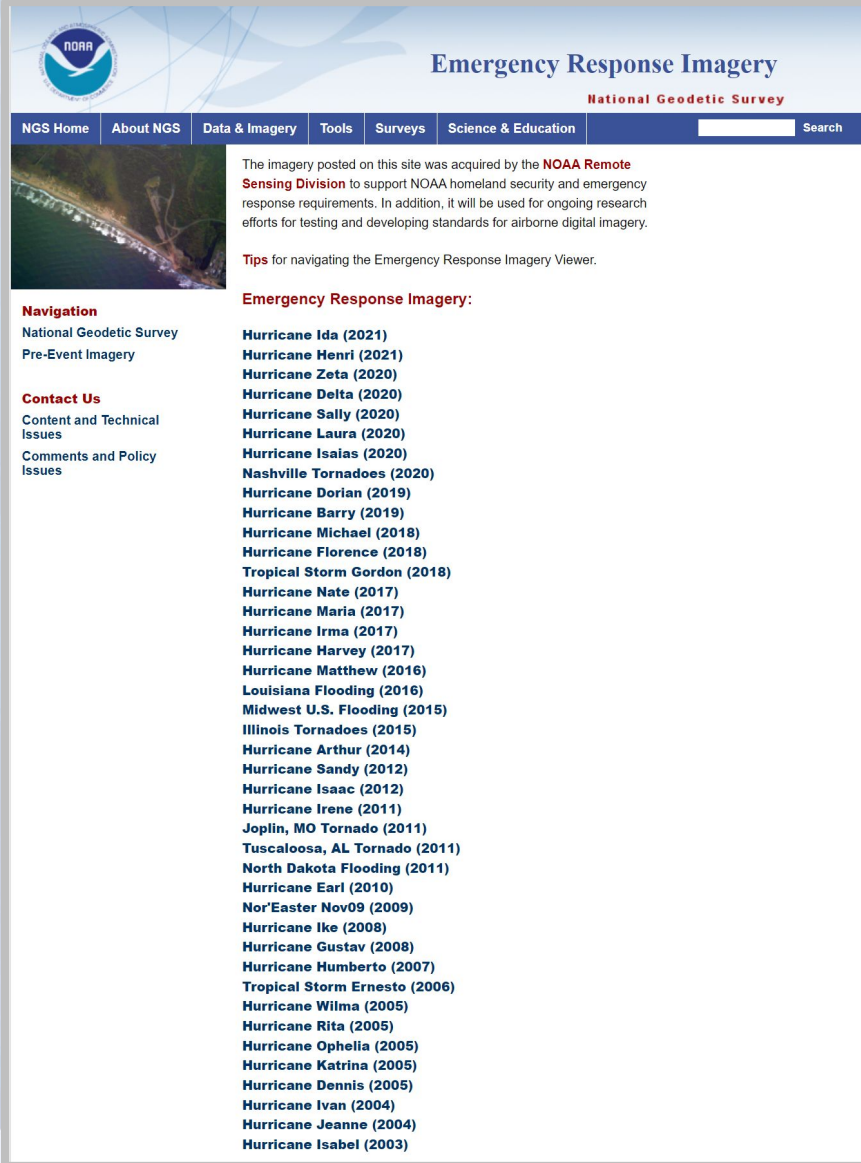


The remotely sensed data collected is disseminated to federal, state, and local government agencies as well as the general public to facilitate support efforts.



National Oceanic and Atmospheric Administration

Emergency Response



Emergency Response Imagery
National Geodetic Survey

NGS Home | About NGS | **Data & Imagery** | Tools | Surveys | Science & Education | Search

The imagery posted on this site was acquired by the **NOAA Remote Sensing Division** to support NOAA homeland security and emergency response requirements. In addition, it will be used for ongoing research efforts for testing and developing standards for airborne digital imagery.

Tips for navigating the Emergency Response Imagery Viewer.

Navigation
National Geodetic Survey
Pre-Event Imagery

Contact Us
Content and Technical Issues
Comments and Policy Issues

Emergency Response Imagery:

- Hurricane Ida (2021)
- Hurricane Henri (2021)
- Hurricane Zeta (2020)
- Hurricane Delta (2020)
- Hurricane Sally (2020)
- Hurricane Laura (2020)
- Hurricane Isaias (2020)
- Nashville Tornadoes (2020)
- Hurricane Dorian (2019)
- Hurricane Barry (2019)
- Hurricane Michael (2018)
- Hurricane Florence (2018)
- Tropical Storm Gordon (2018)
- Hurricane Nate (2017)
- Hurricane Maria (2017)
- Hurricane Irma (2017)
- Hurricane Harvey (2017)
- Hurricane Matthew (2016)
- Louisiana Flooding (2016)
- Midwest U.S. Flooding (2015)
- Illinois Tornadoes (2015)
- Hurricane Arthur (2014)
- Hurricane Sandy (2012)
- Hurricane Isaac (2012)
- Hurricane Irene (2011)
- Joplin, MO Tornado (2011)
- Tuscaloosa, AL Tornado (2011)
- North Dakota Flooding (2011)
- Hurricane Earl (2010)
- Nor'Easter Nov09 (2009)
- Hurricane Ike (2008)
- Hurricane Gustav (2008)
- Hurricane Humberto (2007)
- Tropical Storm Ernesto (2006)
- Hurricane Wilma (2005)
- Hurricane Rita (2005)
- Hurricane Ophelia (2005)
- Hurricane Katrina (2005)
- Hurricane Dennis (2005)
- Hurricane Ivan (2004)
- Hurricane Jeanne (2004)
- Hurricane Isabel (2003)

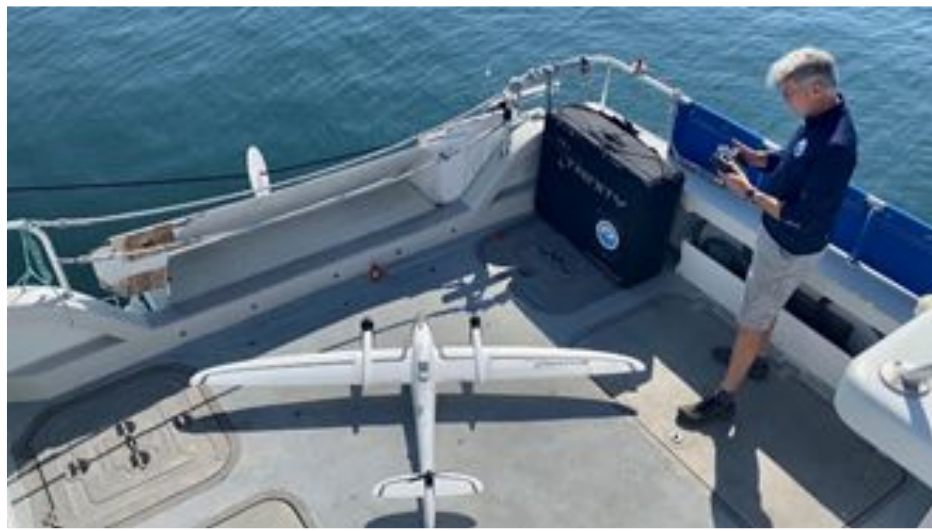
<https://storms.ngs.noaa.gov/>



National Oceanic and Atmospheric Administration

Uncrewed Aerial Systems (UAS)

- Joint RSD/HSD effort to train operators to pilot NOAA-owned UAS from NOAA hydrographic ships and small boats
- Developing the capability and procedures to launch and recover a VTOL UAS from NOAA ships and small boats



Uncrewed Aerial Systems (UAS)

- Imagery acquisition to support CSCAP

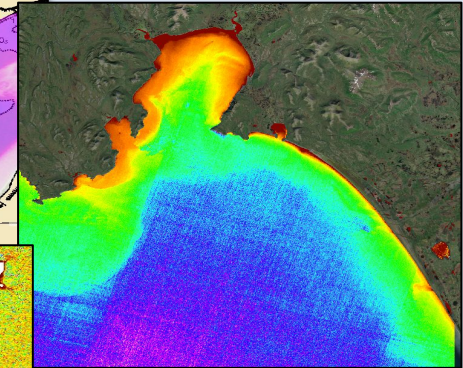
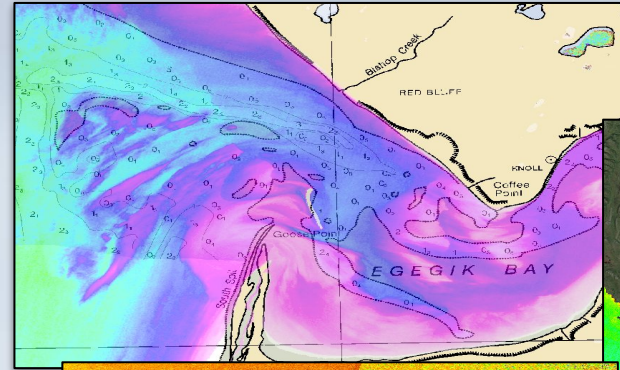


Satellite Derived Bathymetry (SDB)

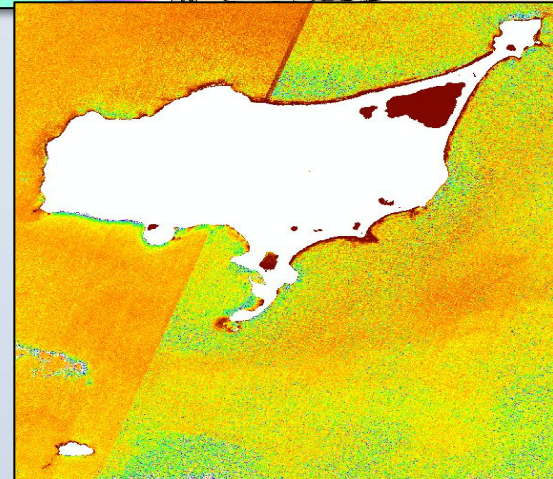
SatBathy Tool Overview (Alpha v1.0)

Testing

Egegik, AK



2021 Nushagak composite



Pribilof Island - Apr 1- June 30 composite

Pribilof artifact: known Sentinel-2 issue over water:

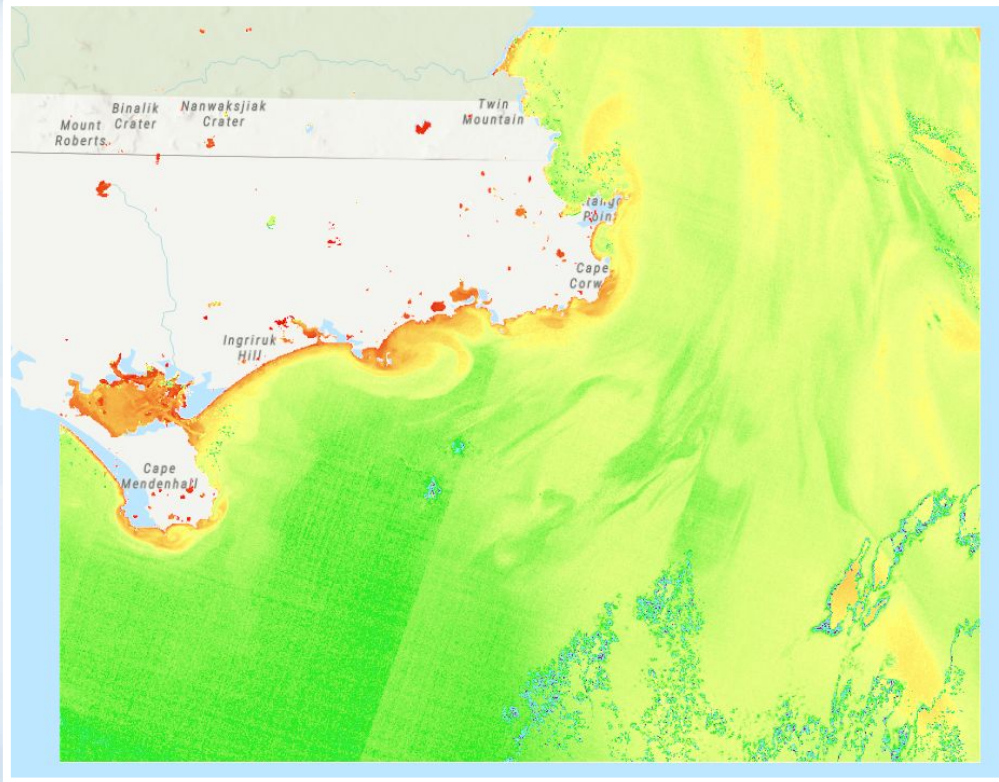
- Banding effect is caused by sensor construction, alternating detectors
- Impacts the acquisition timing and relative azimuth
- Results in incongruities and artifacts in images

A screenshot of the SatBathy tool interface. The interface includes a 'Parameter Controller' section with 'Manually Draw AOI' and input fields for 'Min Lon', 'Max Lon', 'Min Lat', and 'Max Lat'. Below this is an 'SDB Workflow' section with buttons for 'Generate pSDB Products', 'Perform Calibration', and 'Generate SDB Products'. The main map area shows a satellite image of a coastal area with a dashed yellow box indicating the AOI. The map is overlaid with a grid of latitude and longitude coordinates. On the right side, there is a 'Display Layers' section with checkboxes for 'AOI', 'Depth SOUNDGs', 'Lidar DEM', 'Lidar Depths', 'pSDB Red', 'pSDB Green', and 'SDB Final'. Below this is a 'Parameter / Product Status' section with colored bars for 'AOI', 'Images', 'pSDB Products', 'Reference Depths', 'Calibration', and 'SDB Products'.



