Attendee Rules

- ❏ Mute yourself
- ❏ Turn off your camera

2022 Alaska Coastal & Ocean Mapping Summit

Data, Products, and Processing

November 17th, 2022

Agenda – Data, Products, and Processing

- ★ **Seascape Alaska Data Management Technical Team Update** - Christie Reiser, NOAA, National Centers for Environmental Information; Dr. Bob McConnaughey, NOAA, Alaska Fisheries Science Center
- ★ **Crowdsourced Bathymetry Processing** – Anthony Klemm, NOAA, Office of Coast Survey, Atlantic Hydrographic Branch
- ★ **GMRT: Processing and Grid Products** – Dr. Vicki Ferrini, Lamont-Doherty Earth Observatory, Columbia University
- ★ **NOAA NCEI Bathymetric Data Viewer: Data Discovery and Access** – Jess Nation, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder/NOAA NCEI
- ★ **Data Processing Capacity and Expertise Gaps in Alaska** – Dr. Erin Trochim, Alaska Center for Energy and Power, University of Alaska Fairbanks
- ★ **Habitat Mapping With Waterborne Technology** – Liza Hasan, College of Fisheries and Ocean Science, University of Alaska Fairbanks / National Park Service
- ★ **Tsunami Inundation Mapping in Alaska** – Dr. Dmitry Nicolsky, Geophysical Institute, University of Alaska Fairbanks

Mentimeter

Polling Instructions for Panel #3

Go to

www.menti.com

Enter the code

7279 8218

Or use QR code

Go to menti.com and use the code: 7279 8218

3 Icebreaker Questions

2 Data Handling Questions

Results will be shared before the break

Seascape Alaska Data Management Technical Team Update

Christie Reiser – NOAA NCEI | Dr. Bob McConnaughey – NOAA Alaska Fisheries Science Center

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Seascape Alaska

Working together to understand the depths of Alaska's vast seascape

2022 AK Coastal and Ocean Mapping Summit
Seascape AK Data Management Technical Team
November 16-17, 2022

Christie Reiser
Bathymetry Data Manager
NOAA's NCEI

Robert A. McConnaughey, Ph.D.
Research Fishery Biologist
Alaska Fisheries Science Center

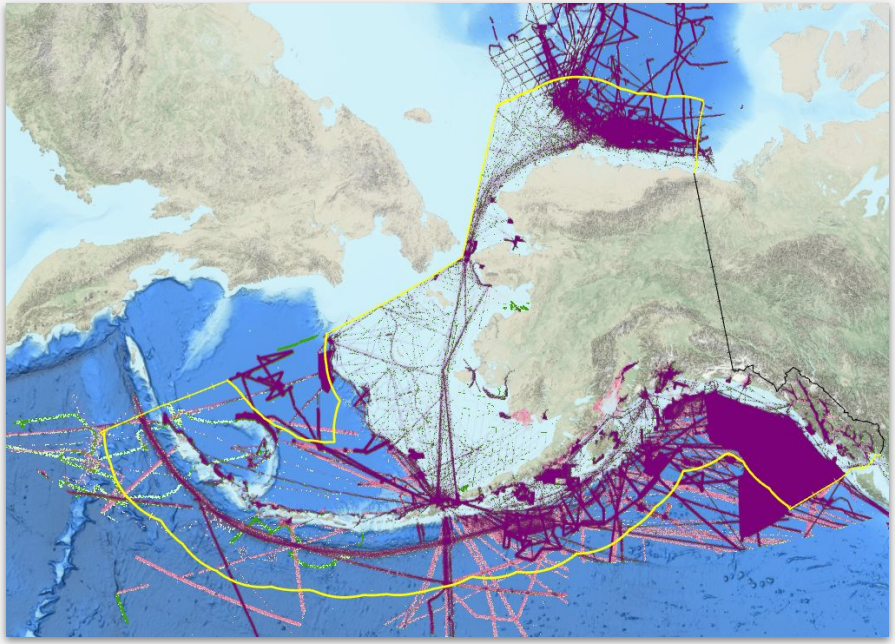
Data Management Technical Team Overview

Established August of 2021

General Purpose

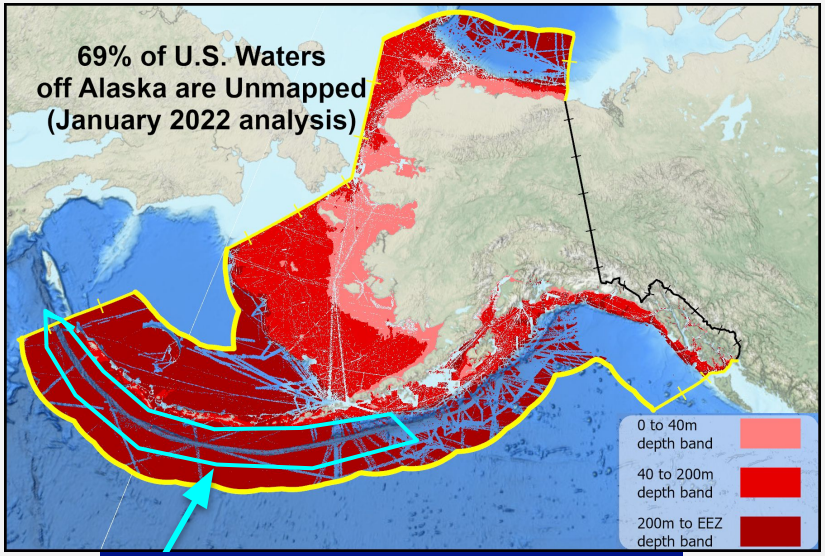
- *Identify bathy data needs for Seascape Alaska*
- *Review bathy gap analysis and identify data that can fill gaps*
- *Create footprints for any data missing from the BGA that should be accounted in support of planning MEC projects*

BGA:
https://www.arcgis.com/apps/mapviewer/index.html?layers=4d7d925fc96d47d9ace970dd5040df0a



Latest updates to the bathy gap analysis (pink/purple is January 2022 version of the BGA; green is new data at NCEI since January 2022)

+28,000 snm of new bathymetry!



DSSV Pressure Drop, Caladan Oceanic LLC,
2.5 long survey lines, 16 days, ~21,000 snm

	0 to 40m Depth Band		40m and Deeper Depth Band	
YEAR	Goal	Actual: Min Mapped	Goal	Actual: Min Mapped
2020		17,484		290,480
2021		18,246		317,759
2022	**23,875**	**5,629**	**388,604**	**70,845**
2023	29,503		459,449	
2024	35,132		530,295	
2025	40,760		601,140	
2026	46,389		671,985	
2027	52,017		742,830	
2028	57,646		813,676	
2029	63,274		884,521	
2030	68,903		955,366	
2031	74,531			
2032	80,160			
2033	85,788			
2034	91,417			
2035	97,045			
2036	102,674			
2037	108,302			
2038	113,931			
2039	119,559			
2040	125,188			

Mapping Goals for 2022

Data Management Technical Team Update

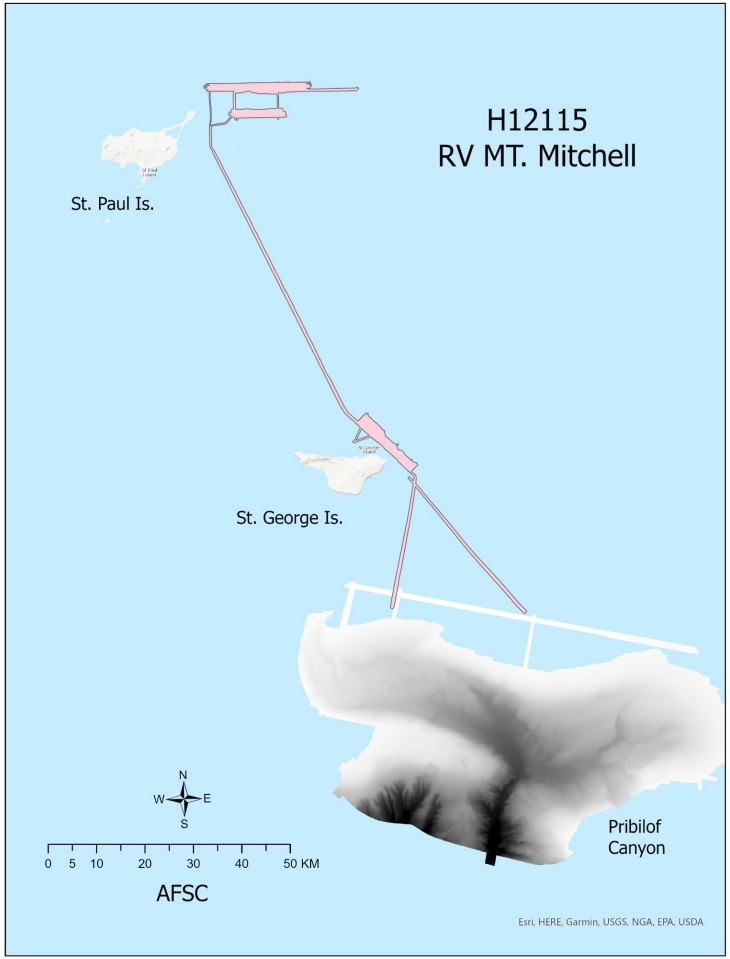
Highlights

- Data sharing - https://iocm.noaa.gov/data-sharing/provider-engagement-form.html
- Fisheries ES60 data from charter vessels
- NPS - topo/bathy LIDAR & singlebeam data
- BOEM - gravity data with associated bathy points
- Data at GMRT but not at NCEI
- USCG - Hypack singlebeam data & ECDIS data
- Outreach to identify more sources of crowdsourced bathymetry
- Eight JAMSTEC cruises sent to NCEI

Multibeam Data

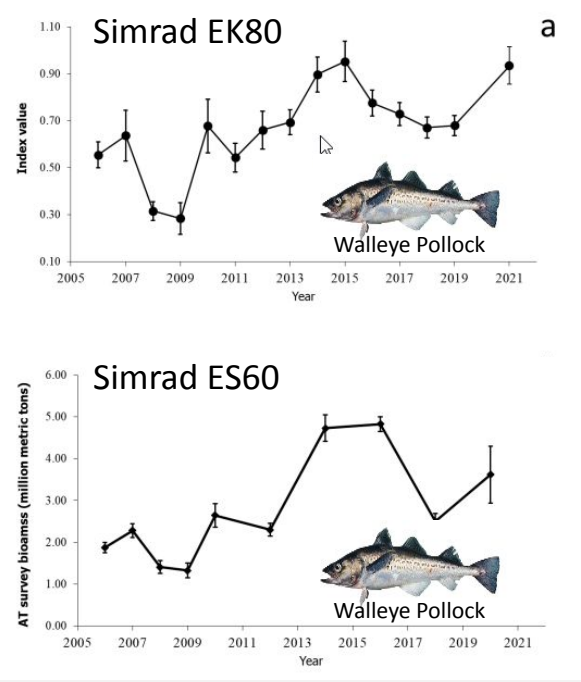
Pribilof Shell Hash Survey

Collected by the R/V Mt. Mitchell in the Central Bering Sea



Estimating Fish Biomass with Echosounders

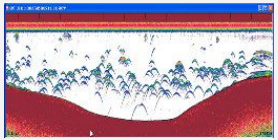
Backscatter Integration



Stienessen, S. C. et al. (2022)

NOAAS Oscar Dyson

Chartered F/Vs



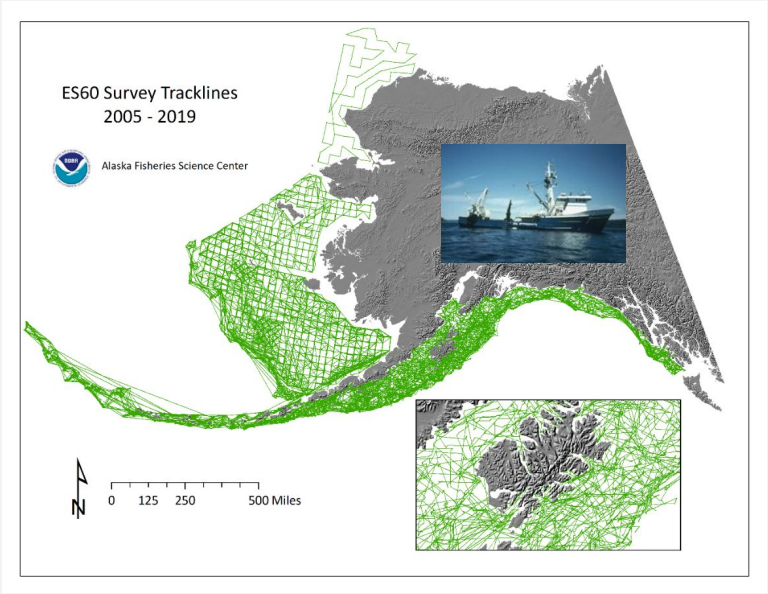
Conclusions

1. Comparable results from scientific & commercial 38 kHz echosounders, *with tri-wave correction*.
2. Ships of opportunity are cost-effective force multipliers.

NOMEC Opportunity?

Single-beam Bathymetry From Bottom Trawl Surveys

Bathymetry & sphere-calibrated backscatter @ multiple frequencies (seabed & water column)



ES60 single-beam data

Data

- 637K km (7.6 TB) trackline data (*.RAW. *.OUT)
- Metadata, *.CAL files
- Σ = ~12M soundings at 1 Hz

Process

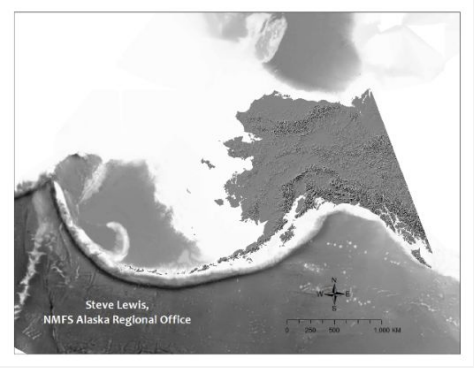
1. Data bundling with Cruisepack (NCEI water column)
2. Data processing with Kluster (OCS/HSTB)

Lessons Learned

For Effective 3rd Party Hydrographic Data Acquisition

Overall

1. **Think in reverse** => consider the intended product 1st (processing & documentation requirements may be different than primary objective) – interact with software developers
2. **Be efficient** => Minimize human intervention / automate the acquisition & submission processes



AFSC Data-Quality Improvements For Bathymetry

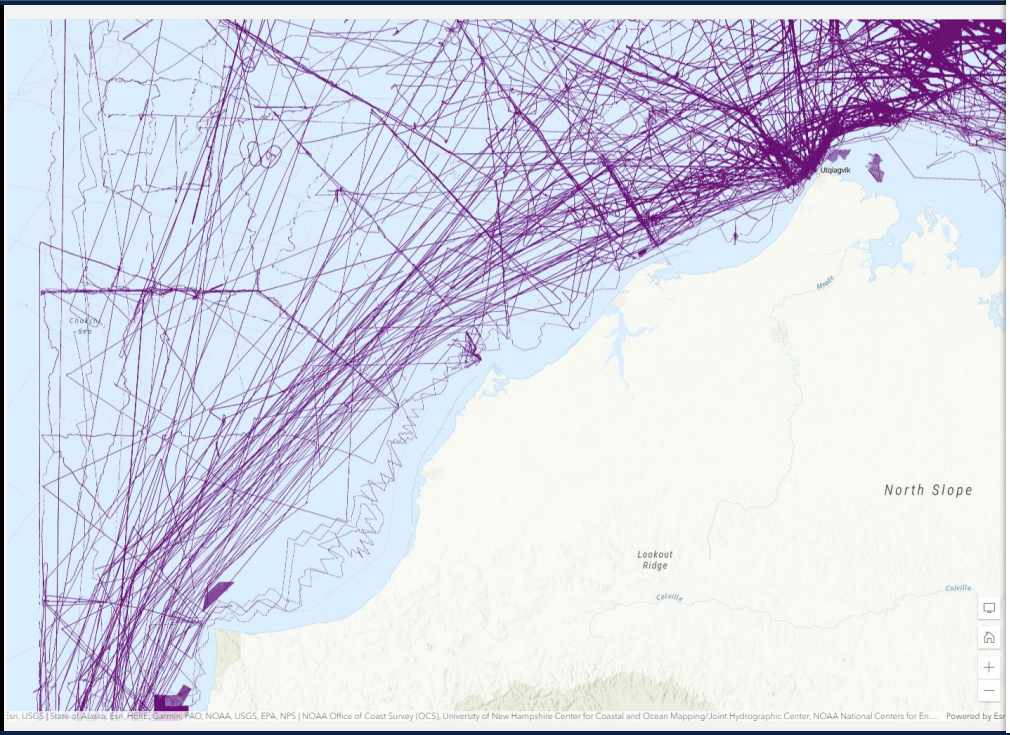
1. Correct for vertical offset of transducer (bathymetry bias)
2. Incorporate dynamic motion sensor corrections (heave error) $$$

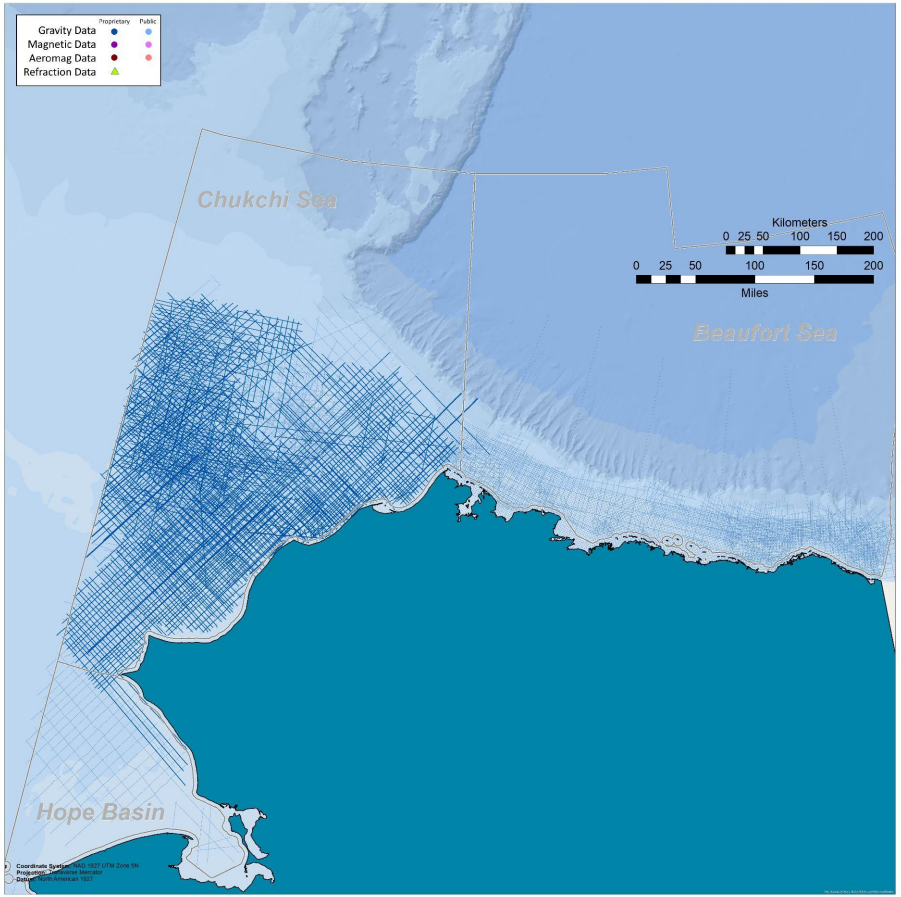
M. Unger; BOEM – United States Department of the Interior, Anchorage, AK; michael.unger@boem.gov

New-Old Potential Field Data in the Alaska OCS

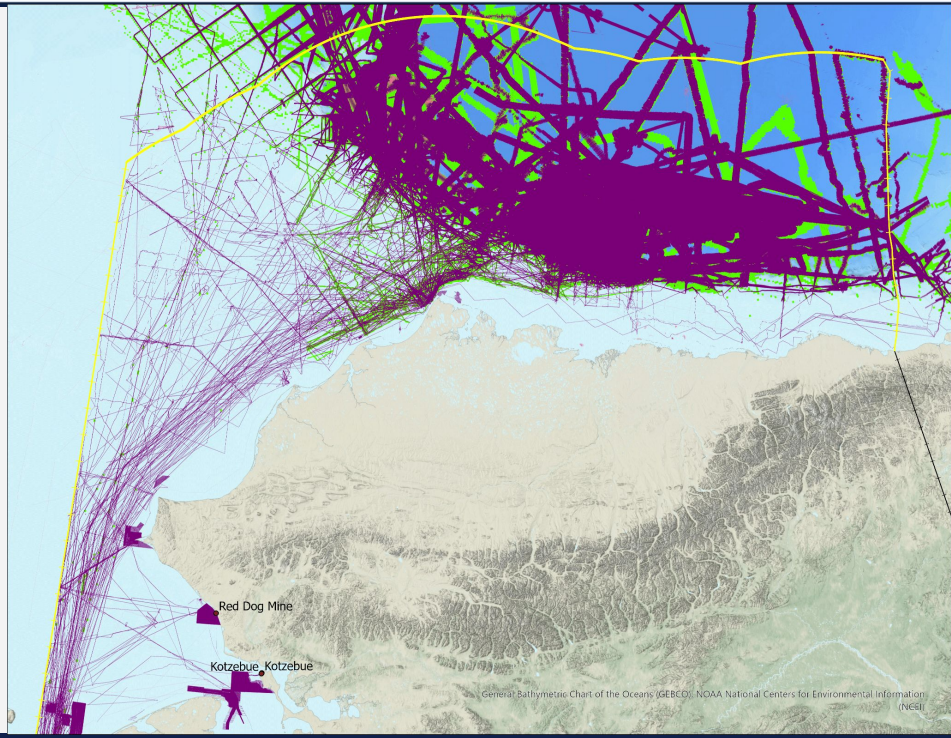
Seascape Alaska

Gravity Data





JAMSTEC Multibeam Data



Challenges of the DM TT

- Data formatting and packaging
- Data restrictions
- Time management and bandwidth of the DM TT members
- Communications with potential data providers

mb.info@noaa.gov

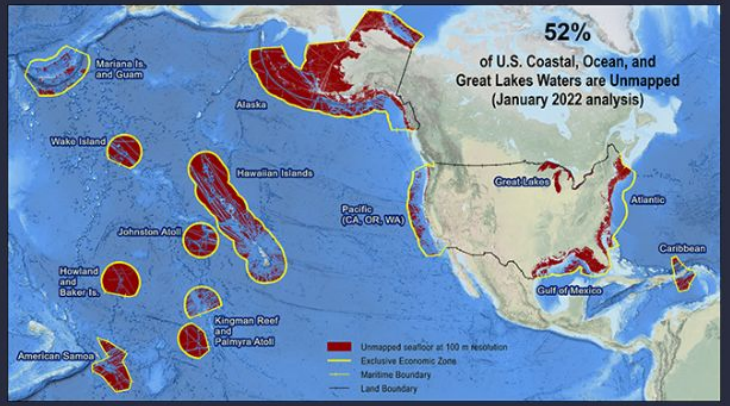
Looking Forward

- Create footprints for missing data
- Continued search for data sharing opportunities
- Create database/GIS
- Continue to encourage use of the Data Provider Sharing Form

https://iocm.noaa.gov/data-sharing/provider-engagement-form.html

Thank you for helping us reach our data goals!

Did you know that as of January 2022, 52% of U.S. waters remain unmapped?



Across NOAA and its sister federal mapping agencies, we are seeking new partners in order to make significant progress on the June 2020 U.S. *National Ocean Mapping, Exploration and Characterization Strategy* (NOMEC), the Executive Order on Tackling the Climate Crisis at Home and Abroad, and the global Seabed 2030 initiative. Knowledge of the depth, shape, and composition of the seafloor has far-reaching benefits, including safer navigation, hazard mitigation for coastal resilience, preservation of marine habitats and heritage, and a deeper understanding of natural resources for sustainable ocean economies.

Questions

Do you want to join the Data Management Technical Team?

Do you have bathy data to submit?

Do you know of data that can fill gaps in the BGA?

Do you have any questions?

Reach out to:
Christie Reiser
christiane.reiser@noaa.gov

End of Presentation

Thank you!

Crowdsourced Bathymetry in Alaska

Anthony Klemm – NOAA Office of Coast Survey

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Crowdsourced Bathymetry in Alaska
Alaska Coastal and Ocean Mapping Summit

Anthony Klemm, NOAA Office of Coast Survey

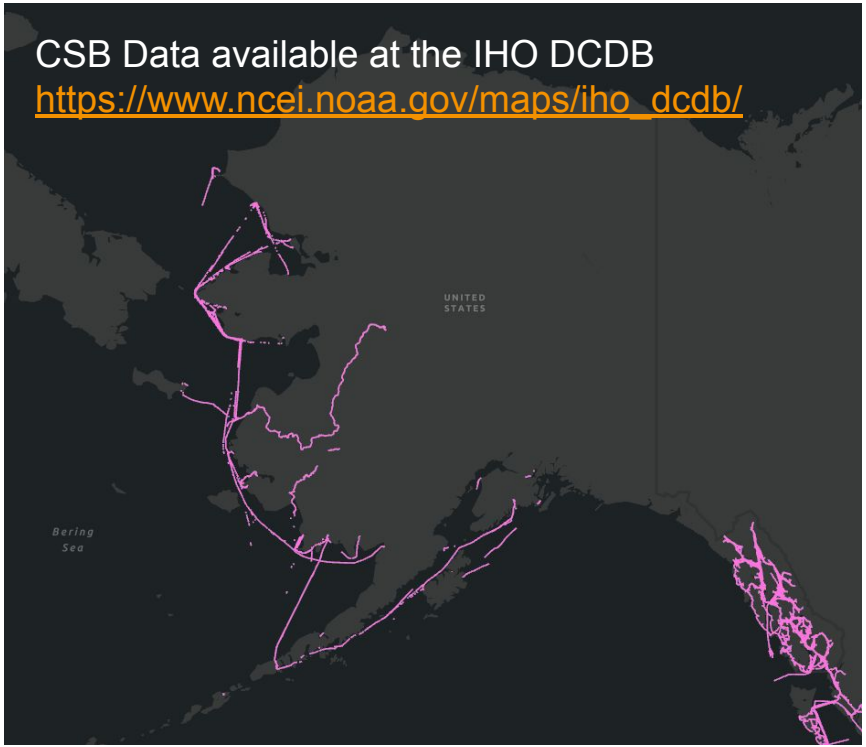
November 17, 2022

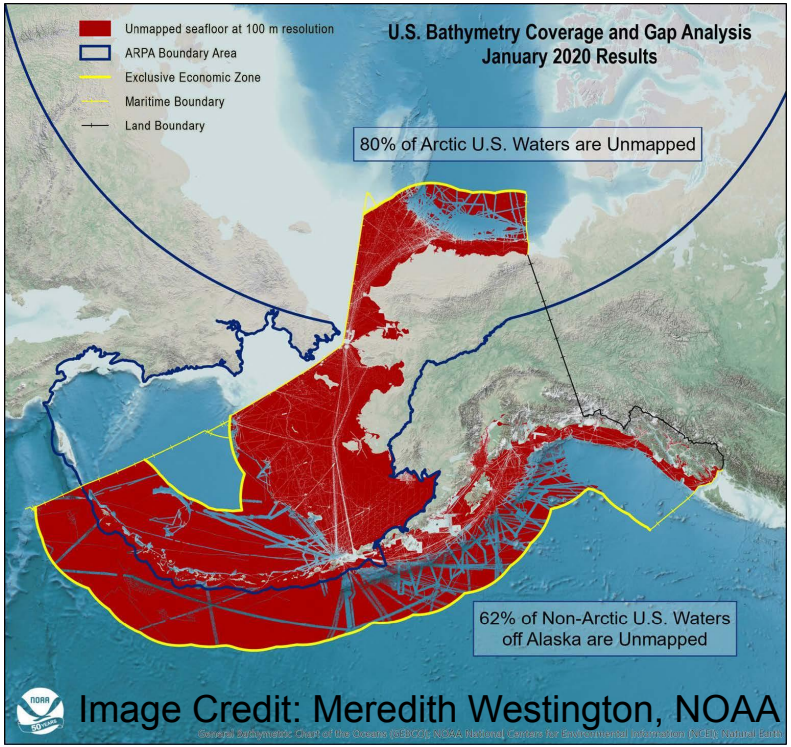
anthony.r.klemm@noaa.gov

Definition

IHO B-12 Definition: Crowdsourced bathymetry (CSB) is the collection and sharing of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.

