Welcome to the First Annual Ocean Day!

2021 Alaska Coastal & Ocean Mapping Summit

December 2, 2021 | Virtual

Logistics

If you are having trouble with your connection, please email amber.butler@noaa.gov

Privacy: Portions of this seminar are being recorded. You may leave the summit if you do not give your permission to be recorded.

Time: We aim to stay to the agenda as much as possible to allow listeners to join in at specific times for sessions of interest, and to be respectful of our speakers' time.

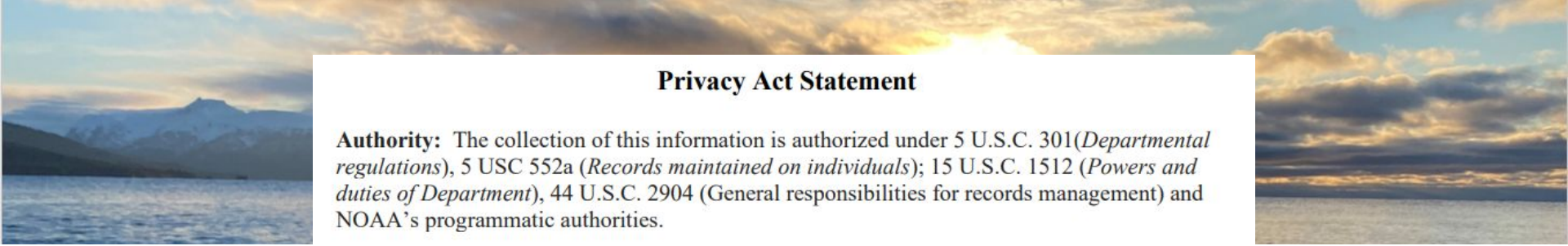
You can find the full agenda in the attached documents in your GoToWebinar menu pane to the right.

Interaction: We encourage you to share input and feedback using the webinar and email:

Use the "Question Box" function for comments or questions. It can be found in the menu bar to the right. Press the small triangle next to "Questions" and it will expand your questions submission box.

You can also use the "raise hand" function during discussion periods and a moderator will unmute you when you are called on. The button looks like a small hand in the menu bar to the right. We will only be opening up questions after each talk, but please feel free to submit them during the presentations and the moderator and speakers will address them during discussion times.

Follow up: Written comments are always welcome, now and later, iwgocm.staff@noaa.gov



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Keynote Address: Take 2

Senator Lisa Murkowski

Agenda

9:00-9:30	Welcome and Keynote addresses on Ocean Mapping
9:30-10:35	Why is Ocean Mapping Important?
10:45-12:00	How Could We Fill the Data Gaps?
12:30-1:45	What Are We Doing?
1:55-2:55	Breakout Session in Google Meet 30 min brainstorm on ways to improve collaboration + 15 min recap
2:55-3:00	Closing Remarks

NOMEC Strategy

Ashley Chappell

December 2, 2021 | Virtual

National Strategy for Ocean Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone

Ashley Chappell
NOAA Integrated Ocean and Coastal Mapping

Setting the Stage: National Mapping Plans

National Ocean Mapping, Exploring, and Characterization of the U.S. EEZ (NOMEC)

Alaska Coastal Mapping Strategy (ACMS)

https://iocm.noaa.gov/about/strategic-plans.html

Goals of the NOMEC Strategy

GOALS

1. Coordinate Interagency Efforts and Resources to Map, Explore, and Characterize the United States EEZ
2. Map the United States EEZ
3. Explore and Characterize Priority Areas of the United States EEZ
4. Develop and Mature New and Emerging Science and Technologies to Map, Explore, and Characterize the United States EEZ
5. Build Public and Private Partnerships to Map, Explore, and Characterize the United States EEZ

IP released in January 2021

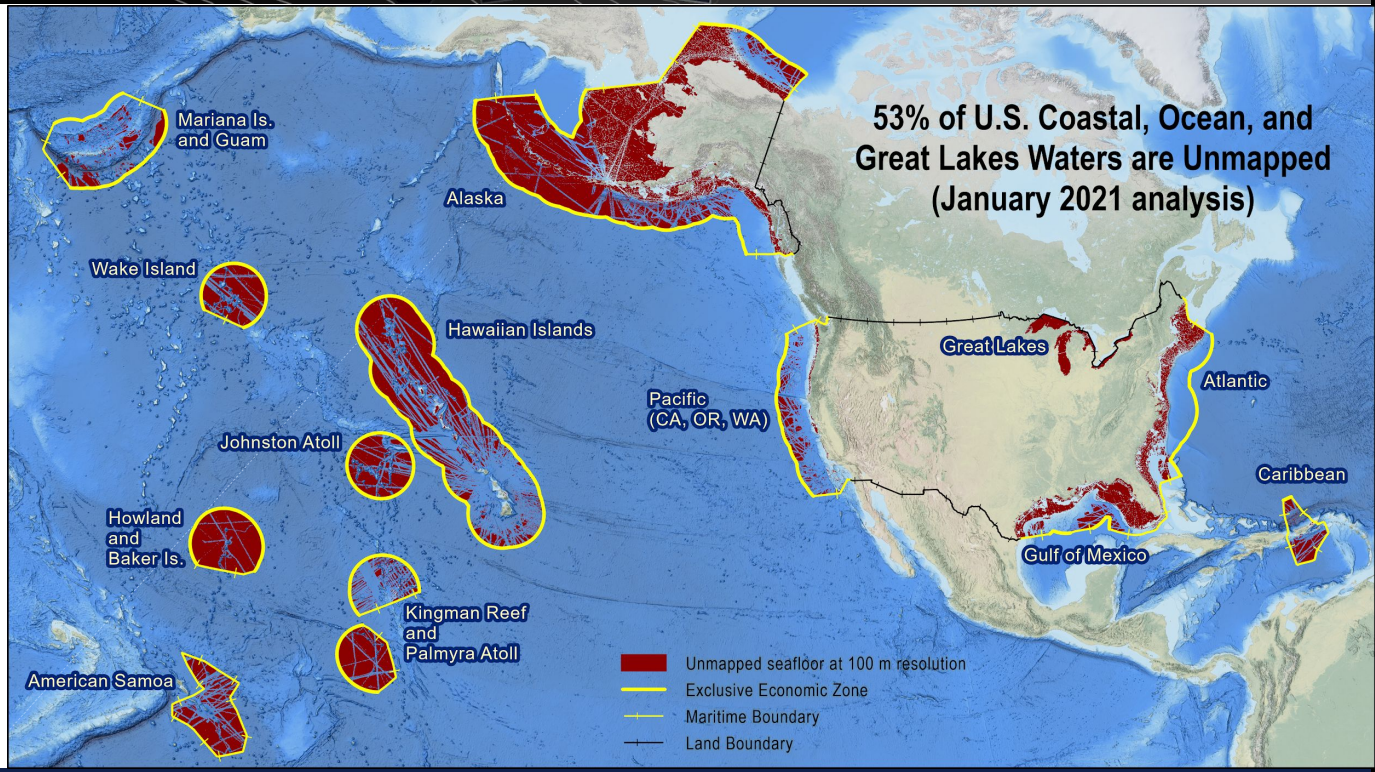
Progress Report on Unmapped U.S. Waters

1st annual report covering progress up to December 2019, released March 2020

2nd annual report covering progress up to December 2020, released March 2021

3rd annual report coming soon!

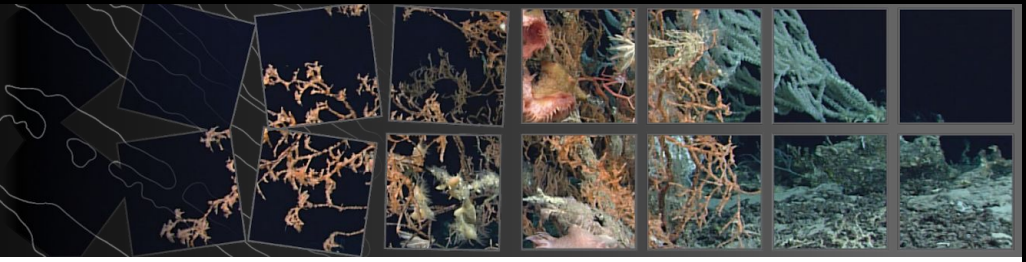
Reports located at https://iocm.noaa.gov/seabed-2030-status.html



Interagency Effort

Plans available at https://iocm.noaa.gov/about/strategic-plans.html

NOMEC Goal 2



Map the U.S. EEZ

- 2.1 Establish a Standard Ocean Mapping Protocol
- 2.2 Coordinate & Execute Campaigns to Map the U.S. EEZ
- 2.3 Make Data Usable and Available

SOMP

This protocol will (at minimum) include specification for the following (7) primary features

- Bathymetry data
- Seabed backscatter
- Water column data
- Sub-bottom profiling
- Side scan sonar
- Magnetometer data
- Data management

NOMEC Goal 2

Map the U.S. EEZ

- 2.1 Establish a Standard Ocean Mapping Protocol
- 2.2 Coordinate & Execute Campaigns to Map the U.S. EEZ
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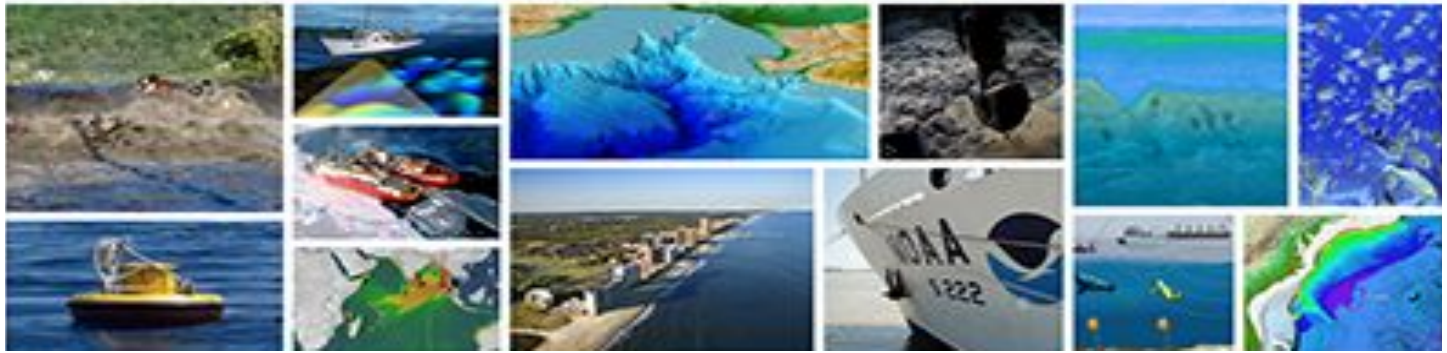
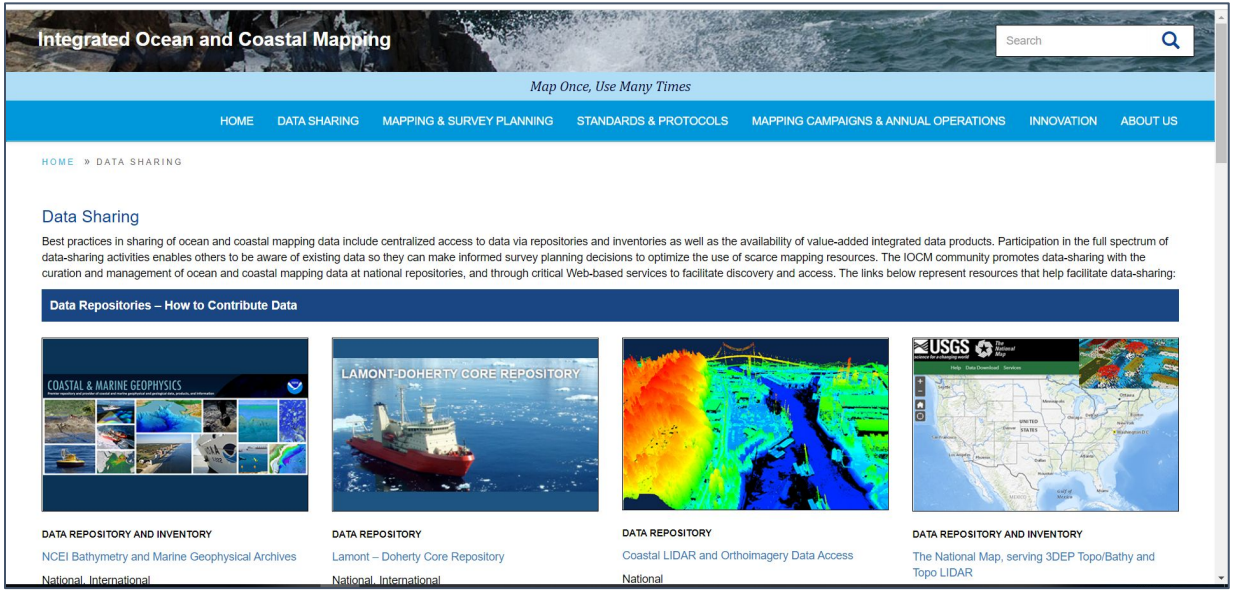


Data, Data, Data

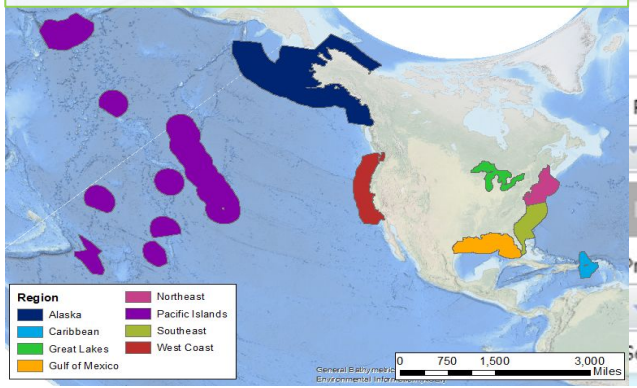
- Existing OCM data has great value, if accessible
- Inventories of existing data
- Outreach to stakeholders to share any data they still have lurking
- External stakeholders may have data collected for one purpose that can now benefit more

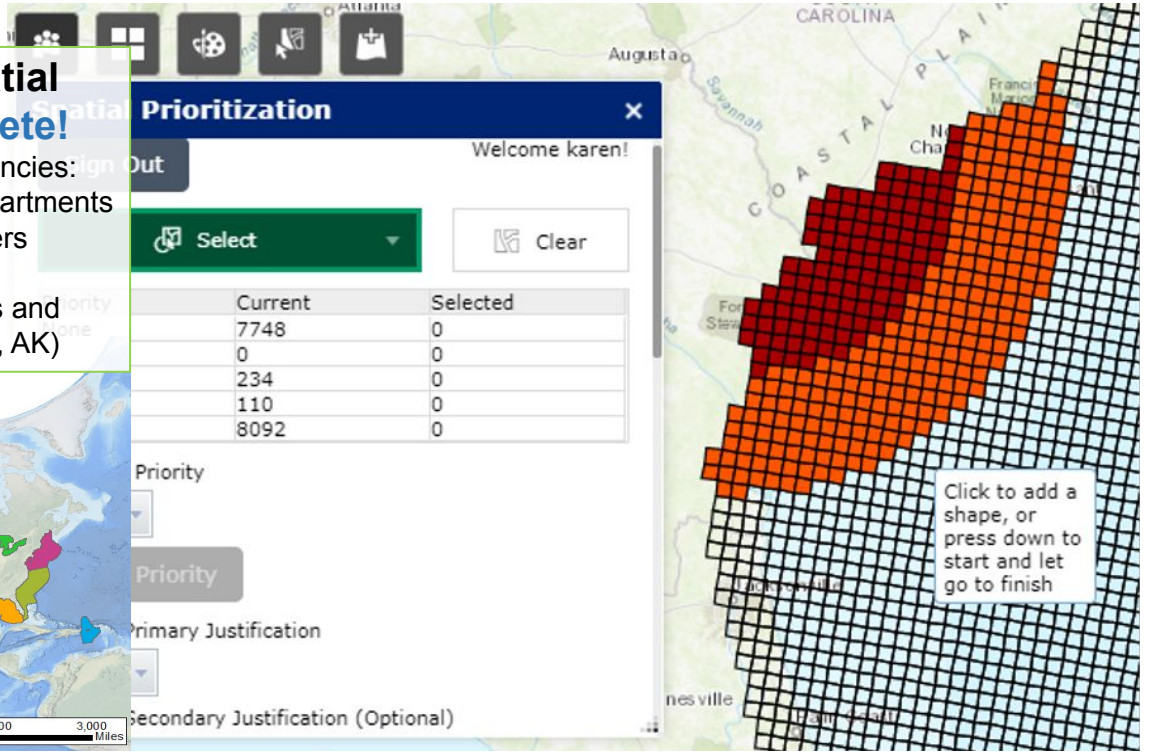


Mapping Priority Areas

IWG-OCM Federal Spatial Priorities Study Complete!