National Oceanic and Atmospheric Administration

First order approximation: automating clipping at SDB extinction depth for operational testing during FY21 field season



Nunivak, AK



SDB clipped to 3.4m so the ships could junction with and stay safely offshore

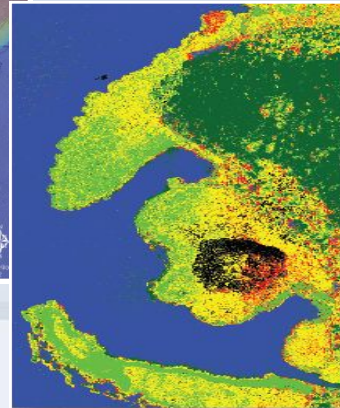
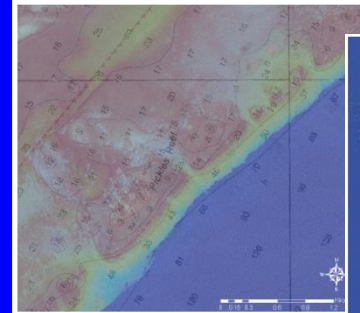
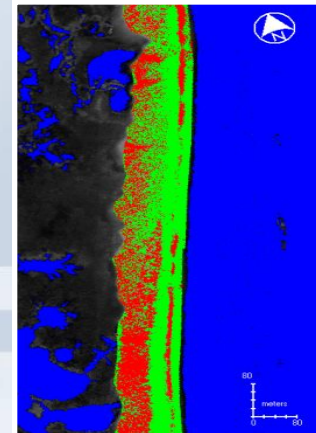
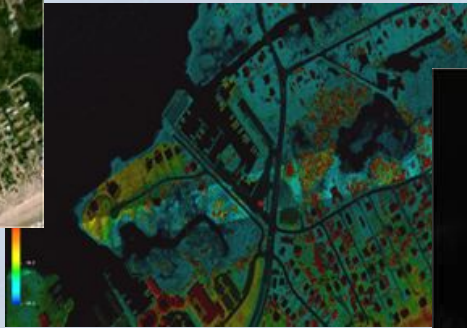
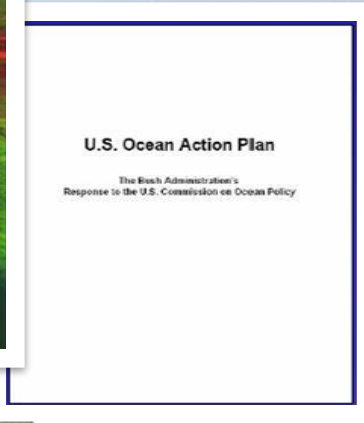
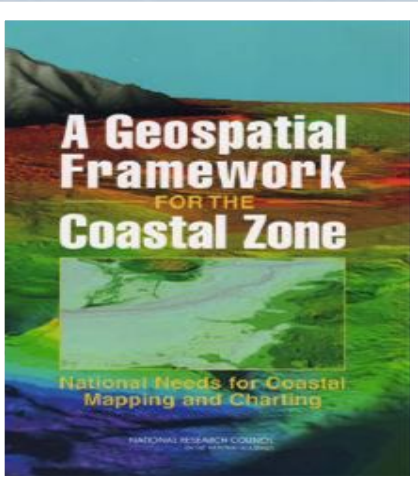
Hope to have this implemented in Beta v1.0 or 1.1



Integrated Ocean and Coastal Mapping (IOCM)

The practice of acquiring, managing, integrating and disseminating ocean and coastal geospatial mapping data in such a manner that permits these data and their derivative products to be easily accessed and used by and for the greatest range of users and purposes.

IOCM requires intra- and inter-agency coordination with a focus on streamlining operations, reducing redundancies, improving efficiencies, developing common standards, and stimulating innovation and technological development.



IOCM Products/Deliverables

Shoreline

Ortho Mosaic Imagery

Lidar Point Cloud
(elevation)

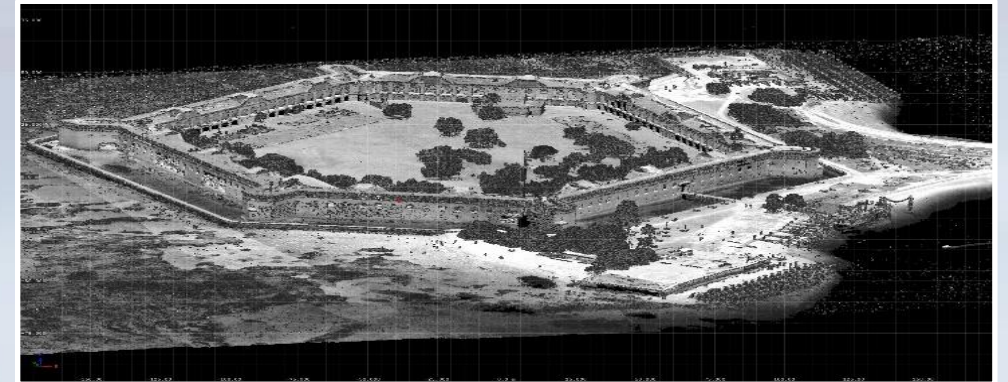
Lidar Point
Cloud
(intensity)



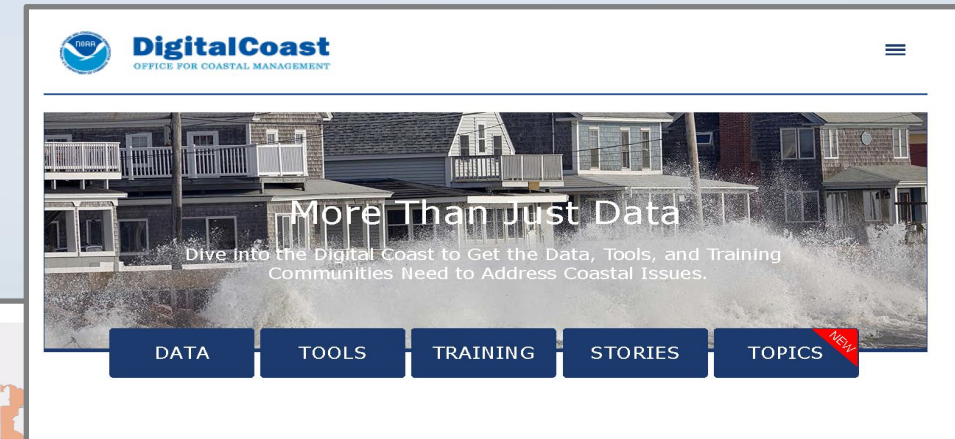
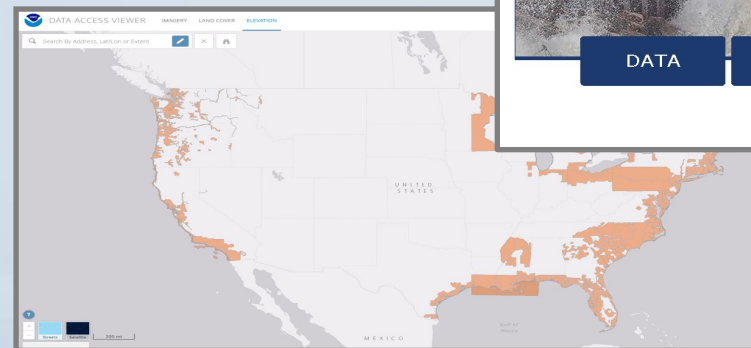
National Oceanic and Atmospheric Administration

TPU

Distribution of Data



Shoreline (<http://www.ngs.noaa.gov/NSDE/>)



Lidar and Imagery:



National Oceanic and Atmospheric Administration

<https://coast.noaa.gov/digitalcoast/>

Questions?

Mike Aslaksen

**Chief, Remote Sensing Division
NOAA National Geodetic Survey**

mike.aslaksen@noaa.gov



National Oceanic and Atmospheric Administration



National Park Service

Tahzay Jones

December 1st, 2021 | Virtual



Acquisition of an ASV for multibeam mapping

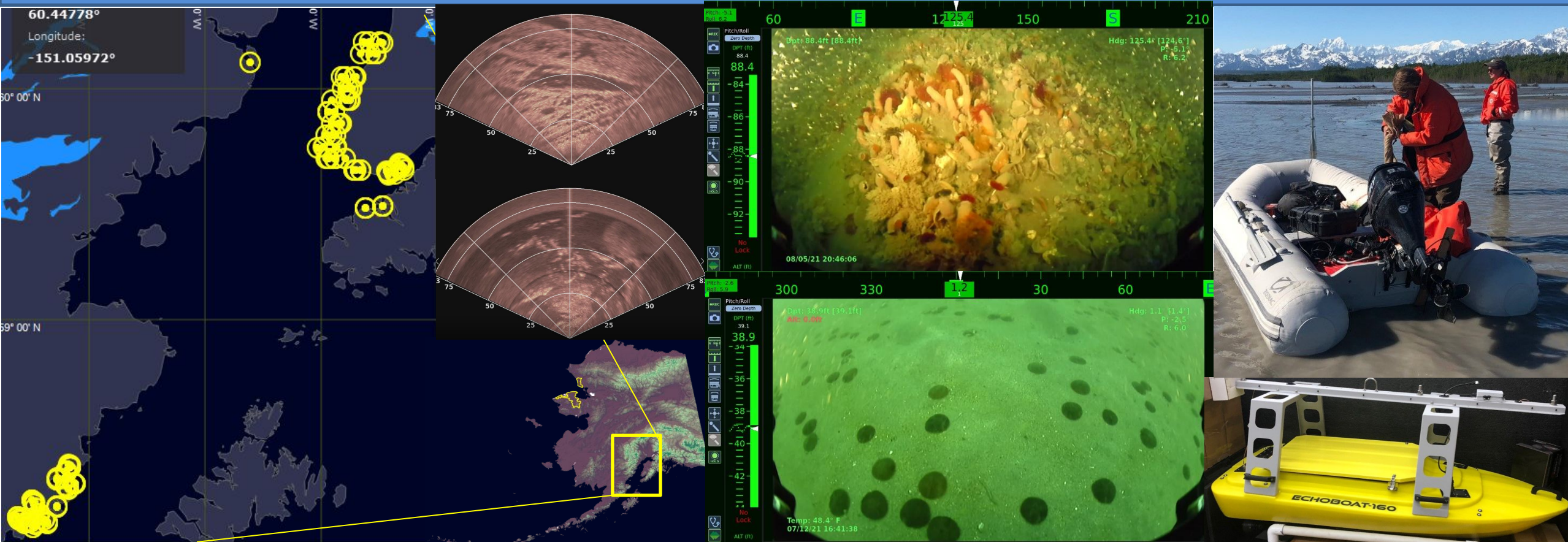
Single Beam bathymetry surveys of coastal lakes and lagoons at Malaspina

Pressure transducers retrieval of tidal station in Chinitna Bay

Benchmark relocations and occupations within in SW Alaska

Benthic Habitat Mapping Partnership with UAF, USGS

ROV dives in Cook Inlet, Kachemak Bay, and Shelikof Strait focused on areas between 10m and 30m





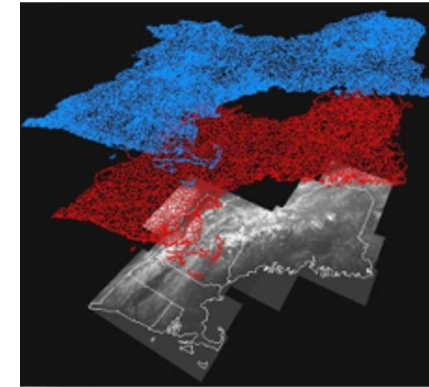
U.S. Geological Survey

Brian Wright

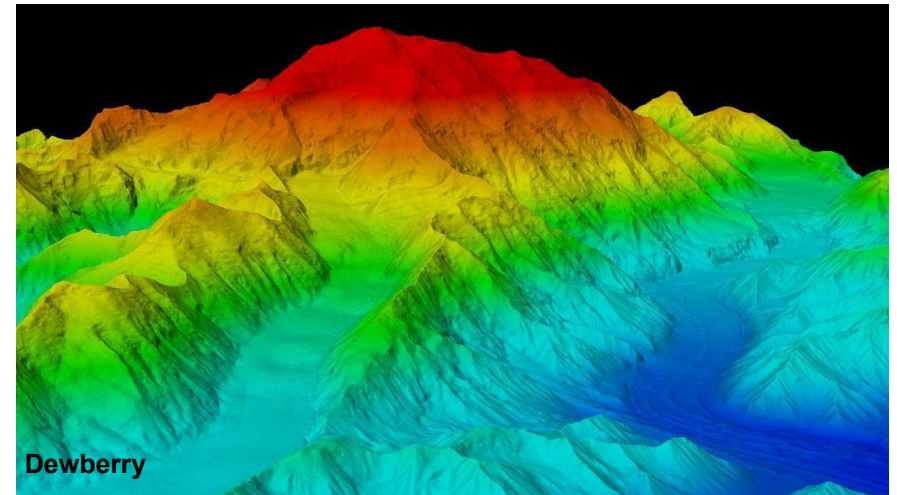
December 1st, 2021 | Virtual

US Geological Survey National Geospatial Program

Statewide Mapping Themes



Elevation
Hydrography
Imagery
Geographic Names
Land Cover
Boundaries



2021 Alaska Coastal and Ocean Mapping Summit



Brian Wright
National Map Liaison - Alaska
User Engagement Office
bwright@usgs.gov
907-201-0113

National Geospatial Program

Mission is to provide national topographic information to advance science, support government, enlighten citizens, and enable decision making

OMB Circular A-16 NGDA Data Themes & Lead Agency (USGS)

National Leadership	USGS Program Emphasis
OMB A-16 Lead for Elevation Terrestrial	3D Elevation Program (Statewide IfSAR Collection)
OMB A-16 Lead for Hydrography Terrestrial	National Hydrography Dataset (NHD) Watershed Boundaries Dataset (WBD) NHDPlus High Resolution
OMB A-16 Lead for Digital Orthoimagery	SPOT Imagery MAXAR (WorldView)
Topographic Maps	Topographic Maps (Historic Collection) US Topo (2012-Present)

Alaska Mapping Executive Committee Tracked Mapping Themes

Theme	Metric	2020 Goal	Oct 2021 Status
Hydrography	NHD WBD NHDPlus HR	Complete by 2030	13% complete
Gravity	% GRAV-D acquired	Mainland by 2019 Aleutians by 2022	100% Mainland Alaska 50% Aleutians
Shoreline Mapping	% updated	Complete by 2026 Dependent upon budget appropriations	58.7% complete 42.5% has been used to update charts)
Coastal Mapping	In development	Complete by 2030	Draft Implementation Plan reviewed by OSTP/OMB and prepared for public comment
Wetlands	NWI	Complete by 2029	75.4% contracted
Elevation	IfSAR	Completed in 2020	Establishing new requirements/priorities
Imagery	1-m GSD	Complete this update cycle in 2023	Completed. Establishing new refresh requirements/priorities

3D Elevation Program

Goal to complete nationwide lidar (IfSAR in AK) to provide the first-ever national baseline of consistent high-resolution elevation data

- Cooperatively funded program seeking to align federal, state, local, private and non-government organizations investments for high resolution elevation data
- Support a wide range of applications, including projects related to energy infrastructure construction and safety, and mitigate risks from natural hazards
- Address Federal, state and other mission-critical requirements
- Leverage the capability and capacity of private mapping firms
- Program oversight and management lead by USGS

Program Milestones:

- Statewide IfSAR completed in FY 2020
- Completion of US Topo production for Alaska FY21



Broad Agency Announcement

- Competitive application process for federal funding assistance for lidar collection
- Federal agencies, state and local governments, tribes, academic institutions, and the private sector are eligible
- Released on August 16, 2021. Initial submissions were due October 8, 2021.
- The Announcement remains open until **June 1, 2022** pending available funding
- Program released in federal fiscal year of 2021, awards and acquisition occur in FY22
- Additional selections will be made depending on availability of funding
- Proposals can request an Independent Government Cost Estimate

The most important factors are project location, geographic overlap with areas identified by federal agencies as areas of interest for lidar acquisition, project cost and cost share (funds contributed by applicants) and technical approach. These factors are equally valued. Secondary factors include areal extent and maturity of applicant's proposal and (maturity of) designated funding sources."