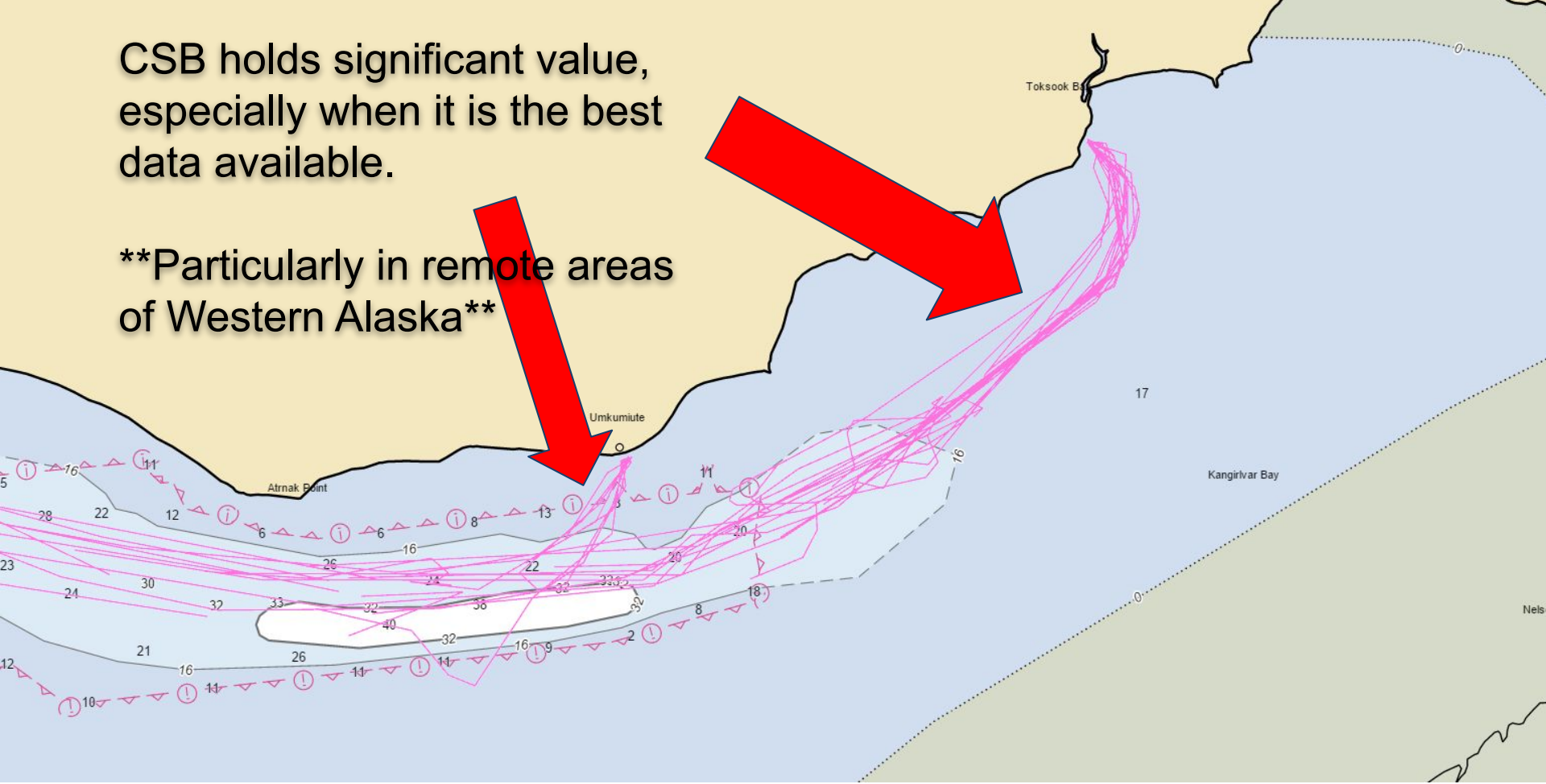
CSB: a piece of the mapping solution





CSB holds significant value, especially when it is the best data available.

Particularly in remote areas of Western Alaska



Ninglick River - Best Available NOAA Nautical Chart

Processing Workflow (Python-based)

- **Filter/Clean data** (i.e. erroneous dates, vessels named “Anonymous,” obvious depth fliers/outliers)

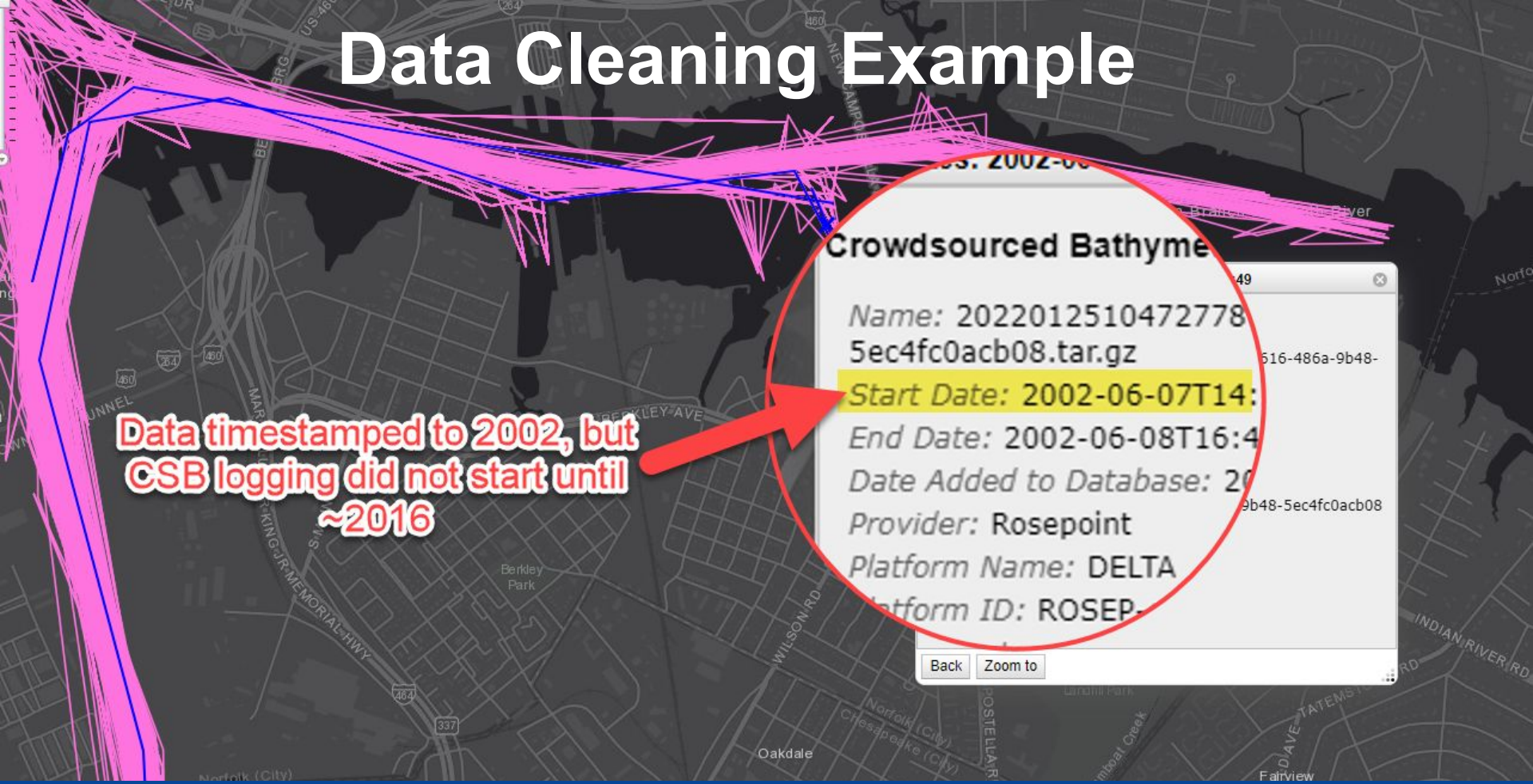
- **Tide correct** using discrete zone tide definitions (time offsets and magnitude coefficients tied to a tide gauge control station; data extracted using CO-OPS web API)
  - Currently using NOAA CO-OPS tide predictions instead of actual observations due to data gaps

- **Derive and apply estimated vertical transducer offset** (transducer draft)
  - Compare tide-corrected depths to recent hydrographic survey / known bathymetry
  - If static offset is detected (i.e. standard deviation of mean depth difference is below a certain threshold), build out master database of vessels and derived transducer drafts and apply to data

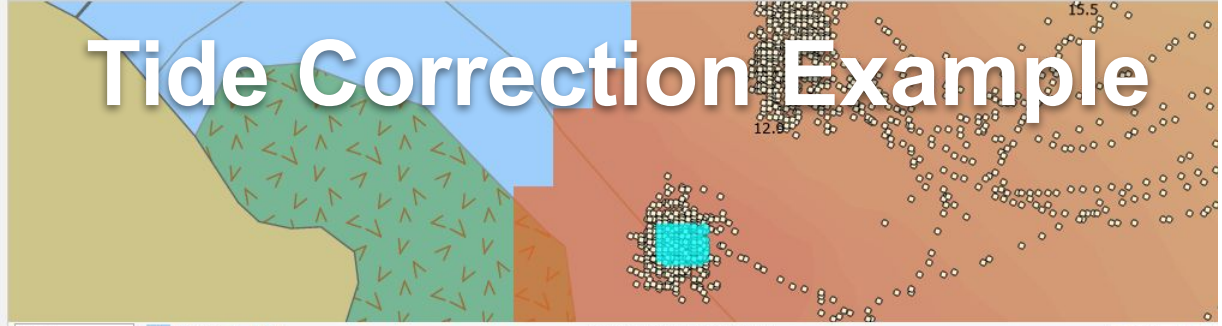
- **Grid/interpolate data** - (Currently use IDW)

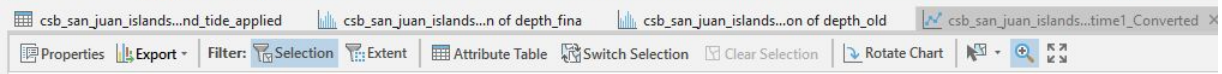
- *Future work may include rating individual contributors based on data quality, with the potential for higher-rated contributor data to be be weighted more in interpolation algorithm.*

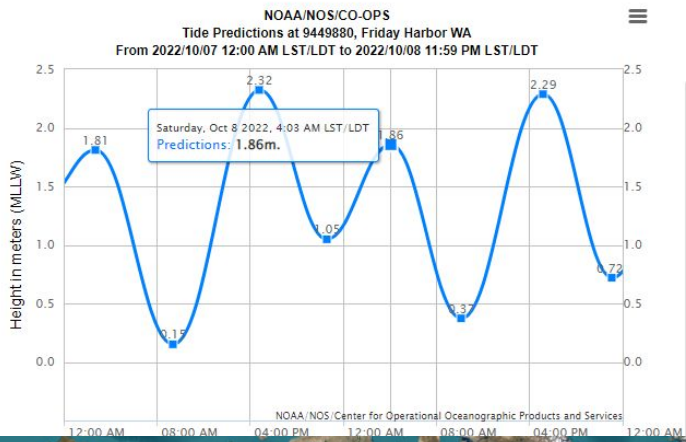
Data Cleaning Example

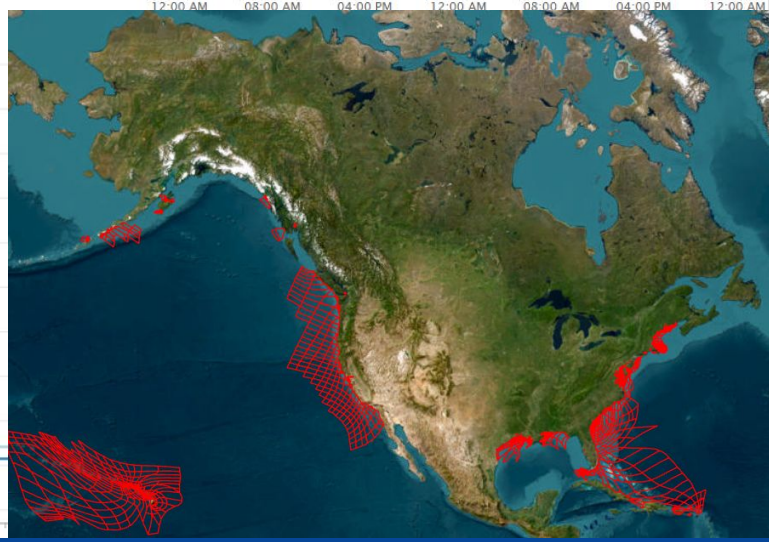


Tide Correction Example

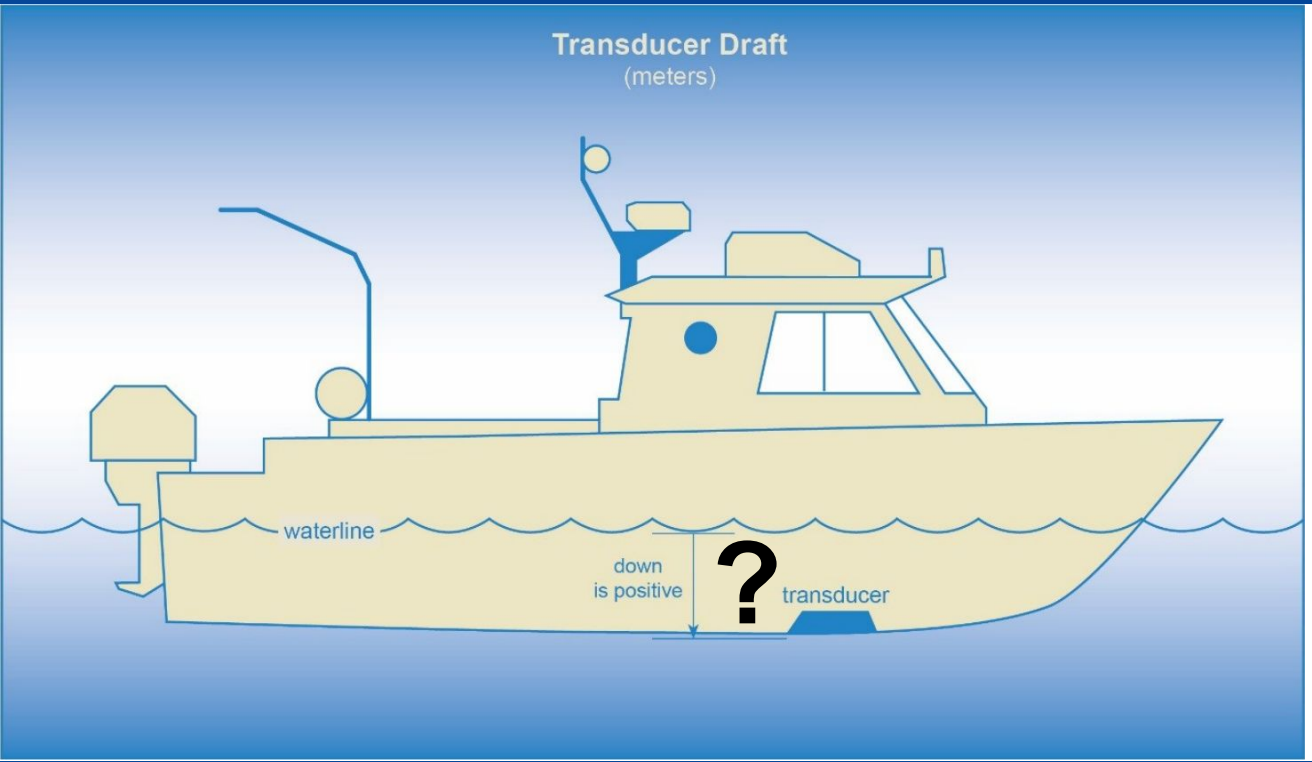








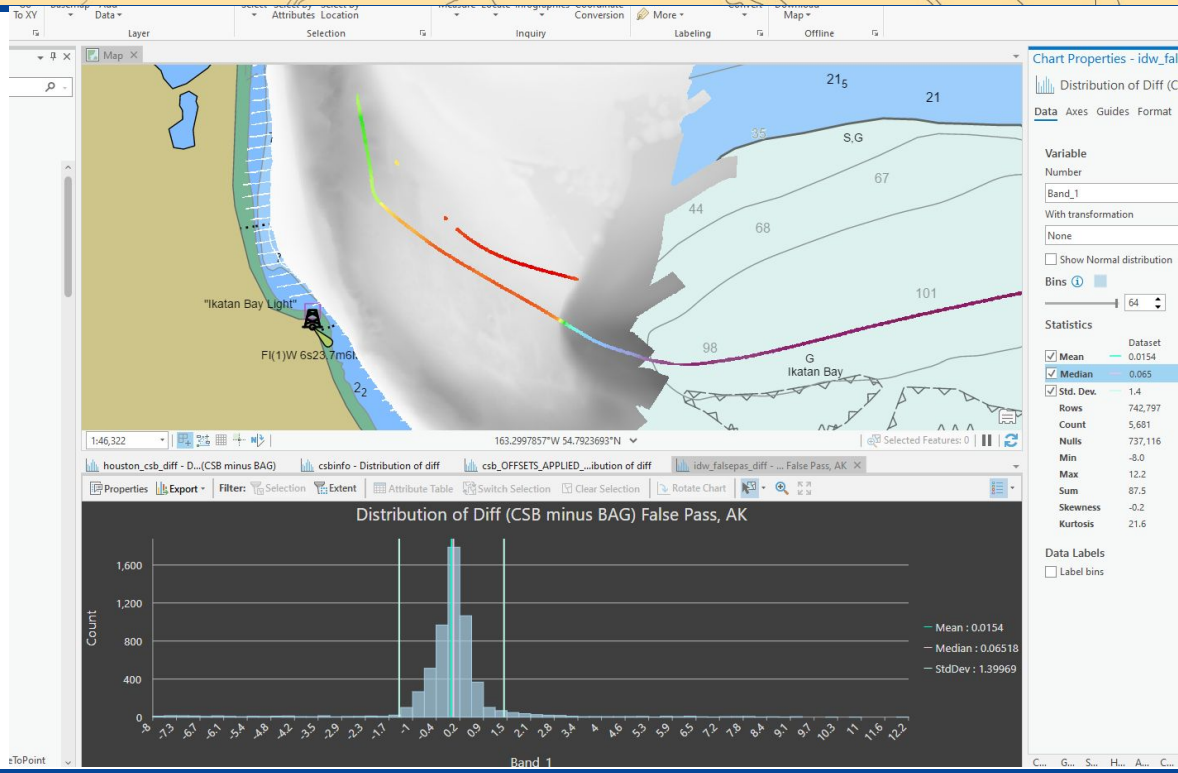
Data-Derived Transducer Draft



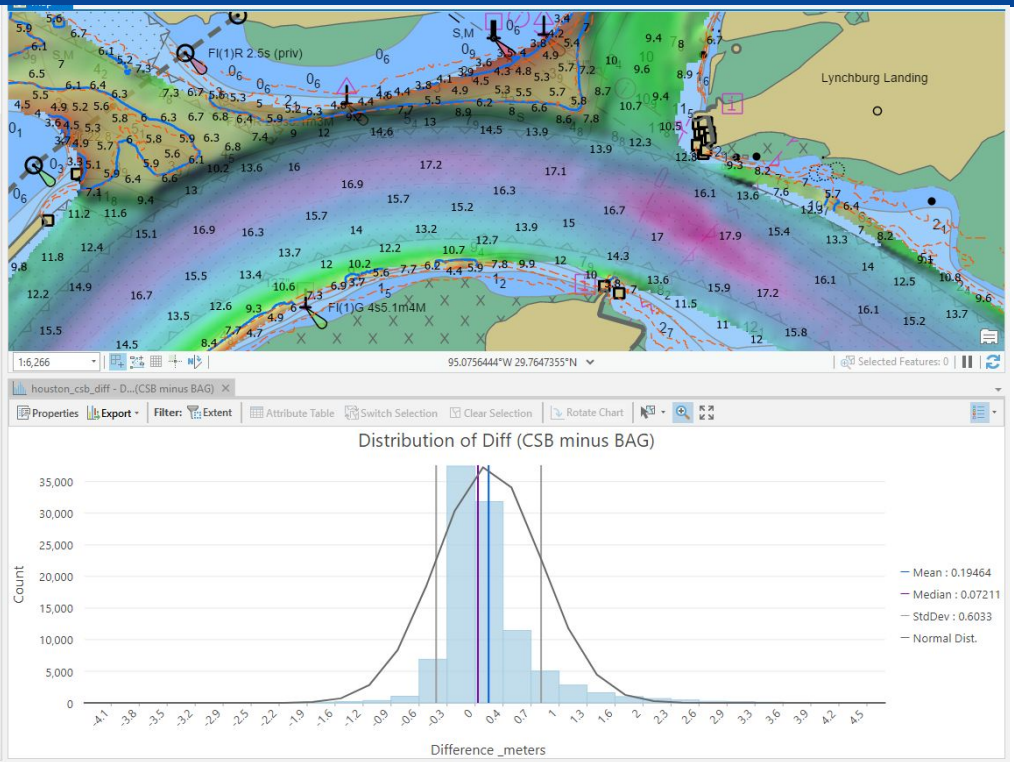
We compare tide-corrected CSB depths to a recent hydrographic survey to derive an estimated static vertical transducer offset for each vessel, and then apply that to the data

Data-Derived Transducer Draft

	A	B	C	D	E
1	Column1	platform	mean	std	count
2	0	ATB GENESIS PATRIOT			0
3	1	Blue Note	-0.23	0.89	1434
4	2	Gray Eagle	-0.48	0.19	475
5	3	Hank The Tank			0
6	4	JOE PYNE			0
7	5	Joe Pyne			0
8	6	Kairos	-1.64	0.12	222
9	7	Lay Time			0
10	8	Magnolia	-0.15	0.18	872
11	9	Maverick			0
12	10	NOAA Ship Thomas Jefferson	-0.87	0.31	772
13	11	Okeanos Explorer	-5.78	0.42	1440
14	12	One With The Wibd			0
15	13	Paragon			0
16	14	R/V Bay Hydro II	-0.86	0.43	1006
17	15	Ren Chai	-1.88	0.43	6426
18	16	Rockhopper			0
19	17	SAILS	-0.04	0.45	7162
20	18	SERENITY	-1.51	0.32	423
21	19	Sea Dweller	-0.41	0.25	1331
22	20	Sea Saga			0
23	21	Sempre Avanti	-0.14	0.33	2129
24	22	Silence Rising	-0.08	0.45	1776
25	23	Tapestry	-0.41	0.35	1551
26	24	Tootega	0.07	0.40	4561



Preliminary results are promising

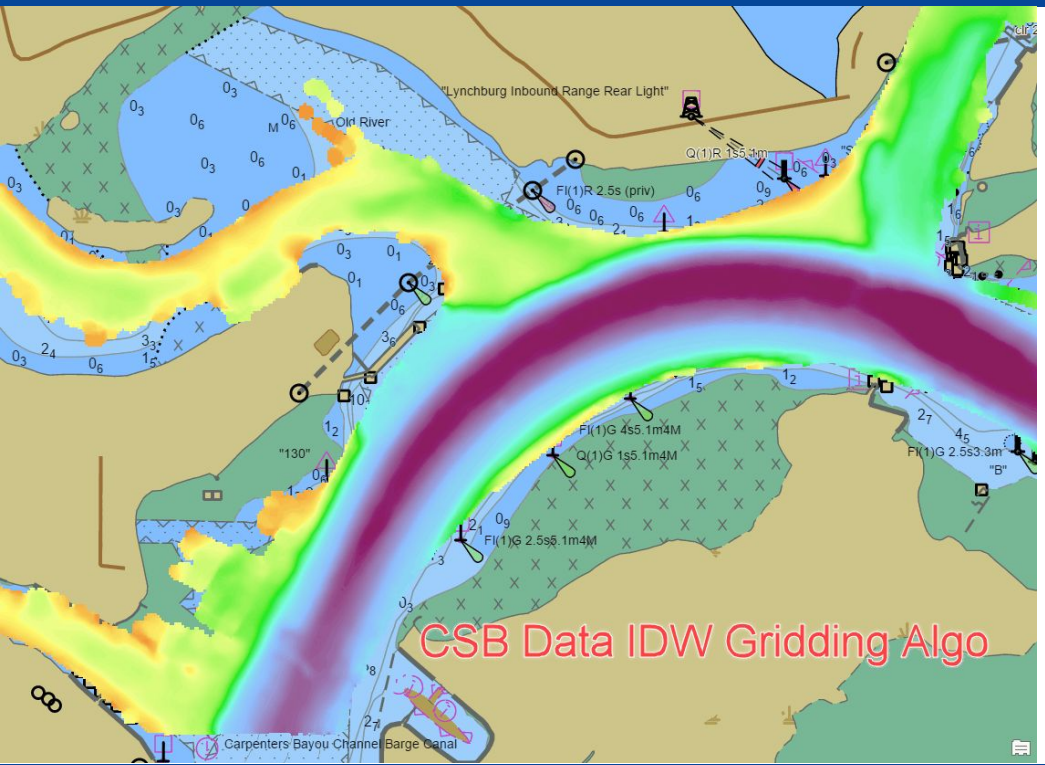


Houston, TX

Comparison of CSB to recent survey:

Mean difference: 0.19 m
Standard deviation: 0.60 m

Preliminary results are promising



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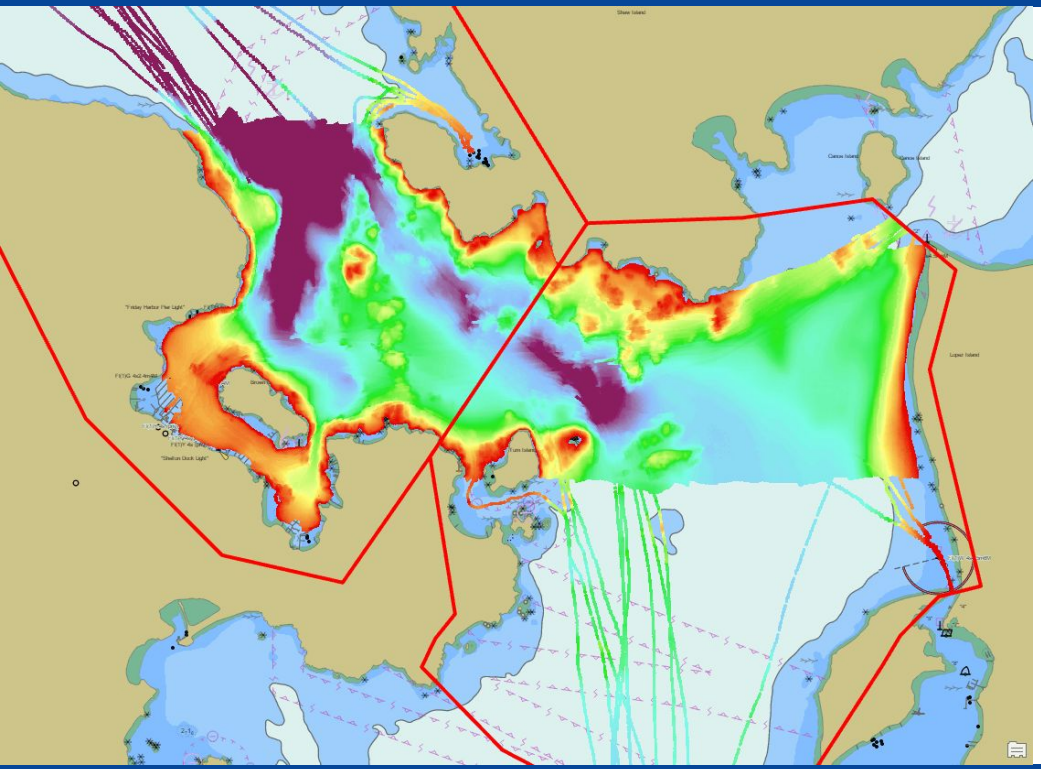
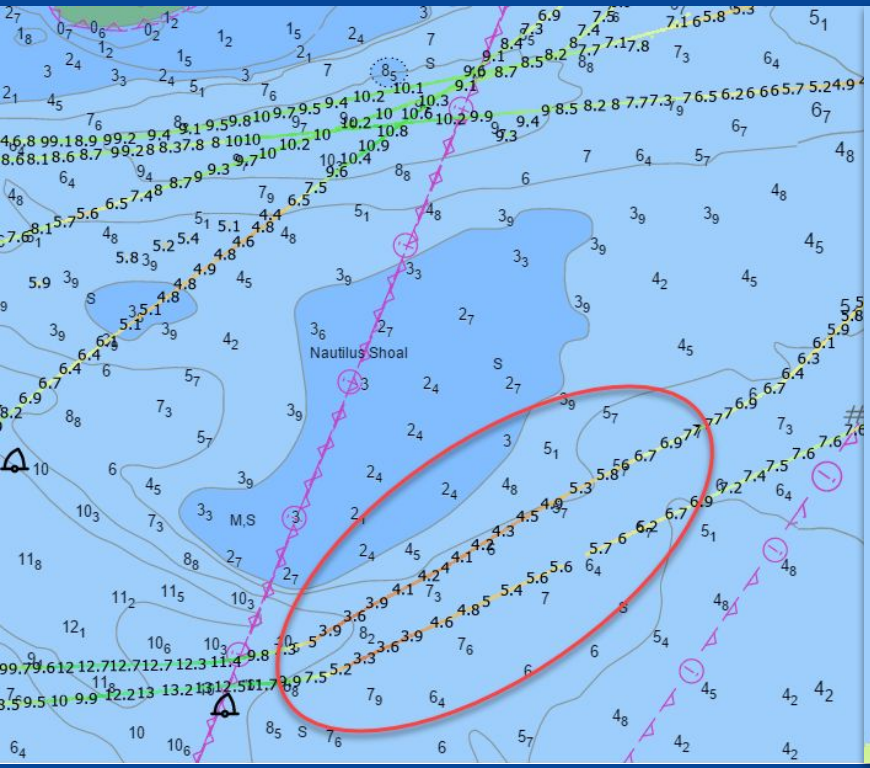


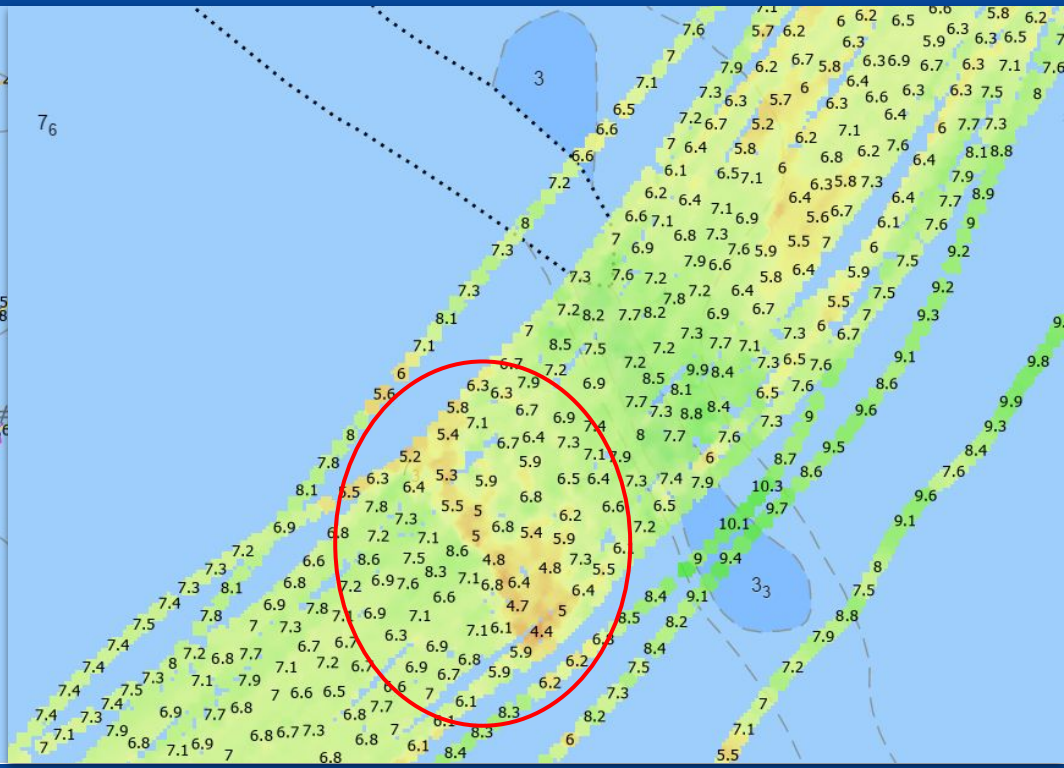
San Juan Islands, WA

Comparison of CSB to recent survey:

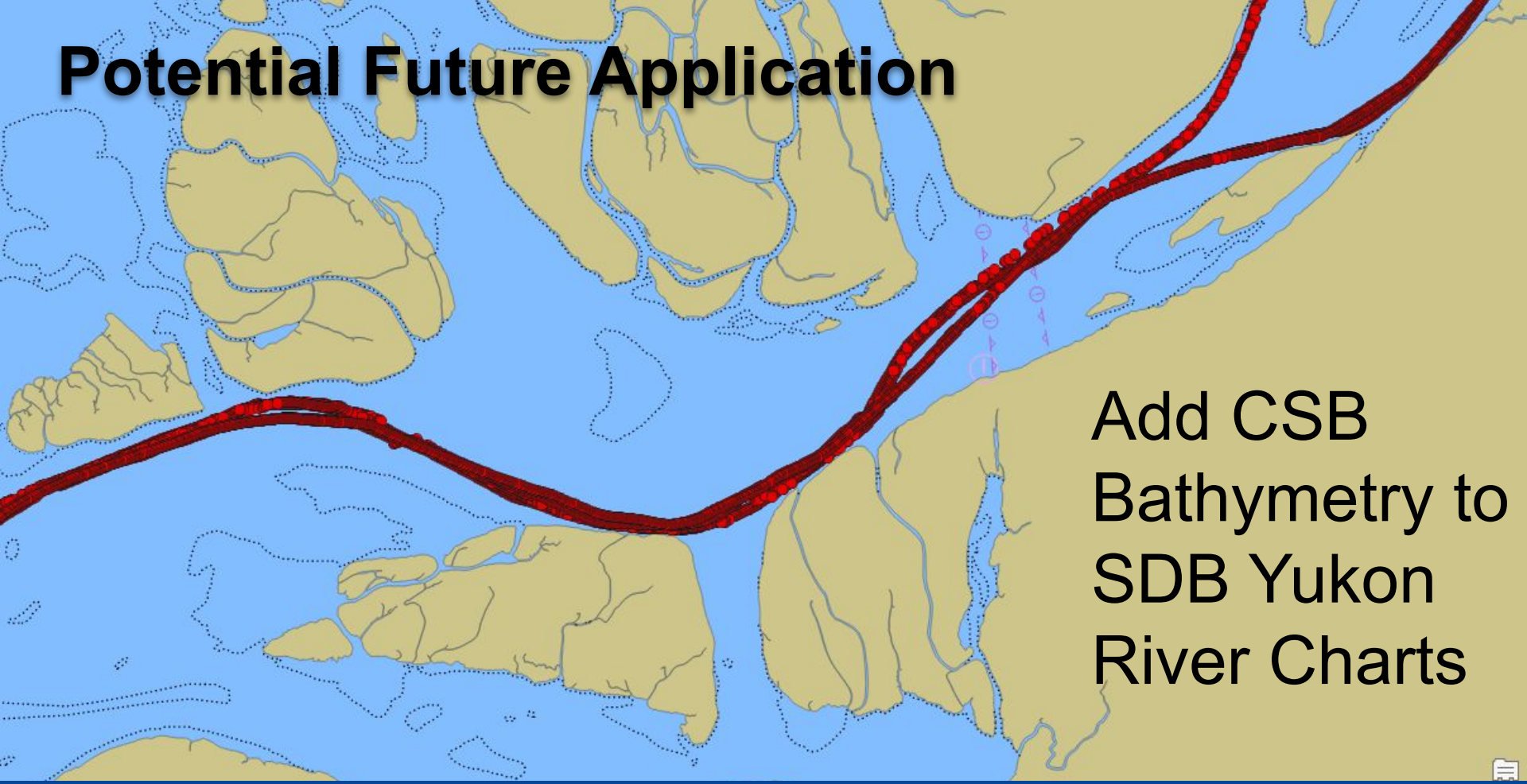
Mean difference: 0.03 m
Standard deviation: 1.50 m

Mischarted Shoals Detected in Chesapeake and Delaware Bays





Potential Future Application



Add CSB Bathymetry to SDB Yukon River Charts

The more CSB data, the better

Please consider contributing

Those interested in contributing data or becoming a Trusted Node should contact the DCDB at bathydata@iho.int.

End of Presentation

Thank you!

GMRT: Processing and Grid Products

Dr. Vicki Ferrini – Lamont-Doherty Earth Observatory, Columbia University

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Funded by:

GMRT:
Processing and Grid Products

Vicki Ferrini*, John Morton, Hayley Drennon, Andrew Goodwillie, Tinah Martin, Emily Miller, Frank Nitsche, Rafael Uribe, Suzanne Carbotte

COLUMBIA CLIMATE SCHOOL
LAMONT-DOHERTY EARTH OBSERVATORY

*ferrini@ldeo.columbia.edu

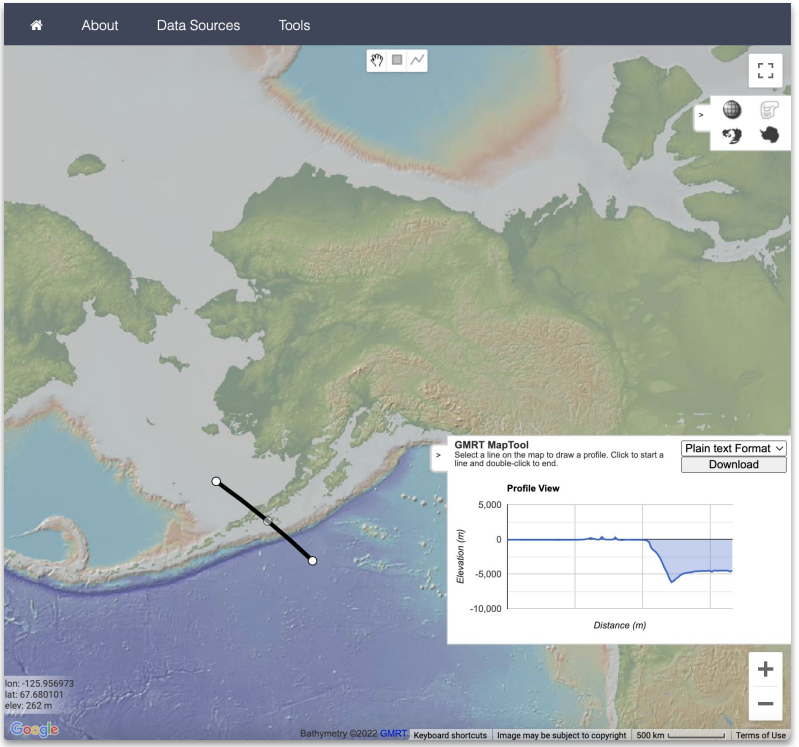
GMRT: Global Multi-Resolution Topography

- Data Synthesis that makes elevation data accessible in many formats
  - Grids, Images, Points, Profiles
- Maintained simultaneously in 3 projections
- Accessible via:
  - GMRT MapTool **Web App**
  - GeoMapApp **Desktop App**
  - GMRT **Web Services**
- Full attribution and provenance to data sources
  - Curates and delivers fit-for-purpose processed swath files into the public domain
  - Contributed grids from international sources

Ryan et al, 2009
Ferrini et al., in prep

GMRT: Goals

- Provide users with access to **seamlessly integrated bathymetry** and land elevation data at the best resolution available for a particular area of interest
- Support broad **accessibility** by **specialists and non-specialists** alike through multiple user interfaces, services, and output formats
- Continuously **expand bathymetry coverage** by integrating new data and highlighting data gaps
- Strive for scalability and efficiency in all aspects of data stewardship continuum



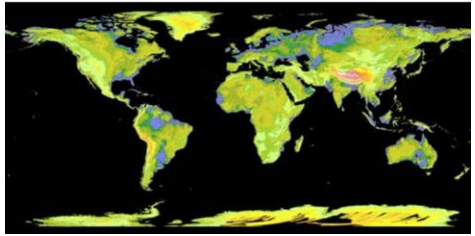
GMRT: Grid Composition

- Maintain input raster data at native resolution
- Curate four discrete tiled elevation components at multiple resolutions
  - Update components independently and on different schedules
- Raster data merged on-the-fly to create custom products for users

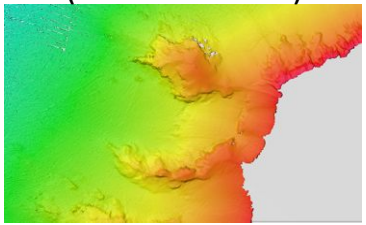
Custom grids delivered to users (netCDF, GeoTiff, ArcAscii)

GEBCO 2022 (~400 m)

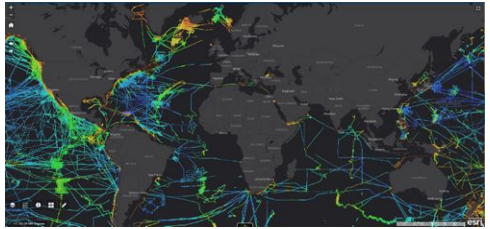
Topography (10-30 m)



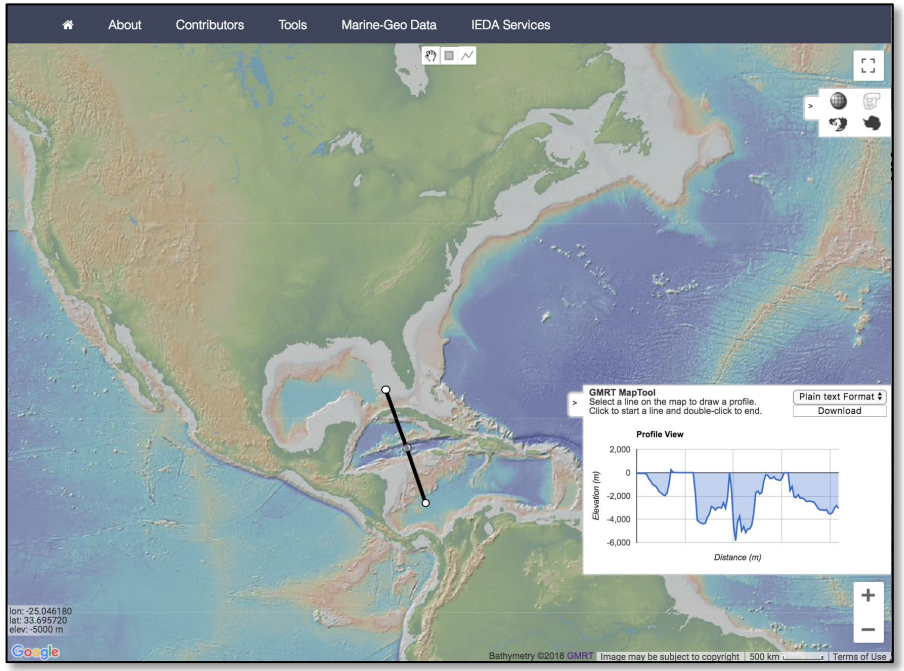
Contributed Grids
(1 to 100s of m)



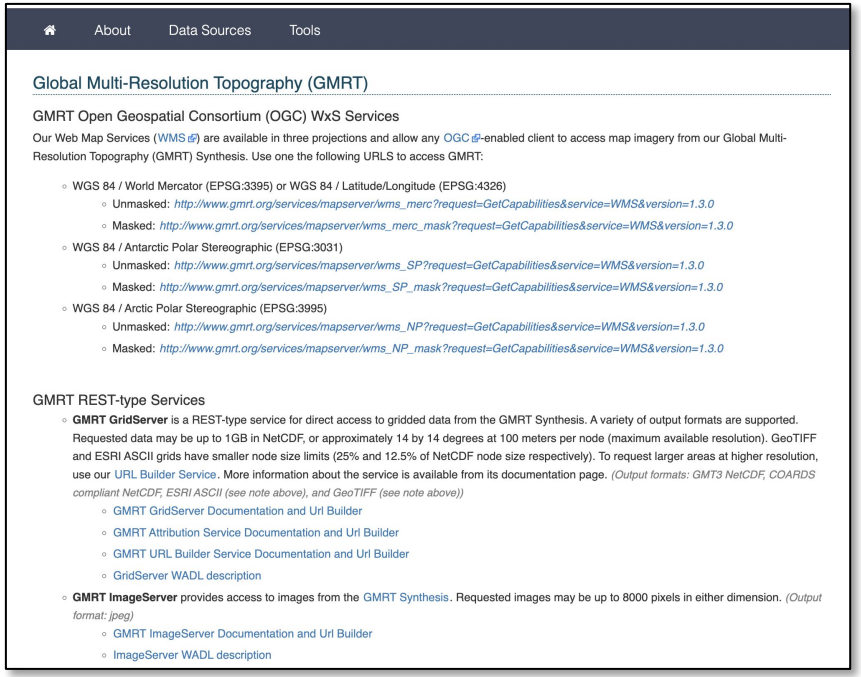
GMRT-MEBS
Multibeam Synthesis (100m)



Access via GMRT Map Tool and Web Services



https://www.gmrt.org/GMRTMapTool/



About Data Sources Tools

Global Multi-Resolution Topography (GMRT)

GMRT Open Geospatial Consortium (OGC) WxS Services

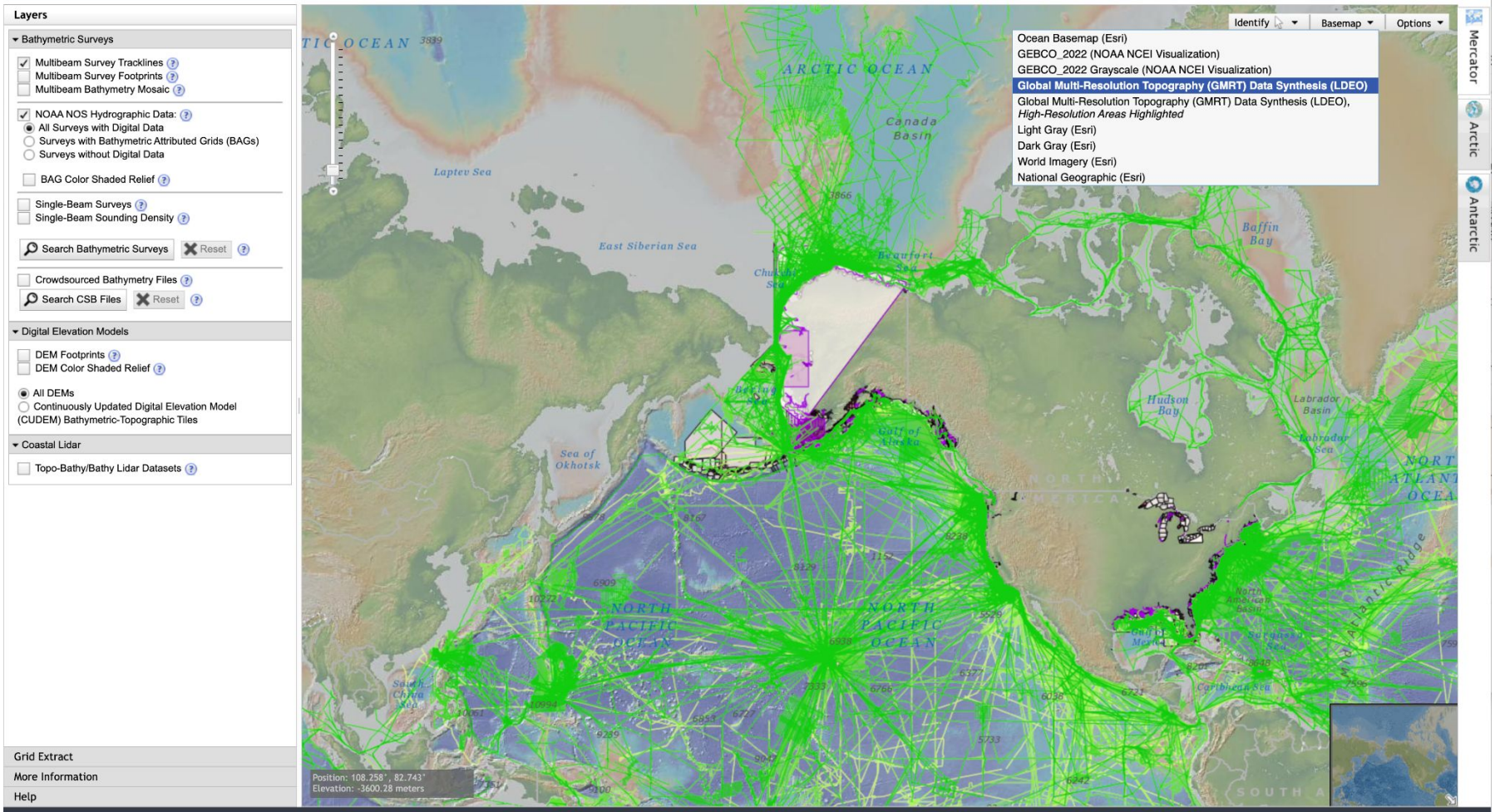
Our Web Map Services (WMS) are available in three projections and allow any OGC-enabled client to access map imagery from our Global Multi-Resolution Topography (GMRT) Synthesis. Use one the following URLS to access GMRT:

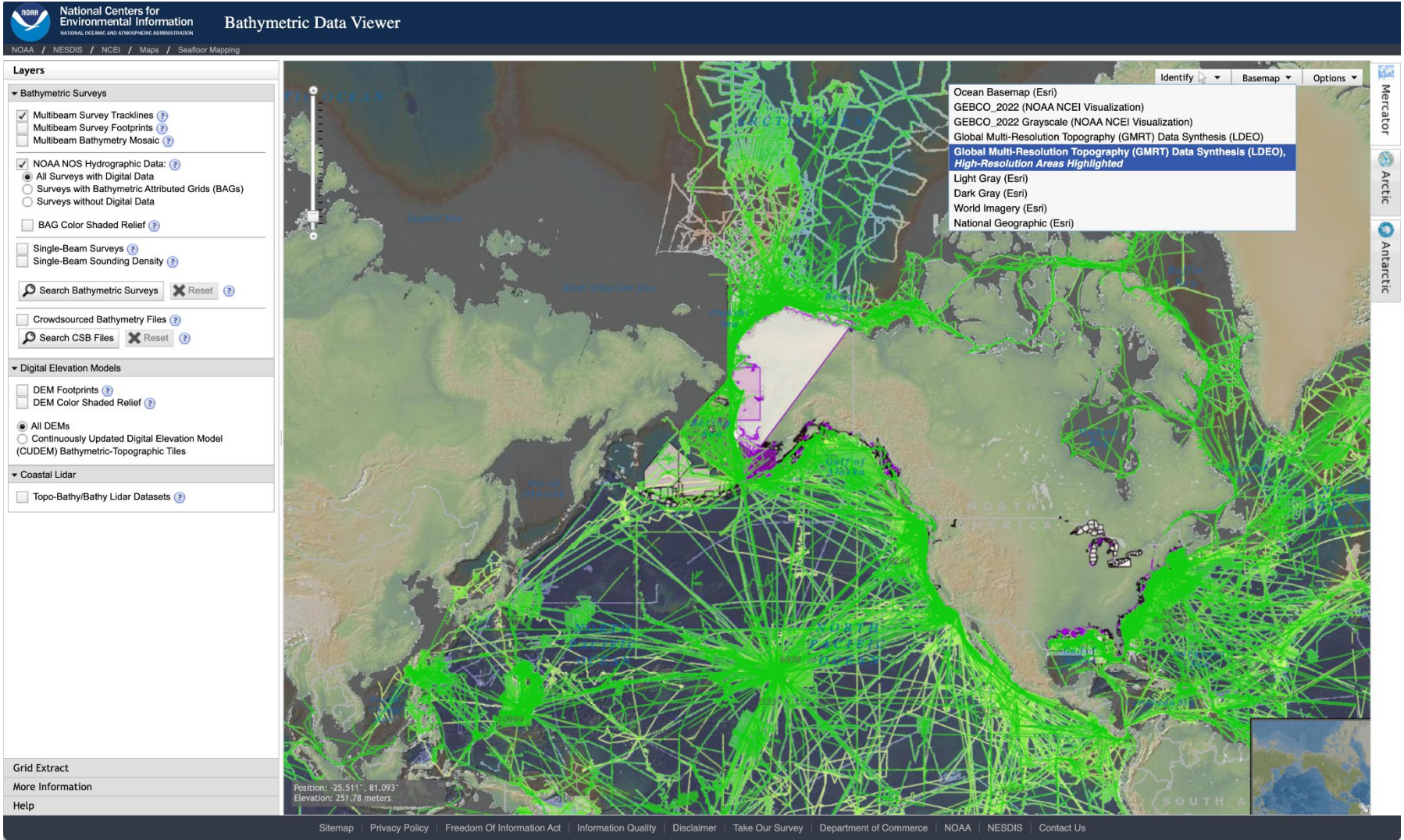
- WGS 84 / World Mercator (EPSG:3395) or WGS 84 / Latitude/Longitude (EPSG:4326)
  - Unmasked: *http://www.gmrt.org/services/mapserver/wms_merc?request=GetCapabilities&service=WMS&version=1.3.0*
  - Masked: *http://www.gmrt.org/services/mapserver/wms_merc_mask?request=GetCapabilities&service=WMS&version=1.3.0*
- WGS 84 / Antarctic Polar Stereographic (EPSG:3031)
  - Unmasked: *http://www.gmrt.org/services/mapserver/wms_SP?request=GetCapabilities&service=WMS&version=1.3.0*
  - Masked: *http://www.gmrt.org/services/mapserver/wms_SP_mask?request=GetCapabilities&service=WMS&version=1.3.0*
- WGS 84 / Arctic Polar Stereographic (EPSG:3995)
  - Unmasked: *http://www.gmrt.org/services/mapserver/wms_NP?request=GetCapabilities&service=WMS&version=1.3.0*
  - Masked: *http://www.gmrt.org/services/mapserver/wms_NP_mask?request=GetCapabilities&service=WMS&version=1.3.0*