- Participation from multiple agencies: **BOEM**, **USGS**, **NPS**, **USCG**, departments of **EPA** and **DOE**, and others
  - Analysis to begin shortly
- Now branching out to regions and external stakeholders (Mid-A, AK)



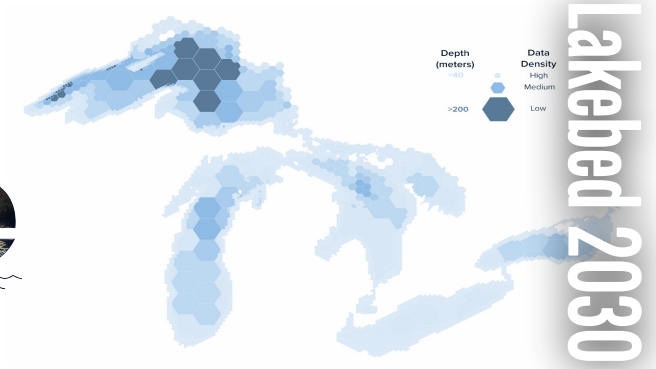


Regional Campaigns

FLORIDA COASTAL MAPPING PROGRAM

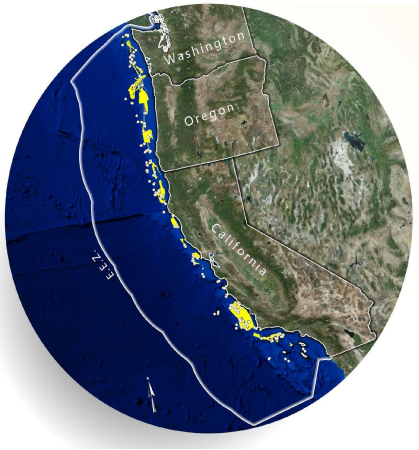
ASPIRE EXPEDITIONS

Seascape Alaska



Lakebed 2030

EXPRESS



End of Presentation

Thank you!

Introduction to Seascape Alaska

Meredith Westington

December 2, 2021 | Virtual

Seascape Alaska

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

Introduction to Seascape Alaska

A Regional Mapping Campaign in Support of the National Strategy for Ocean Mapping, Exploring, and Characterizing the U.S. EEZ

Meredith Westington
NOAA Integrated Ocean and Coastal Mapping

Alignment with NOMEC Strategy

Why? *"Mapping, exploring, and characterizing the ocean and coastal shoreline advances scientific understanding, safeguards the Nation's economic prosperity, and promotes the health and security of our people. This knowledge is essential to advancing America's understanding of the marine environment and addressing sustainable ocean resource management."*

NOMEC Mission

Completely map the seafloor within the outer boundary of the United States EEZ (deep waters (>40 meters) by 2030, coastal (< 40 meters) by 2040); explore and characterize priority areas; and leverage the expertise and resources of multi-sector partnerships

NOMEC Strategic Goals

1. Align priorities in efforts to map, explore and characterize the U.S. EEZ
2. Coordinate mapping efforts to completely map U.S. waters > 40m by 2030 and waters 0-40m deep by 2040
3. Identify priority areas and coordinate interagency and cross-sectoral efforts to explore and characterize the U.S. EEZ
4. Coordinate efforts to promote and advance new technologies
5. Support cross-sectoral partnerships to ensure MEC goals are completed

Seascape Alaska Portfolio

Campaign Values

Accessible, high quality data and products

Data and products follow best practices

Members work together to achieve more

Innovation is encouraged

Plans and progress are shared broadly

Seascape Alaska

Who else?

Current Membership

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Alaska Department of Fish and Game

United States Coast Guard 1790

US Army Corps of Engineers®

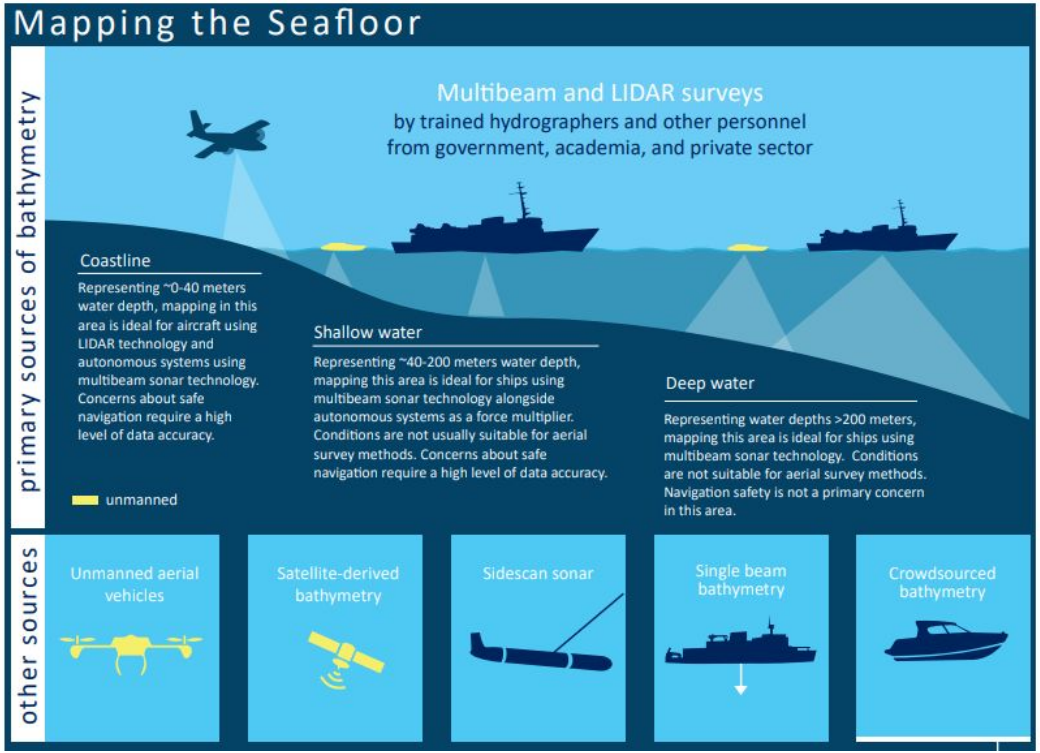
The Seal of the State of Alaska

BOEM
Bureau of Ocean Energy Management

USGS
science for a changing world

National Park Service

Mapping Data



Seascape Alaska In-scope Mapping Operations

- U.S. EEZ off of Alaska
- All projects that include mapping
- Any operations that could yield transit data

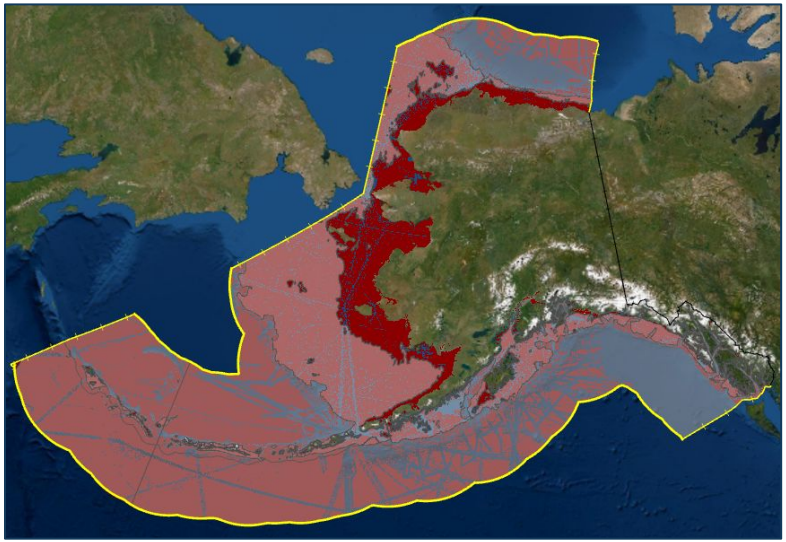
Standard Ocean Mapping Protocol

SOMP

In Work by IWG-OCM

- A guide for data acquisition and processing to encourage widest possible access and usage
- Specs cover bathymetry, backscatter, water column, sub-bottom profiles, magnetometer, side scan sonar + data management to get data into public archives

Unmapped U.S. Waters: Alaska Region



Actual rate of progress:
~1% per year

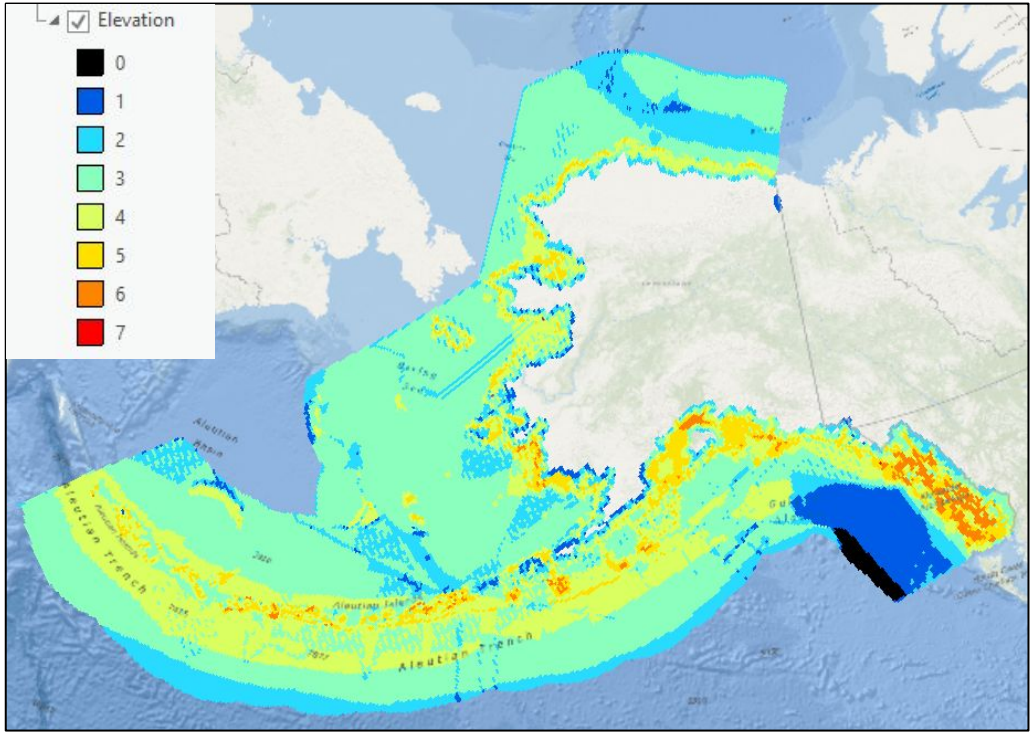
Needed rate of progress:
~7% per year

Alaska portion of Goal 2 performance indicator: Acquire approximately **70,000** square nautical miles (snm) of new bathymetric data coverage annually

	All of Alaska (sq nautical miles)	
YEAR	Goal	Actual: UnMapped
2017		796,800
2018		790,100
2019		778,538
2020		772,360
2021	695,124	
2022	617,888	
2023	540,652	
2024	463,416	
2025	386,180	
2026	308,944	
2027	231,708	
2028	154,472	
2029	77,236	
2030	0	

Alaska Spatial Priorities Study

NOAA Results: # of offices requesting elevation data



Results will be posted on the U.S. Mapping Coordination website- http://fedmap.seasketch.org/

Supports:

- Identifying partners
- Better coordination to reduce duplication of effort
- Sharing of funds/assets

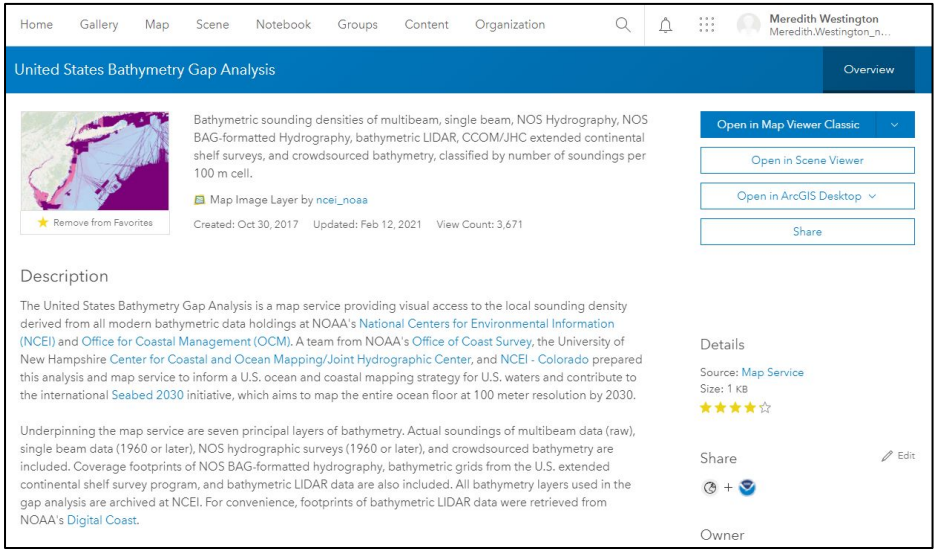
Open call for non-federal, AK participation!

Register at https://arcg.is/19XW49

Target completion date: Dec 10

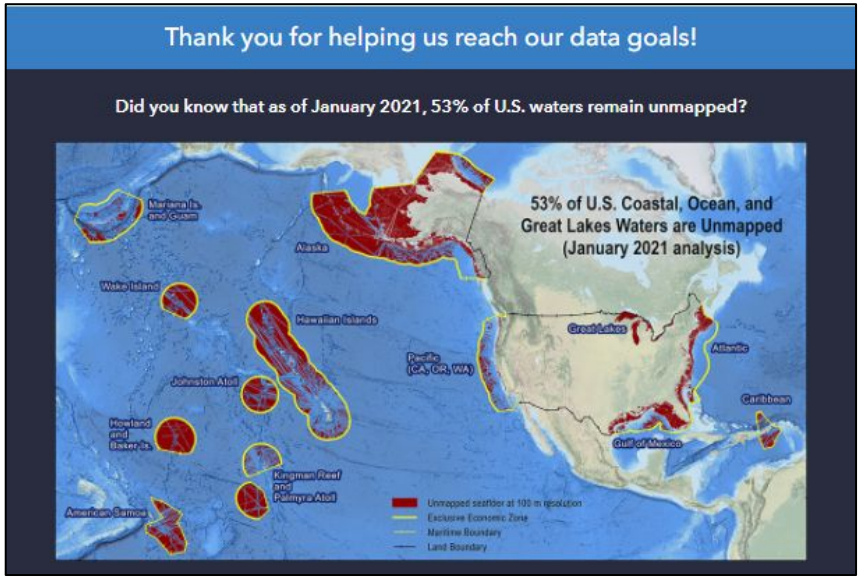
Got Bathymetry Data?

Step #1: Review Bathy Gap Analysis



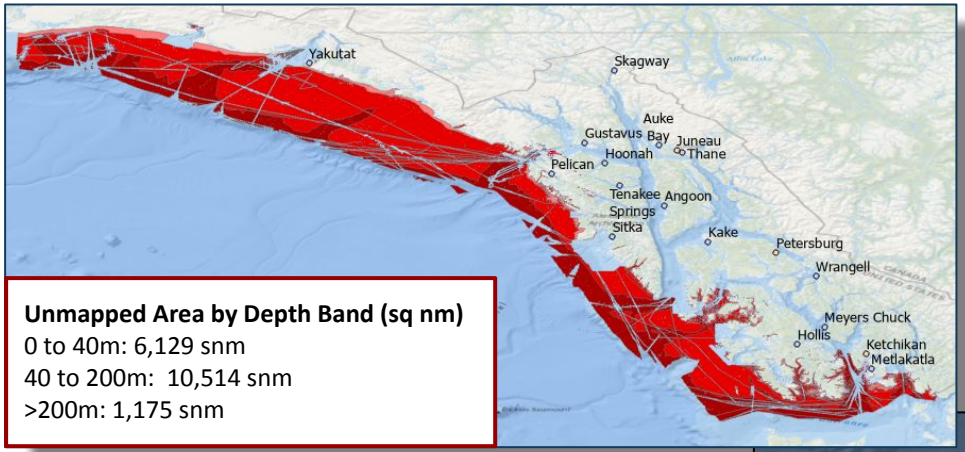
https://noaa.maps.arcgis.com/home/item.html?id=4d7d925fc96d47d9ace970dd5040df0a

Step #2: Let us know if you have data



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

Planning Teams



Unmapped Area by Depth Band (sq nm)
0 to 40m: 6,129 snm
40 to 200m: 10,514 snm
>200m: 1,175 snm

SE Alaska

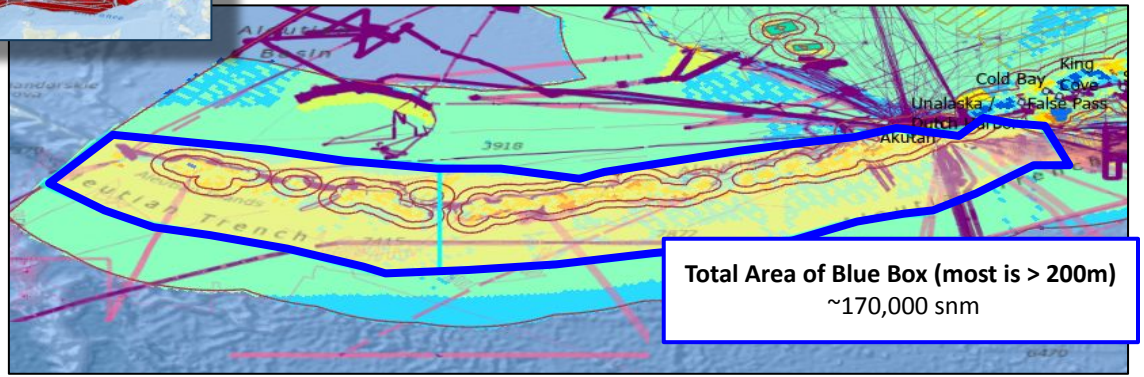
Goal

Develop a mapping plan of action that has us filling gaps in 1-2 years

Aleutians

Goal

Develop a mapping plan of action that has us filling gaps in 2-3 years



Total Area of Blue Box (most is > 200m)
~170,000 snm

Thank you!