Program Highlights: Since the conception of the BAA in 2016, an Alaska proposal has been awarded each year

BAA Acquisition Criteria in Alaska

Proposals for lidar acquisition in Alaska will be considered for the following targeted acquisition areas;

- Critically targeted geographies identified by multiple agencies in the original NEEA study
- Areas that overlap with Federal priorities
- Alaska coastlines extending to the 50-foot elevation line. Additional extents may be considered in developed areas or areas of populated native communities to support geo-hazard and flood related assessment and mitigation
- Flat geographies of the Yukon delta including all US Fish and Wildlife Service refuge lands therein, and in north central Alaska surrounding Barrow
- The area of the Yukon River basin identified for native Alaskan village flood risk
- Larger municipalities with Federal Aviation Administration (FAA) regulated airport facilities and FAA's identified Alaska Peninsula flight approach area. Primary transportation corridors to include existing and proposed railways, highways, ports, and major river corridors

Resources

FY22 Broad Agency Announcement

https://www.usgs.gov/core-science-systems/ngp/3dep/fy22-usgs-broad-agency-announcement-baa?qt-science_support_page_related_con=0#qt-science_support_page_related_con

3D Elevation Program

https://www.usgs.gov/core-science-systems/ngp/3dep/what-is-3dep?qt-science_support_page_related_con=0#qt-science_support_page_related_con

USGS Lidar Base Specifications

<https://www.usgs.gov/core-science-systems/ngp/ss/lidar-base-specification-online>

US Interagency Elevation (Topographic-Topobathy-Bathymetry) Inventory

<https://coast.noaa.gov/inventory/>

Alaska Mapping Initiative

<https://www.usgs.gov/core-science-systems/ngp/user-engagement-office/alaska-mapping>

Alaska Mapping Executive Committee

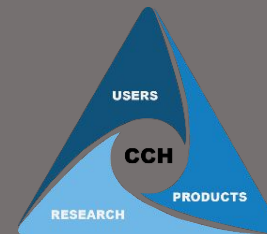
<https://www.usgs.gov/core-science-systems/ngp/user-engagement-office/alaska-mapping-executive-committee>



2021 Alaska Coastal & Ocean Mapping Summit

USGS Coastal Change Hazards

Ann E. Gibbs, Pacific Coastal and Marine Science Center (agibbs@usgs.gov)



Shoreline change assessments

<https://marine.usgs.gov/coastalchangehazardsportal/>

Future flood hazard modeling (CoSMoS-AK)

<https://www.usgs.gov/centers/pcmssc/science/coastal-storm-modeling-system-cosmos>

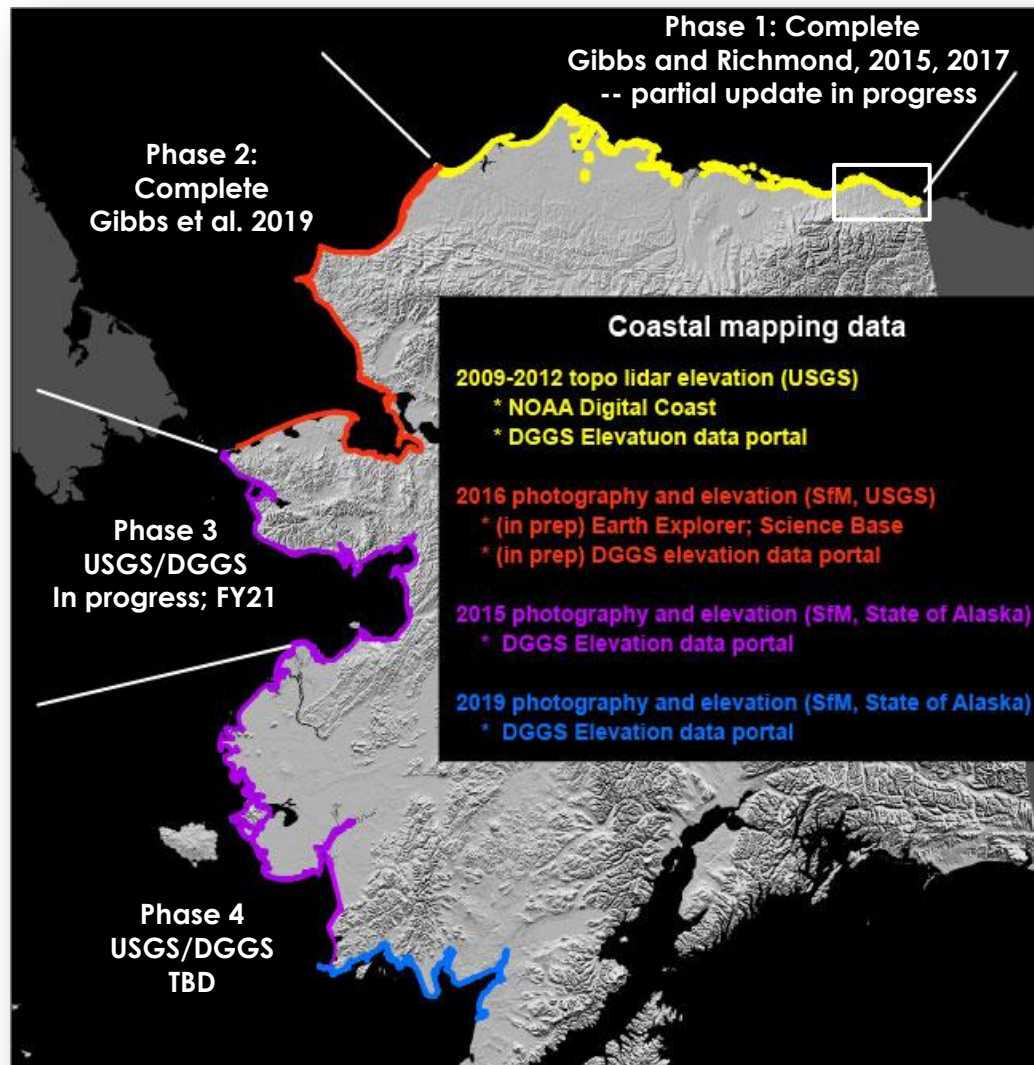
Total water level and coastal change forecasting

<https://www.usgs.gov/centers/spcmssc/science/operational-total-water-level-and-coastal-change-forecasts>

Coastal observing cameras

<https://www.usgs.gov/centers/pcmssc/science/using-video-imagery-study-wave-dynamics-unalakleet>

<https://www.usgs.gov/centers/pcmssc/science/using-video-imagery-study-sediment-transport-and-wave-dynamics-nuvuk-point>



Long-term collaboration with State of Alaska/DGGS

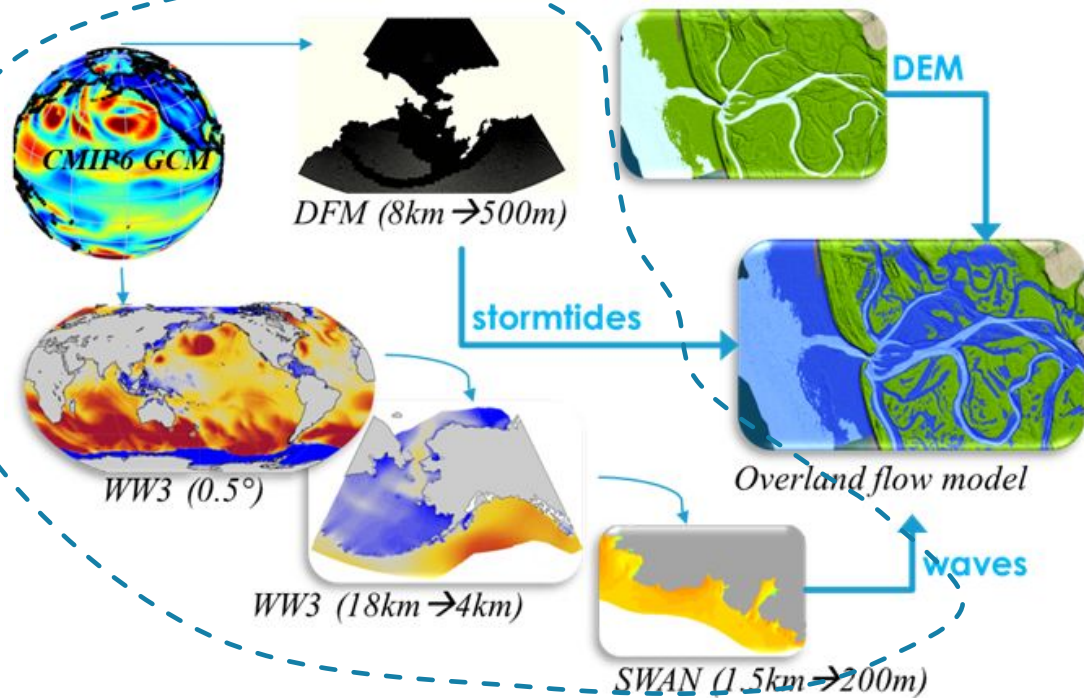
- USGS: continuous coast, regional focus
- DGGS: community focus
- Utilize similar methodology and data sources
- Leverage acquisition and processing of datasets

Status

- Bering Strait to US-Canada border complete (1940s to 2010-16)
- Norton Sound in progress (1950s to 2015)
 - Registering historical imagery (1950s B&W, 1970s AHAP)
- Updates
 - *In progress*: ANWR; 2017 NOAA photography
 - *Future*: Based on new ACMS acquisitions
- Elevation-based shoreline
 - Conformance with the rest of the nation
 - Based on updated geodetic and tidal datum information
- Satellite derived shorelines and change projections

Characterize past and future coastal flood hazards at villages and built environments Alaska

- Running a series of numerical models to map flood hazards out to 2050
 - Multiple sea level rise + future storms scenarios



- Planned *final product*: *flood hazard maps* for all combinations of 6 ranges of sea-level rise and 6 storm return periods (36 total)
- Develop and inform adaptation strategies through a web-based and stakeholder decision support tools via collaboration with ANTHC, AK-CASC, and others
- Currently limited to select coastal villages and locations where adequate DEMs and elevation datum information exist



- | | |
|----------------|------------------|
| 1. Unalakleet | 10. Kaktovik |
| 2. Utqiagvik | 11. Golovin |
| 3. Kotzebue | 12. Oliktok Pt. |
| 4. Elim | 13. Bullen Pt. |
| 5. Deering | 14. Lonely |
| 6. Kivalina | 15. Cape Simpson |
| 7. Point Hope | 16. Shaktoolik |
| 8. Teller | 17. Nome |
| 9. Prudhoe Bay | |

Accuracy of the model is strongly influenced by nearshore bathymetry (< 20-30 m; depending on coastal morphology; e.g. bay vs open coast) and elevation surface (overland flow).