GMRT REST-type Services

- **GMRT GridServer** is a REST-type service for direct access to gridded data from the GMRT Synthesis. A variety of output formats are supported. Requested data may be up to 1GB in NetCDF, or approximately 14 by 14 degrees at 100 meters per node (maximum available resolution). GeoTIFF and ESRI ASCII grids have smaller node size limits (25% and 12.5% of NetCDF node size respectively). To request larger areas at higher resolution, use our URL Builder Service. More information about the service is available from its documentation page. *(Output formats: GMT3 NetCDF, COARDS compliant NetCDF, ESRI ASCII (see note above), and GeoTIFF (see note above))*
  - GMRT GridServer Documentation and Url Builder
  - GMRT Attribution Service Documentation and Url Builder
  - GMRT URL Builder Service Documentation and Url Builder
  - GridServer WADL description
- **GMRT ImageServer** provides access to images from the GMRT Synthesis. Requested images may be up to 8000 pixels in either dimension. *(Output format: jpeg)*
  - GMRT ImageServer Documentation and Url Builder
  - ImageServer WADL description

https://www.gmrt.org/services/index.php


Layers
Bathymetric Surveys
Multibeam Survey Tracklines
Multibeam Survey Footprints
Multibeam Bathymetry Mosaic
NOAA NOS Hydrographic Data:
All Surveys with Digital Data
Surveys with Bathymetric Attributed Grids (BAGs)
Surveys without Digital Data
BAG Color Shaded Relief
Single-Beam Surveys
Single-Beam Sounding Density
Search Bathymetric Surveys
Reset
Crowdsourced Bathymetry Files
Search CSB Files
Reset
Digital Elevation Models
DEM Footprints
DEM Color Shaded Relief
All DEMs
Continuously Updated Digital Elevation Model (CUDEM) Bathymetric-Topographic Tiles
Coastal Lidar
Topo-Bathy/Bathy Lidar Datasets
Grid Extract
More Information
Help
Identify
Basemap
Options
Ocean Basemap (Esri)
GEBCO_2022 (NOAA NCEI Visualization)
GEBCO_2022 Grayscale (NOAA NCEI Visualization)
Global Multi-Resolution Topography (GMRT) Data Synthesis (LDEO)
Global Multi-Resolution Topography (GMRT) Data Synthesis (LDEO), High-Resolution Areas Highlighted
Light Gray (Esri)
Dark Gray (Esri)
World Imagery (Esri)
National Geographic (Esri)
Mercator
Arctic
Antarctic
ARCTIC OCEAN
Canada Basin
Laptev Sea
East Siberian Sea
Beaufort Sea
Chukchi Sea
Baffin Bay
Hudson Bay
Labrador Sea
Labrador Basin
Gulf of Alaska
Sea of Okhotsk
NORTH PACIFIC OCEAN
Caribbean Sea
Mid-Atlantic Ridge
Position: 108.258°, 82.743°
Elevation: -3600.28 meters


National Centers for Environmental Information
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Bathymetric Data Viewer
NOAA / NESDIS / NCEI / Maps / Seafloor Mapping
Layers
Bathymetric Surveys
Multibeam Survey Tracklines
Multibeam Survey Footprints
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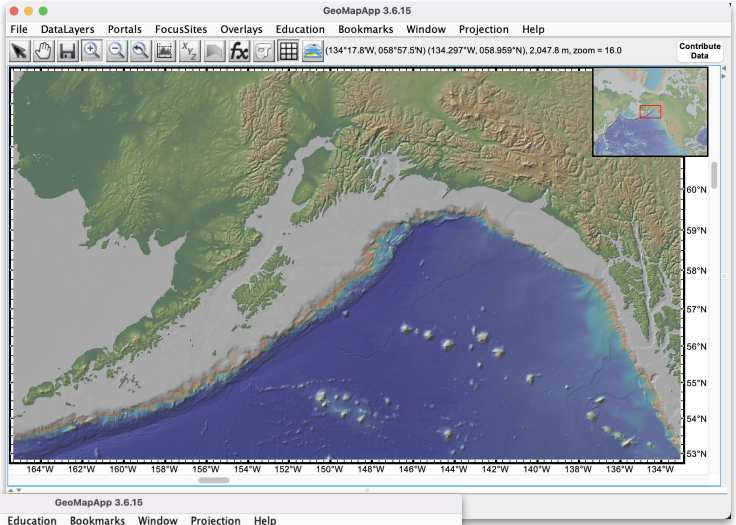
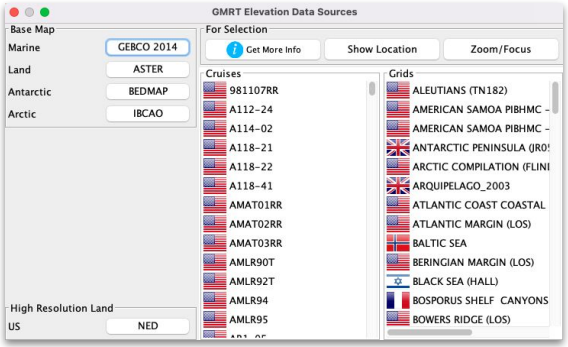
Global Multi-Resolution Topography (GMRT) Data Synthesis (LDEO)
Global Multi-Resolution Topography (GMRT) Data Synthesis (LDEO), High-Resolution Areas Highlighted
Light Gray (Esri)
Dark Gray (Esri)
World Imagery (Esri)
National Geographic (Esri)
Mercator
Arctic
Antarctic
Position: -25.511°, 81.093°
Elevation: 251.78 meters
Sitemap | Privacy Policy | Freedom Of Information Act | Information Quality | Disclaimer | Take Our Survey | Department of Commerce | NOAA | NESDIS | Contact Us

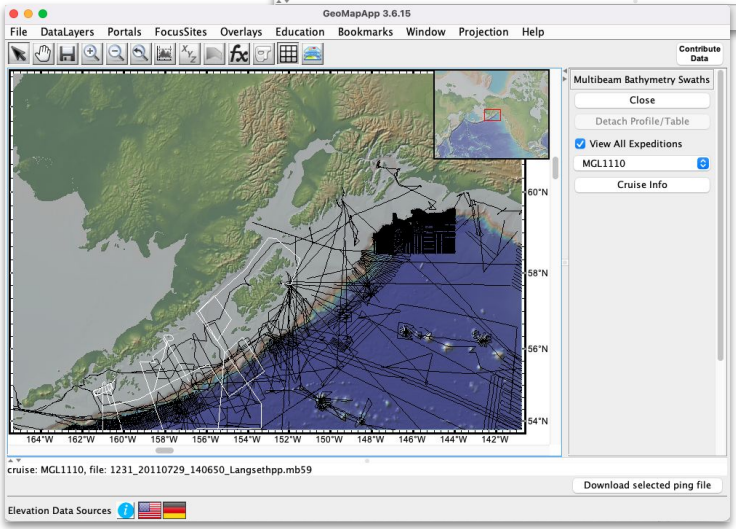
GMRT: Access via GeoMapApp Desktop Application

- GMRT is the default basemap (images)
- GMRT grid can be loaded
  - Profile tool
  - Digitization tool
- Mask Layer to show coverage
- Attribution information
- Access & download processed swath files

  >> Portals - Multibeam Swath Bathymetry

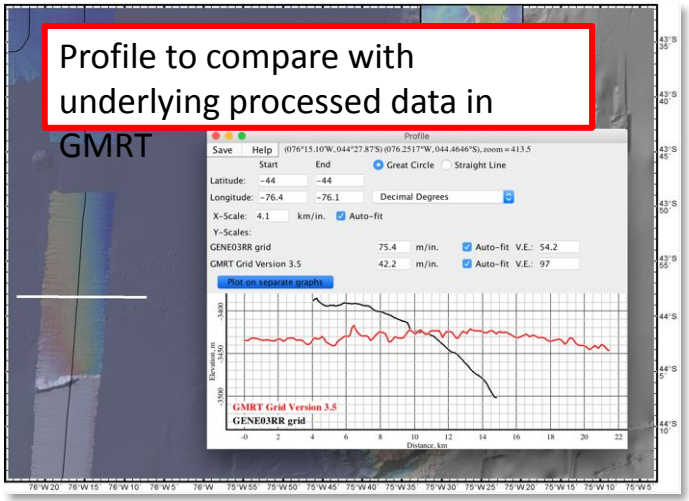


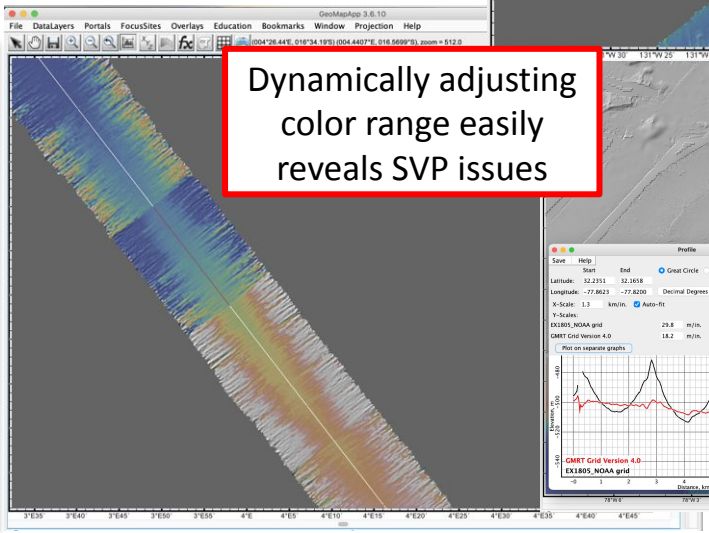


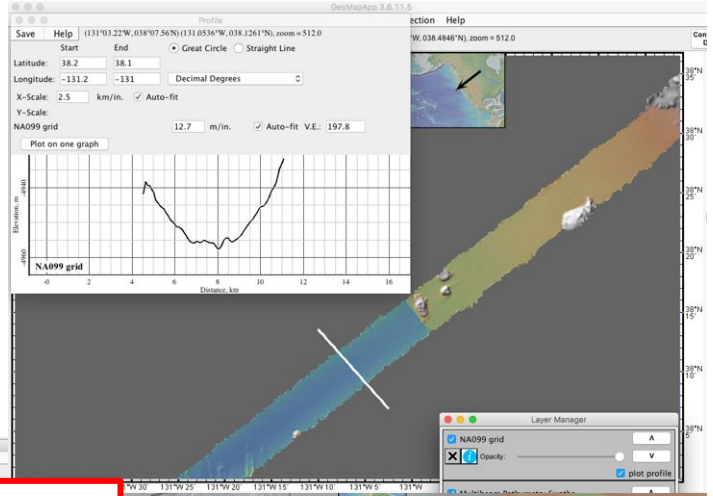


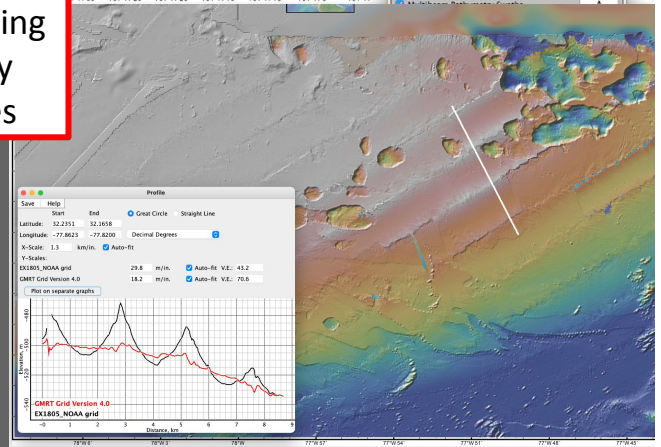
GMRT: MBES Curation

- Create tiled rasters from swath files
  - Review rasters & compare with underlying GMRT data
- Identify and address data quality issues
  - Ping edits, SVP issues
- Ensure that processed data are fit-for-purpose and can be seamlessly integrated with other data
- Make processed swath available



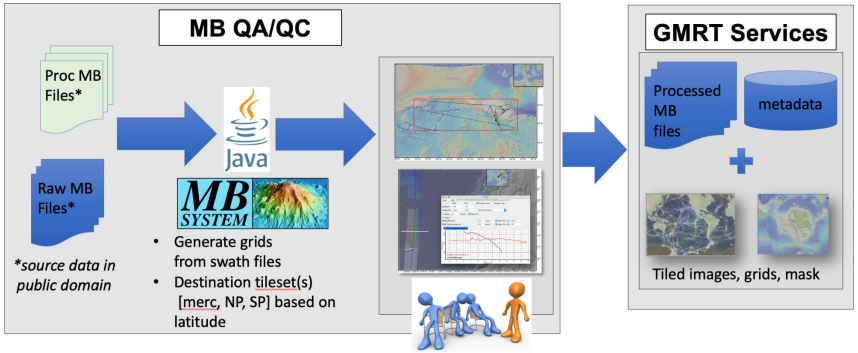


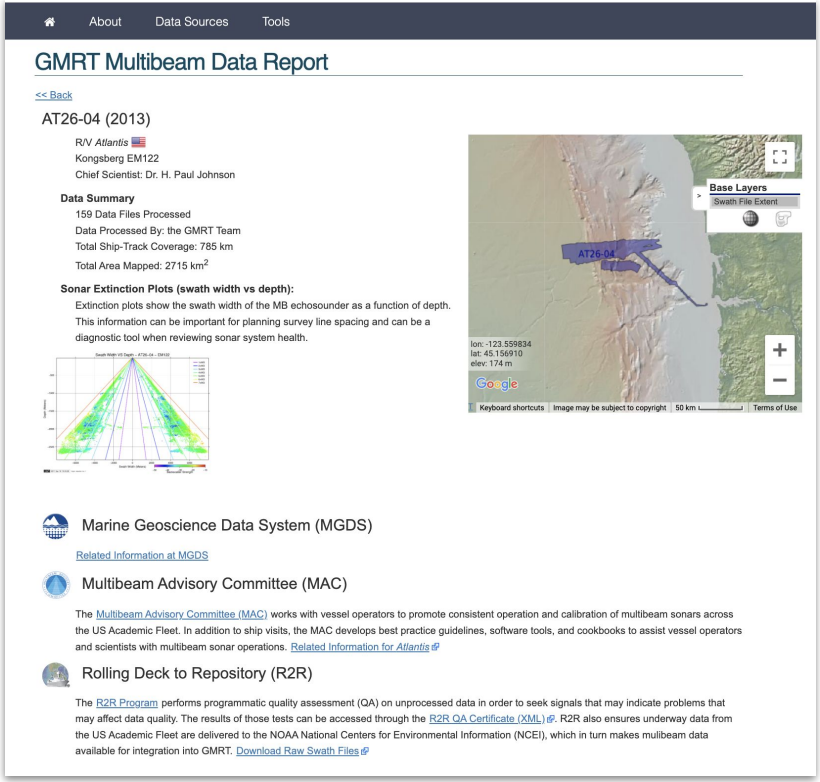




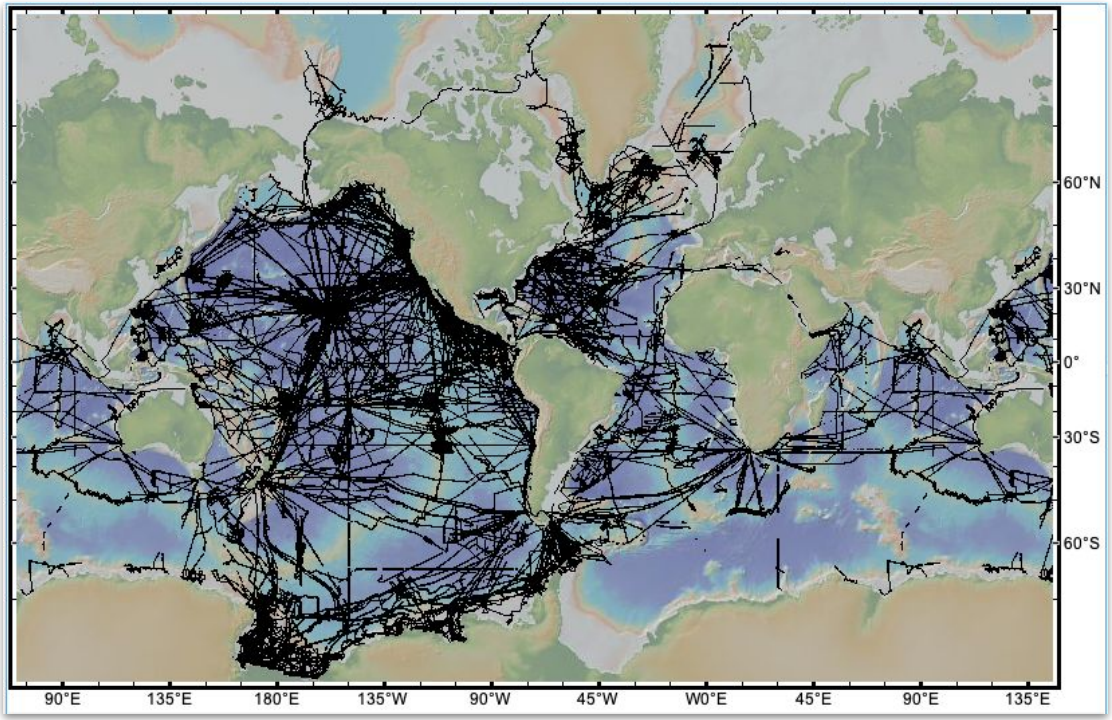
GMRT: MBES Data Curation

- Haxby Gridding Algorithm to create rasters
  - MB-System & GeoMapApp
- Primary focus: US Academic Research Fleet
- Creates publicly-accessible data and metadata
  - Rasters in relevant projections
  - Metadata for attribution and provenance
  - Processed swath files
- MGDS for swath file data catalog, access, DOI and submission to NCEI



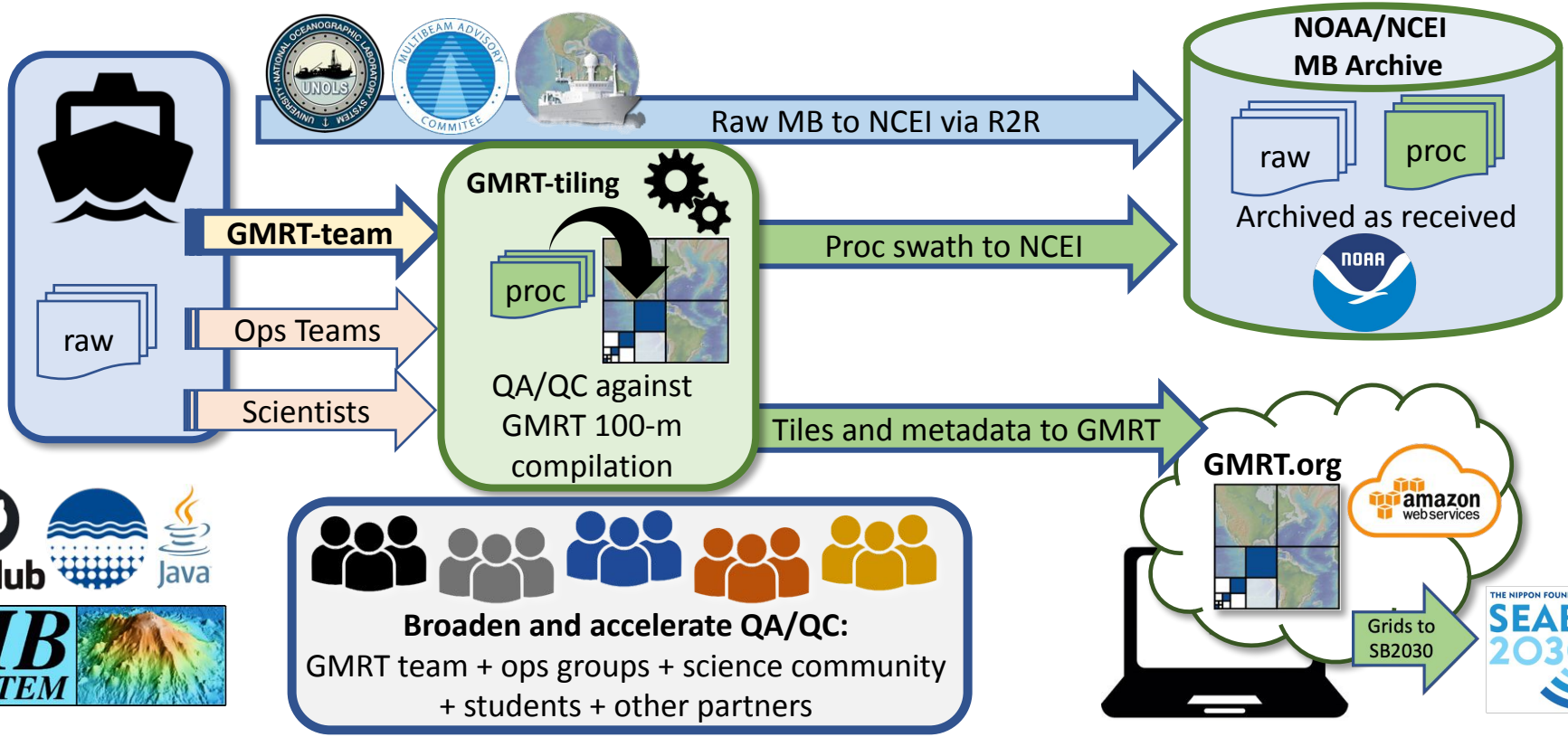


GMRT: Multibeam Sonar Data Curation



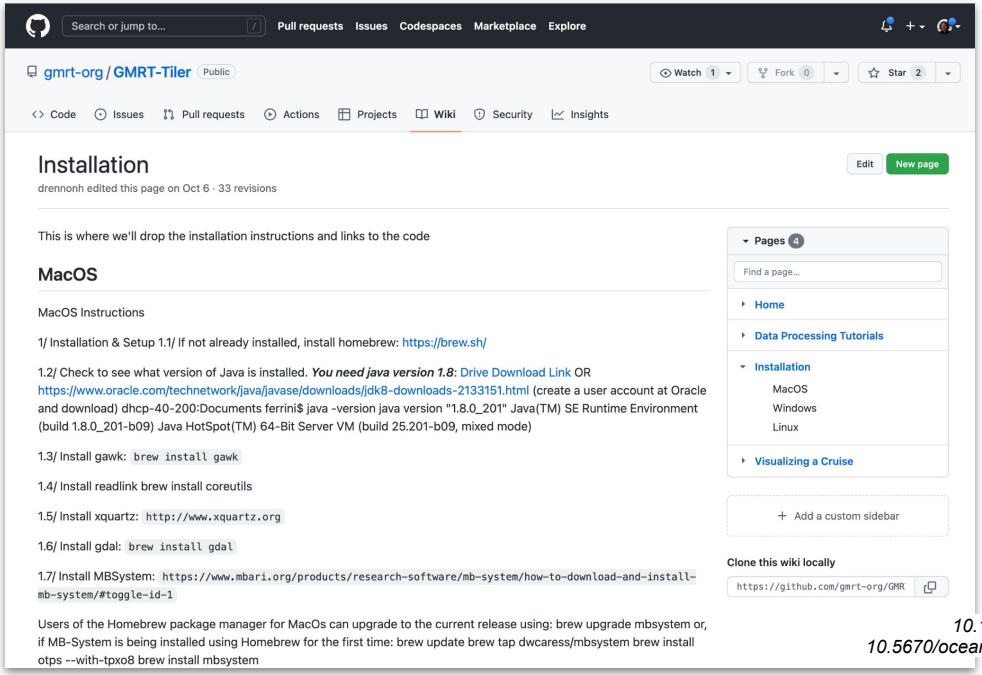
GMRT V 4.1 Curated Multibeam Stats	
Cruises	1,387
Multibeam Devices	23
Ships	43
Ship Operators	30
Chief Scientists	555
Total Swath Files Curated	325,522
Total Area Mapped (km^2)	38,133,571
Total Ocean Mapped (%)	10.54%
Years of data acquisition	1980 - 2021
Release Date	Oct. 2022

GMRT: Distributable Data Processing and Curation



Distributable QA/QC Tools

https://github.com/gmrt-org/GMRT-Tiler/wiki



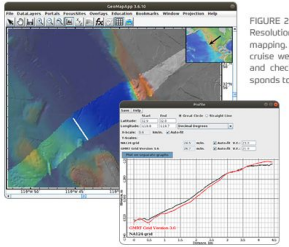


FIGURE 2. The image shows the use of Global Multi-Resolution Topography (GMRT) QA/QC tools for NA125 mapping. The new GMRT tiles generated during the cruise were compared to the current GMRT data set and checked for consistency. The white line corresponds to the profile image.

combined with filling further bathymetry gaps on transits across the Borderland between sites.

The final expedition of the season, NA125, was a mapping-only cruise that targeted gaps in NOAA's US bathymetry coverage and gap analysis (https://iocm.noaa.gov/seabed-2030-bathymetry.html) within the US Exclusive Economic Zone (EEZ). The primary mapping area was along the western boundary of the EEZ west of San Diego. A secondary mapping area located in the more protected regions in the California Borderland was completed when

been contributed directly to the Global Multi-Resolution Topography (GMRT) Synthesis. OET has worked with the GMRT team to improve workflows for processing and integration into GMRT, as well as to smooth the path for submission of data to the Seabed 2030 Regional Centers (Figure 2). In 2020, data collected on 28 *Nautilus* cruises from 2015 to 2019 were prepared for integration into GMRT, revealing some minor issues that were addressed prior to submission to NCEI. Combined, the submitted data cover more than 300,000 km² of seafloor in the Pacific Ocean.

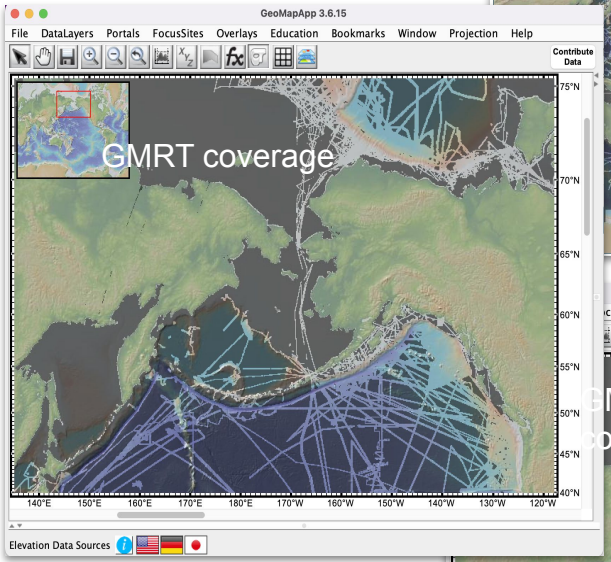
In order to accelerate the rate of data integration, not burden the GMRT team, leverage the skills of the *Nautilus* onboard mapping team, and contribute to the mapping community, GMRT tiling tools were adapted for use aboard *Nautilus* (Ferrini et al., 2020). OET prototyped the use of the tools on board in 2019, and in 2020, GMRT tiling tools were integrated into the standard operating procedures. These tools improve the data submission workflow and provide a testbed for tools that can benefit the broader seabed mapping community.