New Factsheet at
https://iocm.noaa.gov/documents/Seascape%20Alaska%20Factsheet_September%202021.pdf

Questions or would you like to join and participate?

For more information on **Seascape Alaska**, contact
Meredith.Westington@noaa.gov

For more information on **AK Spatial Priorities Study**, contact
Karen.Gouws@noaa.gov

End of Presentation

Thank you!

Poll Question

How did you hear about the Alaska Coastal and Ocean Mapping Summit?

Poll Question

What stakeholder group(s) do you best represent?

Alaska Coastal and Ocean Mapping Summit
December 2, 2021

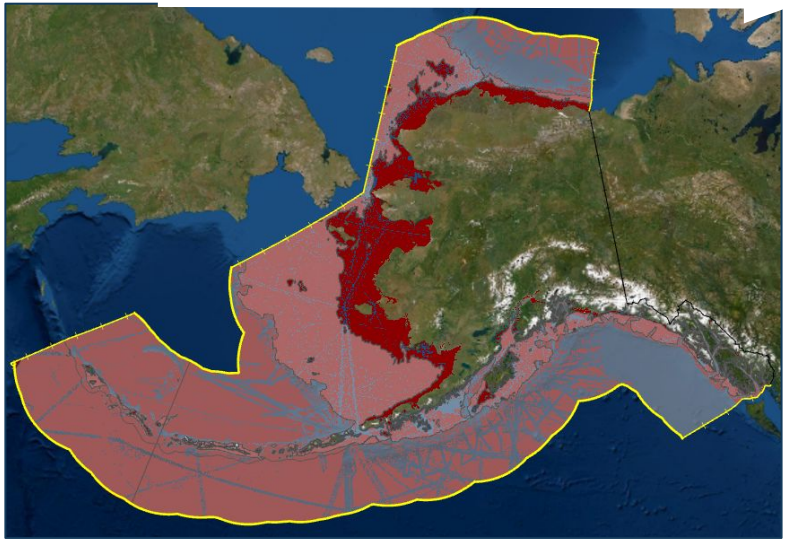
Seascape Alaska

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

Introducing Panel 1: Why is mapping important?

- ★ Community Perspective - Veronica Padula, Aleut Community of St. Paul
- ★ Navigator's Perspective: Prioritizing Mapping Surveys Where Vessels Operate - Ed Page, Alaska Marine Exchange (*retired*)
- ★ Hydrographic Health and Charting - Christy Fandel, NOAA Office of Coast Survey
- ★ Ocean Mapping: Importance to Fisheries Science - Bob McConnaughey, NOAA Alaska Fisheries Science Center
- ★ Brief overview of potential critical mineral resources near Alaska - Paul Knorr, BOEM
- ★ Examples of using multibeam bathymetry to study earthquake, landslide, and tsunami hazards in Alaska - Peter Haeussler, USGS
- ★ Submarine Volcanism and Methane Seepage - Jeff Beeson, NOAA Pacific Marine Environmental Lab
- ★ Topobathymetric Requirements for Marine Energy - Jeremy Kasper, Alaska Center for Energy & Power
- ★ 20 minute panel Q&A

Why do we need to map?



72% unmapped, as of January 2021

Aleut Community of St. Paul Perspective

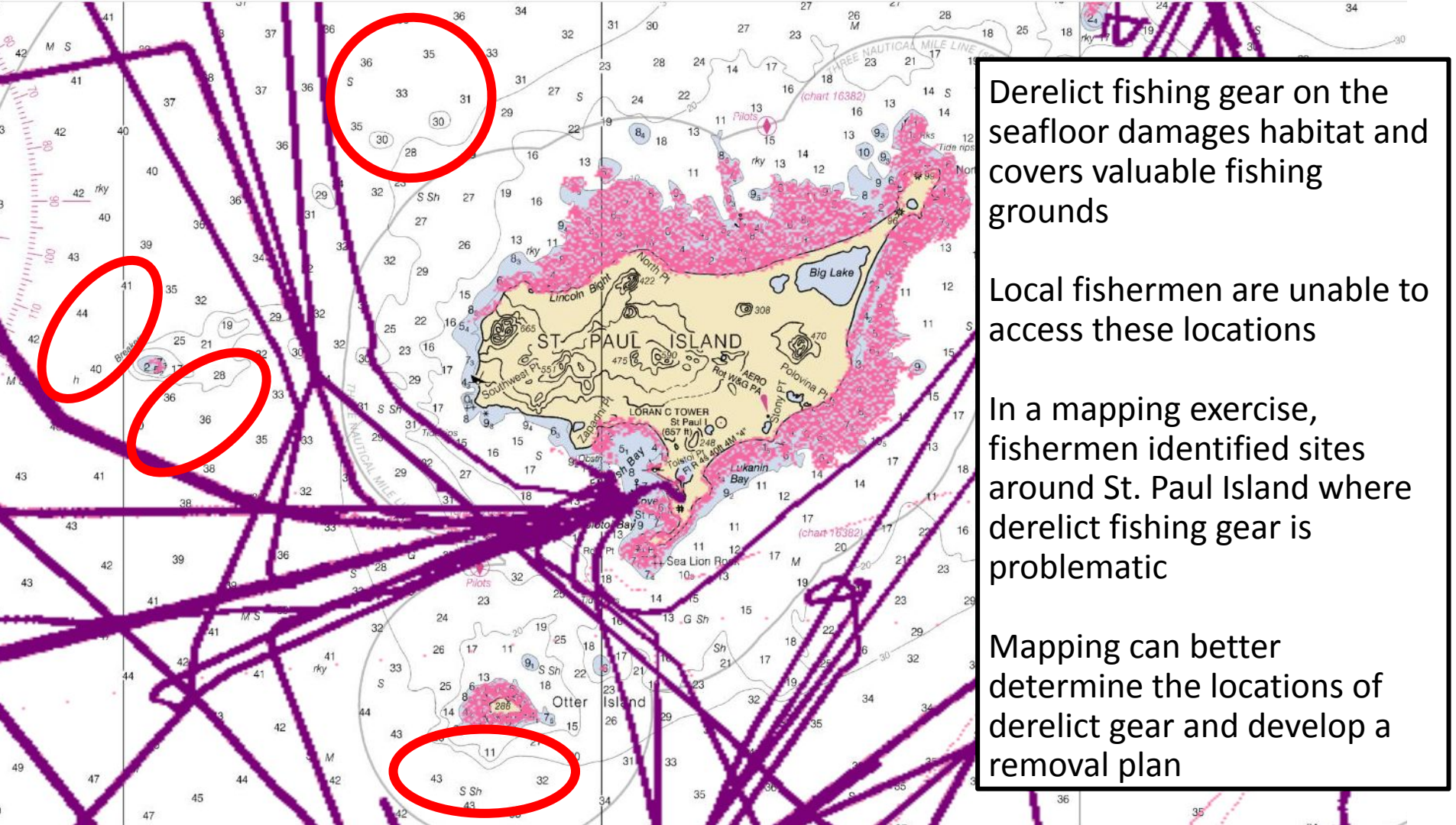
Veronica Padula

December 2, 2021 | Virtual

ALEUT COMMUNITY OF ST. PAUL

TRIBAL GOVERNMENT

Veronica Padula
Assistant Director
Ecosystem Conservation Office
Email: vmpadula@aleut.com



Derelict fishing gear on the seafloor damages habitat and covers valuable fishing grounds

Local fishermen are unable to access these locations

In a mapping exercise, fishermen identified sites around St. Paul Island where derelict fishing gear is problematic

Mapping can better determine the locations of derelict gear and develop a removal plan

End of Presentation

Thank you!

Navigator’s Perspective: Prioritizing Mapping Surveys Where Vessels Operate

Ed Page

December 2, 2021 | Virtual

2021 Alaska Coastal & Ocean Mapping Summit

Navigator's Perspective

Prioritizing Mapping Surveys Where Vessels Operate

Captain Ed Page, USCG (Retired)
Marine Exchange of Alaska

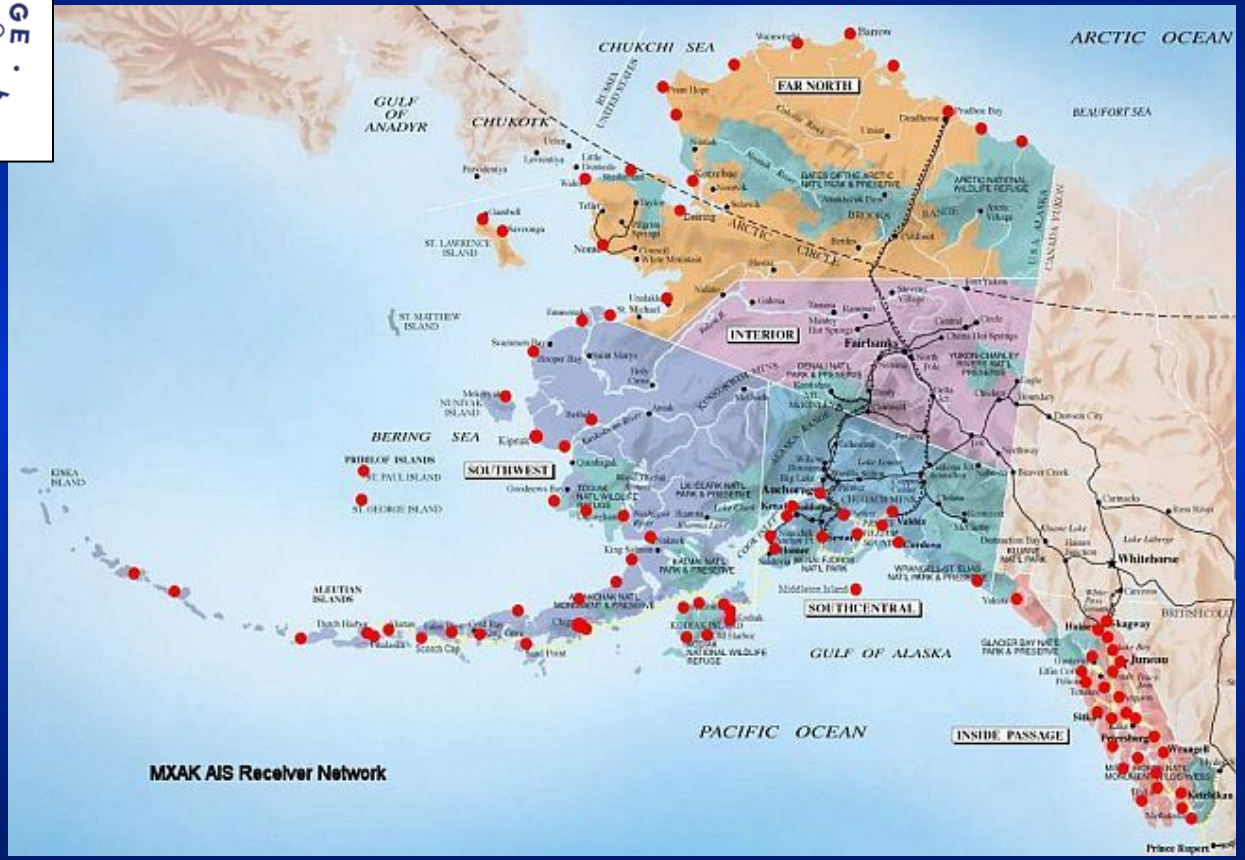
Dynamic Maritime Activity

Changing Mapping Needs

Provide Accurate Mapping to:

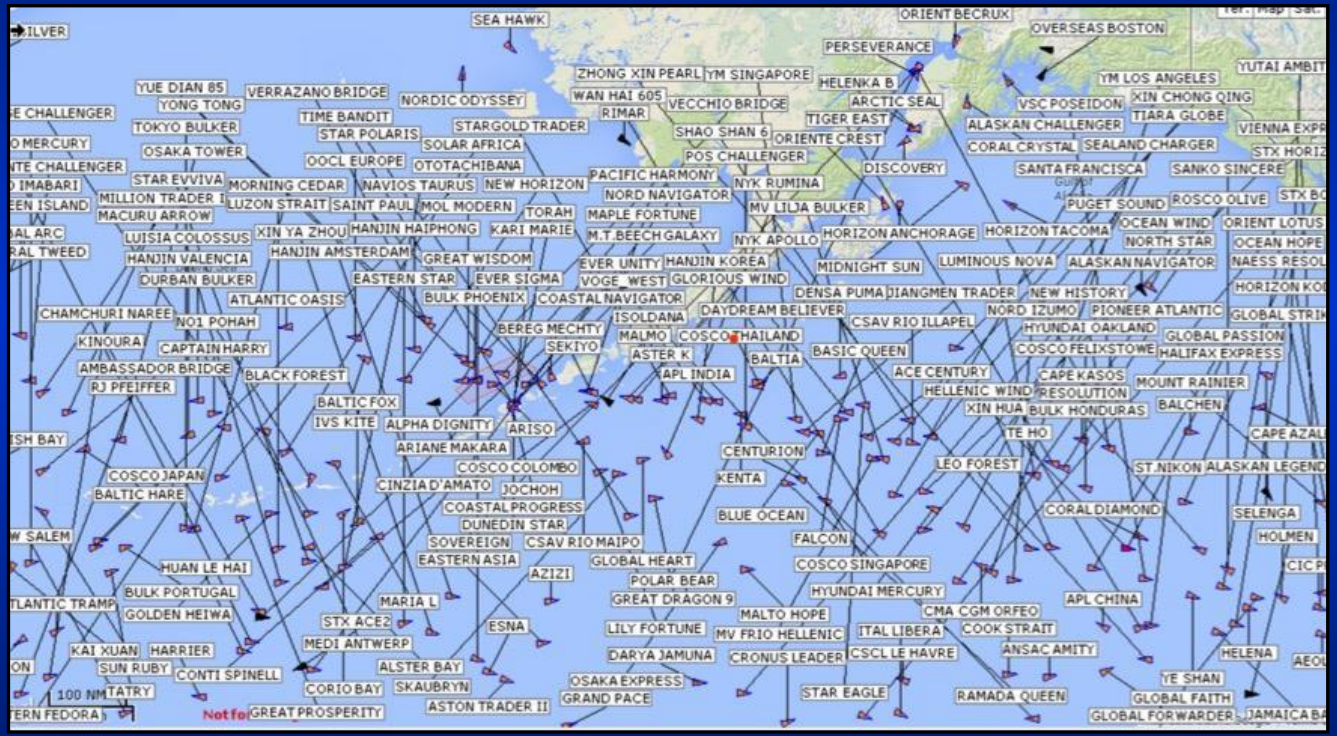
- Support Alaska's Evolving Blue Economy
- Aid Maritime Safety
- Minimize Adverse Environmental Impacts