Currently: Building seamless TB-DEMS with available bathymetry and elevation data.
Expand USGS CoNED efforts beginning FY23

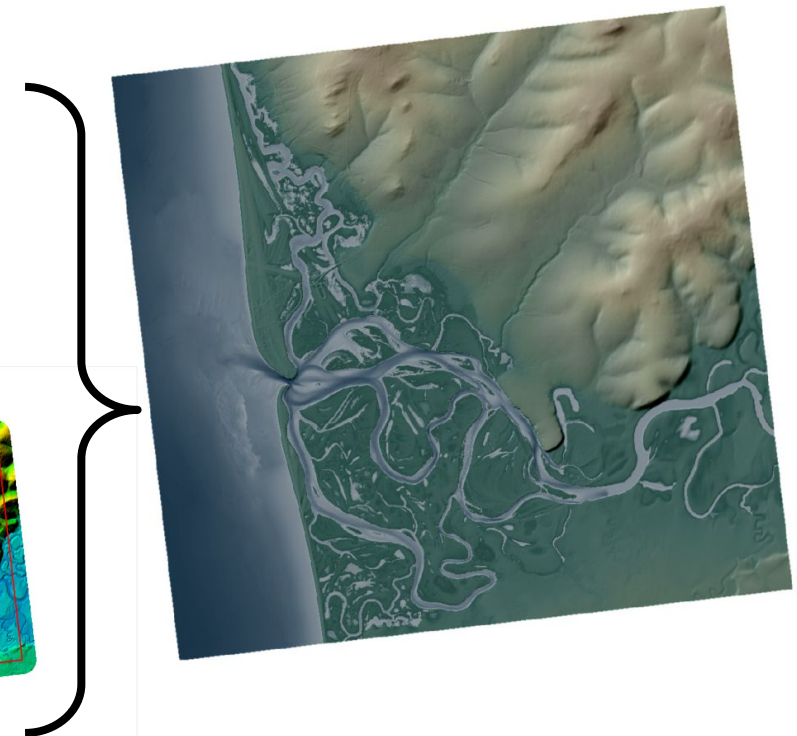
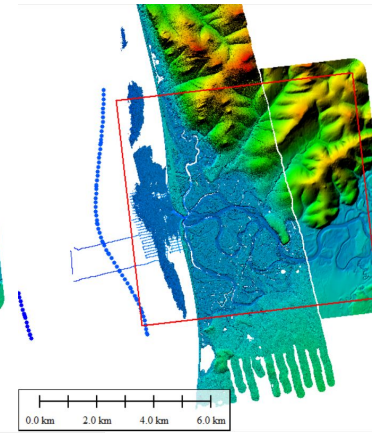
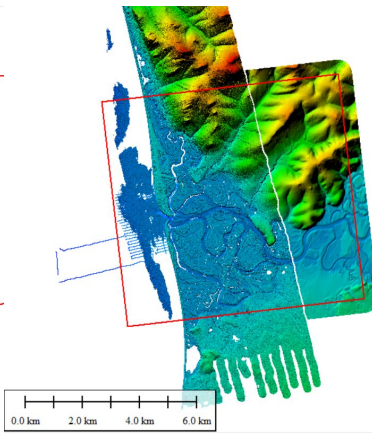
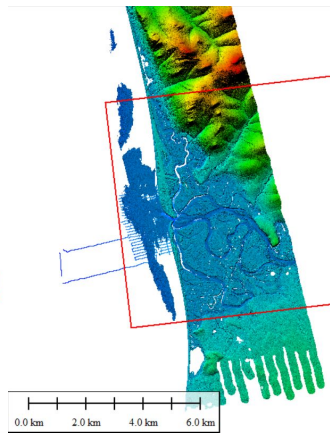
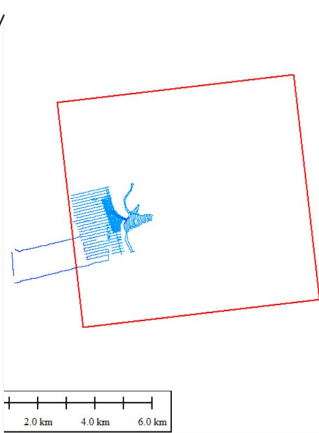
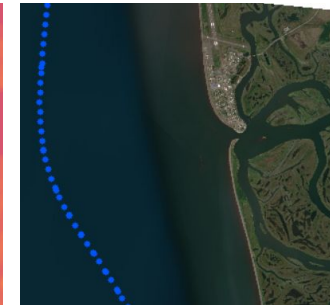
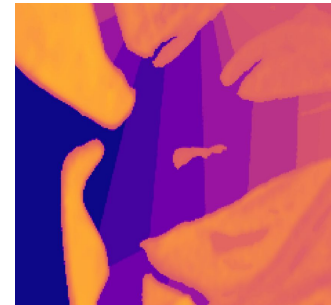
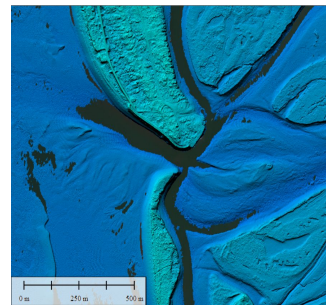
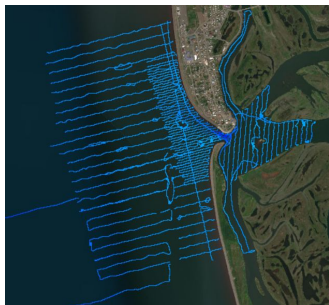
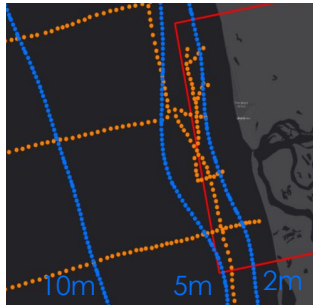
NOS H02479 (orange)
IBCAO4.0 (blue)

2019 Sonar USGS

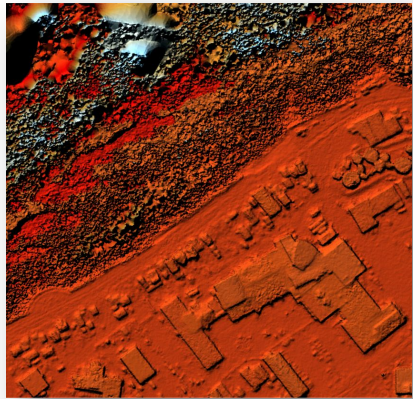
2019 JALBTCX
Bare-earth lidar

2012 IfSAR

IBCAO
extracted isobath



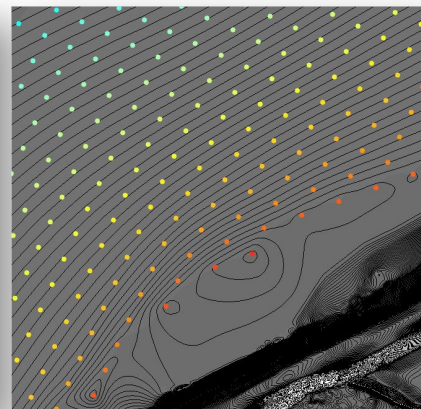
Fodar



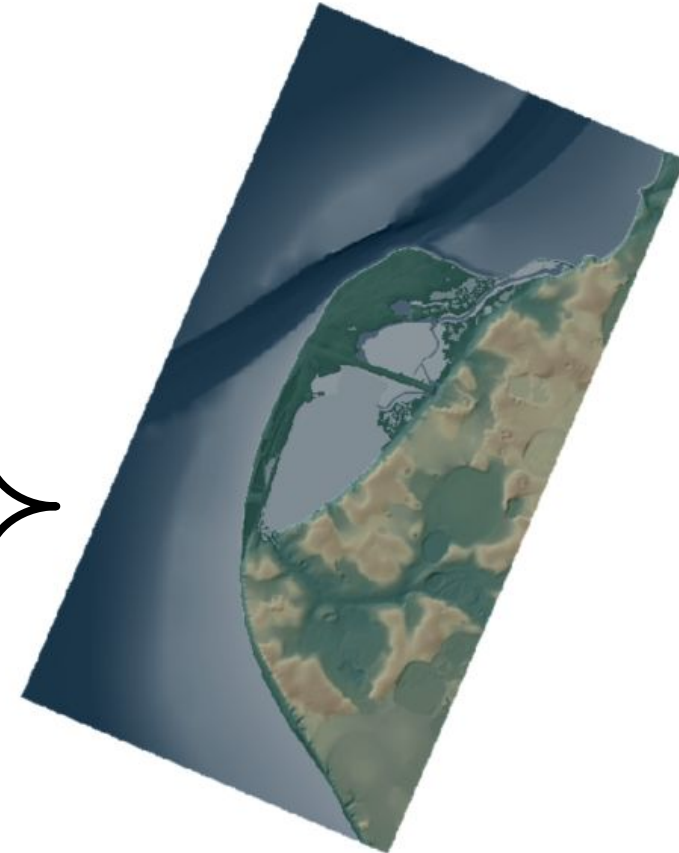
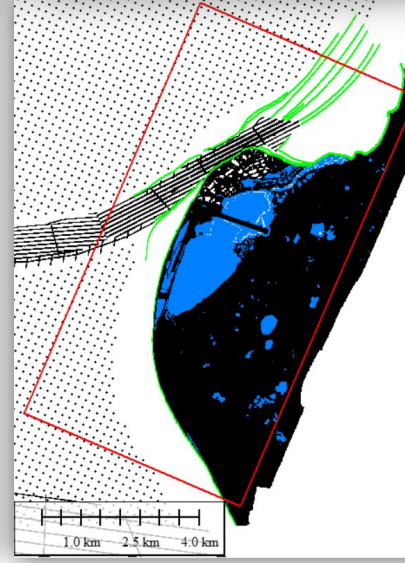
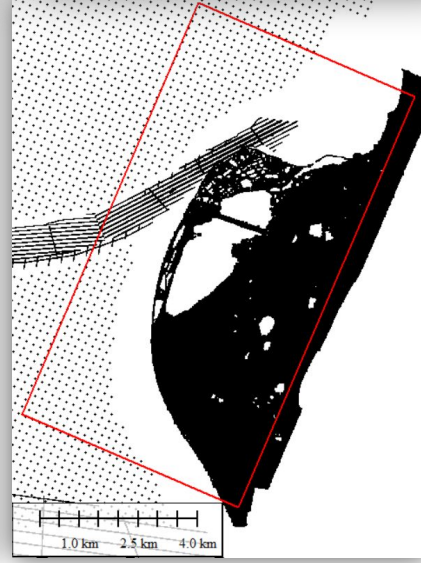
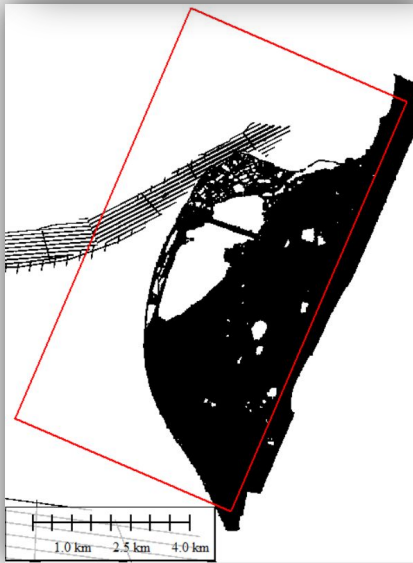
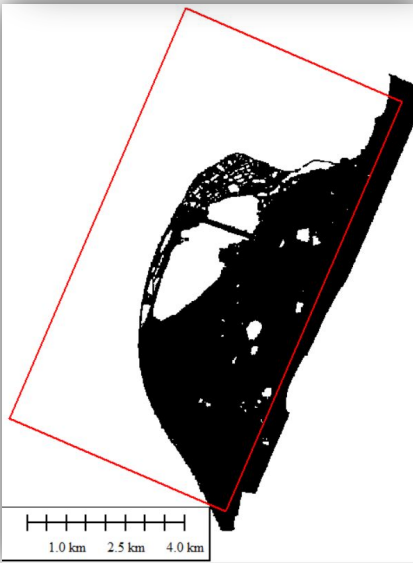
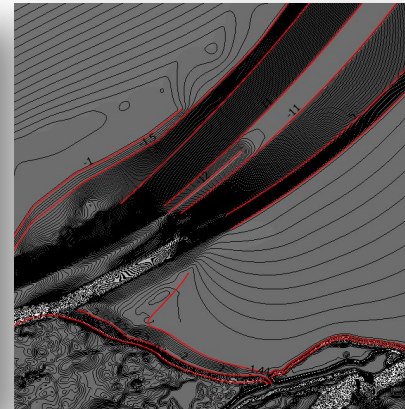
+ multibeam



+ IBCAO 4.0



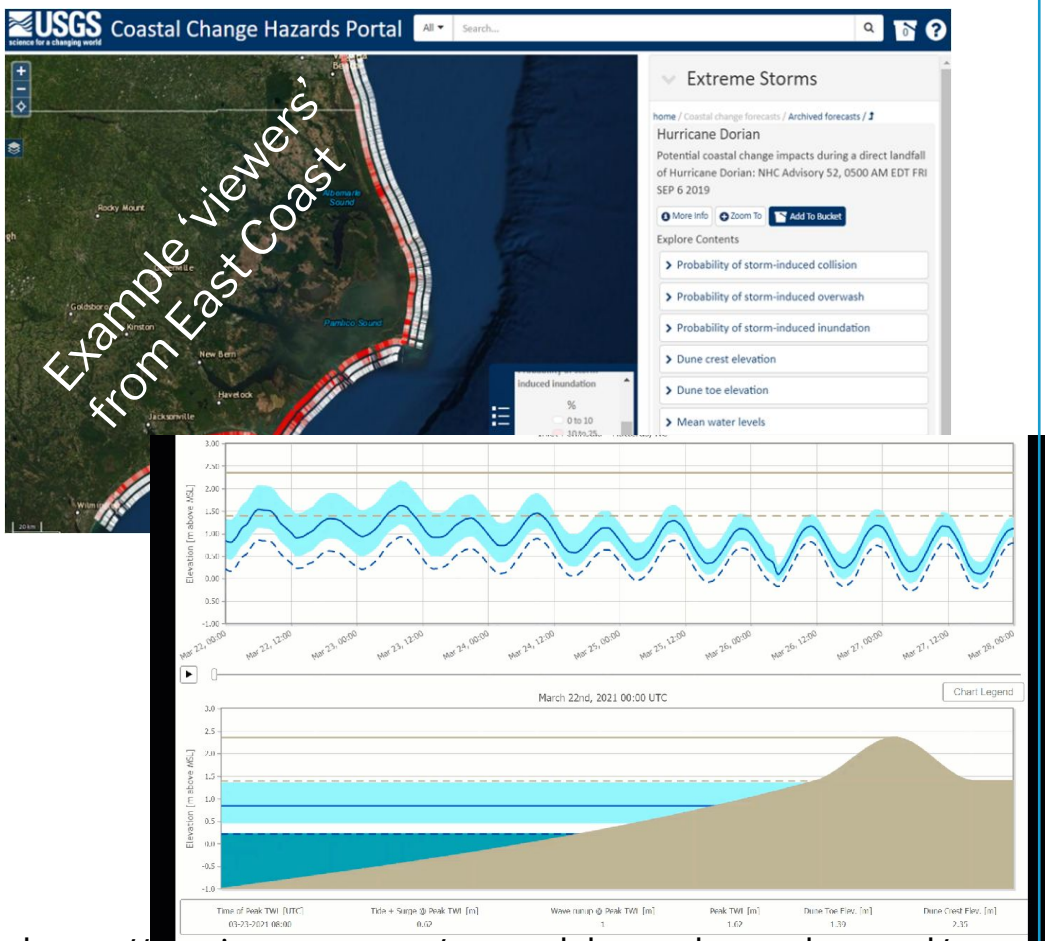
+ interpreted



Blue = water masks, areas of constant elevation

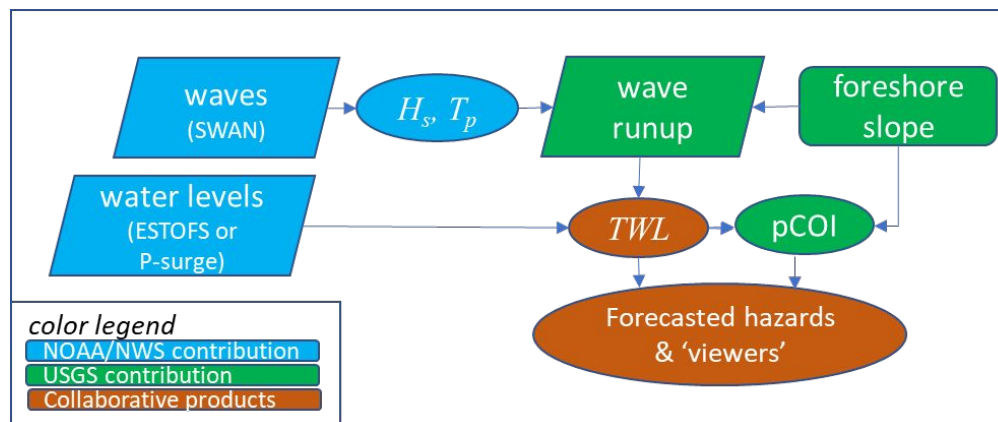
Green = lines of constant elevation

Buildout of a 6-day forecast system for coastal flooding & probability of erosion