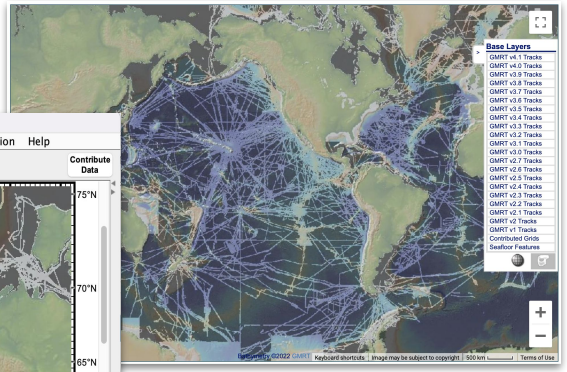
Since *Nautilus* exploration began in the area in 2015, OET

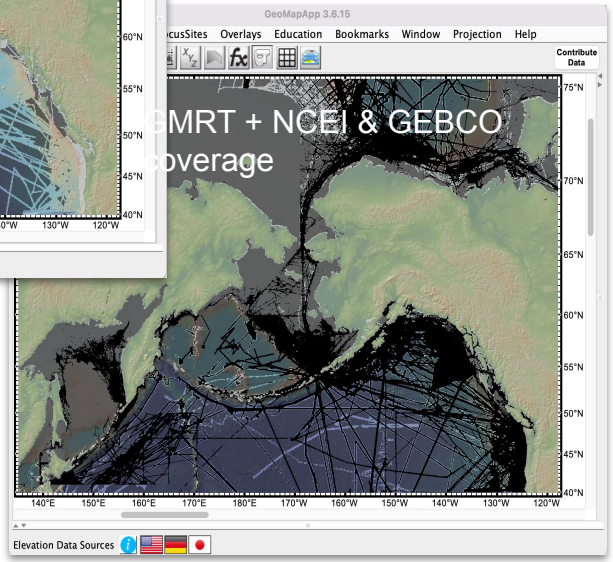
10.1002/essoar.10505639.1
10.5670/oceanog.2021.supplement.01

Bathymetry Data Coverage

- GMRT Mask tiles
- GMRT Metadata service
- Metadata-driven overlays
  - MBES Cruise Tracklines
  - Polygons of data coverage
    - MBES swath data
    - Contributed grids
  - Multiple Formats:
    - Web Feature Services
    - Web Map Services
    - Downloadable shapefiles
      https://www.gmrt.org/services/index.php
    - GeoMapApp Multibeam Portal
- Other data coverage layers in GeoMapApp
  - NOAA:NCEI / IHO-DCDB
  - GEBCO







GMRT is…

- a Global Multi-Resolution Topography **data synthesis**
- an **infrastructure** for delivering elevation data as grids, images, profiles and points at user-defined locations/elevations
- a **tiling scheme** for efficiently storing and delivering multi-resolution data, maintained simultaneously in 3 projections
- a distributable **methodology** for multibeam sonar data QA/QC that
  - is well-suited for data acquired during transits
  - can help ensure that processed data are fit-for-purpose

ferrini@ldeo.columbia.edu

End of Presentation

Thank you!

NOAA NCEI Bathymetric Data Viewer: Data Discovery and Access

Jess Nation – CIRES, University of Colorado Boulder | NOAA NCEI

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

NOAA NCEI Bathymetric Data Viewer: Data Discovery and Access

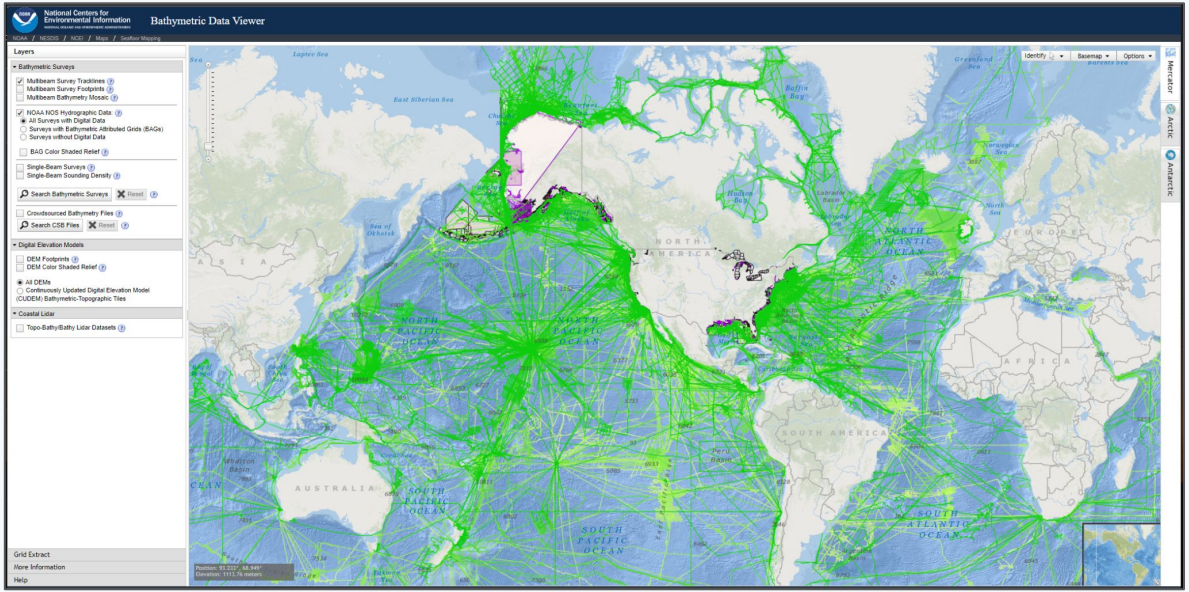
Jessica Nation
Bathymetry Data Manager

University of Colorado *in support of*
NOAA's National Centers for Environmental Information
jessica.nation@noaa.gov

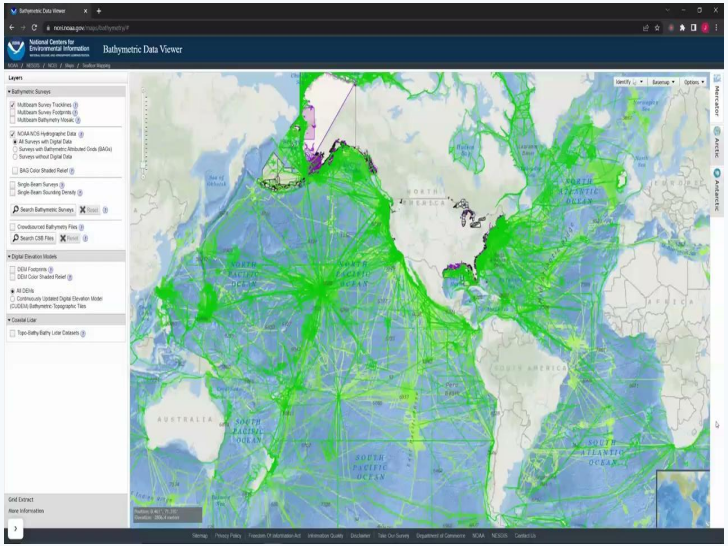
Today's Demonstration

NCEI Bathymetric Data Viewer & Tools

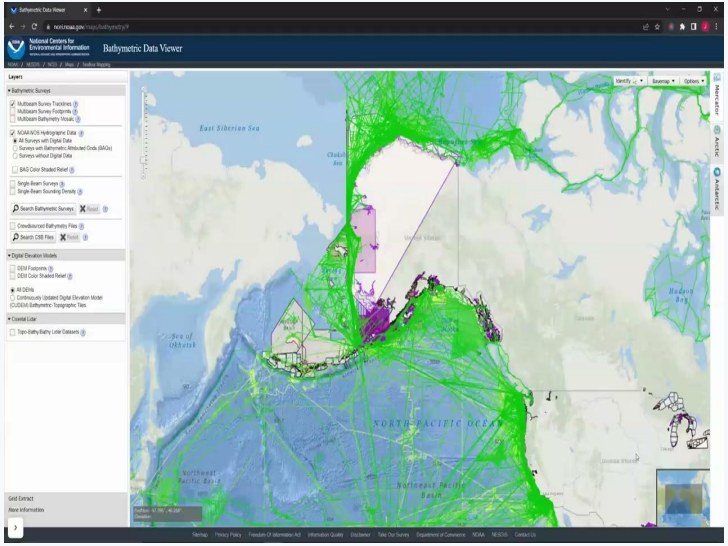
- NCEI Bathymetric Data Viewer overview
- How to Download Data
- Grid Extract



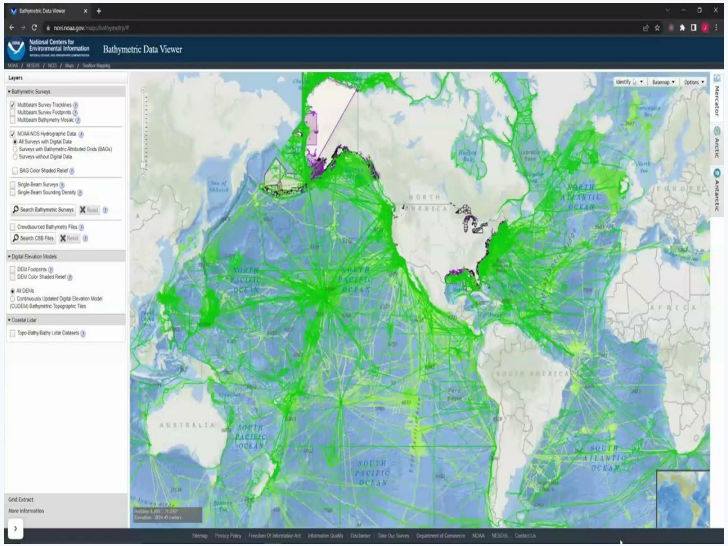
NCEI Bathymetric Data Viewer DEMO



Downloading Data DEMO



Grid Extract DEMO



Questions?

jessica.nation@noaa.gov

- Do you have questions about how access data from the Bathymetric Data Viewer?
- Do you know of any organizations, companies, or academic institutions that might be interested in contributing data?
- Any other questions?

End of Presentation

Thank you!

Data Processing Capacity and Expertise Gaps in Alaska

Dr. Erin Trochim – Alaska Center for Energy and Power, University of Alaska Fairbanks

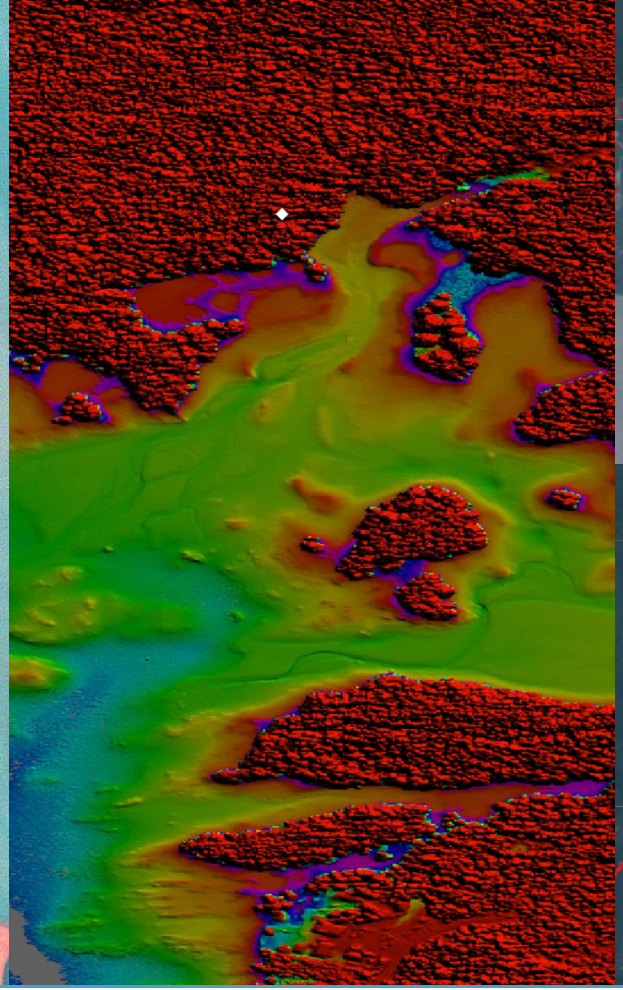
11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Data processing capacity and expertise gaps in Alaska

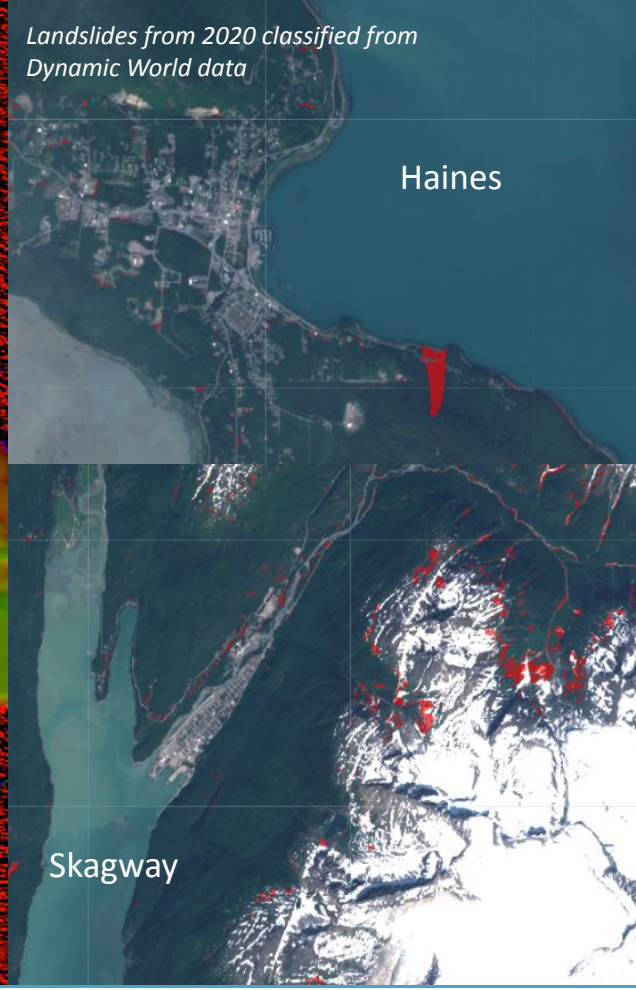
Erin Trochim, PhD
University of Alaska Fairbanks

2022 Undergraduate student intern Joy Lomelino building on her coastal mapping skills learning to fly a UAS

Imagery of Kaktovik's coastline from 2018-2021



Landslides from 2020 classified from Dynamic World data

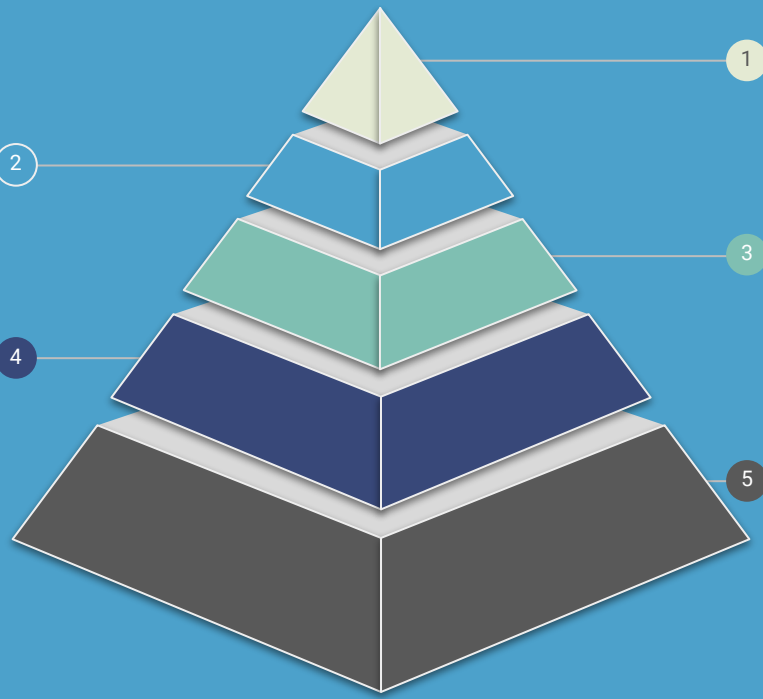


AK coastal applications use

large datasets, computing power

and need APIs to be co-located and accessible

Student / training pipeline development



Research leadership
Support post-doctoral fellowships to create future research leaders

Graduate students
Tackle specific research topics and techniques while including professional development

Foundational education
Host technical workshops, create processing manuals, knowledge transfer of techniques for applications ** CURRENT **

Project fellows
Host Sea Grant Alaska fellows supported by cohort program to refine technical skills and leadership ** CURRENT **

Undergraduate interns
Develop interest in coastal applications. Exposure to data, processing and applications ** CURRENT **

Foundational education

Goal

Building blocks for a career in Alaska coastal and ocean applications

Basic research experience

Growth-minded internship & fellowship experiences

Field & technical skills

Hands-on experience collecting coastal & oceanographic data

Geospatial + data skills

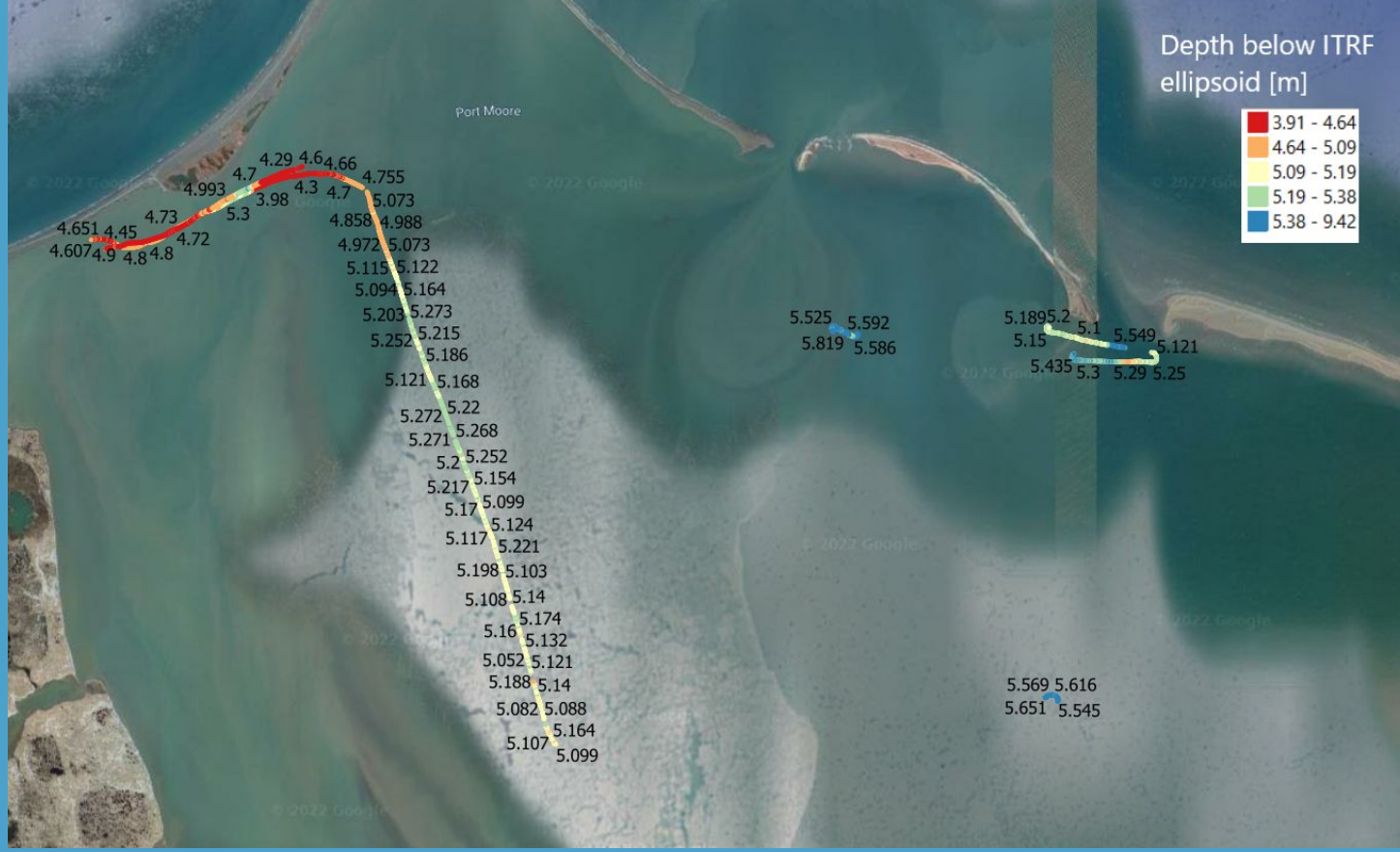
Different approaches including GEE, ESRI ArcGIS and ML

Place-based experience

Opportunities to work on current community-focused projects

Fieldwork

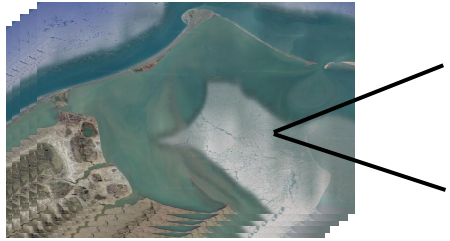
- Overlapping single beam bathymetry in Beaufort
- Expand efforts to Unalakleet
- Verify topo bathymetric lidar using both single & multibeam bathymetry

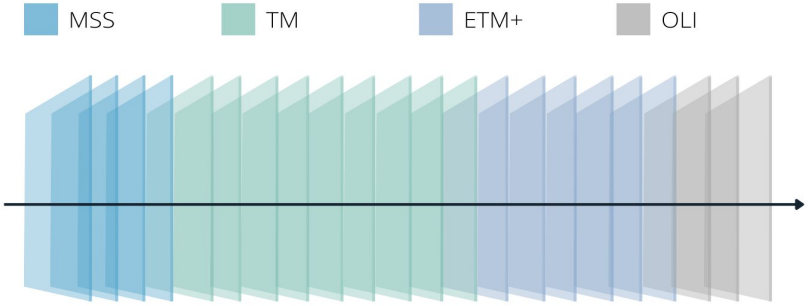


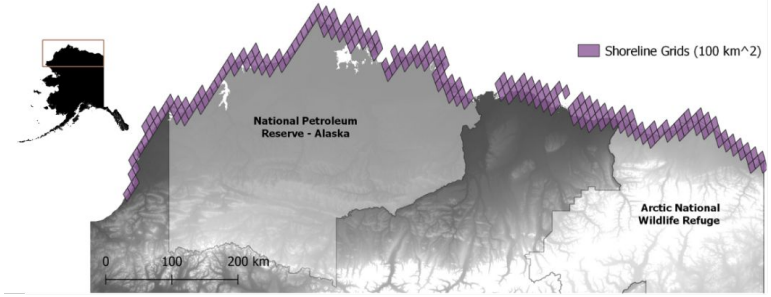
Elson Lagoon bathymetry, surveyed on August 31, 2021 with a hydroball

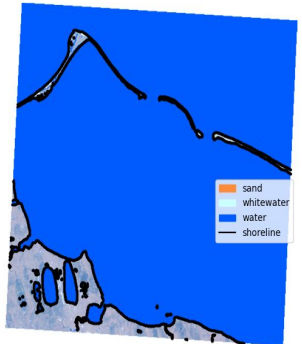
Tracking changing coastlines: CoastSat

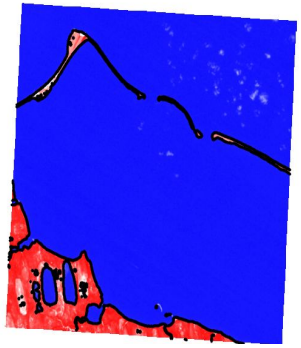
Leverage Landsat temporal record to examine coastal change











Intersections of bathymetry with other RS products

Input Layers	Feature Engineering	Topobathy Lidar	ML
			
Use satellite data including MODIS, Sentinel 2 and Landsat 8	Add additional information including distance from coastline and distance from rivers	Target variable is existing topo bathymetric data with success/fail and date	Different modeling approaches including supervised classification and time series forecasting to estimate likelihood of successful data acquisition

code.earthengine.google.com

Update

Google Earth Engine

Search places and datasets...

ee-edtrochim

combine_started

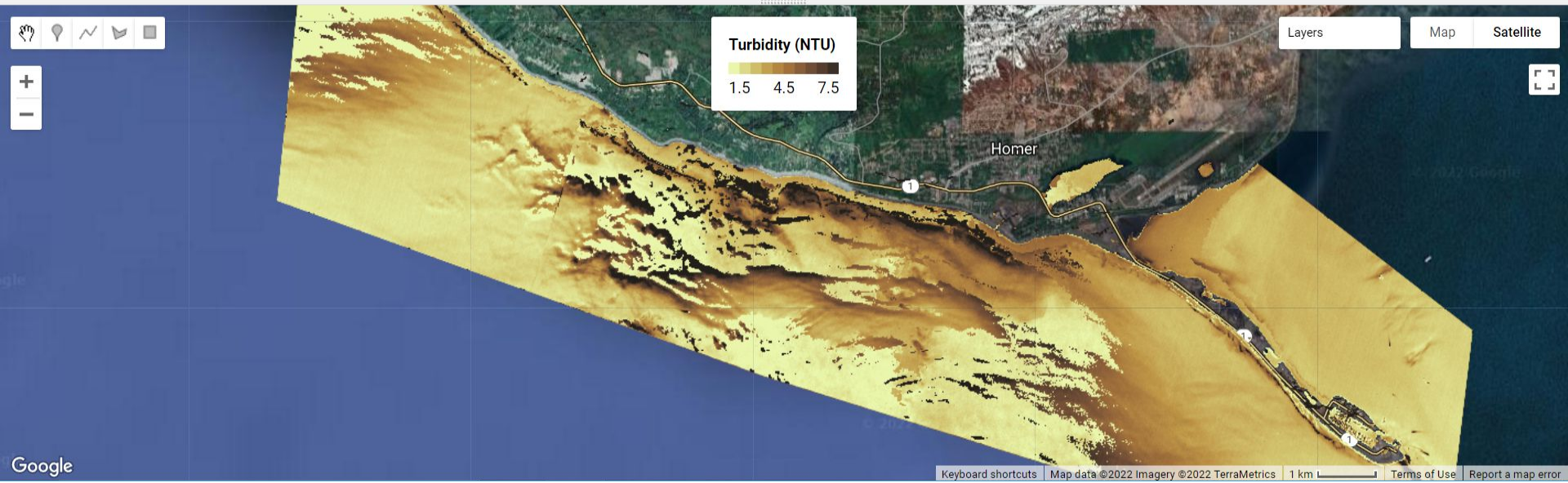
Get Link | Save | Run | Reset | Apps

```
1  // Optical Reef and Coastal Area Assessment (ORCAA)
2
3  function createAnalysisIC(startDayInput, endDayInput, userselectarea){ //the function requires a start year (string), end year (stri
4
5      // Set area of interest. Runs the setAreaOfInterest function, using userselectarea as the input
6      var areaInput = userselectarea;
7
8      // Set the start and end dates of the collection from the user defined dates specified in the panel
9      var start = startDayInput;
10
11
```

Inspector | Console | Tasks

Use `print(...)` to write to this console.

List (7 elements) JSON

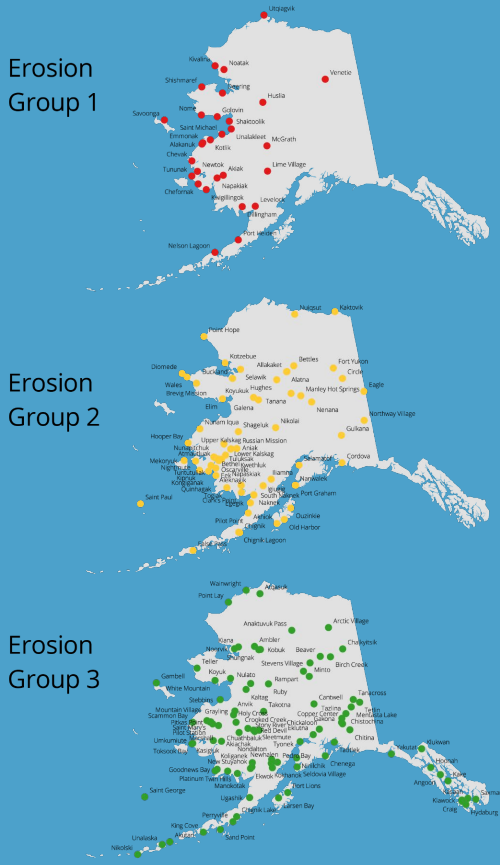


Coastal Mapping

ACEP | UAF University of Alaska Fairbanks | US Army Corps of Engineers

What research and development needs to be done

1. Test military prototype sensors in AK
   a. New high & low altitude available
2. Produce NCMP analysis products
3. Community threats and energy planning
   a. Focus on updating Alaska Environmentally Threatened Communities rankings (right)
4. Capacity development and coordination



Denali Commission Environmentally Threatened Communities erosion rankings

End of Presentation

Thank you!