Alaska AIS Network



Alaska Vessel Traffic

1.5 Million Square Miles



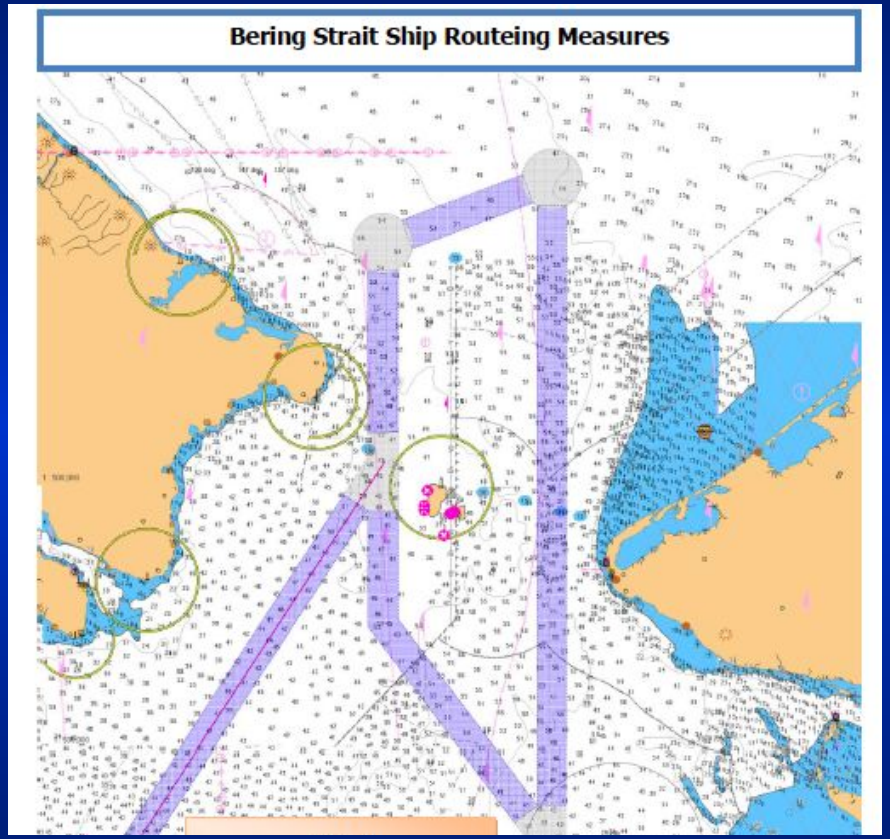
Vessel Activity - International

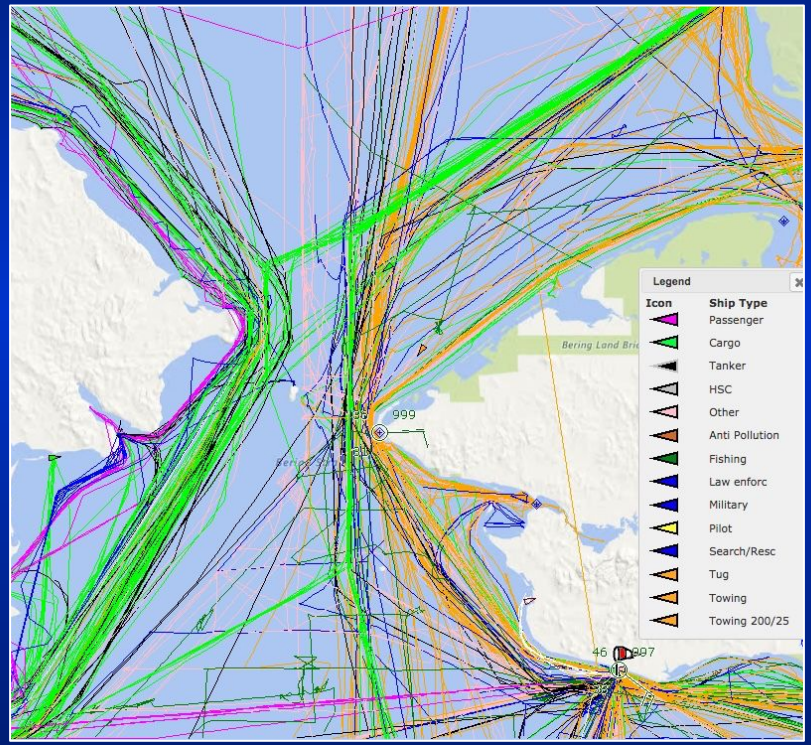
Annually

4,500 Unique Vessels 10,000 Transits of Aleutians

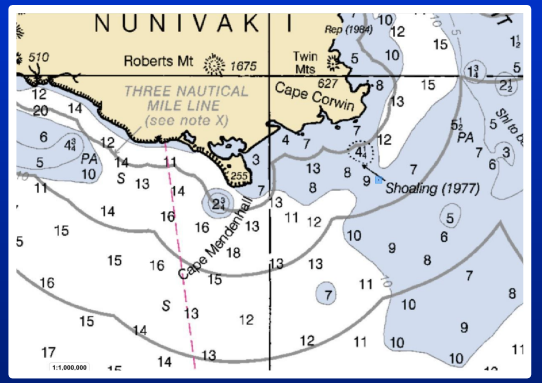
Tankers, Bulkers, Passenger Vessels, Fishing, Barges

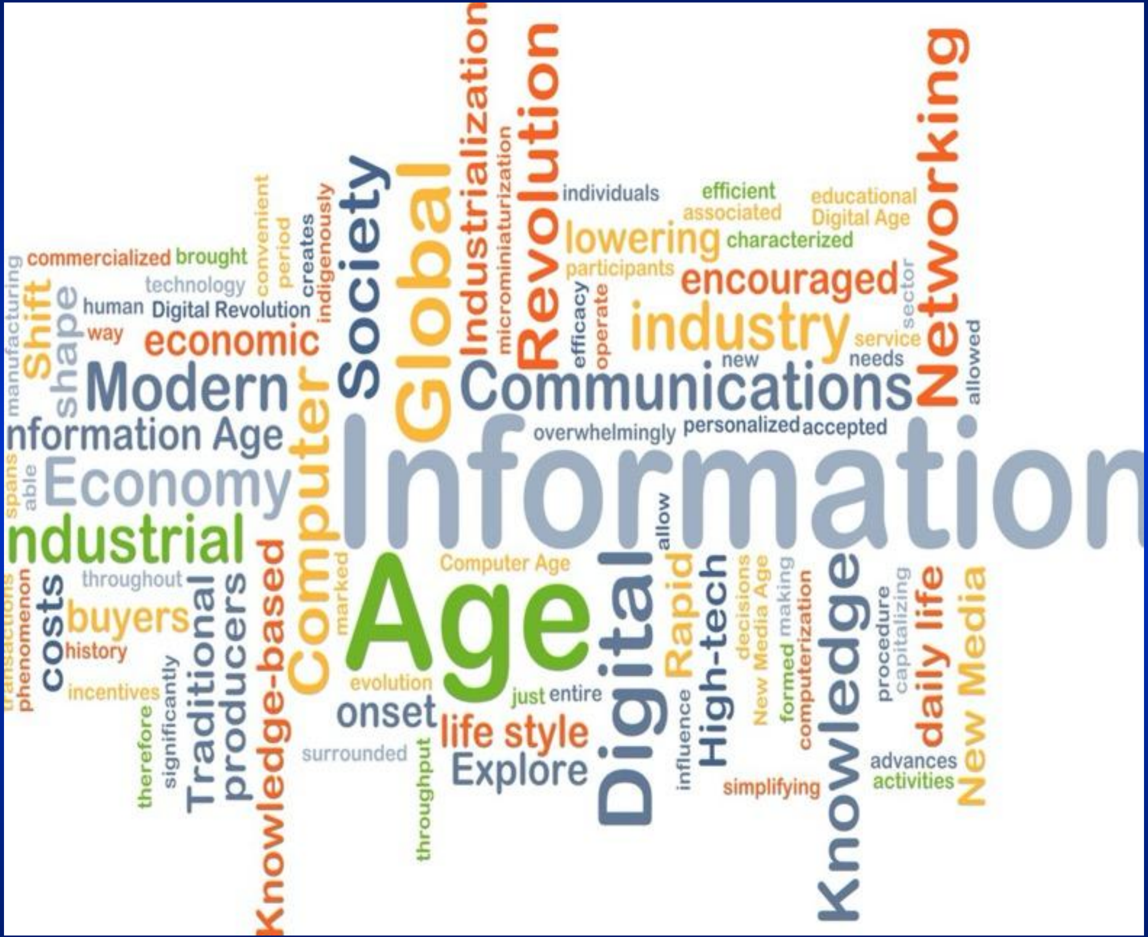
PARS
Port Access Route Study





Tanker **EBONY CHAMPION**
Grounding




Information
Age
Digital
Knowledge
Communications
Networking
Revolution
Industrialization
Global
Society
Computer
Modern
Information Age
Economy
industrial
industry
encouraged
lowering
economic
Shift
shape
human
Digital Revolution
commercialized
brought
technology
convenient
period
creates
indigenously
manufacturing
way
microminiaturization
individuals
efficient
associated
educational
Digital Age
characterized
participants
efficacy
operate
service
sector
new
needs
allowed
overwhelmingly
personalized
accepted
spans
able
transactions
phenomenon
costs
throughout
buyers
history
incentives
therefore
significantly
Traditional
producers
Knowledge-based
marked
evolution
onset
surrounded
throughput
Computer Age
just
entire
life style
Explore
allow
Rapid
influence
High-tech
decisions
New Media Age
formed
making
computerization
simplifying
procedure
capitalizing
daily life
New Media
advances
activities

End of Presentation

Thank you!

Hydrographic Health and Charting

Christy Fandel

December 2, 2021 | Virtual

Hydrographic Health and Charting

Coast Survey / Hydrographic Surveys Division / Operations Branch

Christy Fandel
Chief, Operations Branch

Mapping & Charting Responsibility

US Exclusive Economic Zone

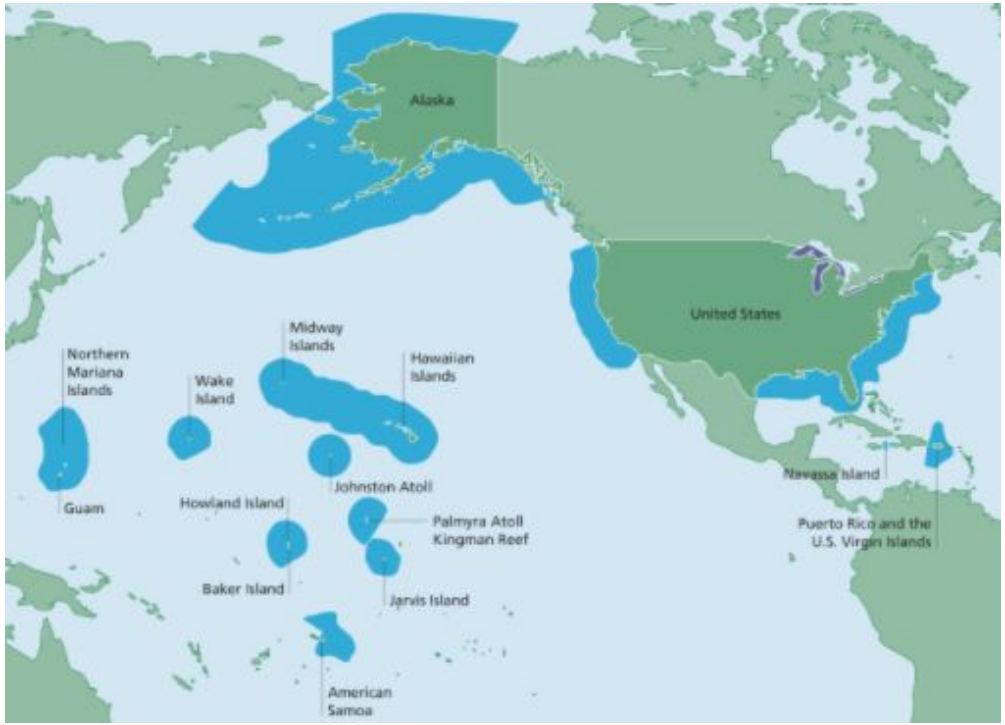
3,400,000 SNM

Surveyed to "Modern Standards"

~47%

Average Annual Hydrographic Acquisition

3,000 SNM



Hydrographic Health Model

$$\text{Hydrographic Health} = \underbrace{\left(\text{Desired Survey Score} - \text{Present Survey Score}\right)}_{\text{Hydrographic Gap}} \times \underbrace{\sum\left(\text{Consequence} \times \prod(\text{Likelihood})\right)}_{\text{Hydrographic Risk}}$$

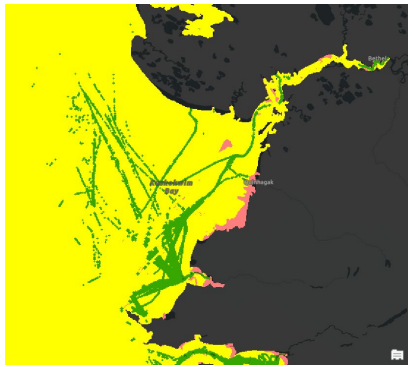
- Age of Past Data
- Vessel Type
- Number of Groundings
- Proximity to Seafloor
- Density of Obstructions
- Tidal Currents
- Quality of Past Data

- Vessel Traffic Density
- Proximity to SAR Stations
- Depth
- Age of Past Data
- Number of hurricanes
- Seafloor Complexity
- Proximity to Coral Reefs

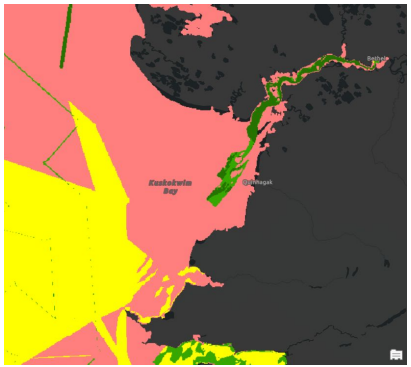
Hydrographic Health Model

$$\text{Hydrographic Health} = \underbrace{\left(\text{Desired Survey Score} - \text{Present Survey Score}\right)}_{\text{Hydrographic Gap}} \times \underbrace{\sum\left(\text{Consequence} \times \prod(\text{Likelihood})\right)}_{\text{Hydrographic Risk}}$$

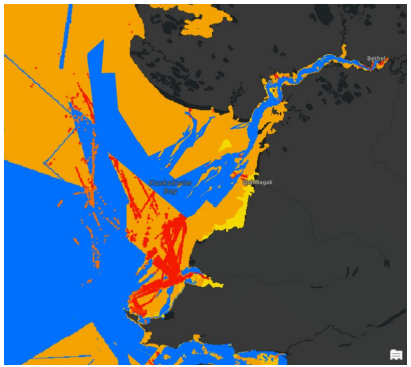
Desired Survey Score



Present Survey Score



Hydrographic Gap



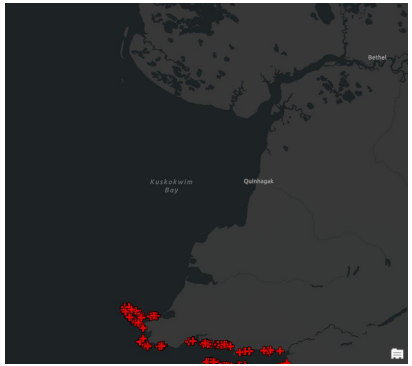
Complete | Partial | Lesser

No Gap — Increasing Gap →

Hydrographic Health Model

$$\text{Hydrographic Health} = \underbrace{\left(\text{Desired Survey Score} - \text{Present Survey Score}\right)}_{\text{Hydrographic Gap}} \times \underbrace{\sum\left(\text{Consequence} \times \prod(\text{Likelihood})\right)}_{\text{Hydrographic Risk}}$$

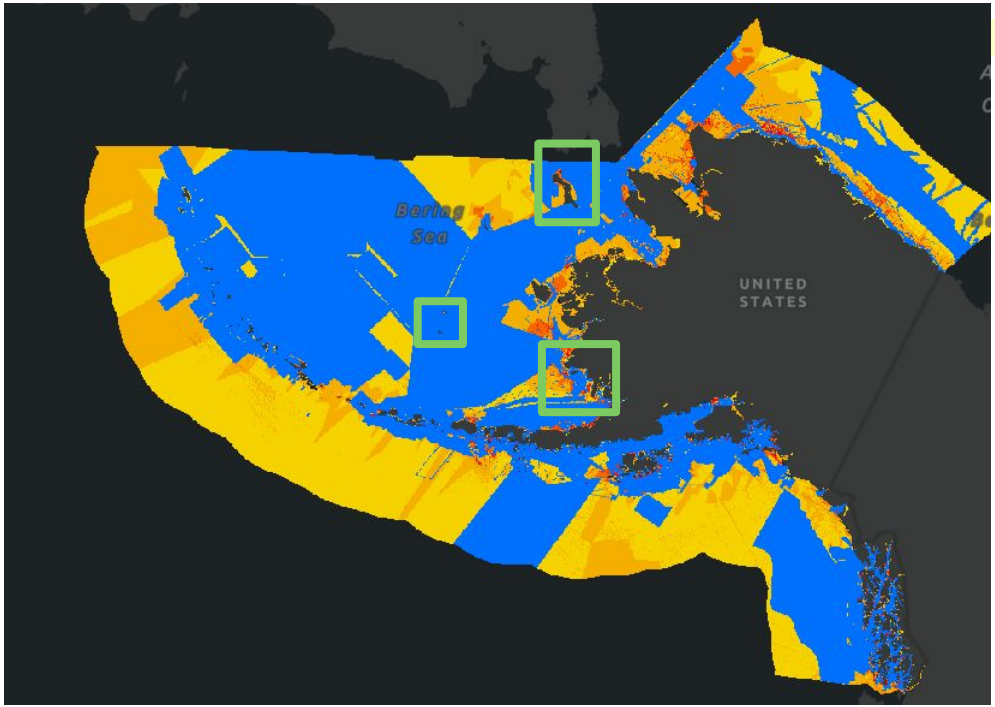
Hazards



Vessel Traffic

Groundings

Hydrographic Health Model



End of Presentation

Thank you!