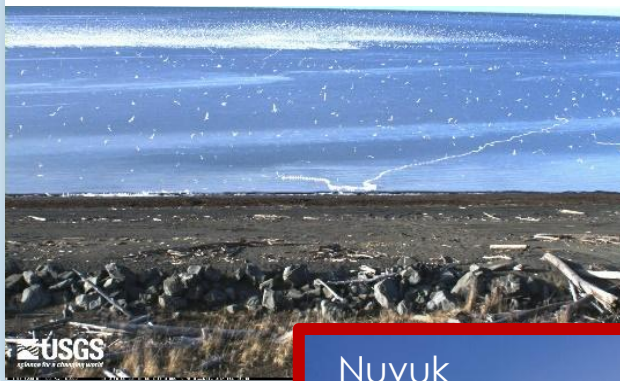


<https://marine.usgs.gov/coastalchangehazardsportal/>
<https://coastal.er.usgs.gov/hurricanes/research/twlviewer/>

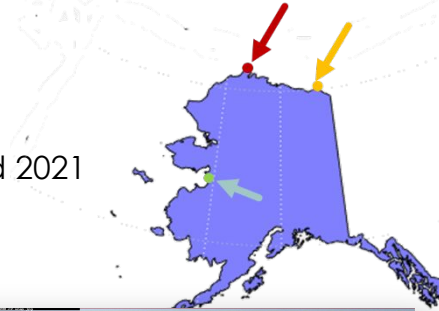
- Ongoing collaboration with NOAA/NWS
- East Coast in ~2015. National expansion to Gulf coast, West coast, and Alaska
- Provides 144 hour forecasted total water levels and probabilities for collision, overwash, or impact (pCOI)
- **Accuracy of TWL models is strongly influenced by nearshore bathymetry** (< 20-30 m; depending on coastal morphology; e.g. bay vs open coast) **and elevation surface** (overland flow).
- **Wave runup strongly influenced by nearshore bathymetry (< 5 m) and foreshore slope.**



Unalakleet: Installation 2018



Unalakleet installed 2018
(joint USGS/DGGS effort)
Nuvuk/Point Barrow installed 2021
Barter Island 2018-2019



Nuvuk
Point Barrow



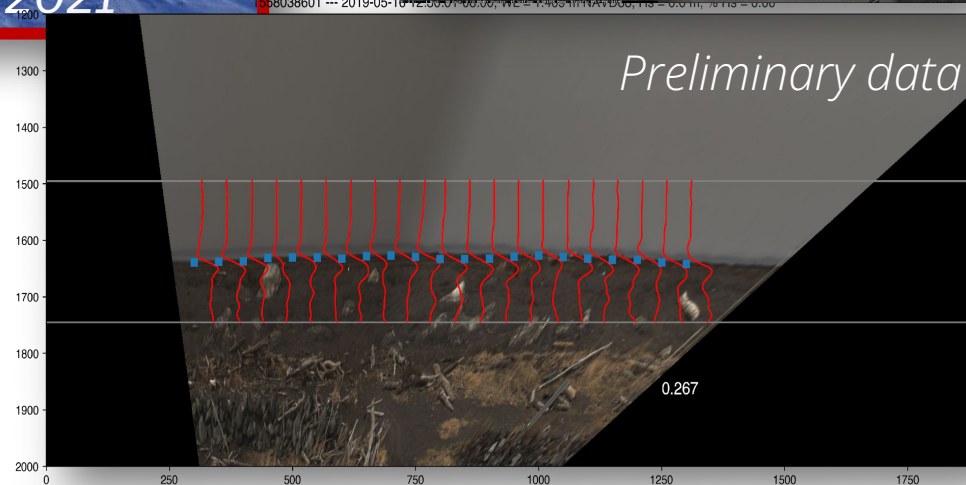
Unalakleet



Kaktovik
2018-2019



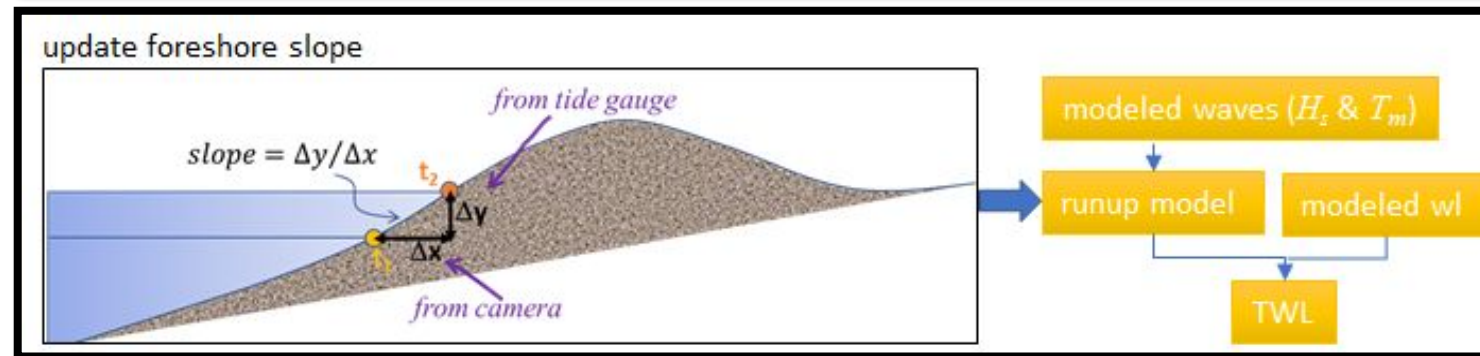
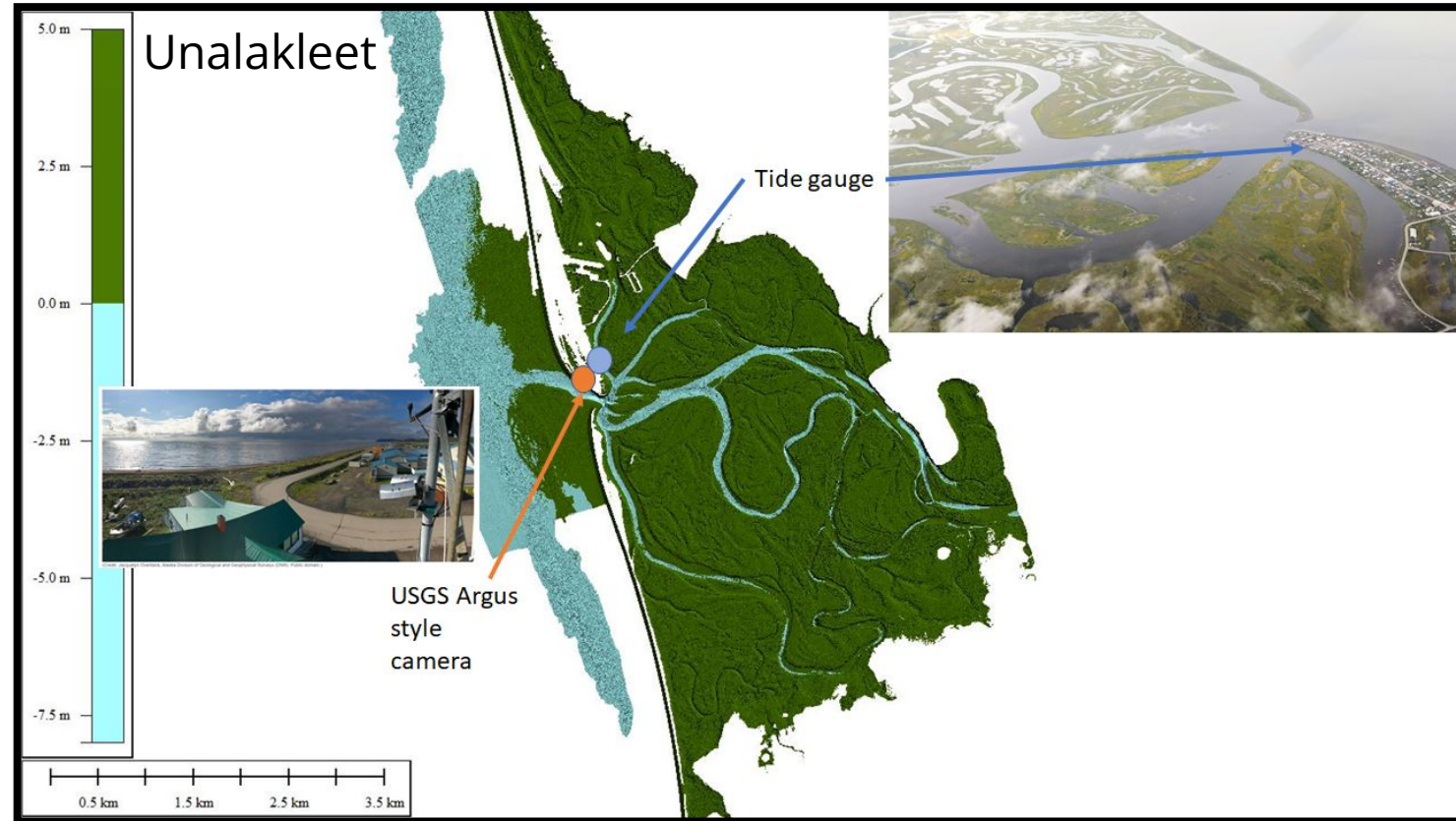
installation 2021



High-resolution, web-enabled video camera systems

- Monitoring coastal change
- Measuring wave runup and validating TWL forecast models
 - LWI (shoreline) extracted from imagery and used as validation for TWL forecasts**
- Quantifying nearshore morphodynamics to improve forecasts
 - Dynamic updating of foreshore slope and incorporating into TWL forecasts (quantify variability, improve model)**
 - Calculate nearshore bathymetry**
- Characterizing wave conditions (height, period)
- Assessing sediment entrainment in ice
- Tracking nearshore sea-ice dynamics

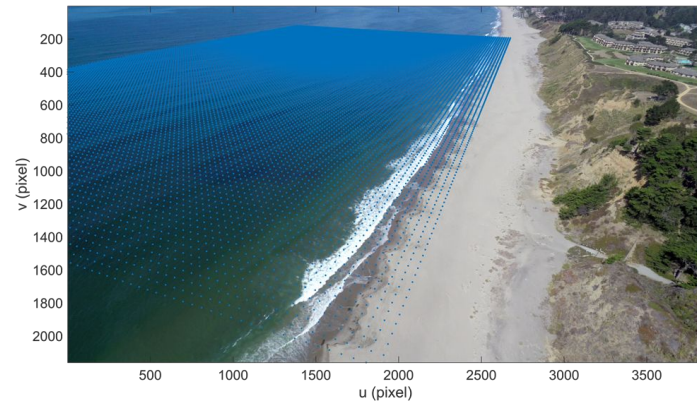
Shoreline and foreshore slope extraction



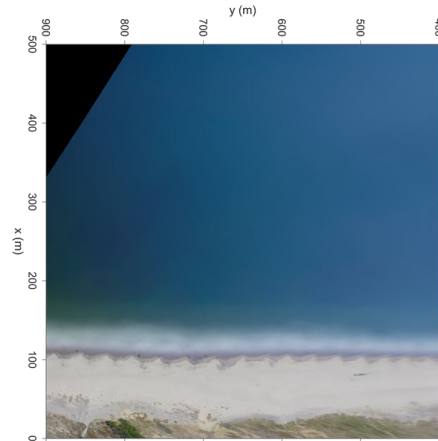
Estimating nearshore bathymetry using optical observations of propagating waves

Example from Seascope Beach, Central CA (POC: Shawn Harrison, NRL, formerly USGS)

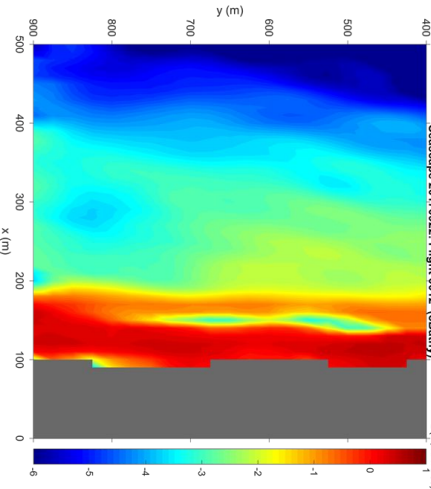
Pixel identification



Rectification



“cBathy”



Algorithm and approach that is gaining much traction since its initial development in 2013.



remote sensing

New paper just out in July 2021



Article

Updates to and Performance of the cBathy Algorithm for Estimating Nearshore Bathymetry from Remote Sensing Imagery

Rob Holman ^{1,*} and Erwin W. J. Bergsma ²



End of Presentation

Thank you!