Habitat Mapping With Waterborne Technology

Liza Hasan – National Park Service | University of Alaska Fairbanks

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Habitat mapping with waterborne technology

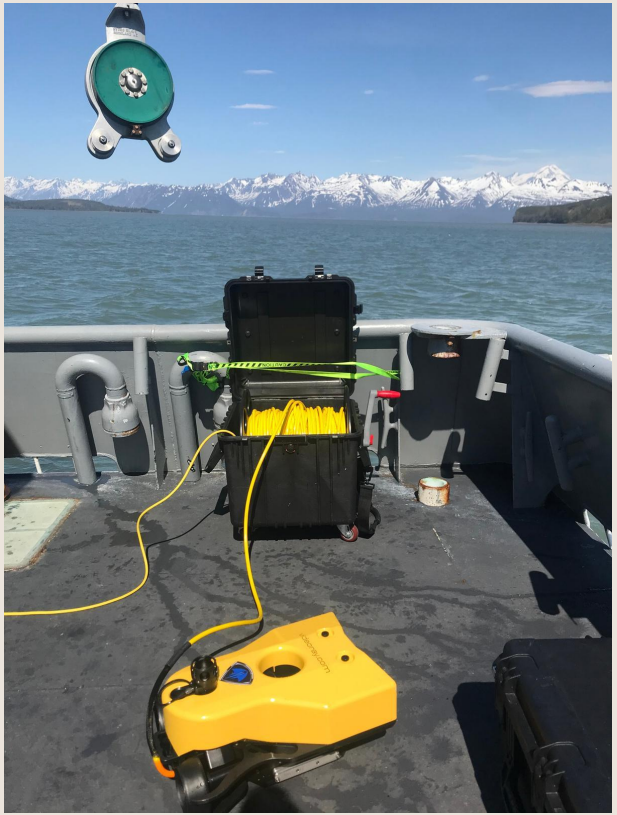
Liza Hasan (NPS/UAF)

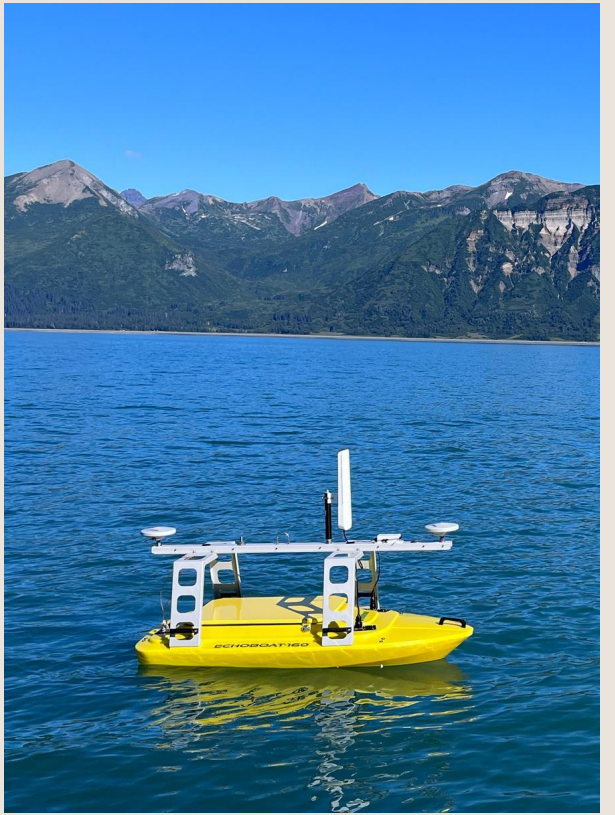
November 17th, 2022

2022 Alaska Ocean and Coastal Mapping Summit

Panel Session 3: Data, Products and Processing

Photo: Tahzay Jones



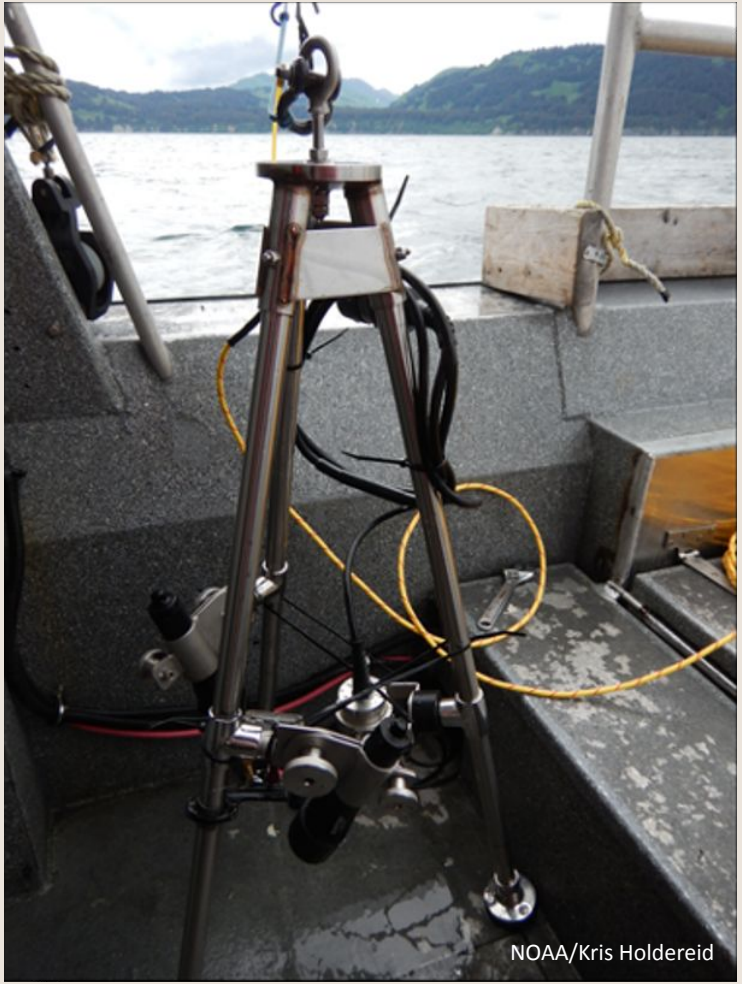

ECHOBOAT-160

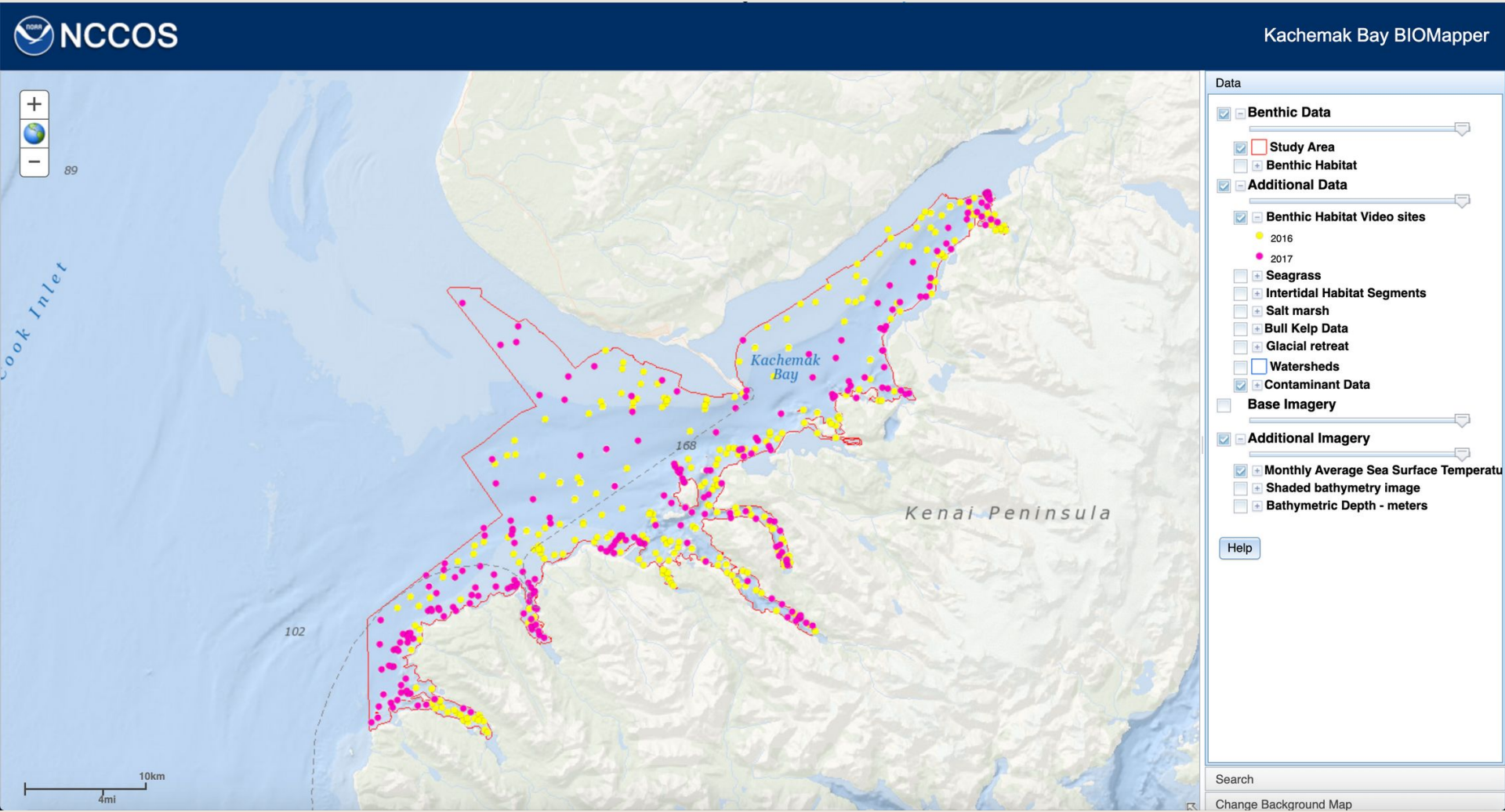
Introduction

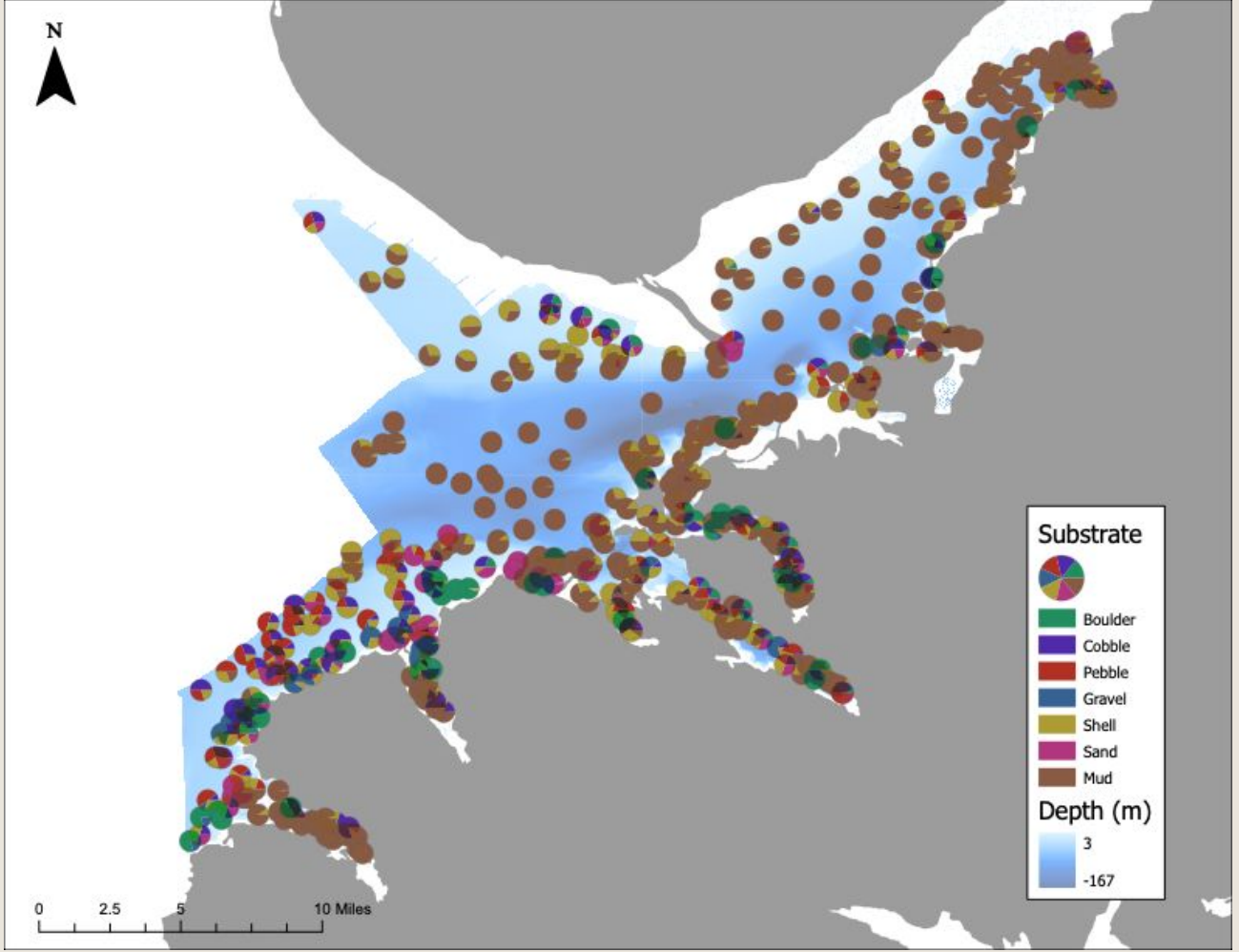
- Nearshore coastal habitat mapping
- Mapping tools for ecological research
- Benthic habitat characterization
  - Substrate and algae
- Applications of habitat information
  - Sea otter species distribution modeling

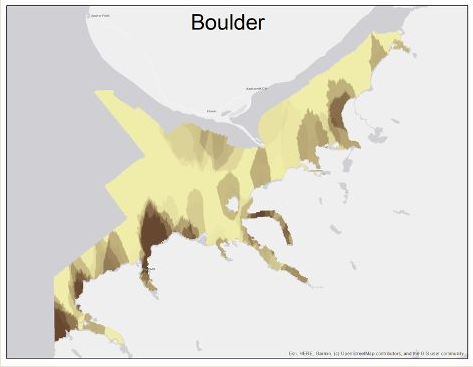
Drop camera

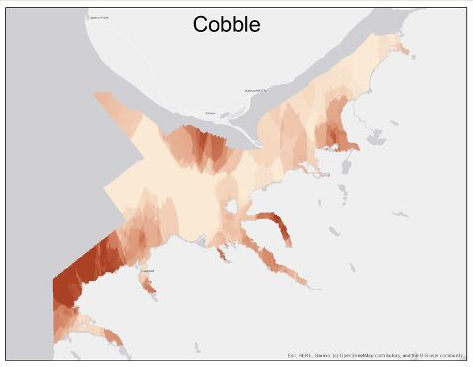
- Typically most affordable
- Downward or forward looking
- Visual data
- Point surveys
- Efficient and effective method for high density of visual sampling
- Ground truth acoustic backscatter
- Mark GPS location top-side

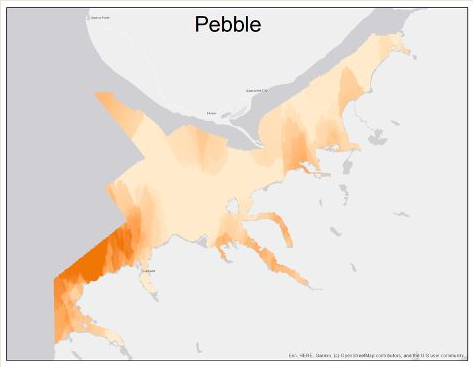


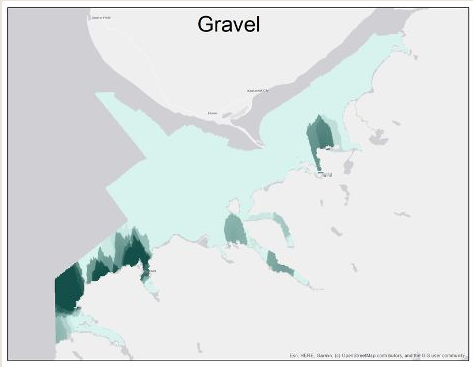

NCCOS
Kachemak Bay BIOMapper
Data
Benthic Data
Study Area
Benthic Habitat
Additional Data
Benthic Habitat Video sites
2016
2017
Seagrass
Intertidal Habitat Segments
Salt marsh
Bull Kelp Data
Glacial retreat
Watersheds
Contaminant Data
Base Imagery
Additional Imagery
Monthly Average Sea Surface Temperatu
Shaded bathymetry image
Bathymetric Depth - meters
Help
Search
Change Background Map
Kachemak Bay
Kenai Peninsula
Cook Inlet
89
168
102
10km
4mi

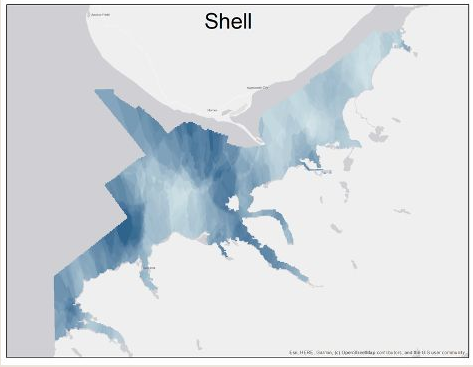

N
Substrate
Boulder
Cobble
Pebble
Gravel
Shell
Sand
Mud
Depth (m)
3
-167
0
2.5
5
10 Miles