Ocean Mapping: Importance to Fisheries Science

Bob McConnaughey

December 2, 2021 | Virtual

Ocean Mapping
Importance to Fisheries Science

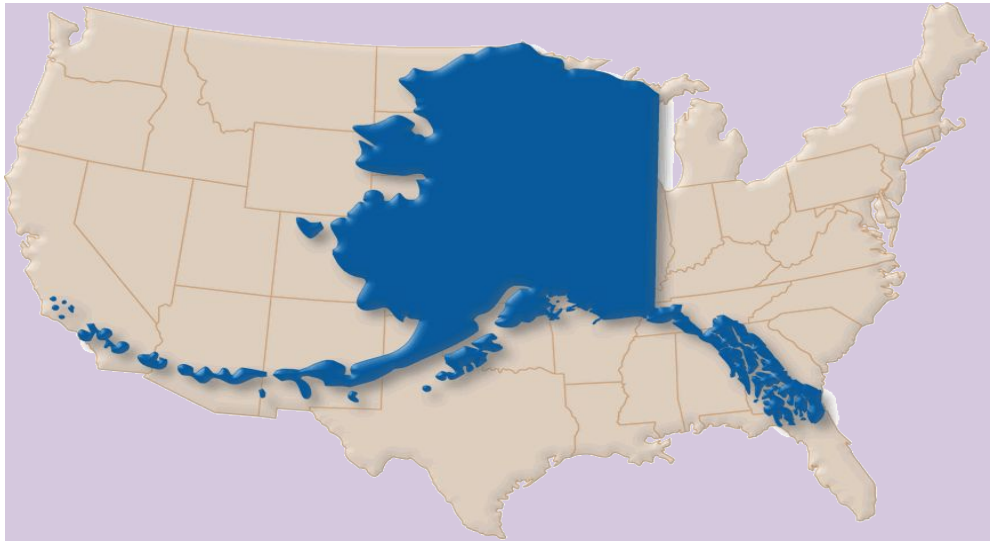
NOMEC Summit Panel 1

Bob McConnaughey
Alaska Fisheries Science Center

NOAA FISHERIES

NOAA Fisheries

Alaska



Vast Area

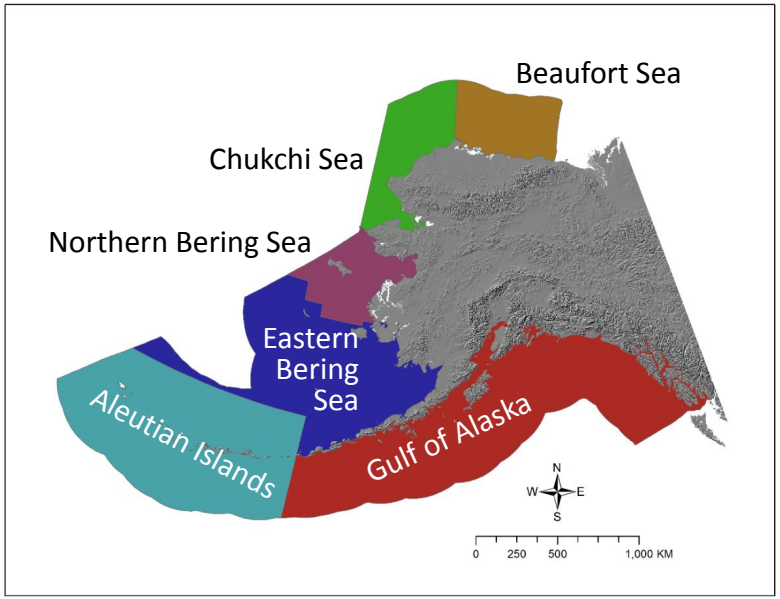
- 70% U.S. shelf
- 28% EEZ
- 47K mi shoreline

Valuable Fisheries

- 69 managed stocks
- >50% U.S. landings
- $4.5B wholesale

The Alaska Fisheries Science Center is the branch of NOAA Fisheries that is responsible for research on living marine resources in the coastal oceans off Alaska.

Operational Units
For Research & Management



Region	Km^2
Gulf of Alaska	1,199,958
Aleutian Islands	1,000,110
Eastern Bering Sea	776,011
Northern Bering Sea *	224,942
Chukchi Sea *	268,728
Beaufort Sea *	243,144
	3,712,815

* Expanded mission (loss of sea ice)

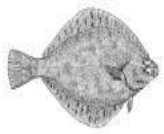
Scientific & Management Activities

Alaska Fisheries Science Center / Alaska Regional Office

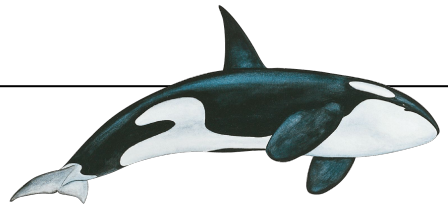




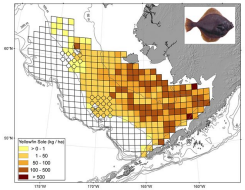




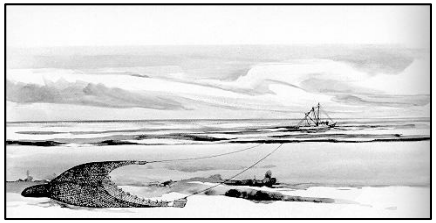

- Stock assessment surveys
- Population modeling (harvest advice)
- Biological studies (food habits, age & growth, behavior, recruitment)
- Habitat / ecosystem studies
- Consultations



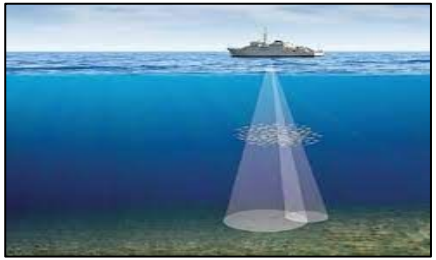
Mapping Applications



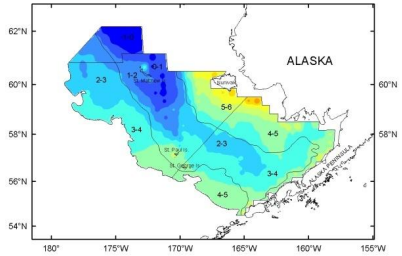
Fish Surveys + Enviro Data -> Spatial Modeling

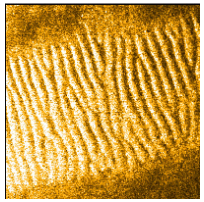


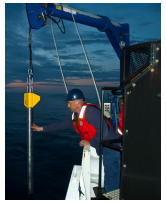
Bottom trawls



Midwater sonars

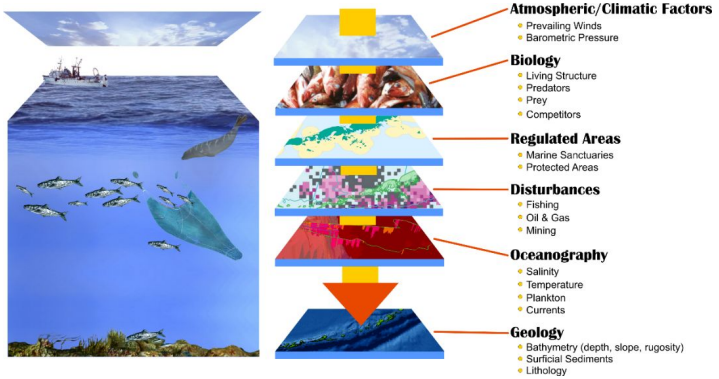






$$Y = a_1 X_1 + a_2 X_2 + a_3 X_{3+}$$

…

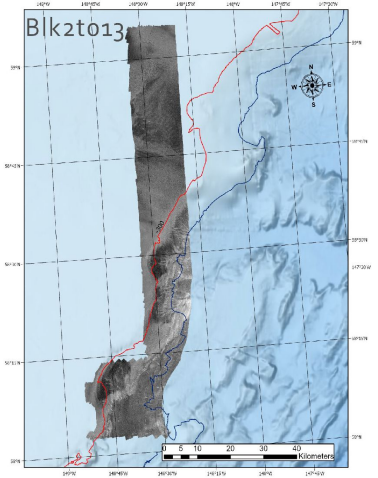


Spatially link fish abundance with physical & biological factors

Example: Untrawlable Habitat Modeling

Reduce Bias in Bottom-Trawl Surveys

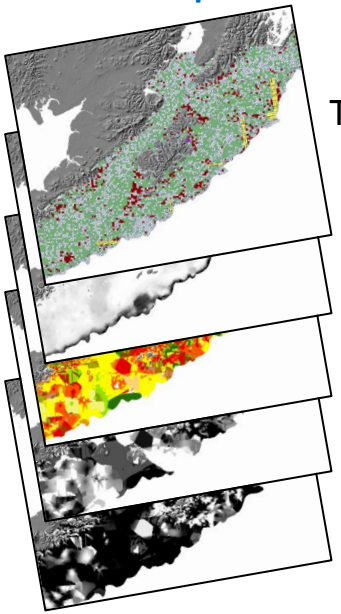
1. Hydro survey



Backscatter Bathymetry

2. Extract descriptive statistics

3. Spatial model



Trawlability

Seabed Characteristics

gam(trawlable ~ s(slope) + s(rugosity) + s(mean_bs) + …)

Questions?

Ocean Mapping
Importance to Fisheries Science

Pacific ocean perch, Aleutian Islands survey

NOAA FISHERIES

End of Presentation

Thank you!

Brief overview of potential critical mineral resources near Alaska

Paul Knorr

December 2, 2021 | Virtual

BOEM
Bureau of Ocean Energy Management

Mapping Marine Critical Minerals Offshore of Alaska

Alaska Coastal and Ocean Mapping Summit

December 1-2, 2021

Paul O. Knorr, PhD ***paul.knorr@boem.gov***

What are Critical Minerals?

- **Non-fuel mineral or mineral material essential to the economic and national security of the U.S.**
- **Serves a vital function in the manufacturing of a product**
- **Supply chain is vulnerable to disruption**
- **U.S. is dependent on foreign sources of critical minerals**
  - USGS identified 35 critical minerals
  - 14 lack any domestic production
  - More than 50% import-reliant for 29
  - About half are found on the Outer Continental Shelf (OCS)

Critical Minerals Occurring Offshore

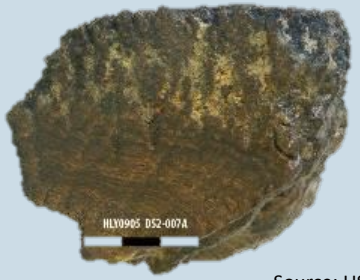
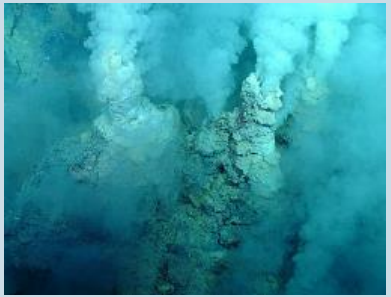
Yellow = Occur in marine minerals within the US Exclusive Economic Zone

- Aluminum (bauxite)
- **Antimony**
- Arsenic
- Barite
- Beryllium
- **Bismuth**
- Cesium
- Chromium
- **Cobalt**
- Fluorspar
- **Gallium**
- **Germanium**
- Graphite (natural)
- Halfnium
- Helium
- Indium
- **Lithium**
- **Magnesium**
- **Manganese**
- **Niobium**
- **Platinum group metals**
- Potash
- **Rare earth elements**
- Rhenium
- Rubidium
- **Scandium**
- Strontium
- Tantalum
- **Tellurium**
- **Tin**
- **Titanium**
- Tungsten
- **Uranium**
- **Vanadium**
- **Zirconium**

The types of critical minerals that occur in offshore deposits are used in transportation **(lithium, cobalt, manganese)** and defense and national security **(germanium, rare earth elements)**

Table adapted from 83 FR 23295

Main Deposit Types Containing Critical Minerals

Manganese (or Polymetallic) Nodules	Ferromanganese Crust	Seafloor Massive Sulfides (SMS)
 Source: USGS	 Source: USGS	 Source: NOAA
Depth: 4,000 to 7,000m Occurrence: Authigenic precipitate in soft sediments of abyssal plains Extent: Occur in all ocean basins, most abundant in central Pacific Growth Rate: **2-10 mm / million years** Critical Minerals: **Cobalt, manganese, REE, tellurium, platinum, bismuth, niobium, zirconium**	Depth: 600 to 7,000m Occurrence: Authigenic precipitate on flank and summit of seamounts Extent: Central and western Pacific Growth Rate: **1-4 mm / million years** Critical Minerals: **Cobalt, manganese, REE, tellurium, platinum, bismuth, niobium, zirconium**	Depth: 100 to 7,000m Occurrence: Precipitate of minerals leached from host rock and magmatic fluid Extent: Globally along active tectonic boundaries Growth Rate: variable to ≤ cm / day Critical Minerals: **Antimony, bismuth, gallium, tellurium, germanium**

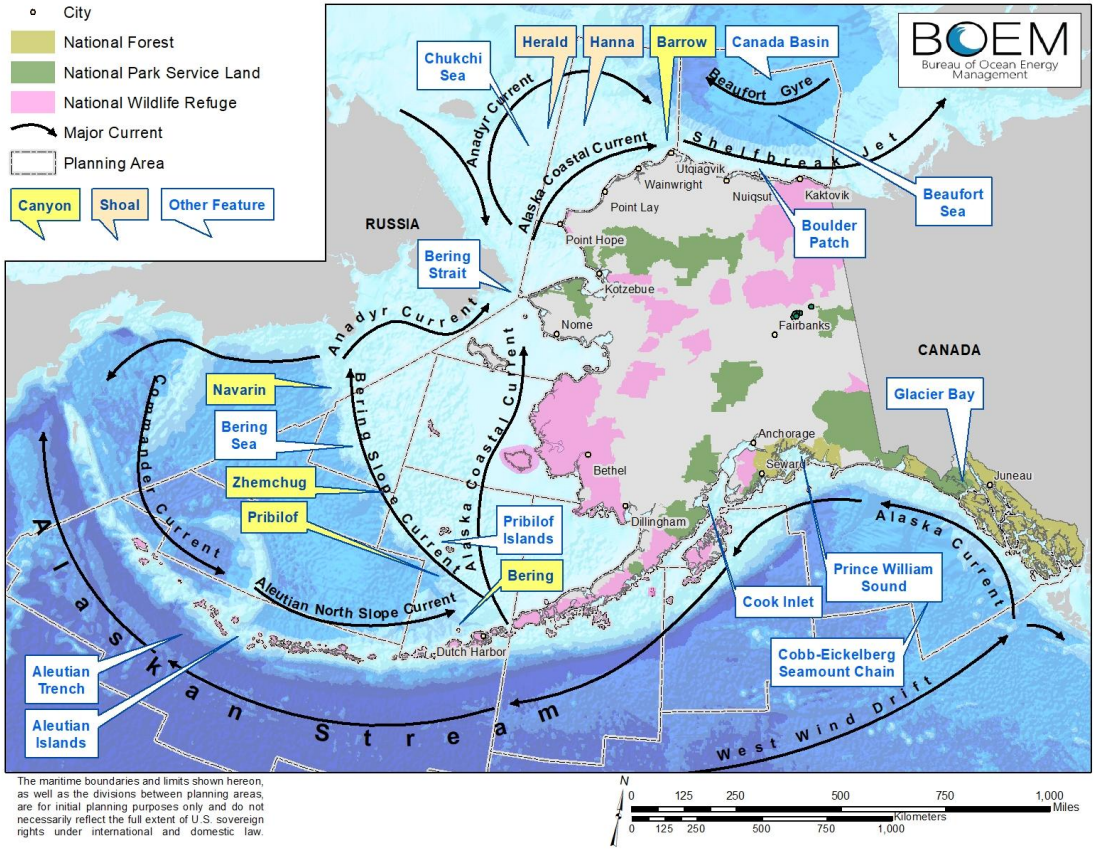
Main Deposit Types Containing Critical Minerals