JALBTCX - Joint Airborne Lidar & Bathymetry Technical Center of Expertise

Chris Macon

December 1st, 2021 | Virtual



National Coastal Mapping Program

- Develops regional, repetitive, high-resolution, high-accuracy elevation and imagery data
- To build an understanding of how the coastal zone is changing
- Facilitates management of sediment and projects at a regional, or watershed scale

Lidar Bathymetry and Topography
Marquette Harbor, Michigan, 2019



Number of surveys since 2004

Per year

- 2500 square miles
- @ 25 navigation channels
- @ 50 navigation structures
- 18 billion points
- 4500 digital elevation models
- 3000 air photo tiles
- 3000 hyperspectral image tiles

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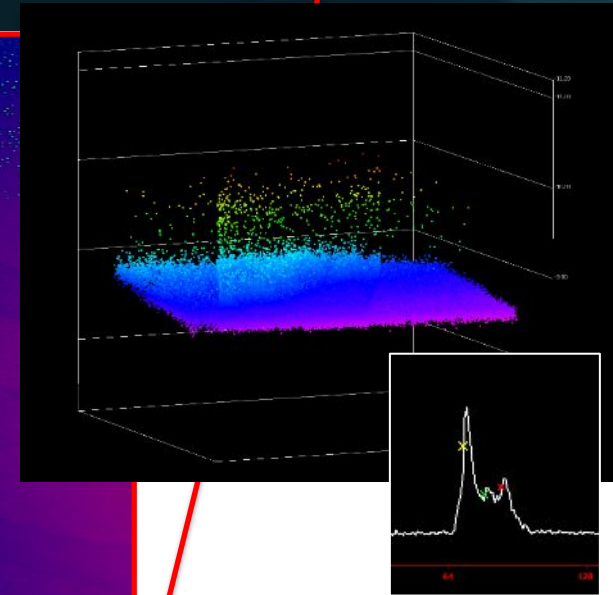
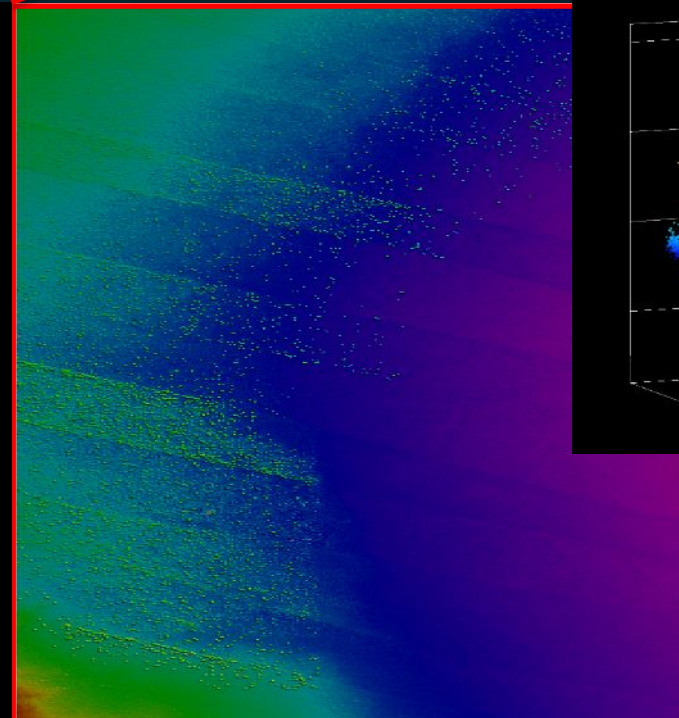
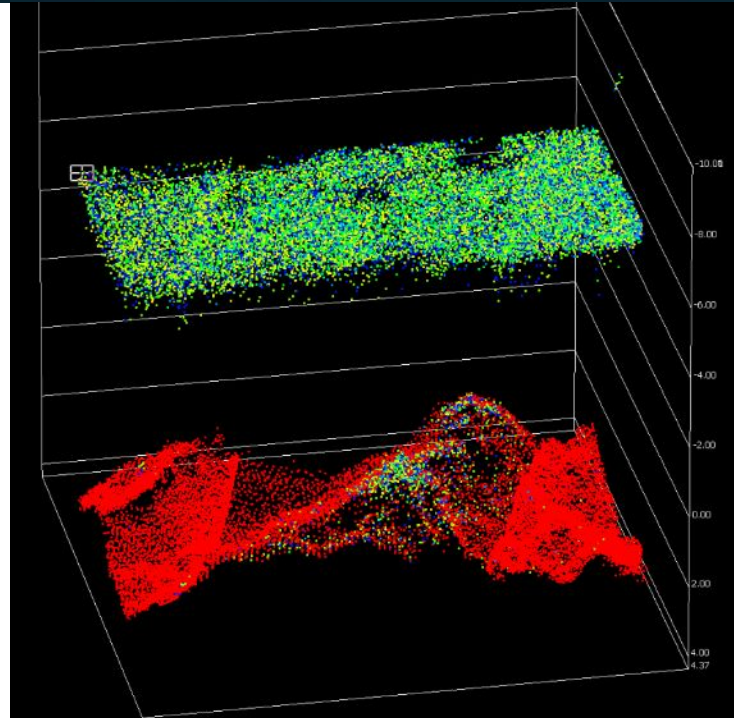
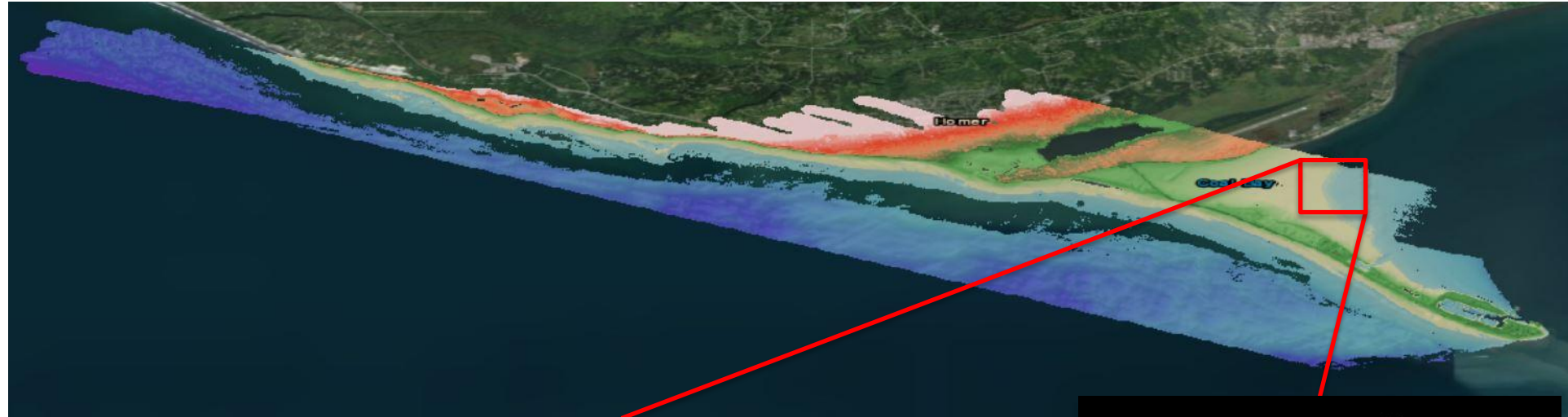




TOPOGRAPHIC/BATHYMETRIC PILOT PROJECT IN ALASKA

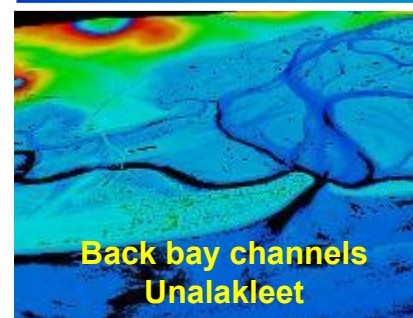
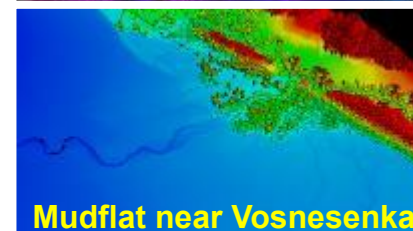
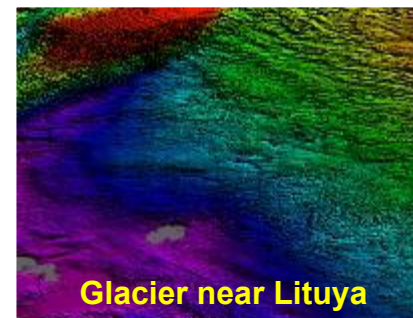
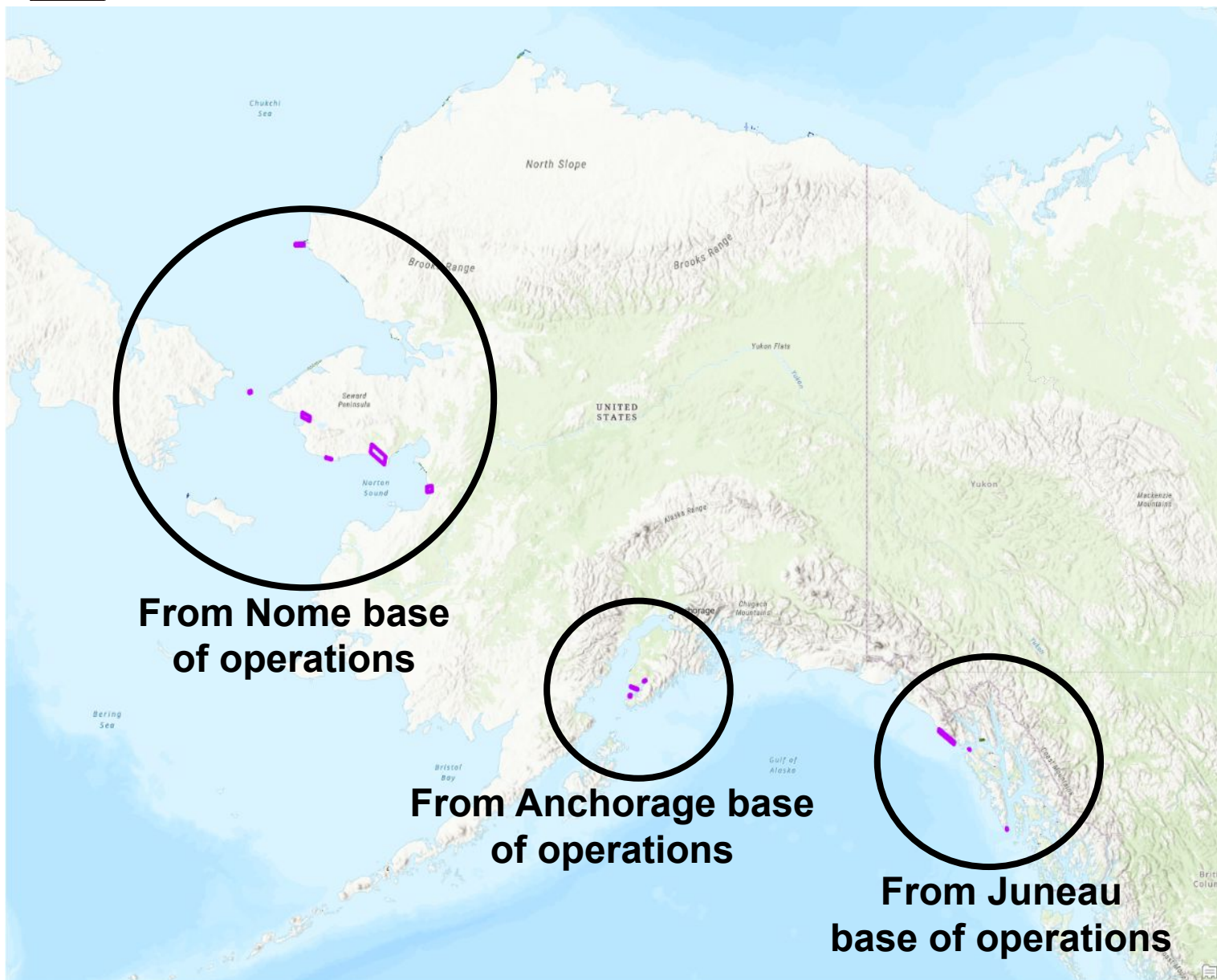