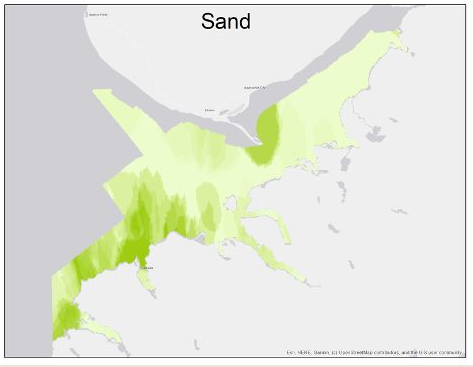

Boulder

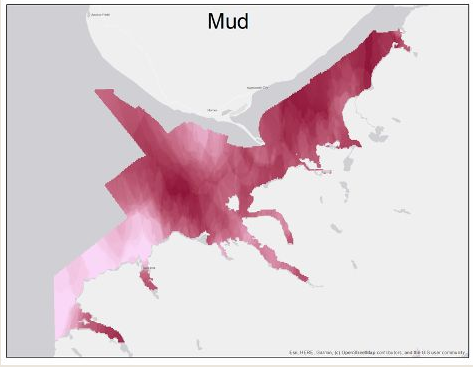

Cobble

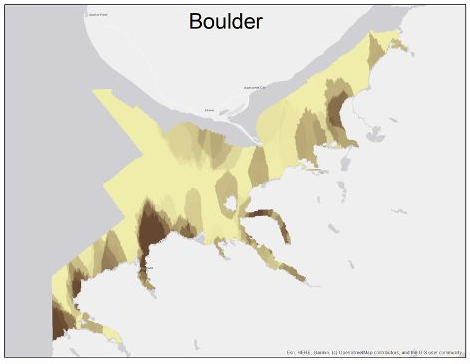

Pebble

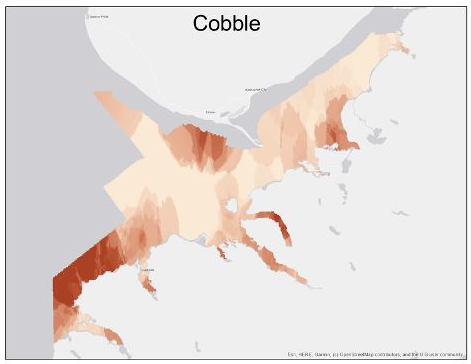

Gravel

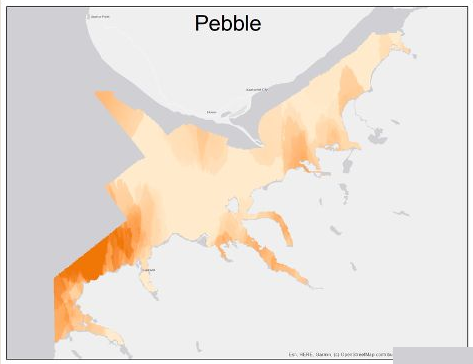

Shell

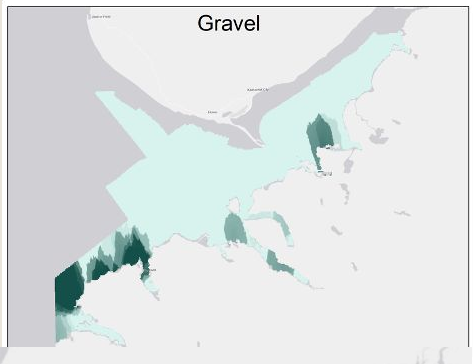

Sand

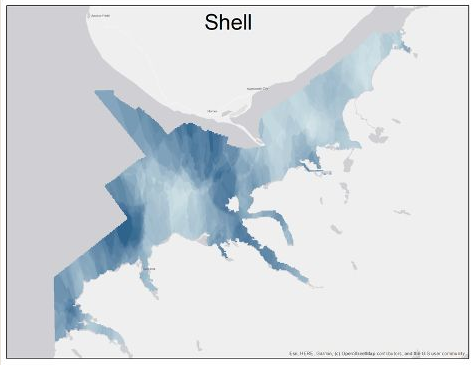

Mud

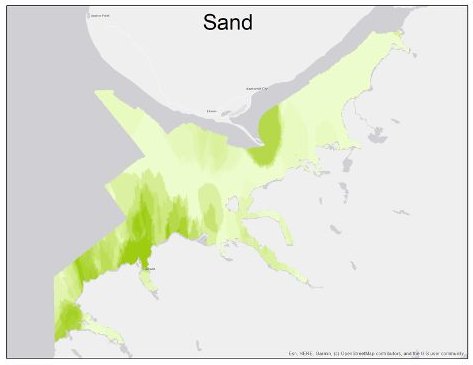

Boulder

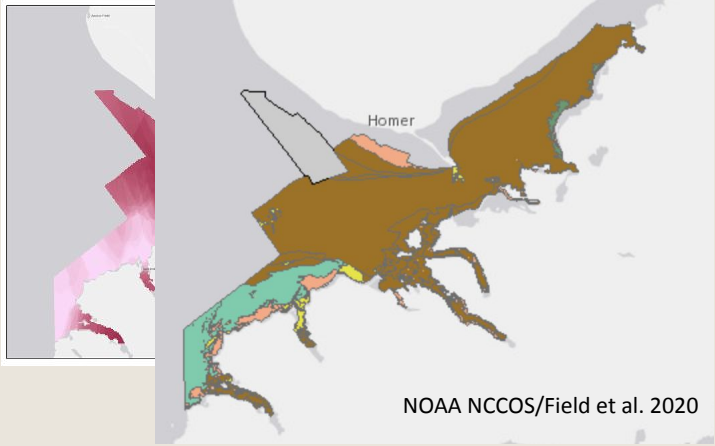

Cobble


Pebble


Gravel

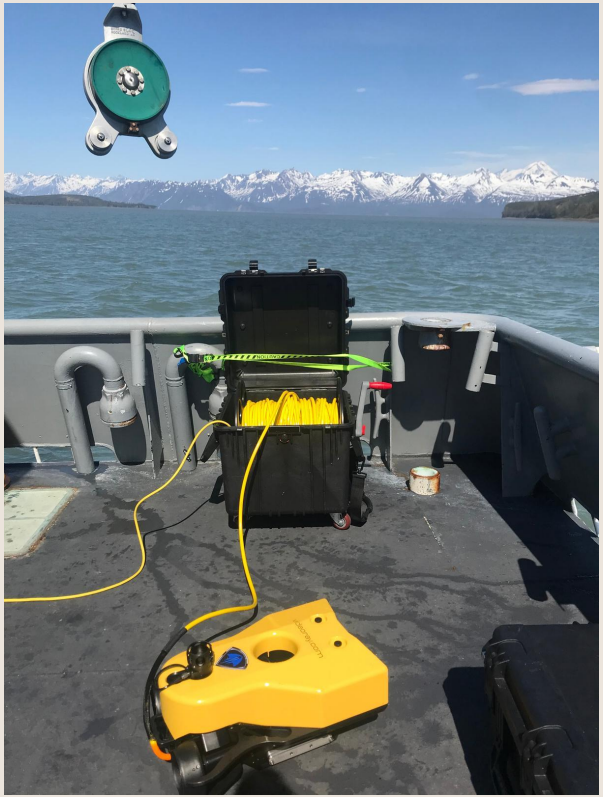

Shell

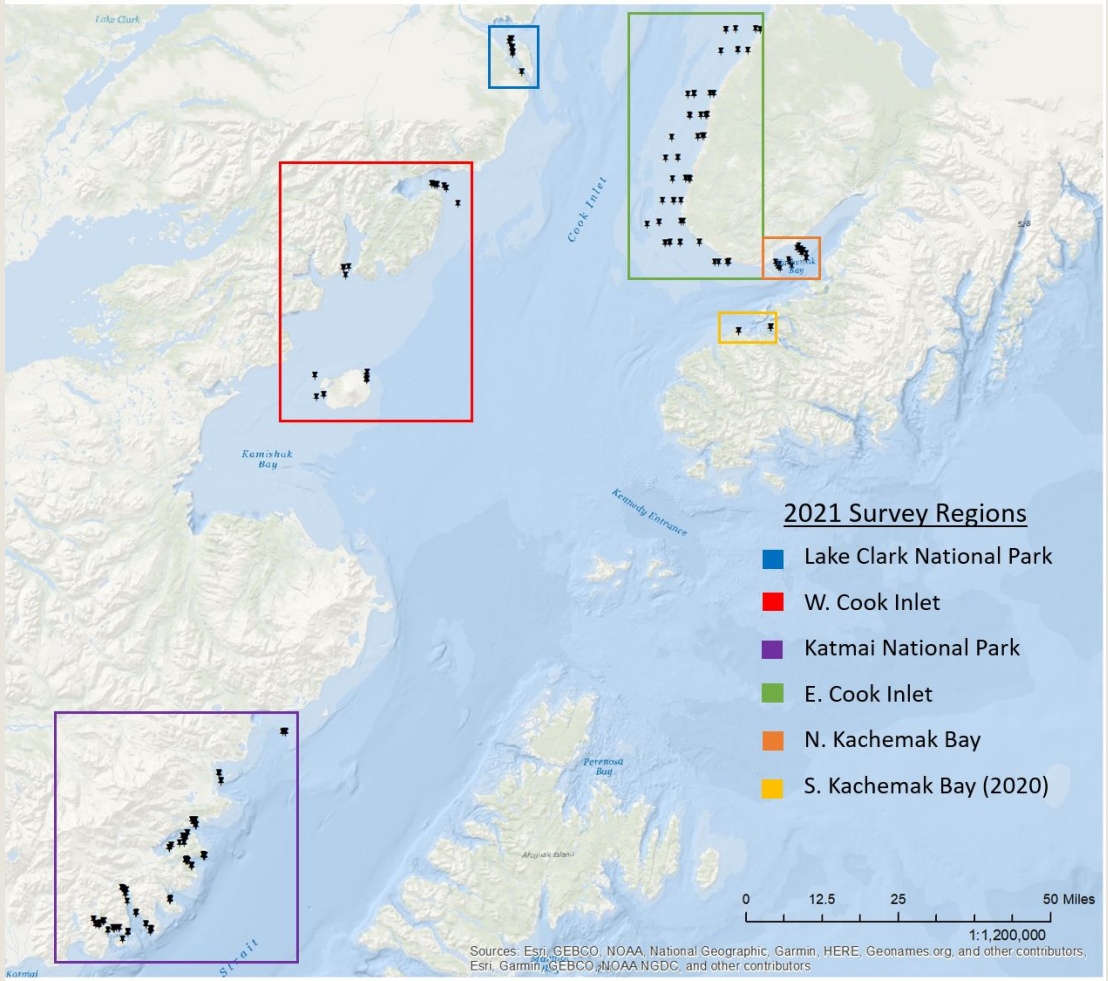

Sand

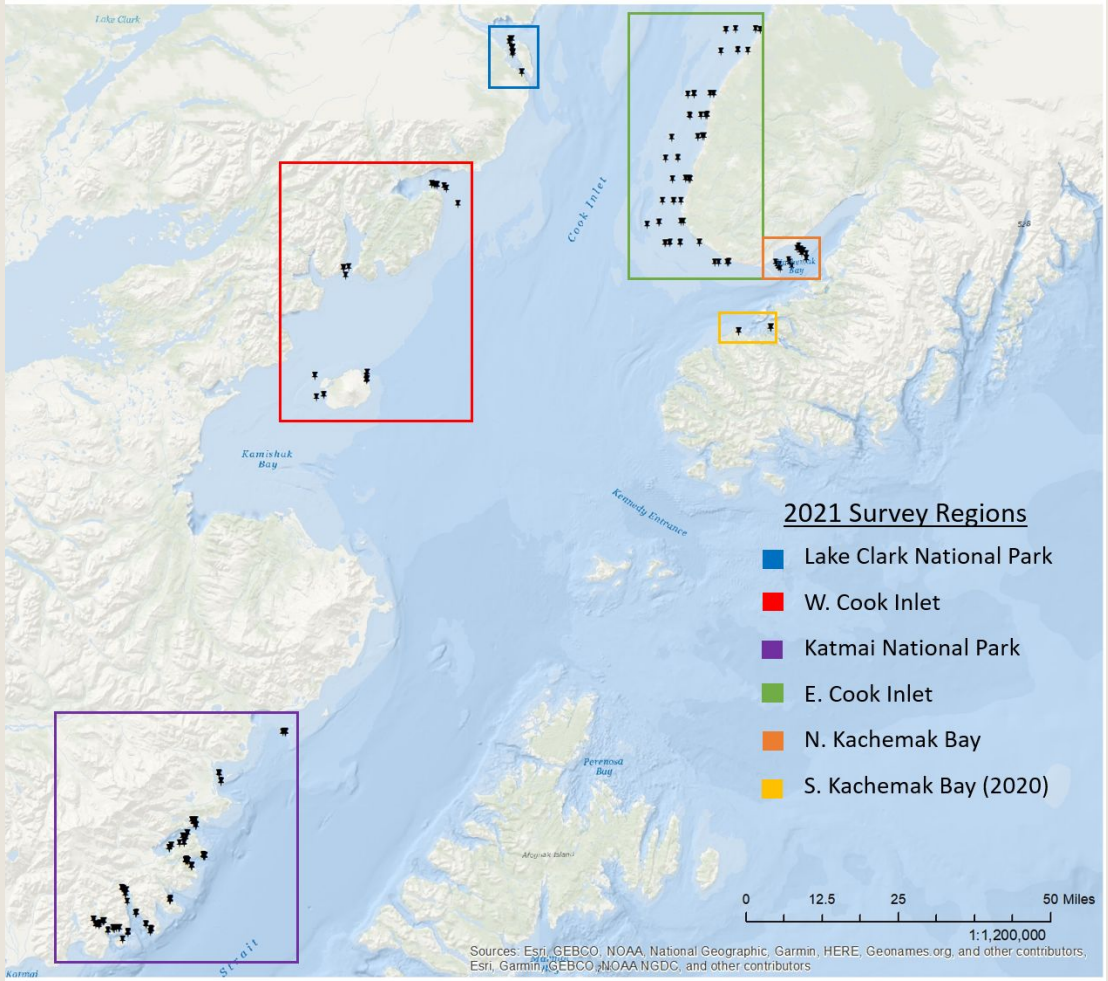

Homer
NOAA NCCOS/Field et al. 2020

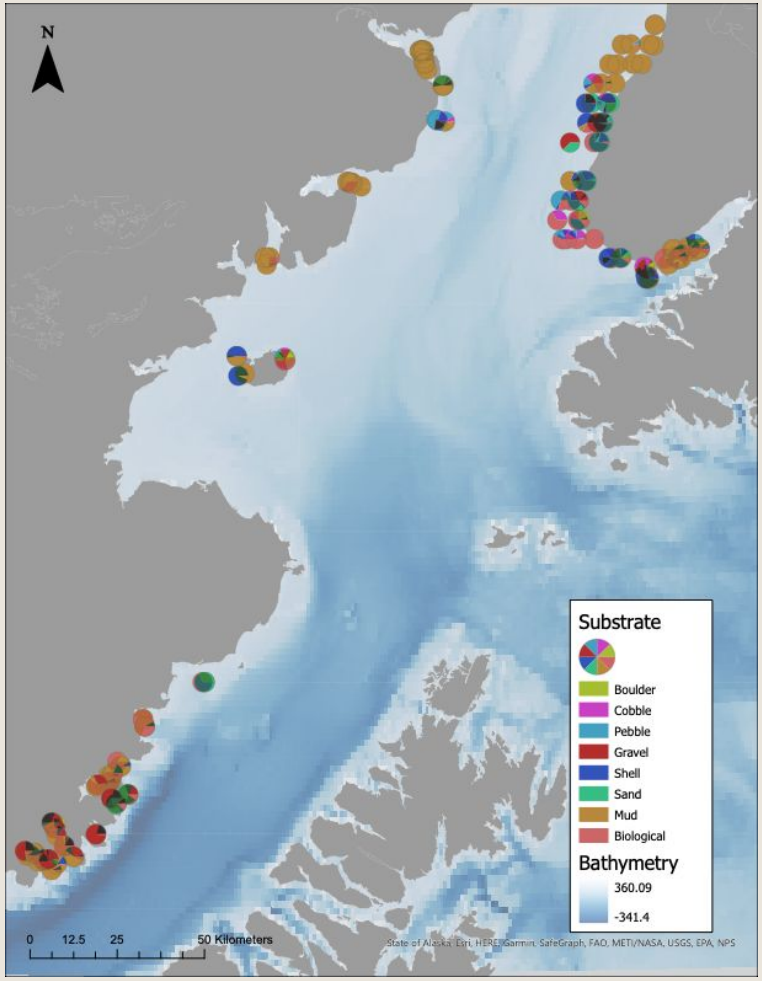
Remotely operated vehicle

- Various ROVs available with a range of abilities
- Visual transect surveys
- Other instruments can be attached
  - Multibeam sonar
  - Sensors
- Valuable for exploration
- DVL location tracking




Lake Clark
Cook Inlet
Kamishak Bay
Kennedy Entrance
Perenosa Bay
Alaska Peninsula
Katmai
2021 Survey Regions
Lake Clark National Park
W. Cook Inlet
Katmai National Park
E. Cook Inlet
N. Kachemak Bay
S. Kachemak Bay (2020)
0
12.5
25
50 Miles
1:1,200,000
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

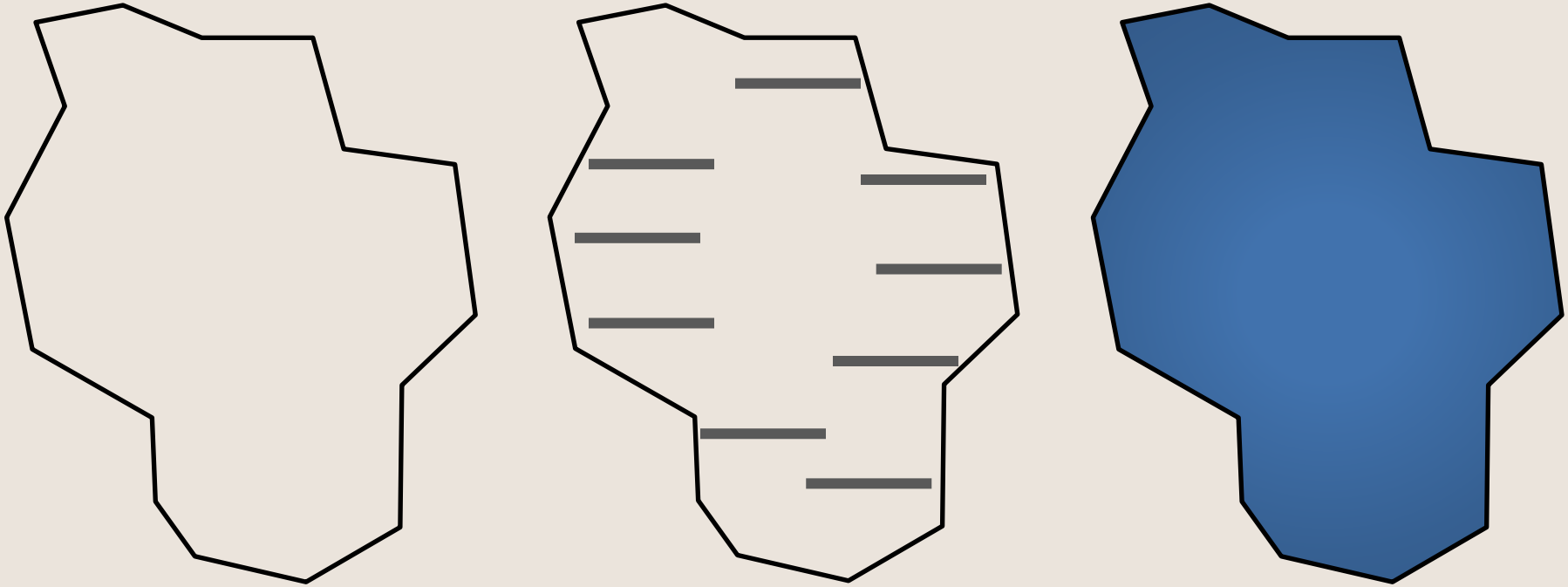

Lake Clark
Cook Inlet
Kamishak Bay
Kennedy Entrance
Perenosa Bay
Alaganik Island
Kamishak Bay
Katmai
2021 Survey Regions
Lake Clark National Park
W. Cook Inlet
Katmai National Park
E. Cook Inlet
N. Kachemak Bay
S. Kachemak Bay (2020)
0 12.5 25 50 Miles
1:1,200,000
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors


N
Substrate
Boulder
Cobble
Pebble
Gravel
Shell
Sand
Mud
Biological
Bathymetry
360.09
-341.4
0 12.5 25 50 Kilometers
State of Alaska, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

Autonomous surface vehicle

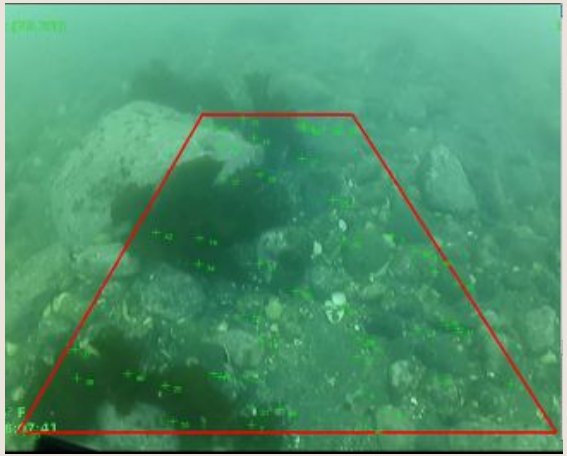
- Higher price point
- Multibeam sonar
- Continuous survey within an area
  - Larger survey area, but limited based on battery
- Program survey path
- Survey further away from operator

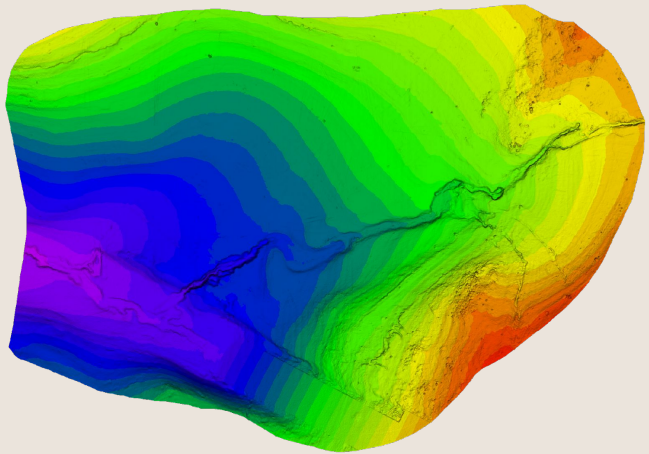
Spatial scale of data



Form follows function

- Visual vs. acoustic survey
- Manual vs. algorithmic habitat characterization
- Ecological assessment
- Exploration vs. survey of specific site





Questions?

Email: ehasan@nps.gov

End of Presentation

Thank you!

Tsunami Inundation Mapping in Alaska

Dr. Dmitry Nicolsky – Geophysical Institute, University of Alaska Fairbanks

11.17.2022 | Alaska Coastal & Ocean Mapping Summit

Tsunami Inundation Mapping in Alaska: History of the product line

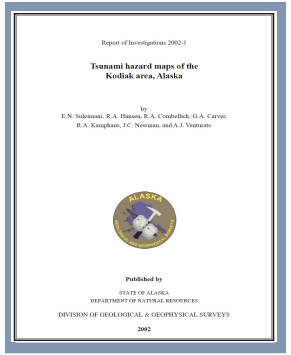
Dmitry Nicolsky (UAF),
Elena Suleimani (UAF),
Barrett Salisbury (ADGGS),
Curtis Jonson (DHS/EM),

and many, many others over the long history

Under the umbrella on National Tsunami Hazard Mitigation Program

High-resolution maps and reports

1998


Report of Investigations 2002-1

Tsunami hazard maps of the Kodiak area, Alaska

by
E.N. Suleimani, R.A. Hansen, R.A. Combellick, G.A. Carver, R.A. Kaufman, J.C. Newman, and A.J. Venturato

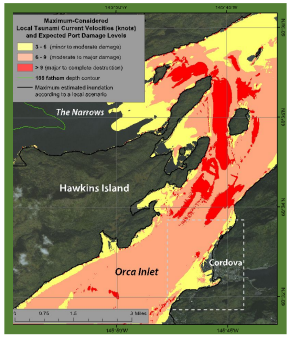
Published by
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
2002

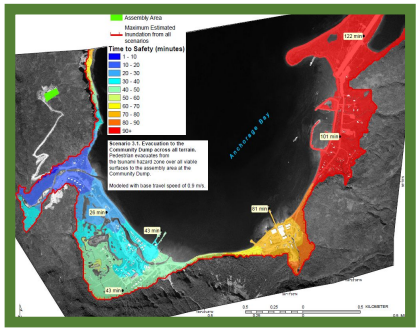
Maritime

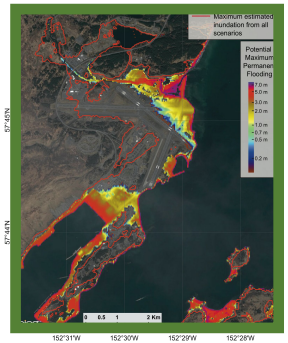
Pedestrian

Subsidence

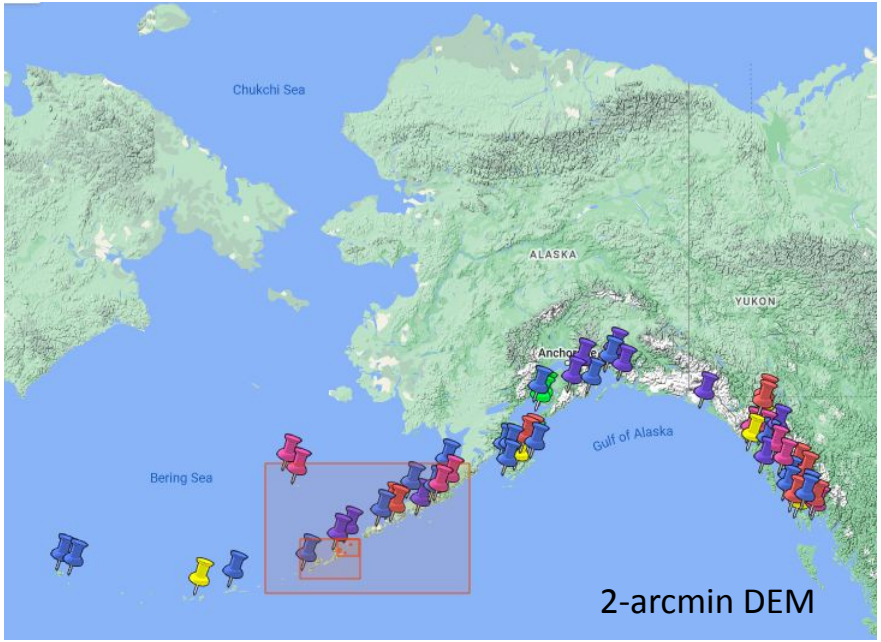
2016

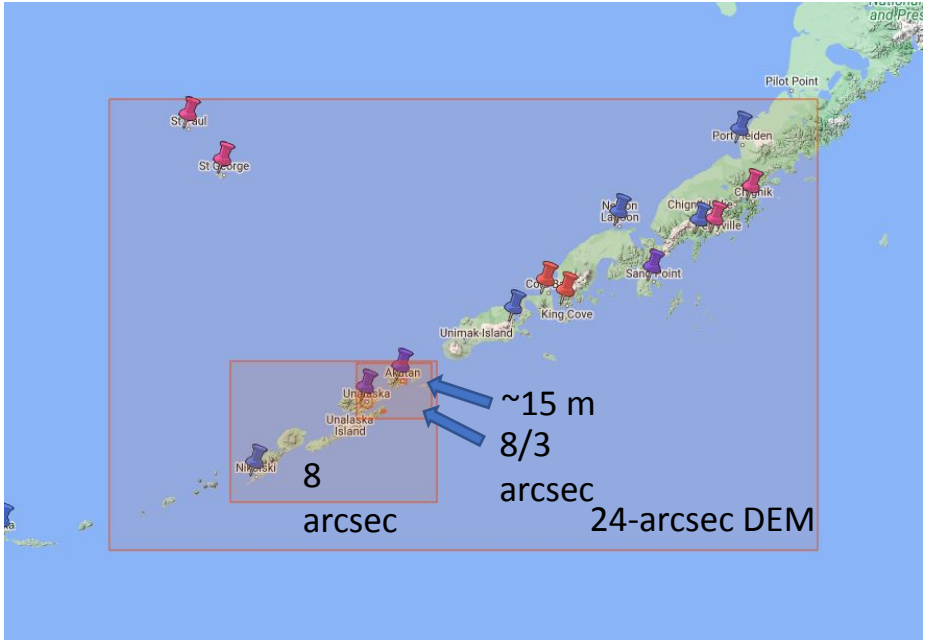






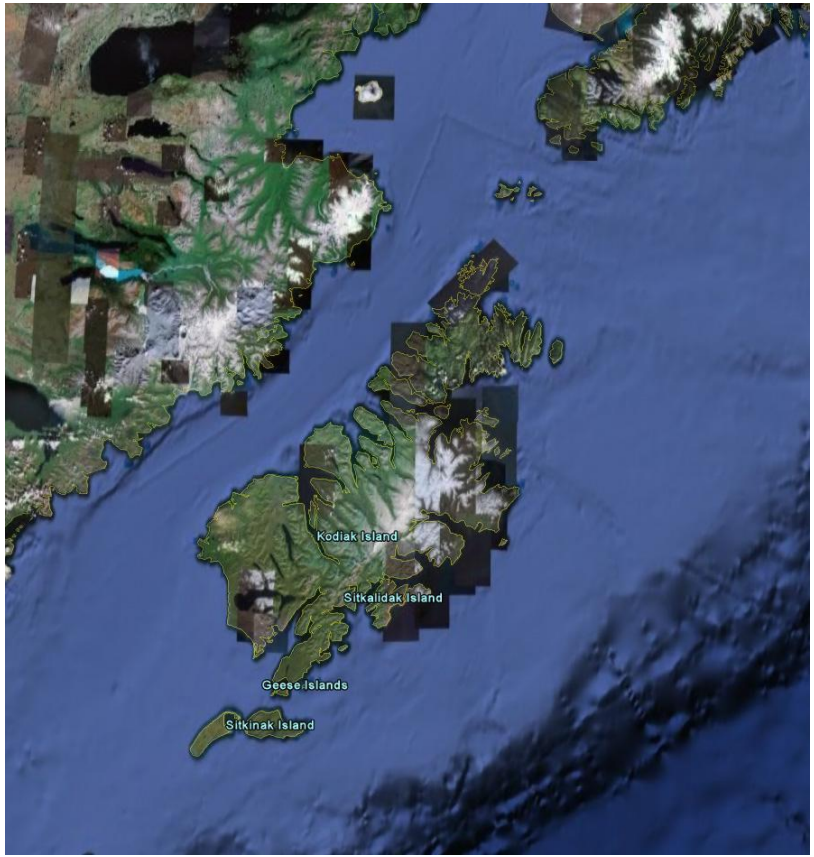
Development of the tsunami inundation map



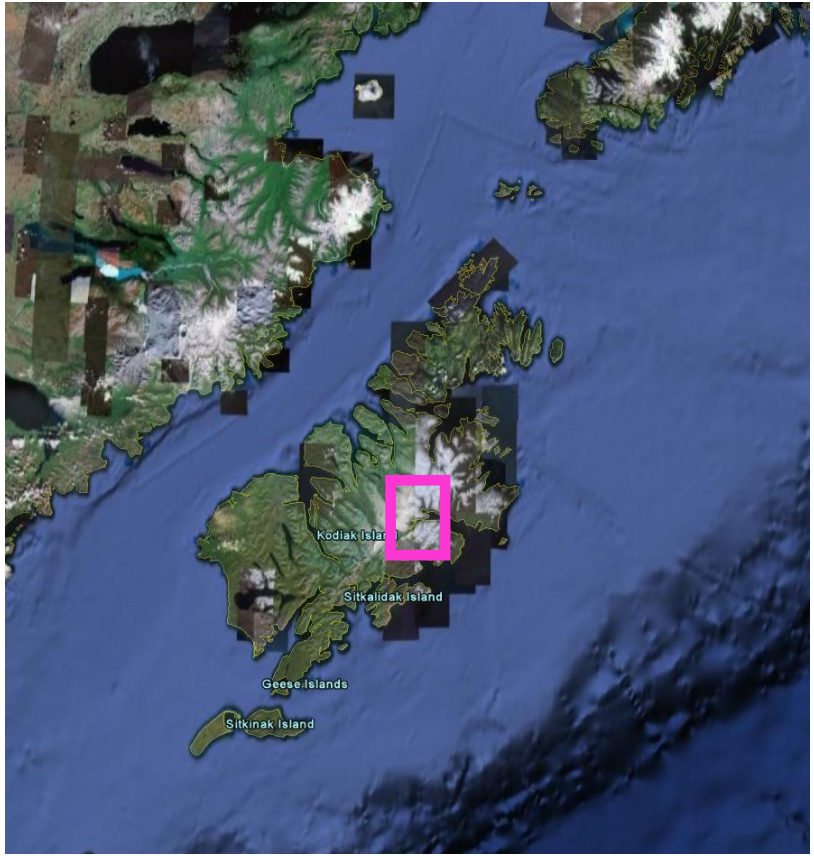


- Digital Elevation Models are compiled by the National Centers for Environmental Information (NCEI)
- Almost all communities have a 15-meter resolution bathymetry-topography seamless DEM developed
- MHHW and WGS84 datums

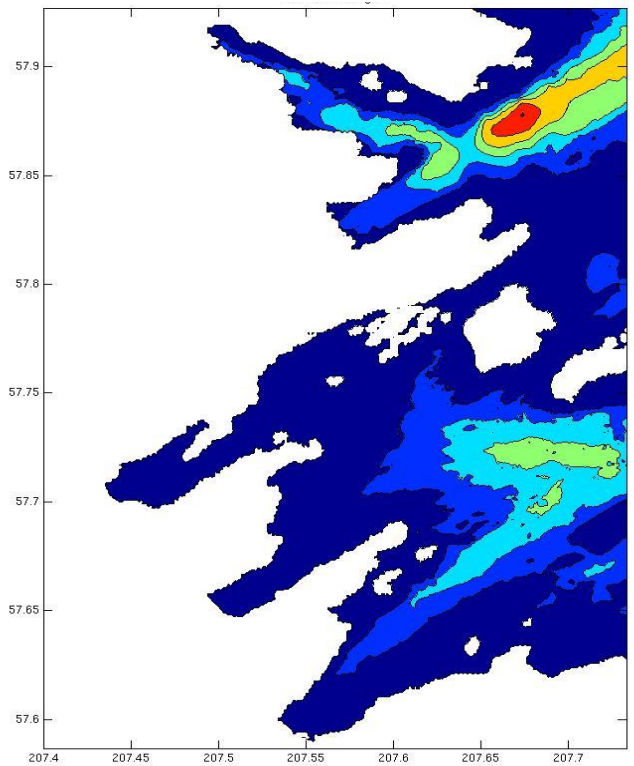
DEM resolution matters: Minimum 90 meters for inundation modeling



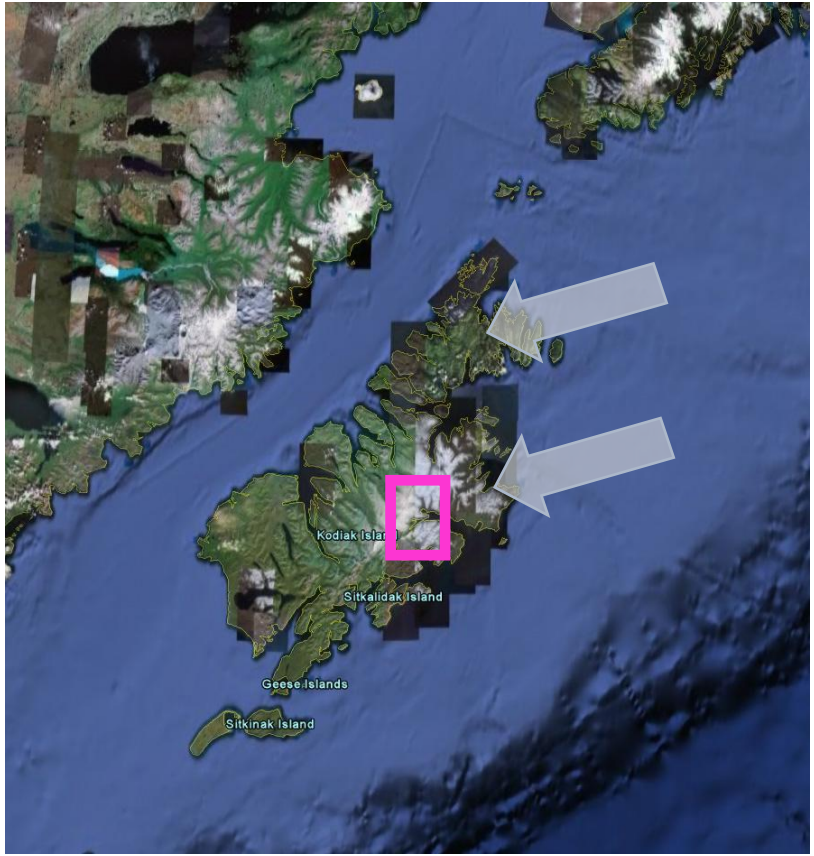
DEM resolution matters: Minimum 90 meters for inundation modeling