Placer deposits: collections of particles concentrated by gravity

Source: Utah Geological Survey

Source: USGS

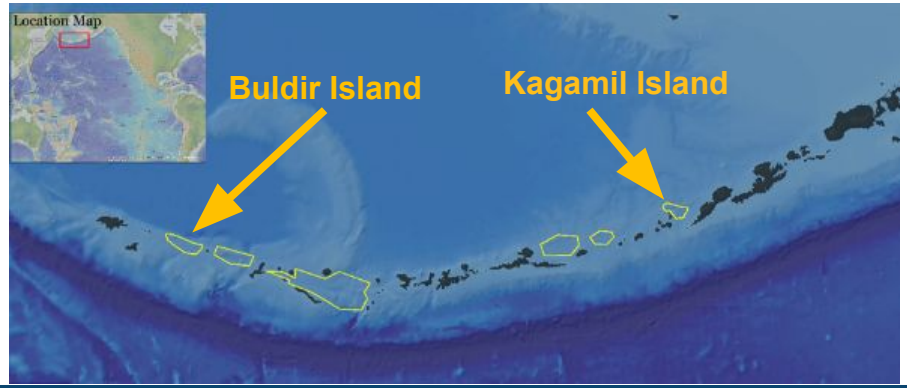
Critical Minerals – Environmental

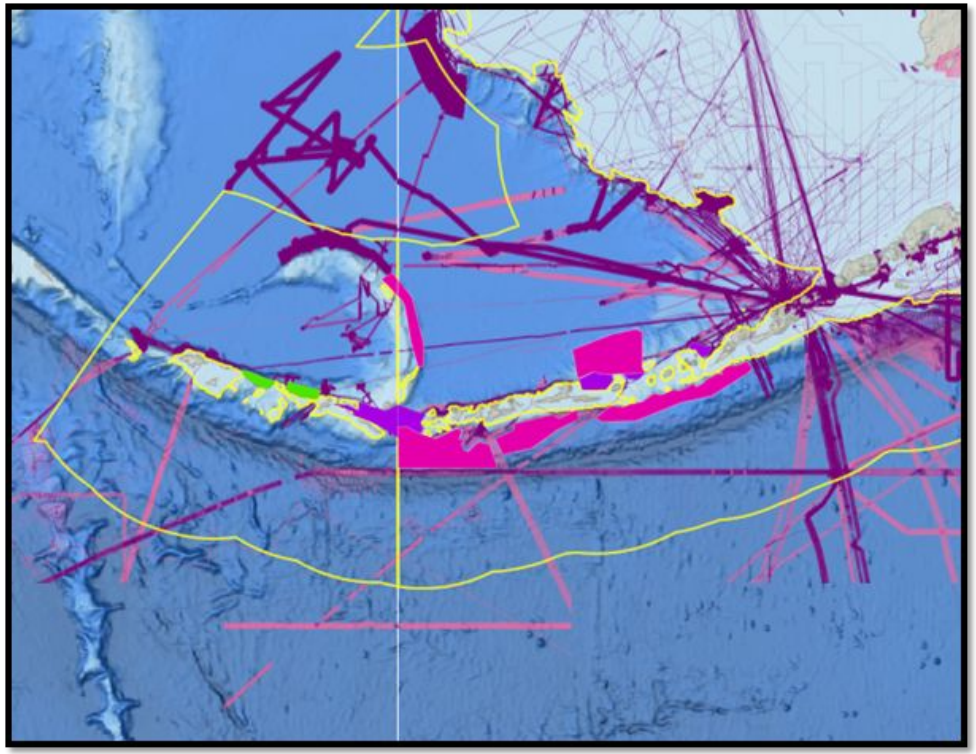


Planning factors could include Marine Protected Areas (MPA), Essential Fish Habitat (EFH), and Habitat Areas of Particular Concern (HAPC)

Alaskan Mineral Resources – Aleutians – Hydrothermal

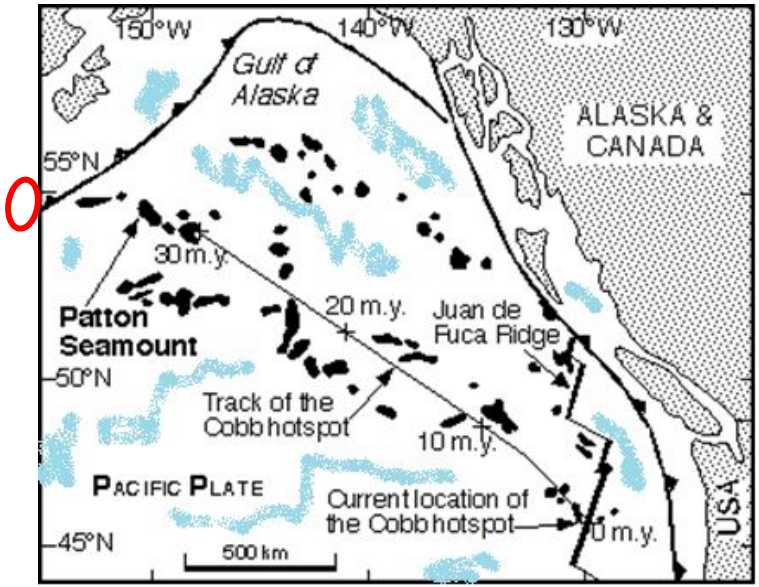
- MM 21-04 Seamount Benthic Mapping and Characterization for Deep-Sea Corals, Benthic Ecosystems, and Critical Minerals and of the Aleutian Islands (Knorr, Mueller)
- BOEM will be funding an exploratory study in FY2022 w/ NOAA and USGS
- Phase 1 – Identify potential vent systems and target areas for a Phase 2 ROV effort



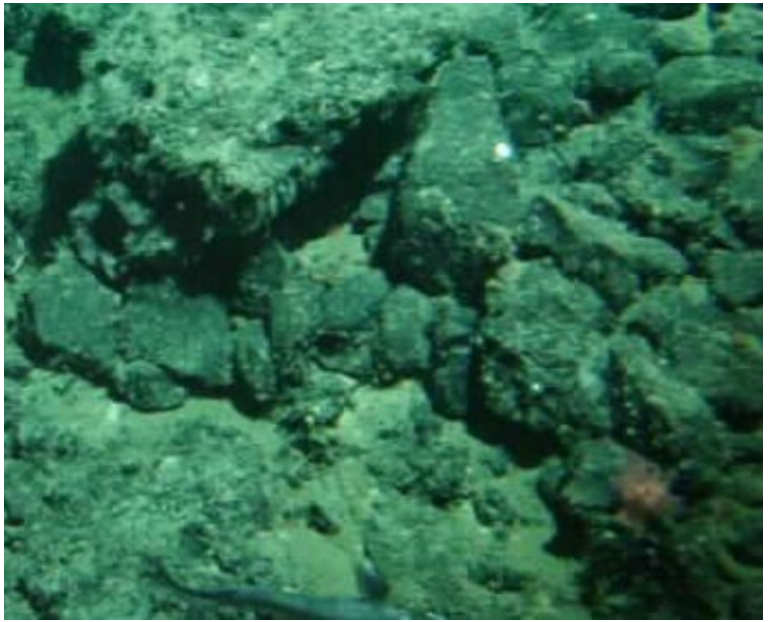


Green and purple are BOEM/USGS areas of interest

Alaskan Mineral Resources – Gulf of Alaska – Crust

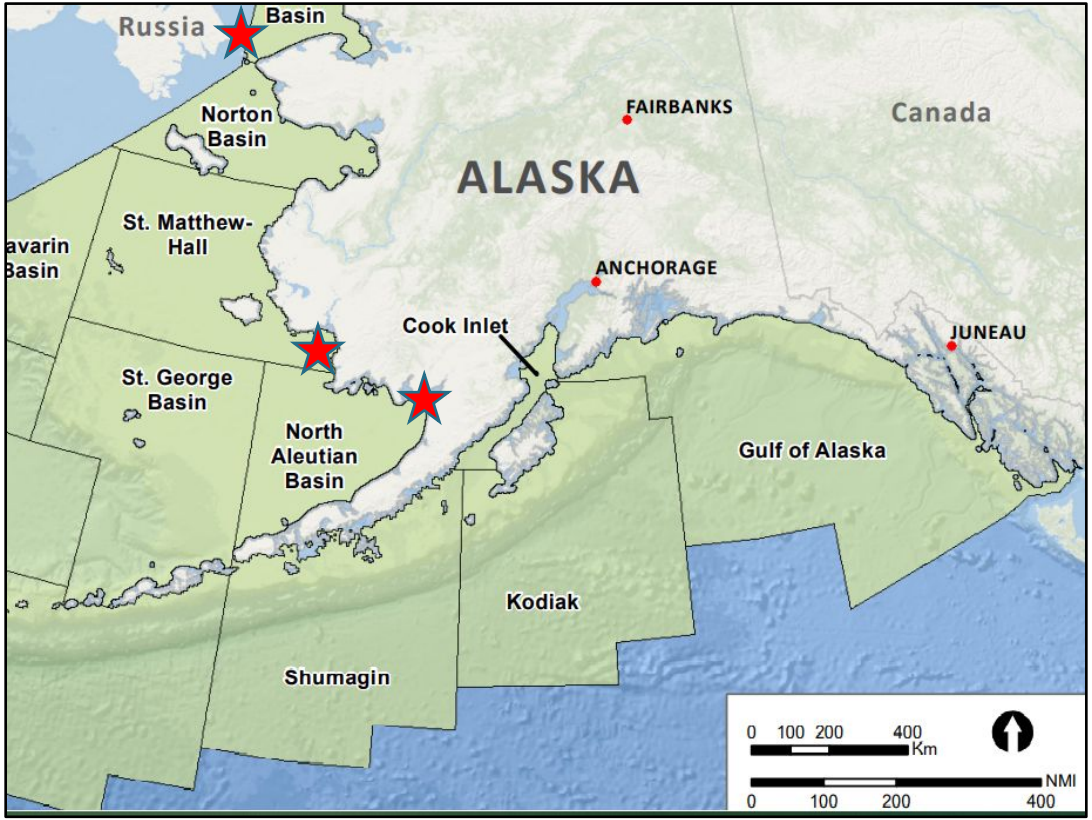


Source: oregonstate.edu



Iron-manganese crust on Patton Seamount surface

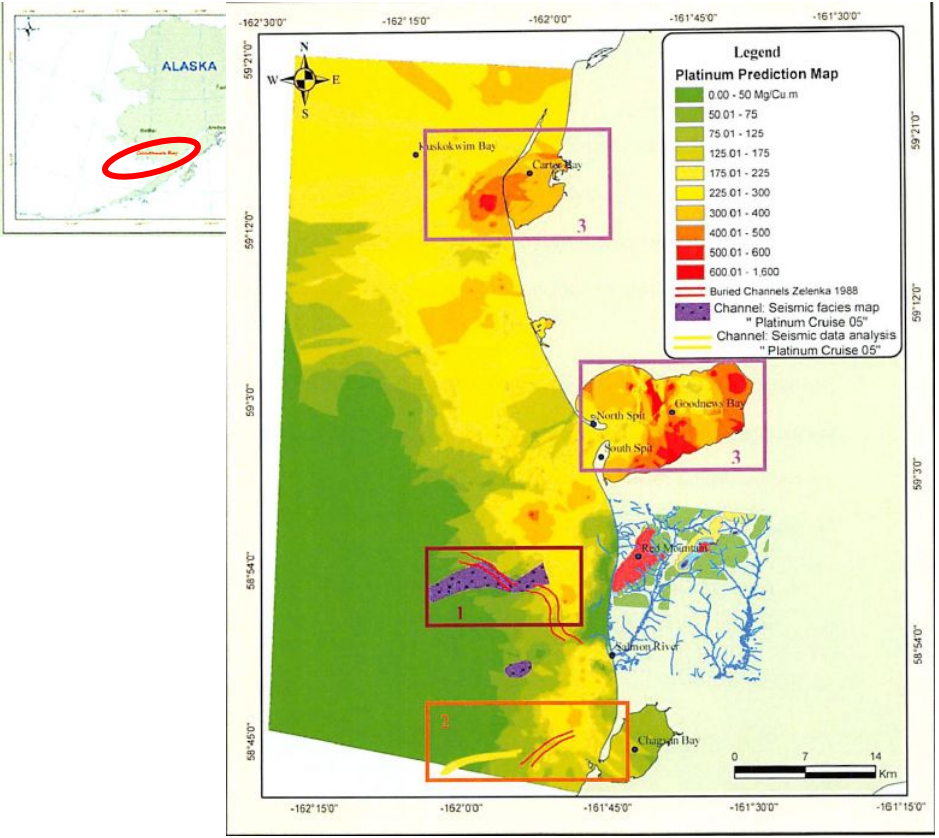
Alaskan Mineral Resources – Overview – Placers



Alaskan Placers – Bristol Bay

Iron, **titanium**, garnet, and olivine-rich sands

Alaskan Placers – Goodnews Bay



Platinum group (critical)

Alaskan Placers – Norton Sound / Bering Sea

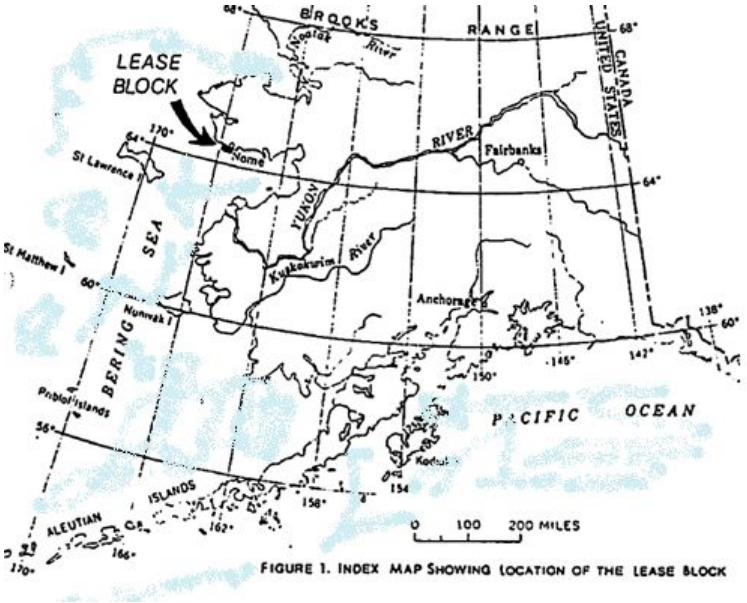
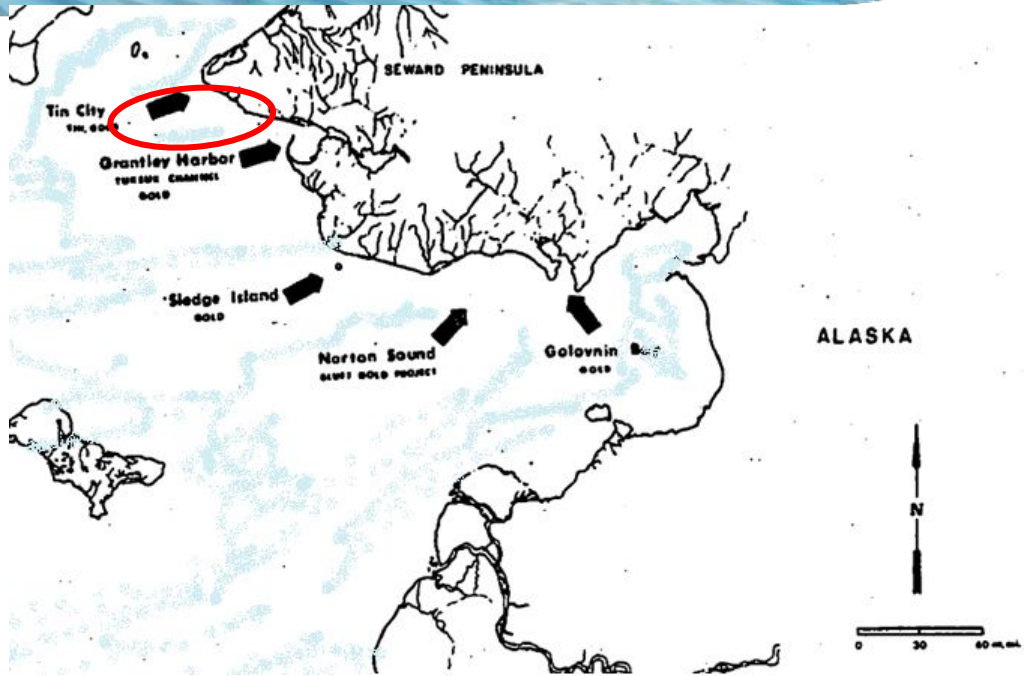


FIGURE 1. INDEX MAP SHOWING LOCATION OF THE LEASE BLOCK

Source: boem.gov



Gold (not critical) and **tin** (critical)

Source: Moore and Welkie, AGS Proceedings '76

End of Presentation

Thank you!