June 10-12, 2018
406M Valid Returns
21.4 m Max Depth
47 Flightlines
25.5 Miles²





2019 JALBTCX Topo/Bathy Operations

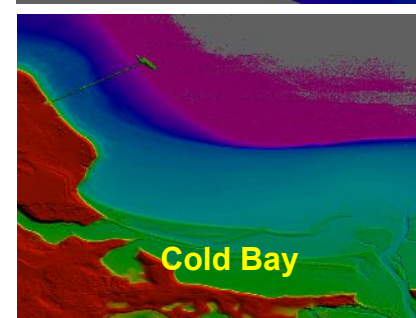
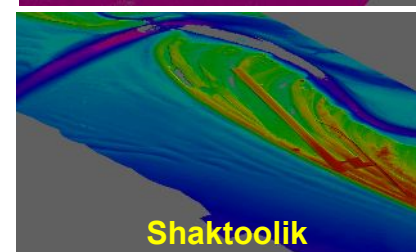
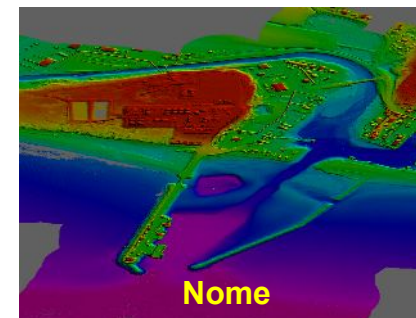
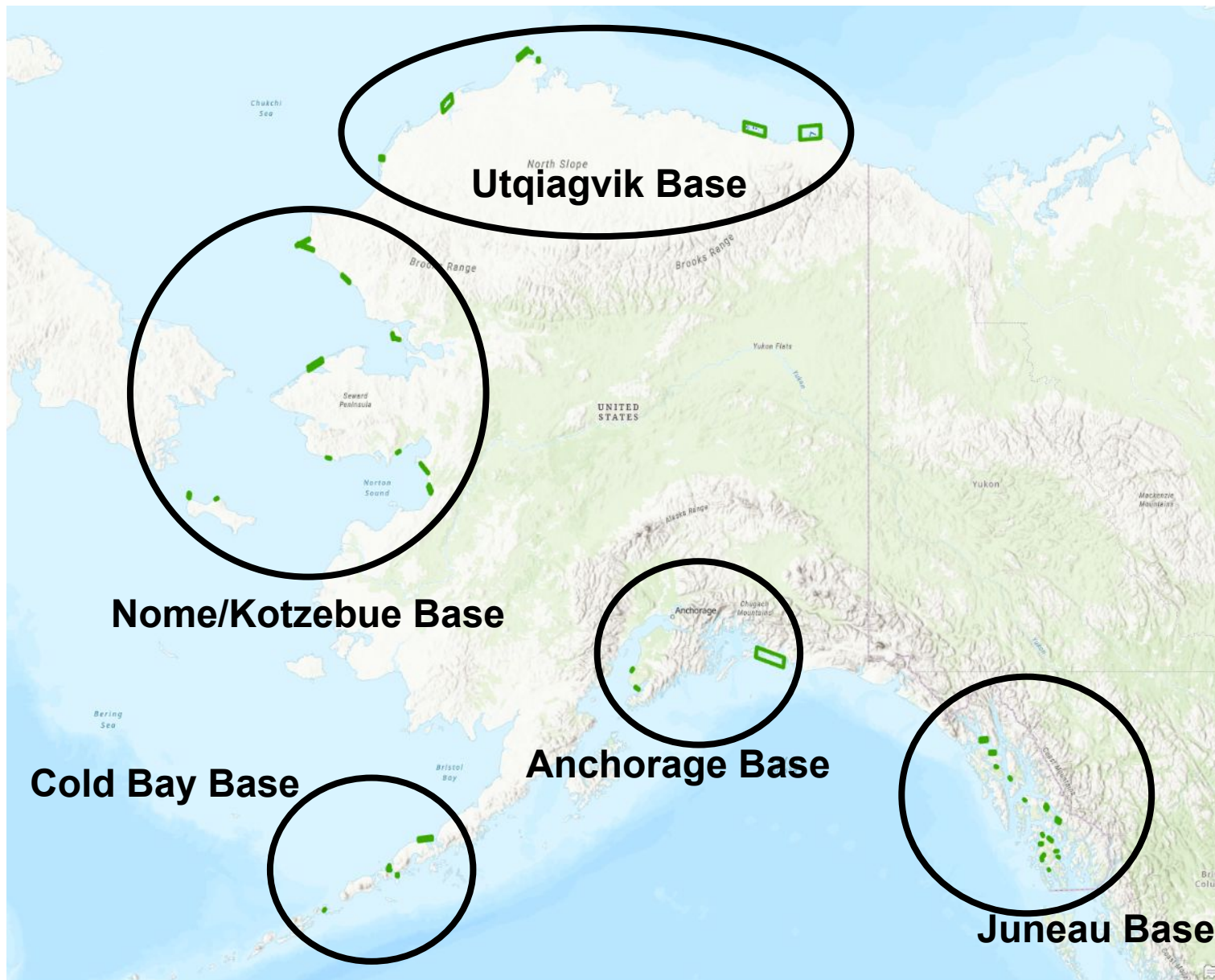


- Utilized NAVO return transit from INDOPACOM
- July 4 – July 29
- 13 Flight days between 9 July and 27 July
- 18 Flights
- 100 Engine Hours
- 54 Survey Hours
- 40 Transit Hours
- ~ 1/3 of days impacted by Weather
- Delivered Data on 17 Dec to USACE, DGGS, and NPS





2021 JALBTCX Topo/Bathy Operations



- 2 Campaigns (~June/~August) due to weather and sea ice
- May 30 – June 29
- 32 Days
- 35 Flights – 12 Hours
- Aug 3 – Aug 26
- 24 Days
- 21 Flights – 78 hours
- 764 Lines
- 9.15 Line KM Flown



Ice, snow, clouds

Photograph of Utqiagvik (Barrow) during collection flight



Kivalina, AK, 23 June 2021



Cape Blossom, AK, 22 June 2021

Mount Shishaldin, Alaska



31 May 2021



22 June 2021

Pictures taken from JALBTCX aircraft of sea ice covering the survey area at Cape Blossom, AK.

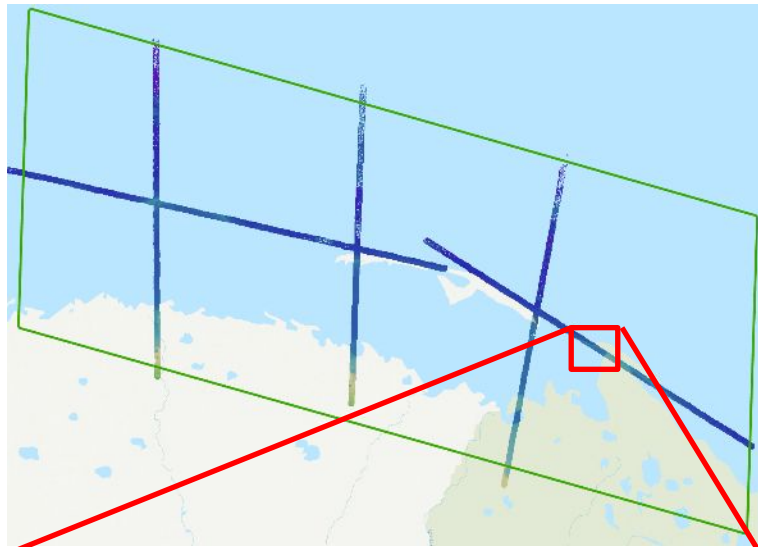


Klawock, AK, June 2021

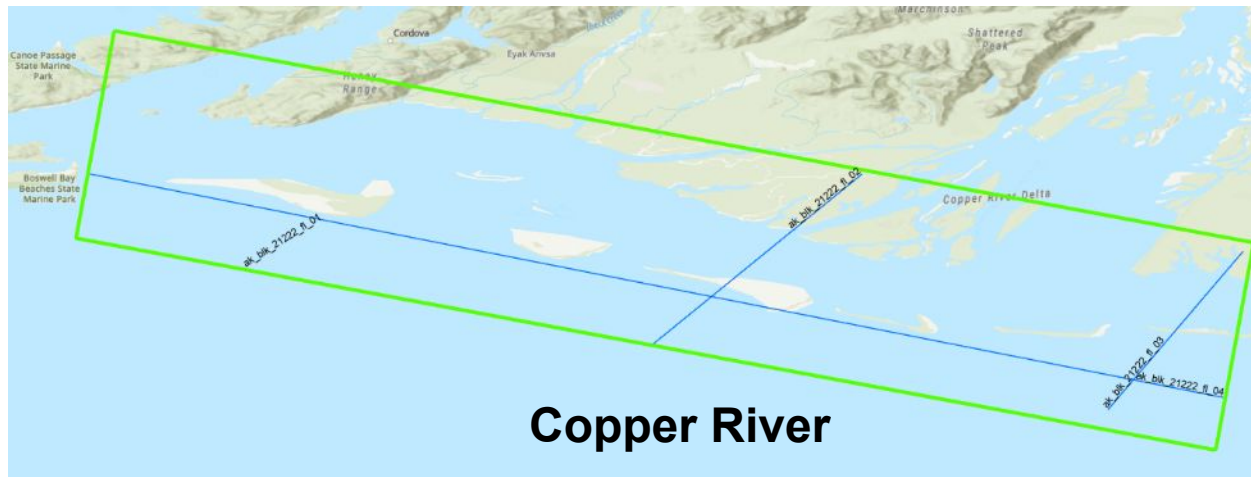
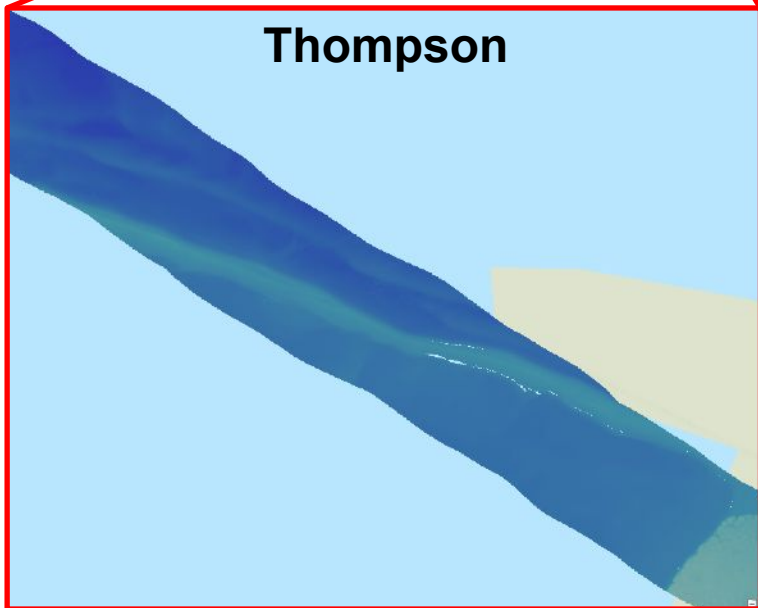




2021 JALBTCX Topo/Bathy Exploratory Collections



Thompson



Copper River



Kaktovik

- Exploratory lines flown at Copper River, Thompson, Kaktovik
- Decent Results on the North Slope
- No bathy data near Copper River





2021 JALBTCX Topo/Bathy Northwest AK



Utqiagvik

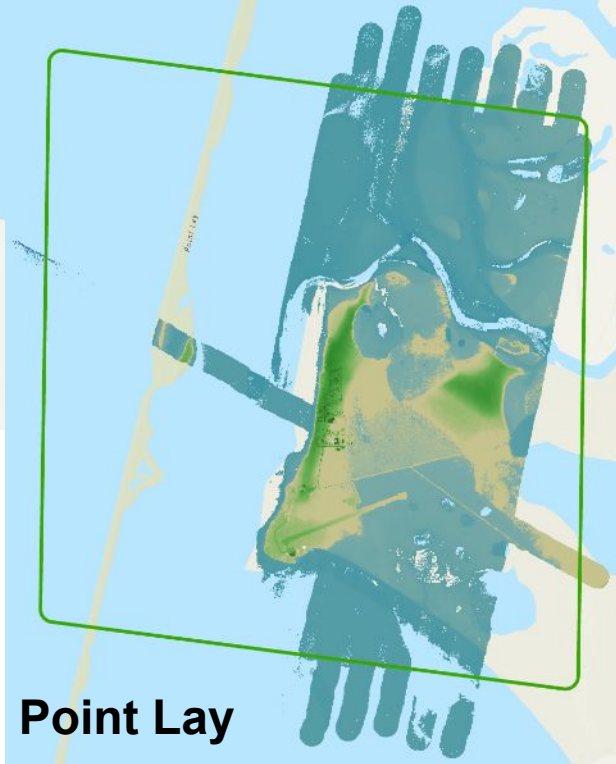


Wainwright



- Northwest North Slope had mixed returns
- Ocean side had no bathy
- Point Lay and Wainwright areas decreased in size due to poor water conditions

Point Lay

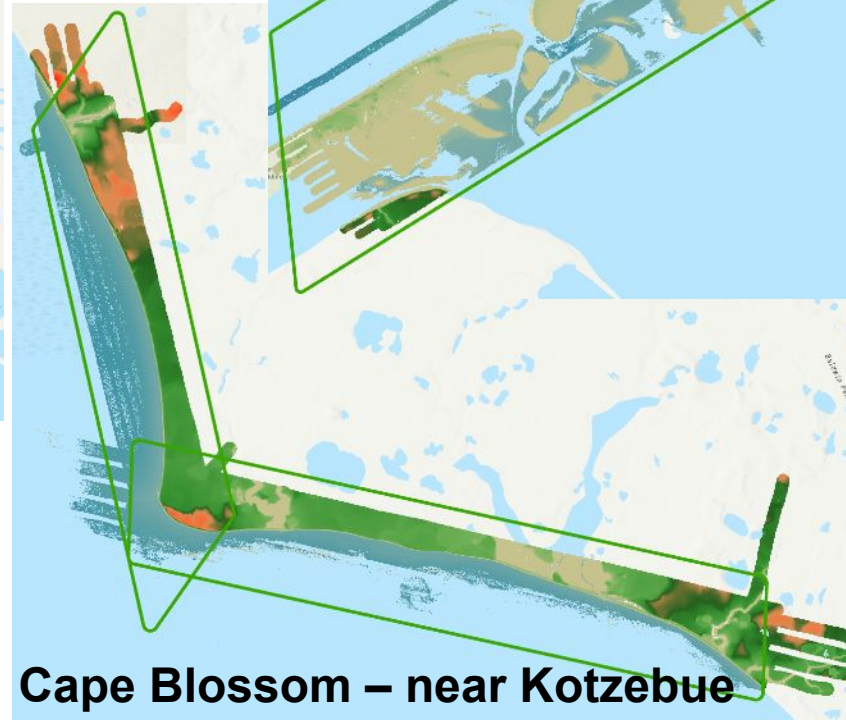
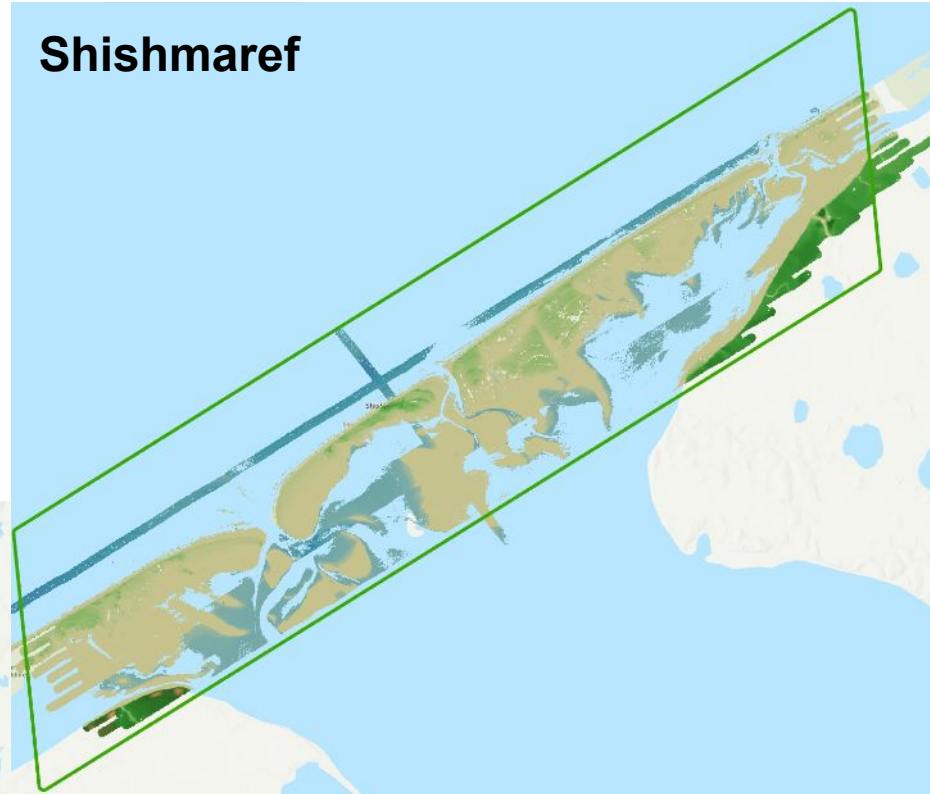