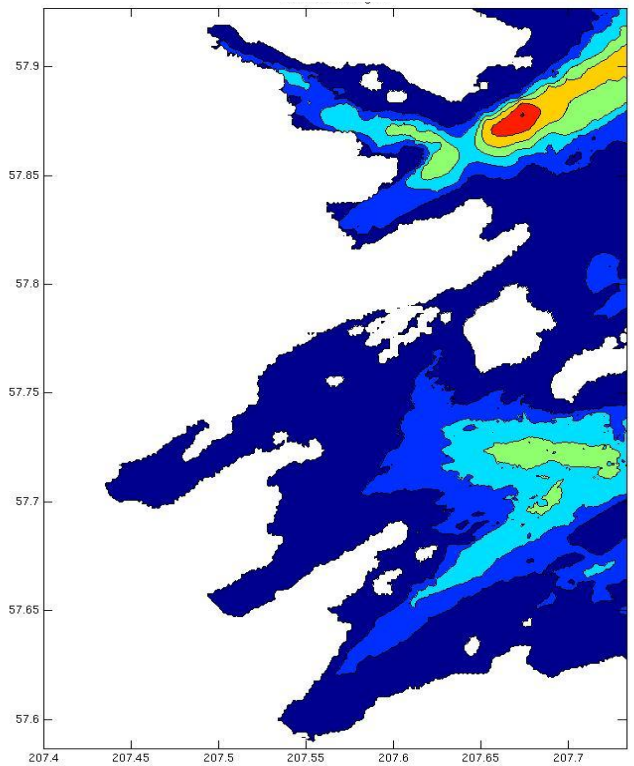
Kodiak grid, 44m x 82m



DEM resolution matters: Minimum 90 meters for inundation modeling

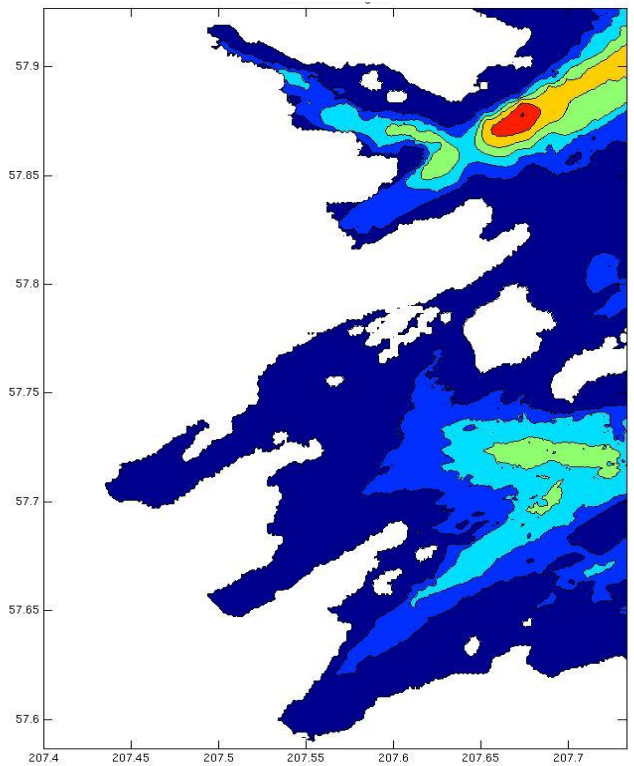


Kodiak grid, 44m x 82m



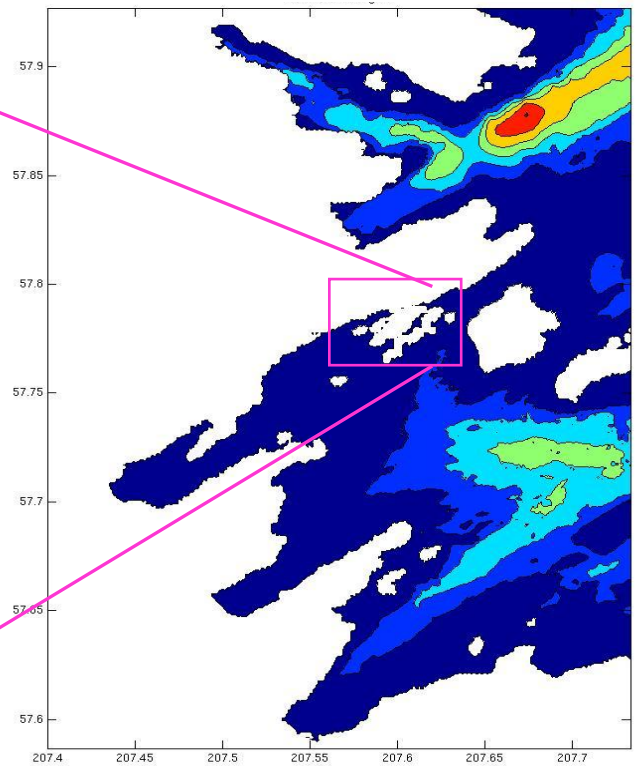
DEM resolution matters: Minimum 90 meters for inundation modeling

Kodiak grid, 44m x 82m



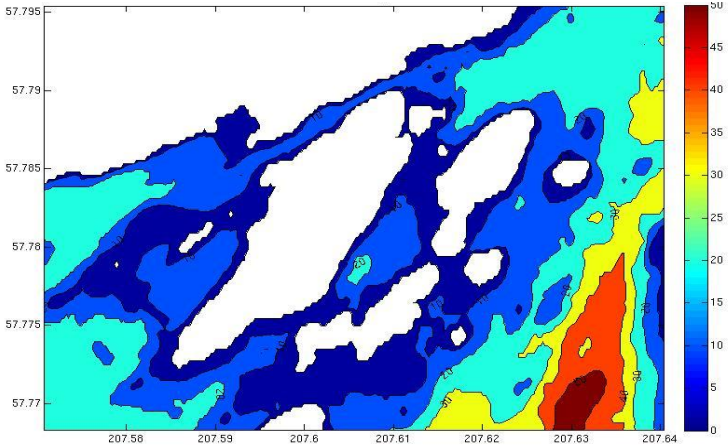
DEM resolution matters: Minimum 90 meters for inundation modeling

Kodiak grid, 44m x 82m

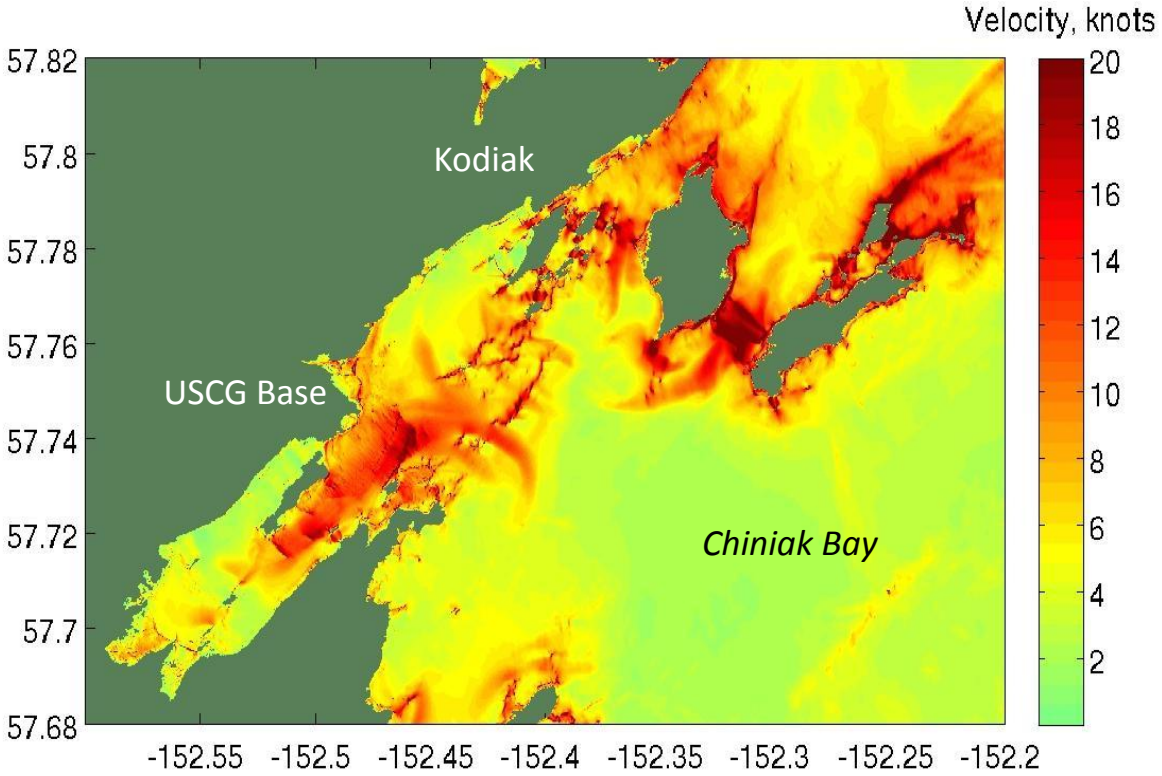


DEM resolution matters: Minimum 90 meters for inundation modeling

Kodiak grid, 22m x 27m



Modeling tsunami currents.
Trying to find areas that are more dangerous than others

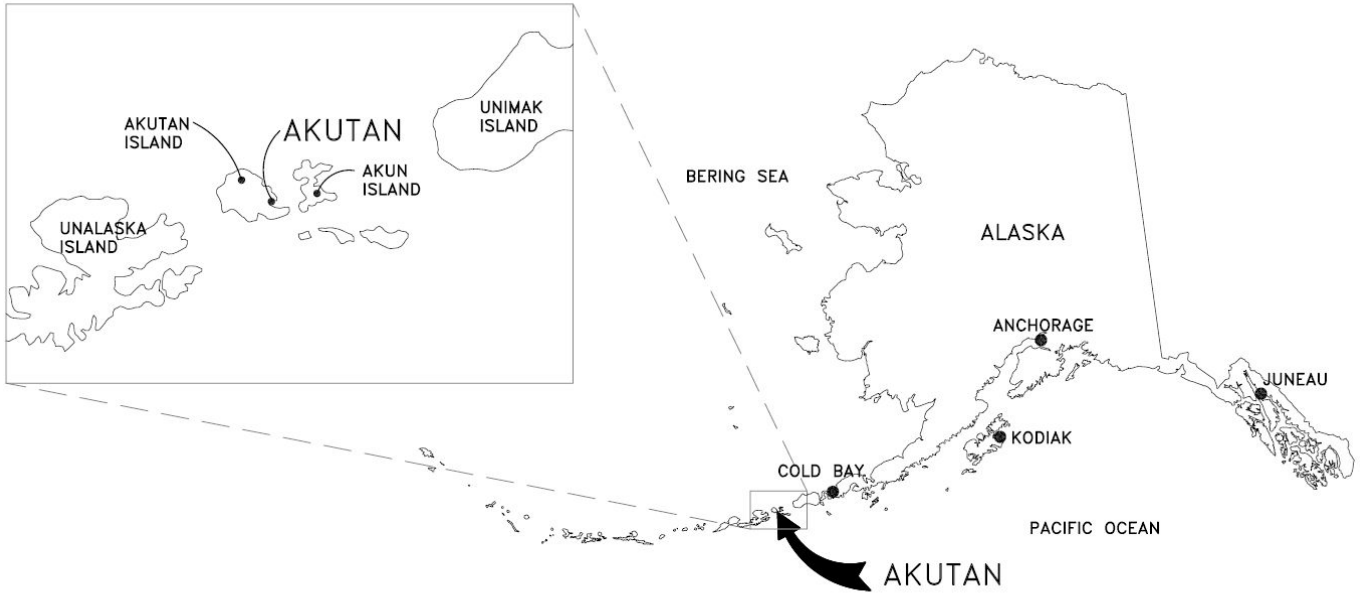


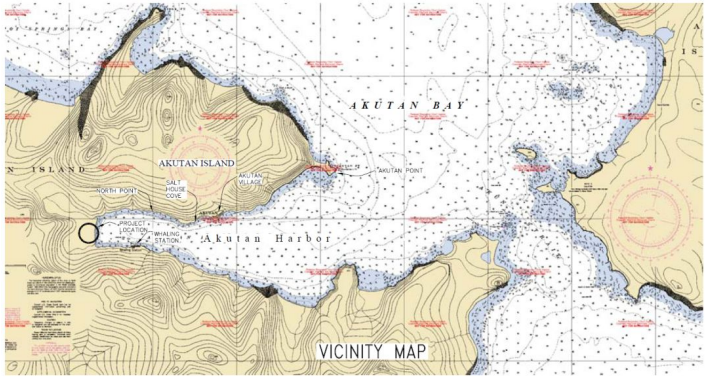
Requirements are more demanding:

The DEM resolution needs to be at least 10 meters

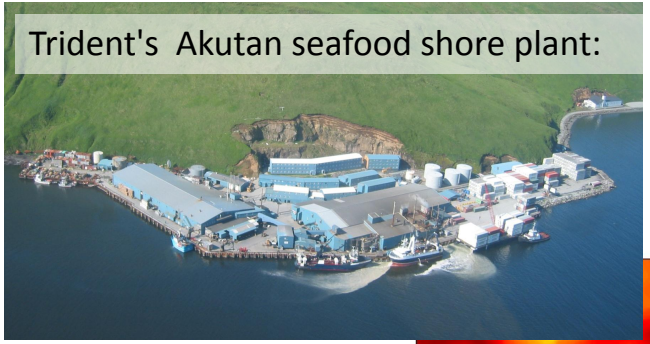
Challenge to model tsunami currents in small boat harbors.

DEM must resolve the harbor entrance, breakwaters => 5-m DEM resolution

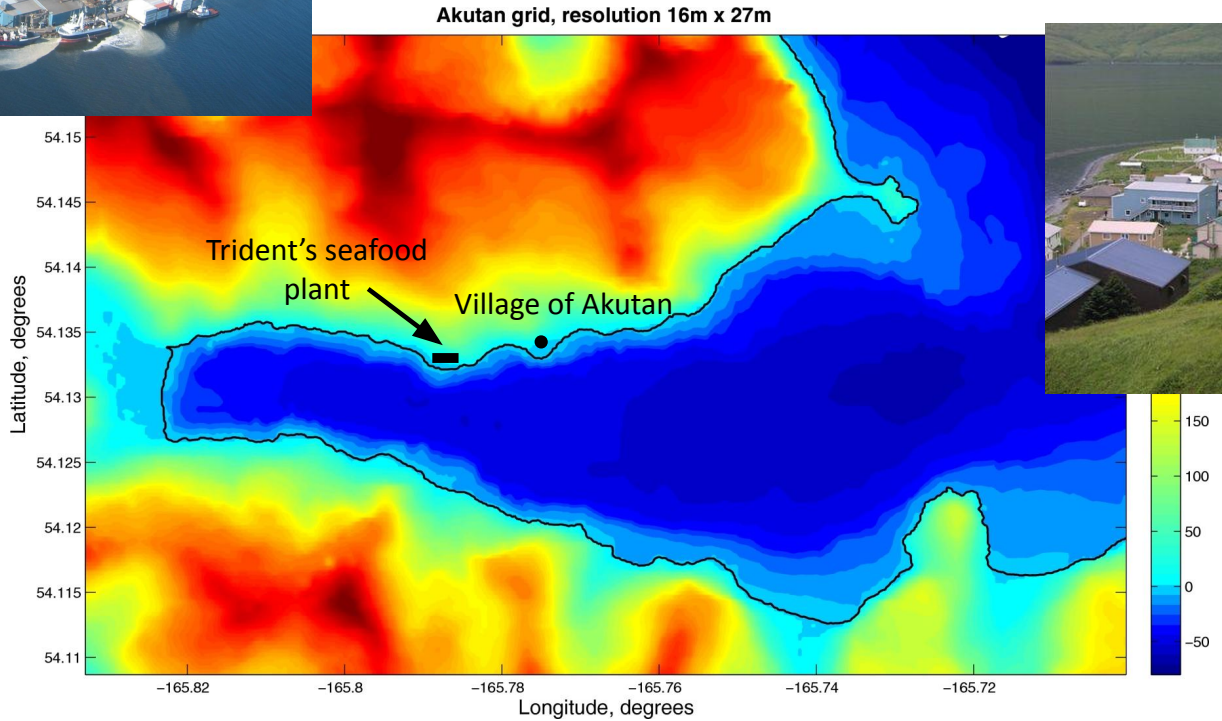

AKUTAN
AKUTAN ISLAND
AKUTAN
AKUN ISLAND
UNIMAK ISLAND
UNALASKA ISLAND
BERING SEA
ALASKA
ANCHORAGE
JUNEAU
KODIAK
COLD BAY
PACIFIC OCEAN
AKUTAN


AKUTAN BAY
AKUTAN ISLAND
AKUTAN POINT
NORTH POINT
SALT HOUSE COVE
AKUTAN VILLAGE
PROJECT LOCATION
WHALING STATION
Akutan Harbor
VICINITY MAP

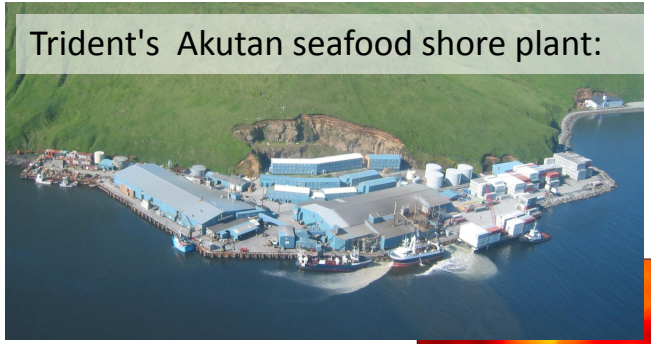
Akutan mapping



Population: 75 local residents
Trident employees: about 800

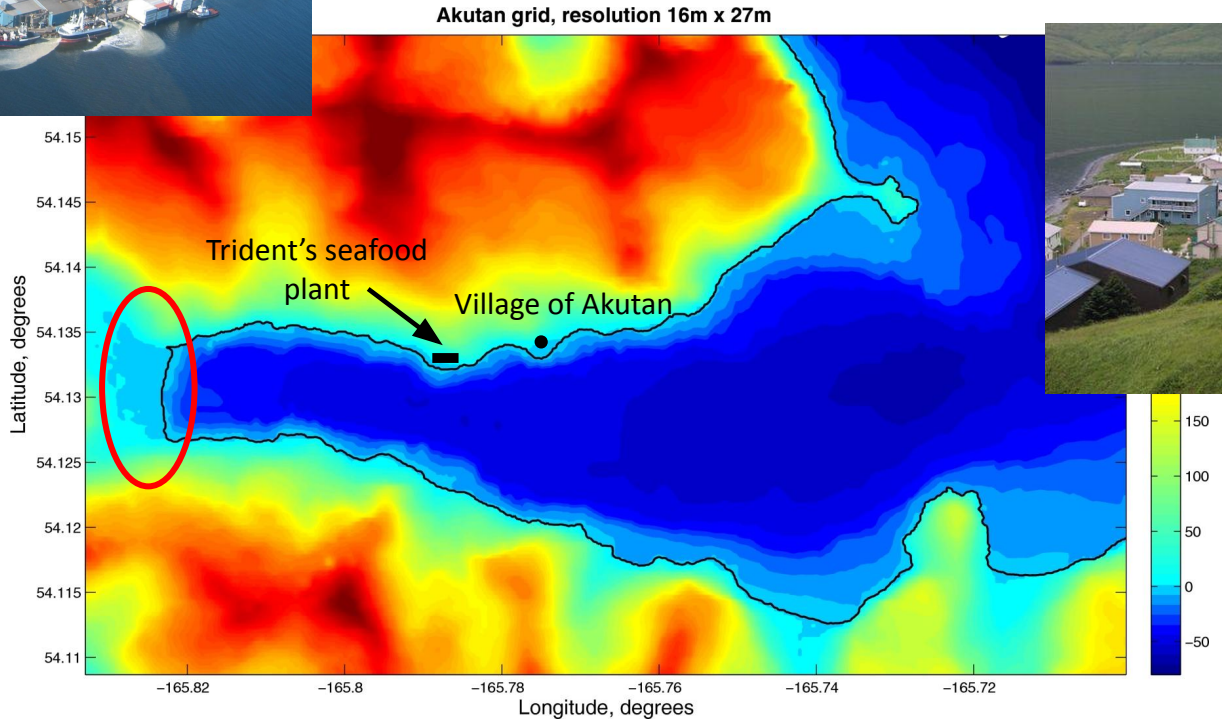


Akutan mapping



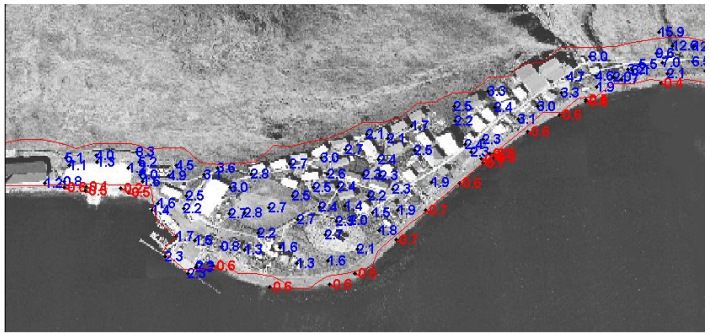
Population: 75 local residents
Trident employees: about 800

New harbor location

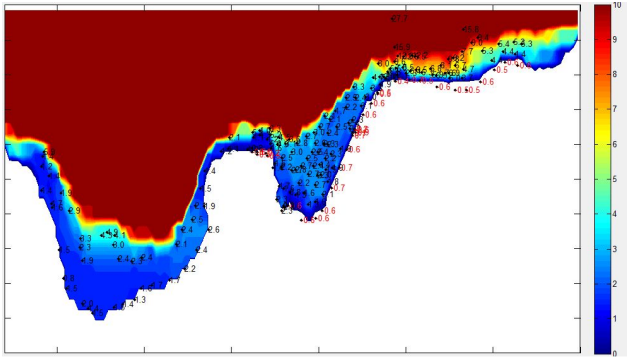


Adjustment of the Akutan DEM

GPS survey near the village of Akutan:



Corrected DEM along the northern shore of Akutan Harbor:



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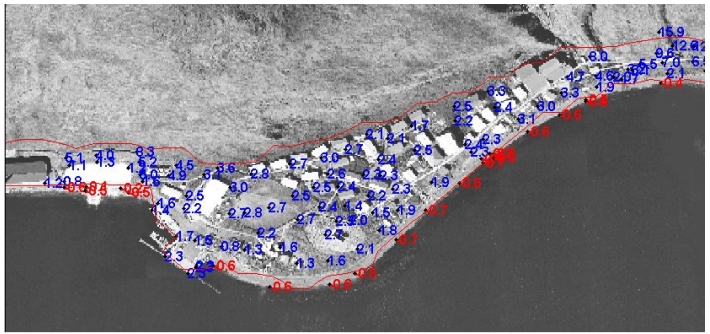
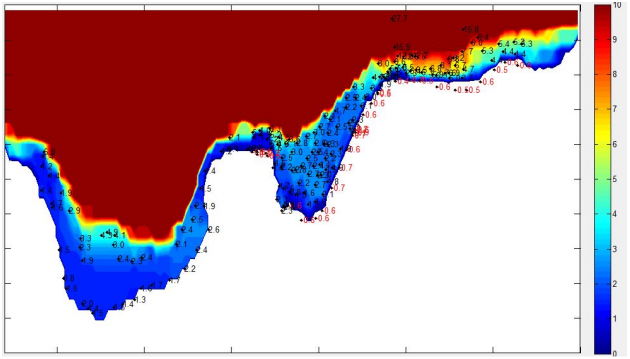
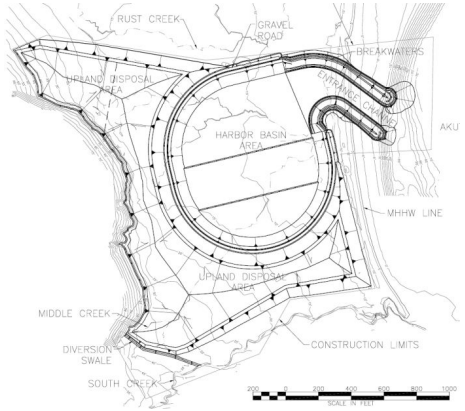


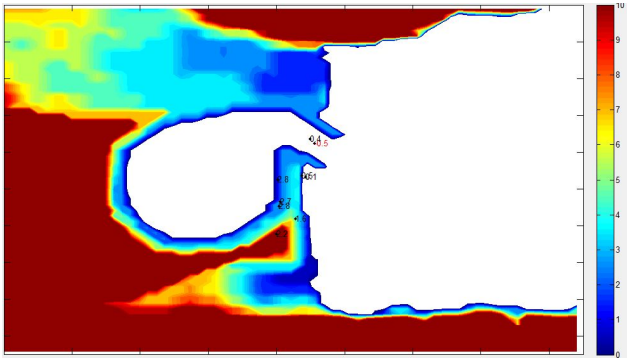
Corrected DEM along the northern shore of Akutan Harbor:



New construction in the western part of Akutan Harbor:



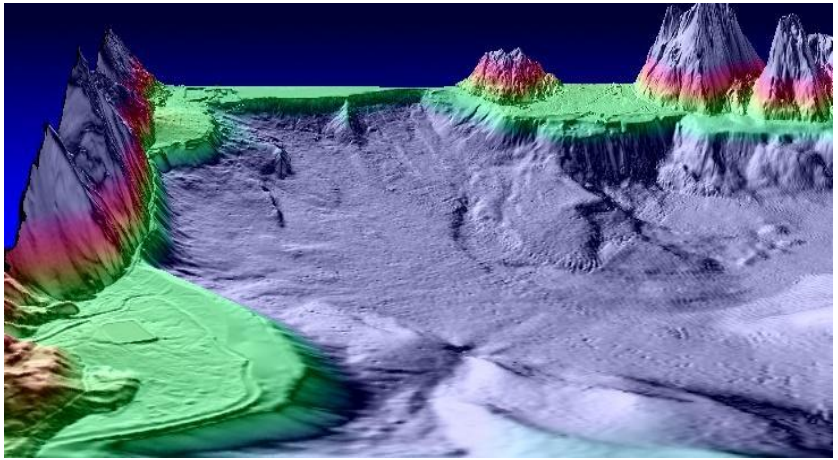
Corrected DEM in the western part of Akutan Harbor:



Findings

- Need better cooperation with people who construct harbors and have water depth soundings to construct DEMs to resolve potential tsunami currents and impacts on the infrastructure

- As we pivot towards considering tsunamis in the Bering Sea, better bathymetry in the coastal areas would be instrumental for accurate modeling of potential inundation



Seward 15-m DEM

Besides being instrumental for modeling tsunamis, the high-resolution DEM can provide information about historical and prehistorical landslides, fault offsets.

The Aleutian trench likely preserves a rich history of landslides, but their locations and unknown.

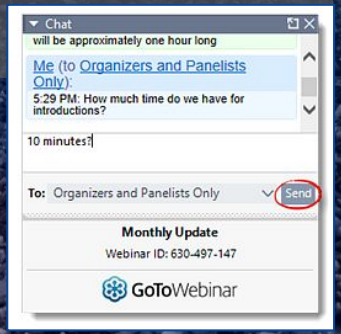
- High-resolution DEMs can help to characterize tsunami sources. Cooperation can help with high-resolution, multibeam mapping

End of Presentation

Thank you!

Questions for Presenters?

- Send your questions to “Organizers and Panelists Only” in the **GoTo Webinar chat box**.
- If you would like to speak, use “Send Question to Staff” option.



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BREAK TIME

Back at 1:55pm AKST

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November 17th, 2022