Examples of using multibeam bathymetry to study earthquake, landslide, and tsunami hazards in Alaska

Peter Haeussler

December 2, 2021 | Virtual

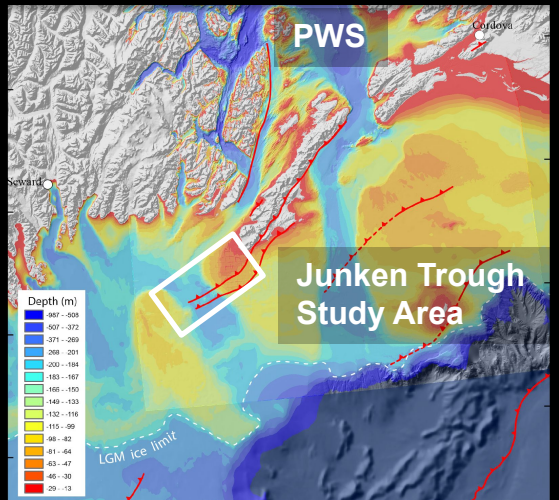
Examples of using multibeam bathymetry to study earthquake, landslide, and tsunami hazards in Alaska

Peter Haeussler ***USGS - Anchorage***
Alaska Coordinator, Earthquake hazards program
ACOMS Meeting, December 2021

USGS

Fault characterization: Megathrust splay faults

- Important tsunami-generating faults
- Mapped onland after 1964, but inferred to extend to offshore Seward

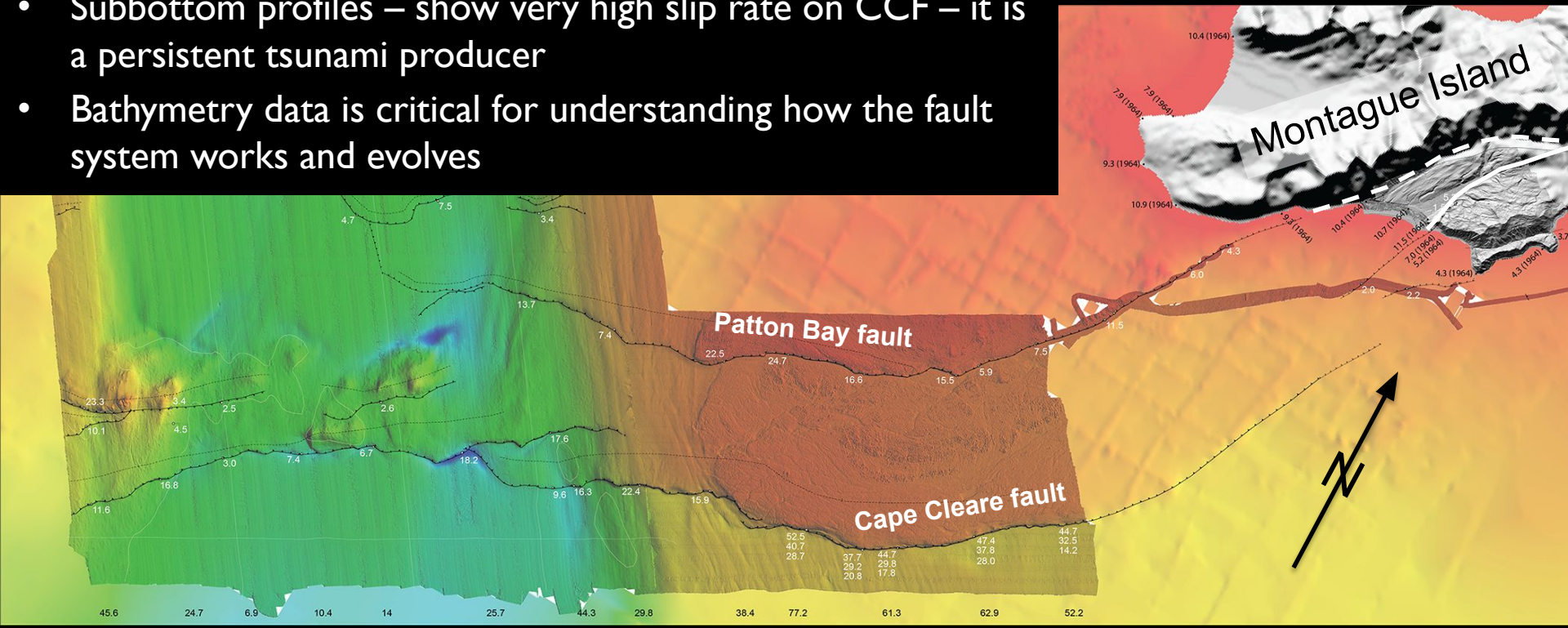


Patton Bay surface rupture on Montague Island

Hanning Bay fault at Fault Cove, Montague Is.

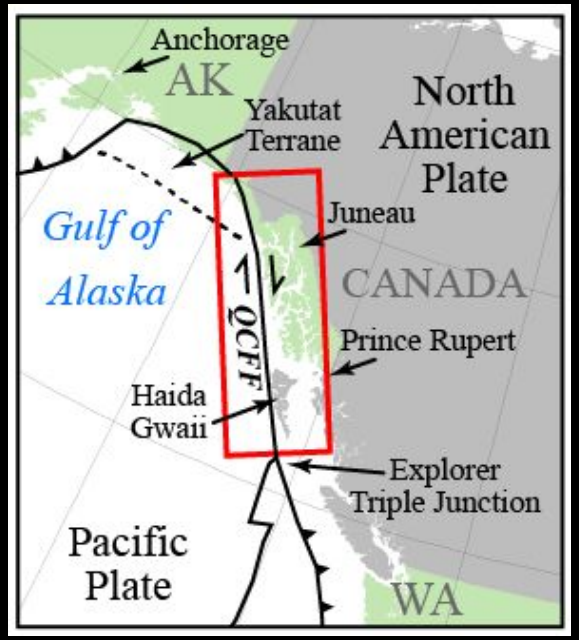
Offshore Characteristics

- Onshore – the Patton Bay fault is the major fault strand
- Offshore – the Cape Clear is the major fault strand
  - 53-m-tall fault scarp!
- Subbottom profiles – show very high slip rate on CCF – it is a persistent tsunami producer
- Bathymetry data is critical for understanding how the fault system works and evolves

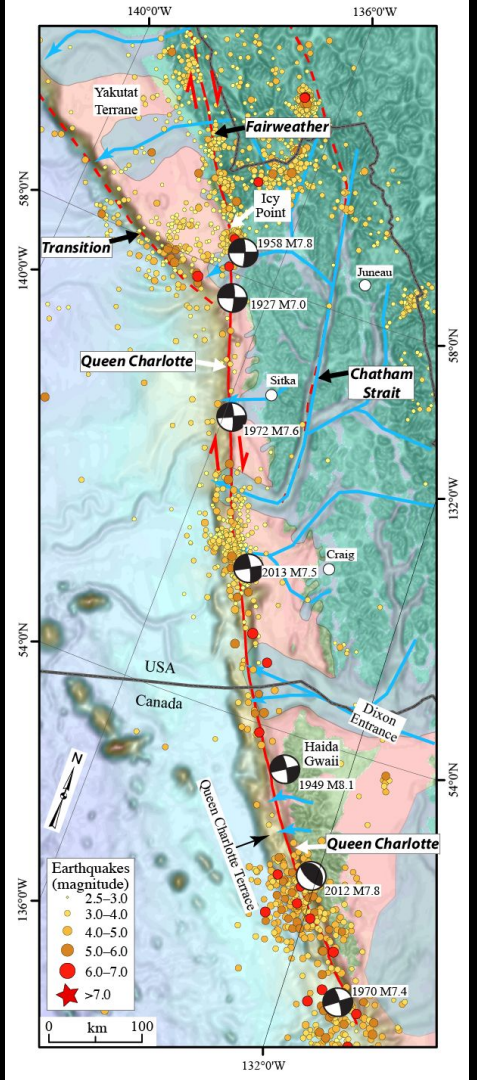


Fault Characterization: Queen Charlotte fault

- Major fault – "the San Andreas of the north"
- 7 major (M7+) earthquakes in last 100 years
- Almost no work on the fault prior to 2015



Major earthquakes since 1900:
1927 M7.0
1949 M8.1
1958 M7.8
1970 M7.4
1972 M7.6
2012 M7.8
2013 M7.6

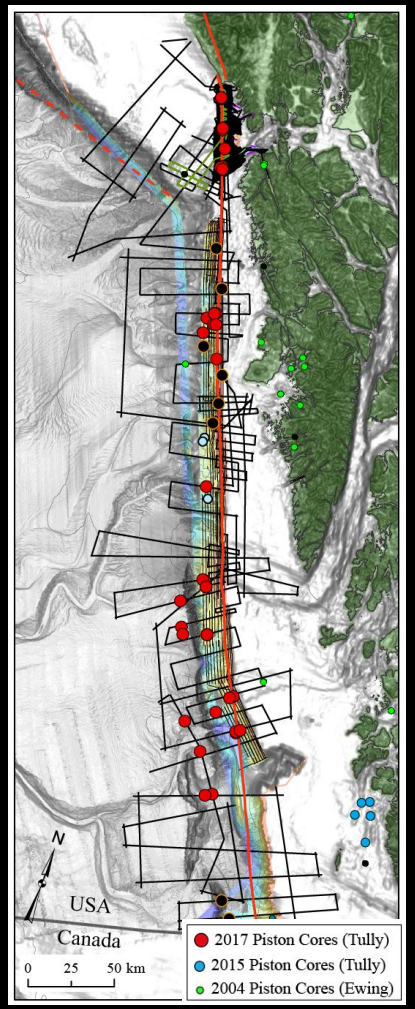


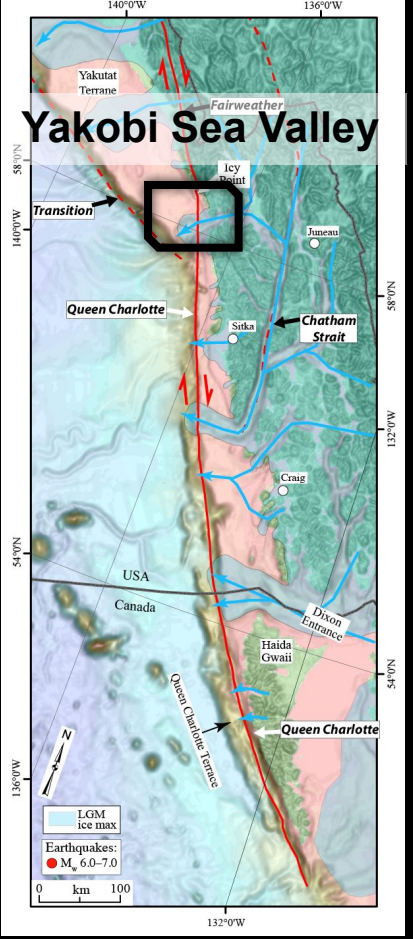
The entire fault is now mapped!

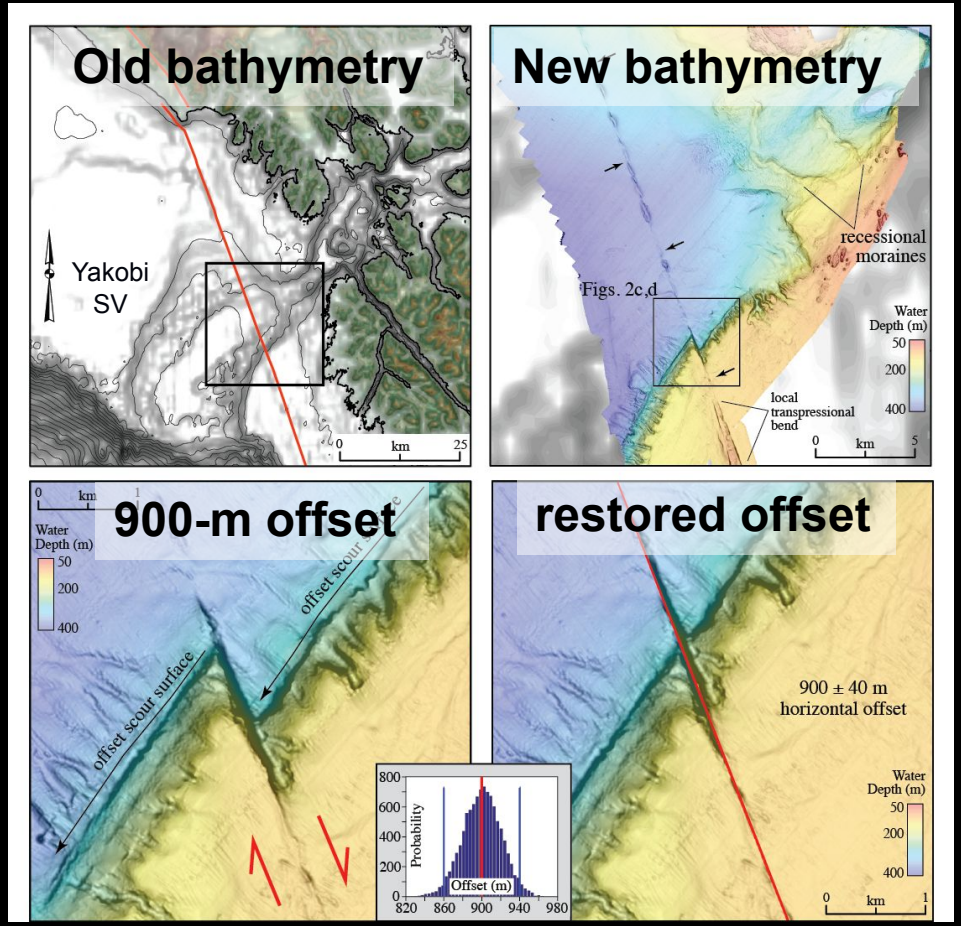
- 2015-2018: 125 days at sea
- Combination of multibeam and sparker seismic data collected

Cruises in U.S. Waters:

- 2015 *R/V Solstice* continental slope high-resolution MCS and MBES geophysical surveys
- 2015 *R/V Alaskan Gyre* continental shelf high-resolution MCS and Chirp geophysical surveys
- 2016 *R/V Medeia* continental slope high-resolution MCS and MBES geophysical surveys
- 2016 *R/V Norseman* continental slope high-resolution MCS geophysical survey
- 2017 *R/V Ocean Starr* high-resolution MCS and CHIRP geophysical surveys
- 2017 R/V *John P. Tully* high-resolution MCS, piston coring and bottom camera surveys
- 2018 *R/V Fairweather* MBES mapping survey





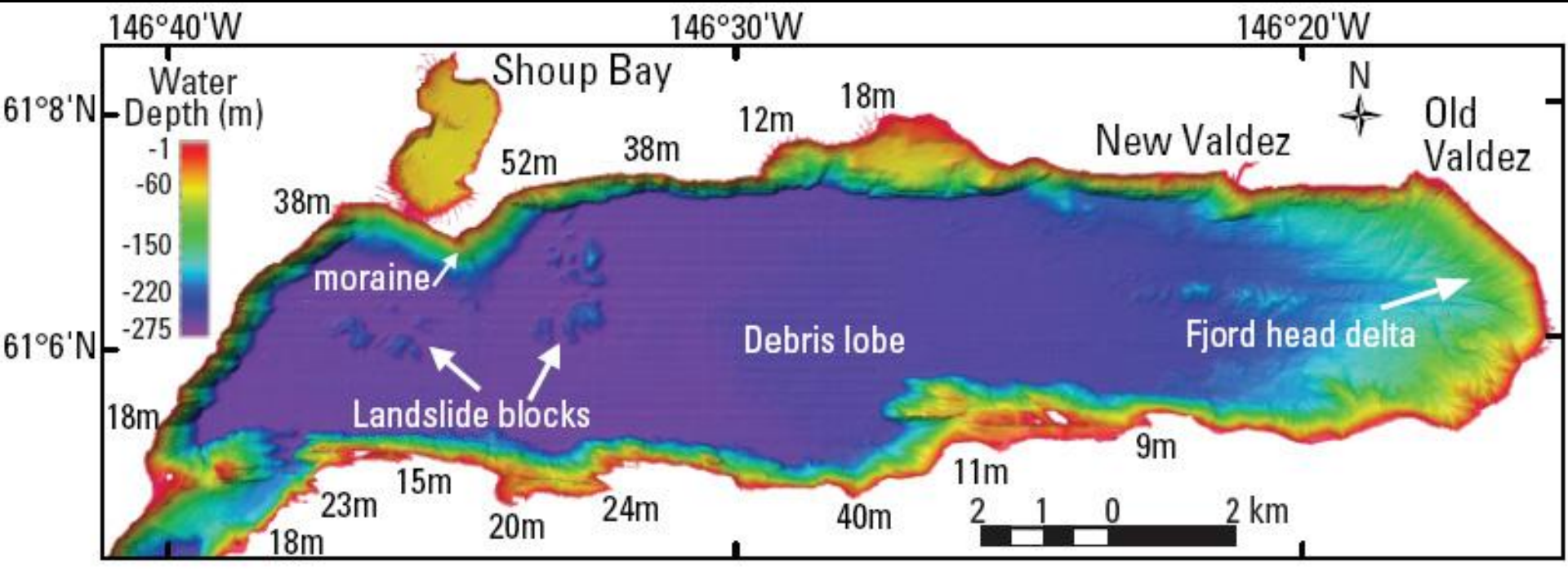


LaDiCaoz offset reconstruction (method based on Zielke et al., 2012)

53±3 mm/yr slip rate

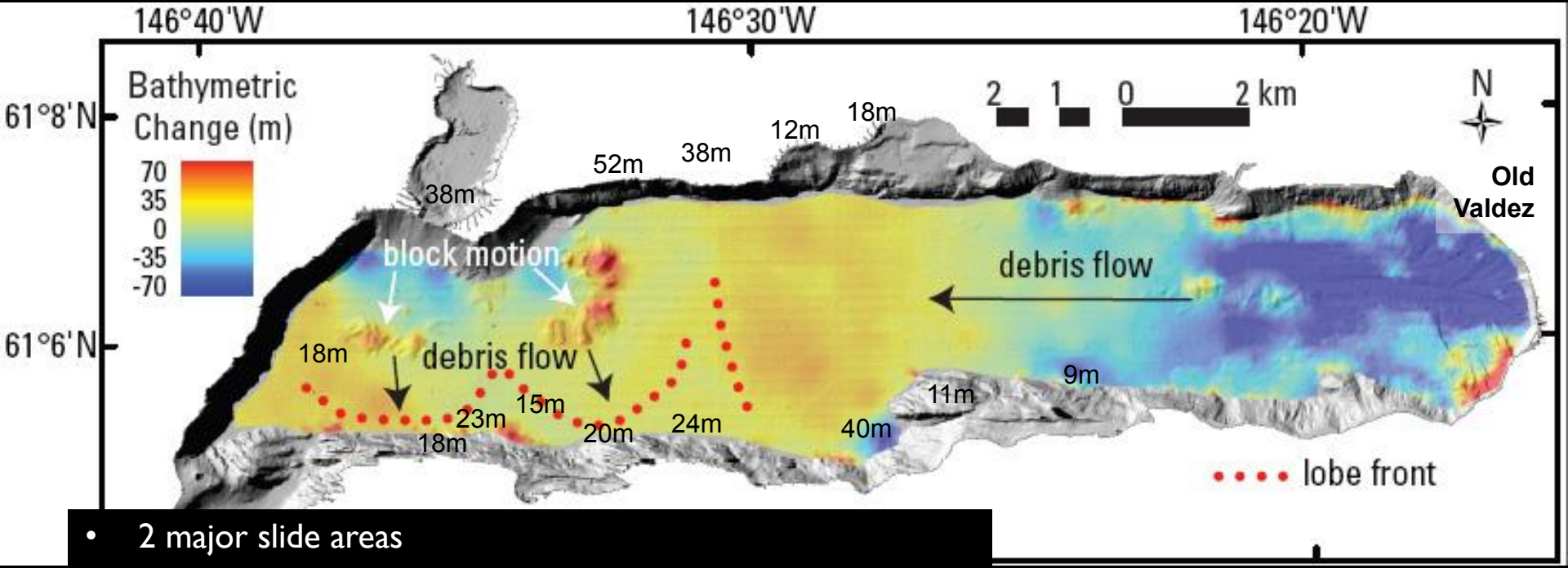
- We found offset reconstructions for 179 strike-slip piercing points
- These reveal consistent ~5.3 cm/yr slip-rate over 650 km distance
- The entire plate boundary is localized to a single, knife-edge fault
- This is the worlds fastest continent-ocean transform fault!