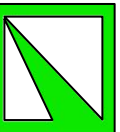
2021 JALBTCX Topo/Bathy Kotzebue Sound



Shishmaref



- Kotzebue Sound had mixed returns
- Shishmaref was highly variable with minimal bathy
- Cape Blossom had decent returns with ice pack on the shoreline
- Kivalina also had sea ice with mixed returns





2021 JALBTCX Topo/Bathy St Lawrence Island



- Good bathy data around St Lawrence Island
- Very difficult location to fly with persistent low clouds and limited weather forecast
- Terrain did not help either
- Good area to expand coverage area to maximize collection.

Christopher.I.macon@usace.army.mil



US Army Corps
of Engineers

Finger Glacier, Glacier Bay National Park, 2019



JALBTCX
Joint Airborne Lidar Bathymetry
Technical Center of Expertise



U.S. Fish & Wildlife Service

Sydney Thielke and Lew Coggins

December 1st, 2021 | Virtual



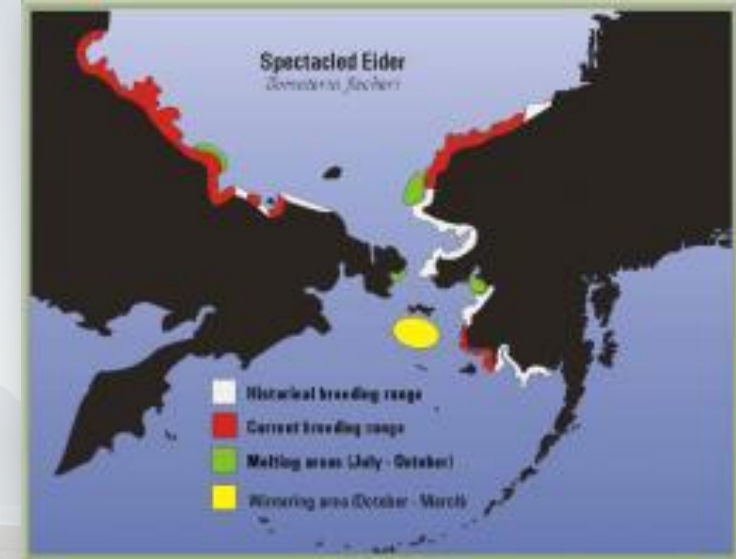
USFWS Coastal Mapping Update

Sydney Thielke, Regional Wetlands Coordinator
USFWS, Alaska Region
Sydney_Thielke@fws.gov



USFWS Coastal Priorities

- 2020 solicitation for input across USFWS Alaska
 - Refuge administrative boundaries
 - Climate change and coastal erosion
 - Intertidal fish habitat
 - Shipping routes and infrastructure/oil spill response
 - Trust resources and Endangered Species





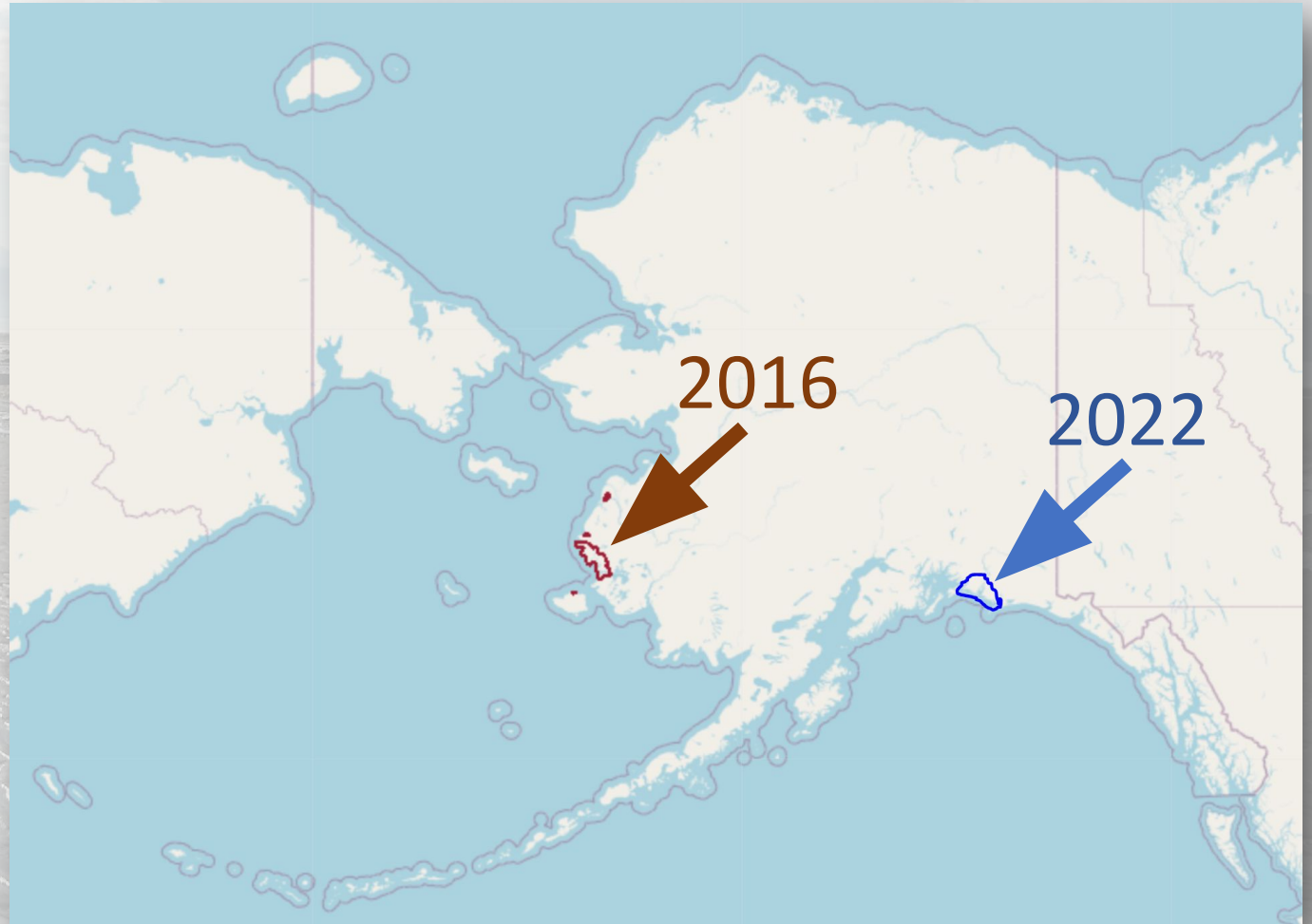
USFWS Existing and Future Contributions

• Lidar

- 2015 Western AK
- 2022 Copper River Delta

• Imagery

- FWS has invested in an imagery platform for small collections





USFWS capability to collect imagery

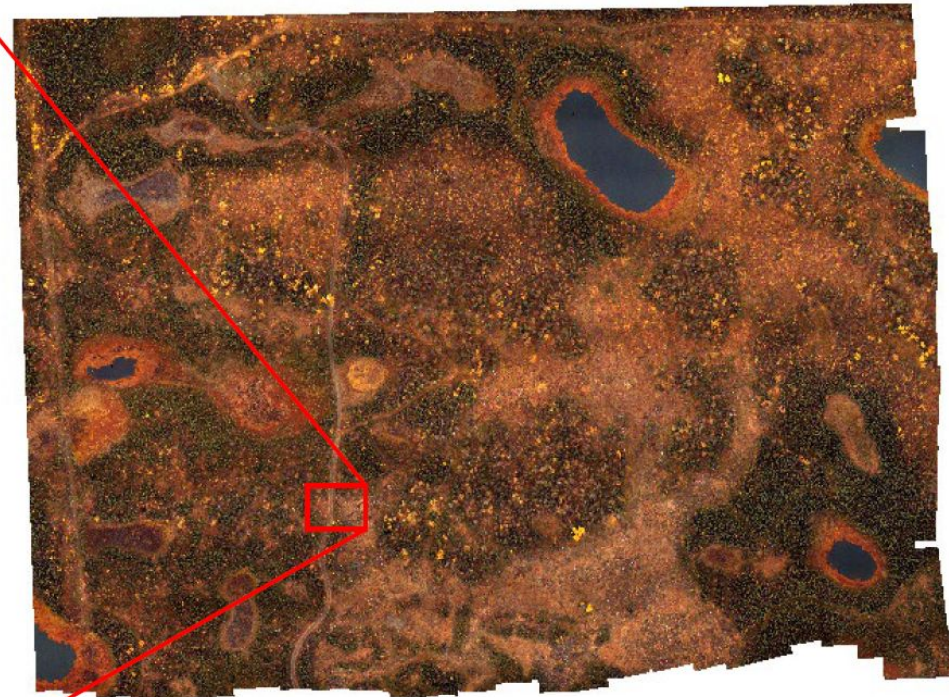
- Lucint12 Camera System
 - Nine Sensors
 - Bayer Color
 - Monochrome Red Edge
 - Monochrome NIR
 - Monochrome LWIR
- Lucint12 Camera System
 - Currently deployed on USFWS Cub Crafters CC-18
 - Future deployment on Cessna 206
 - Smaller sized collections <100,000 acres





USFWS capability to collect imagery

Moose Pens: Overview, 1" GSD, Color



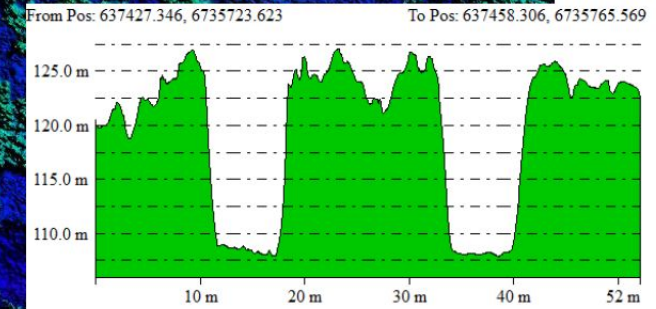
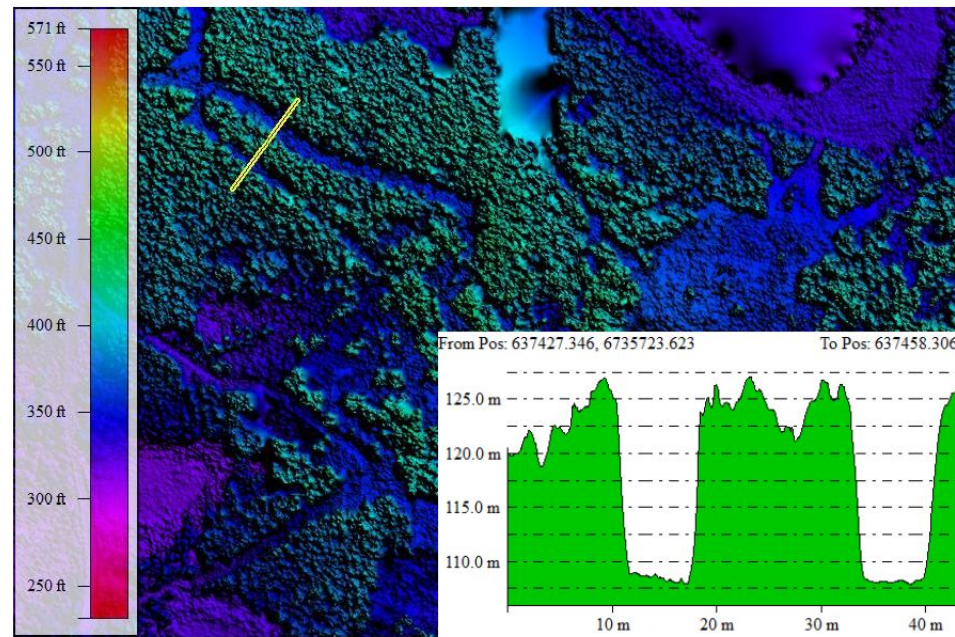


USFWS capability to collect imagery

Multispectral Products Delivered



Single Bands, NIR (+ Red Edge, NDVI Indices)



Digital Elevation Models (DEM)



Session Q&A

Ask questions of our presenters by typing them into the question box, found in the menu bar to the right. Click the triangle next to “Questions” to expand.





Poll Question:

What other entities are mapping Alaska's coastal areas that we can collaborate with?

Please type your suggestions into the question box.





30 minute break