Submarine landslides – Port Valdez



2002-2003 NOAA bathymetry surveys

Differential bathymetry reveals sources of tsunami

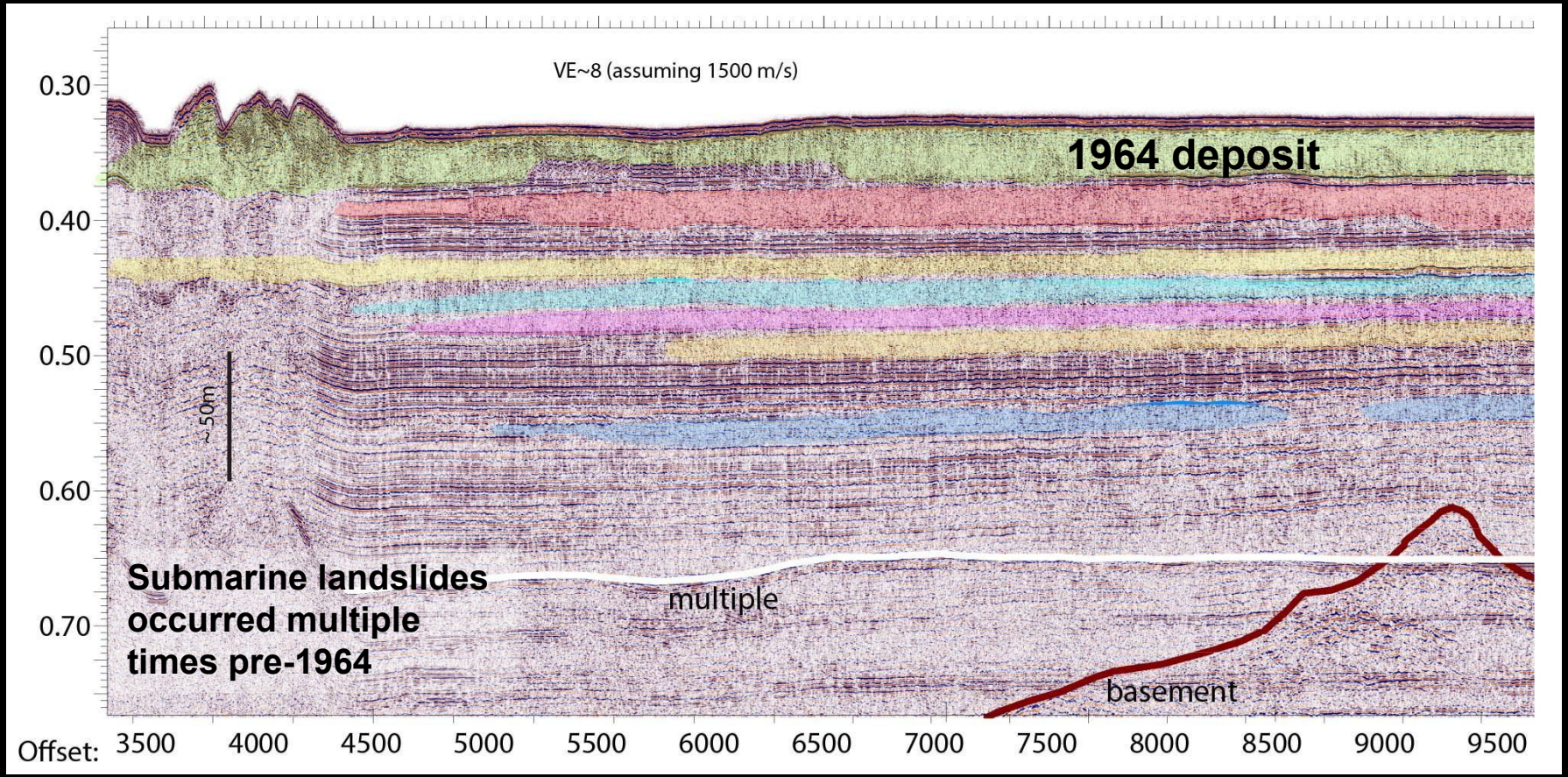


- 2 major slide areas
- Fjord-head delta failure
- Blocks fell off Shoup Bay moraine
- Information used to revise tsunami hazard maps

Bathymetry difference map

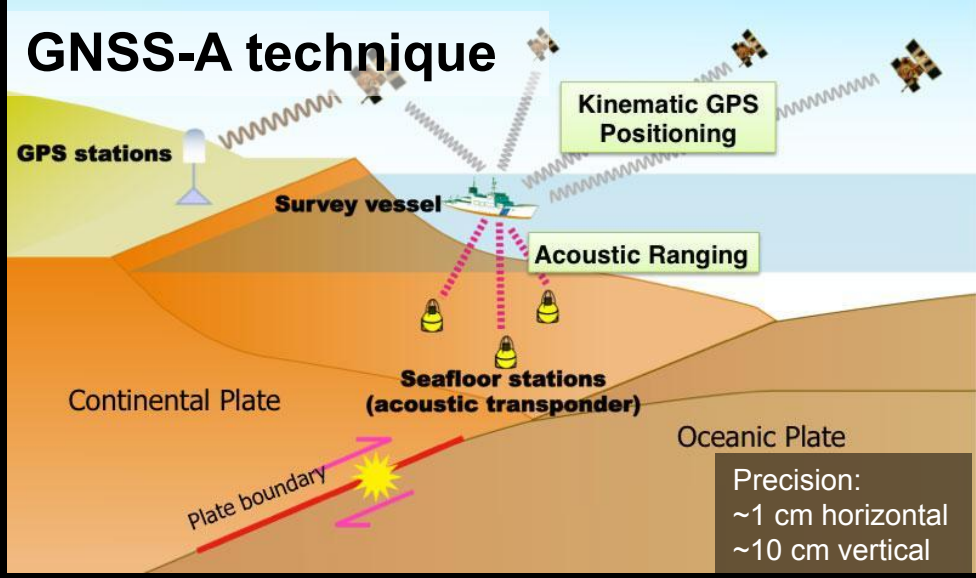
Blue = deeper after 1964
Warm = shallower after 1964

Sub-bottom profiles show previous debris flows



Seafloor geodesy

- My prediction: the biggest advances in understanding the hazard from megathrust earthquakes in the next decade will come from seafloor geodesy
- USGS has a wave glider for GNSS-A surveying



- USGS waveglider used to study the Shumagin Islands earthquake sequence of 2020 and 2021 in two deployments
- Three seafloor benchmarks (~$100K/each) were deployed during and NSF-funded experiment in 2018

End of Presentation

Thank you!

Submarine Volcanism and Methane Seepage: Why is mapping important?

Jeff Beeson

December 2, 2021 | Virtual

Alaska Coastal and Ocean Mapping Summit

Submarine Volcanism and Methane Seepage:Why is mapping important?

Discovering, measuring, understanding, and predicting ecological impacts of natural chemical, biological, and geological processes between the solid Earth and Ocean.

December 2nd, 2021

Dr. Jeff Beeson - NOAA PMEL - Earth-Ocean Interactions Group

https://www.pmel.noaa.gov/eoi/

Submarine Volcanism: Why is mapping important?

Our Why

We explore globally to discover and characterize new hydrothermal vent sites and undersea ecosystems to assess their potential resources and their chemical impact on the ocean environment.

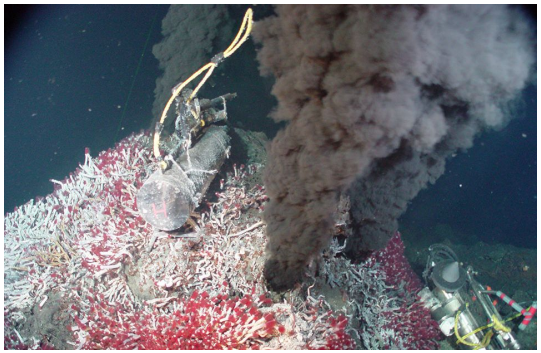
Our How

CTDs, camera systems, submersibles, remotely operated vehicles, autonomous underwater vehicles, and gliders, high-temperature water samplers, portable and moored hydrophones

Our Who

Marine Biologist, Geologist, Marine Resource Managers, Physical/Chemical Oceanographers

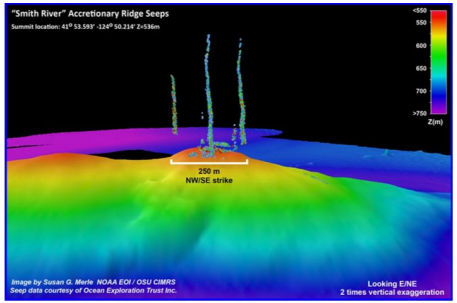
Mapping data provides some of the first clues to where these submarine volcanoes are located



Methane Seepage: Why is mapping important?

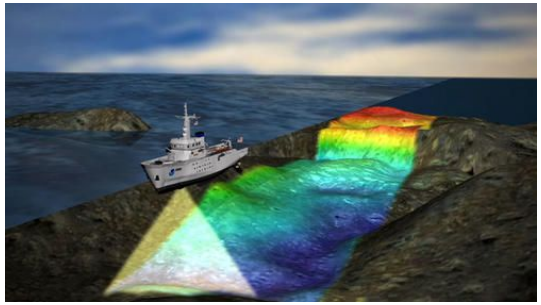
Our Why

An unknown amount of methane is fluxing through continental margins, and up to ~5000 gigatons of carbon are stored in icy methane hydrate deposits within their sediment.



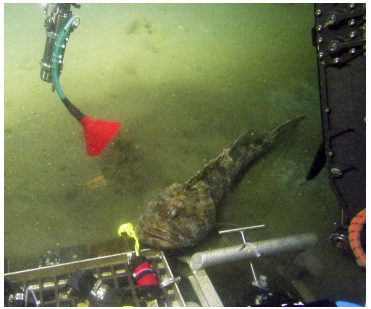
Our How

EOI scientists use multibeam sonar and a remotely operated vehicles to document and characterize undersea methane sites



Our Who

Geochemist, Geologist, Fisheries, Biologist, Marine Resources Managers, Climate Modeling, Oceanographers



Nearly 3,500 methane bubble streams, clustered into more than 1,300 methane emission sites, have been identified along the US Cascadia margin, derived both from archived published data and 2011, 2016–2018 dedicated multibeam surveys using co-registered seafloor and water column data.

Merle et al. 2021 - **Distribution of Methane Plumes on Cascadia Margin and Implications for the Landward Limit of Methane Hydrate Stability**

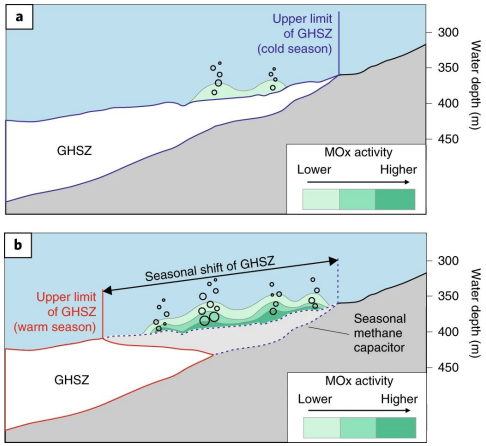
Thoughts on Alaska: Why is mapping important?

What impacts will a warming Alaska margin have on the carbon cycle?

We can assess the current state of methane seepage in Alaska's EEZ

Mapping data will directly aid in the assessment of methane seepage in the waters offshore Alaska

Changing pressure temperature conditions will alter the state methane hydrate in the subsurface



Ferré, B., Jansson, P.G., Moser, M. *et al.* Reduced methane seepage from Arctic sediments during cold bottom-water conditions. *Nat. Geosci.* 13, 144–148 (2020). https://doi.org/10.1038/s41561-019-0515-3

Mapping data will allow a baseline to compare against as the Alaskan Margin continues to change

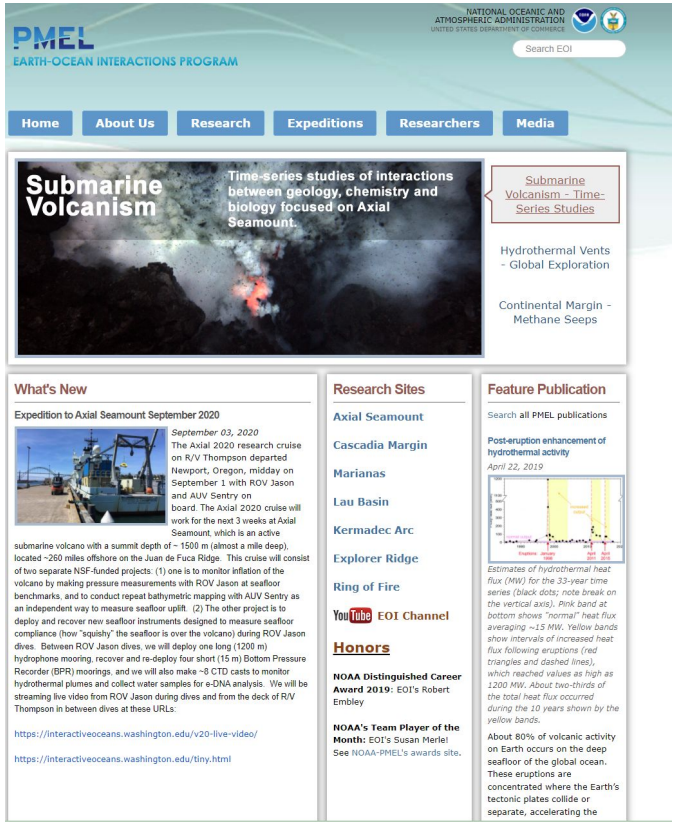
How does submarine volcanism impact ocean chemistry and biology in the north Pacific?

Mapping data will provide the information needed for more detailed exploration cruises to submarine volcanoes and hydrothermal vent sites

PMEL Acoustics will be deploying a quad hydrophone array north of Adak Island in summer 2022

Goal: detect submarine volcanic sources along the central and western Aleutian arc.

Mapping Data of these areas will be of great help to our volcano detection efforts.



Find more information at
https://www.pmel.noaa.gov/eoi/

Map it, and they will come....

Thank you
Jeff Beeson

Contact - jeff.beeson@noaa.gov

End of Presentation

Thank you!

Topobathymetric Requirements for Marine Energy

Jeremy Kasper

December 2, 2021 | Virtual

Topobathymetric Requirements for Marine Energy

Jeremy Kasper[a,b], Erin Trochim[a], Noelle Helder[1]

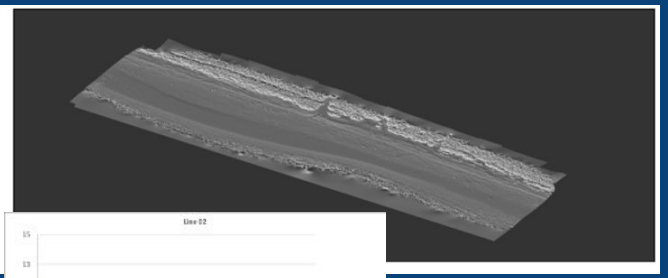
[a]Alaska Center for Energy and Power, University of Alaska Fairbanks

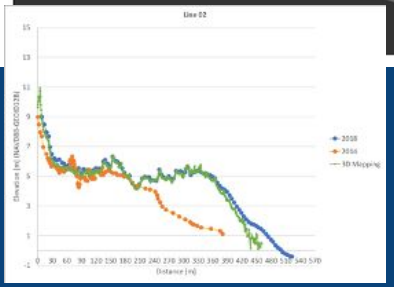
[b]Pacific Northwest National Lab

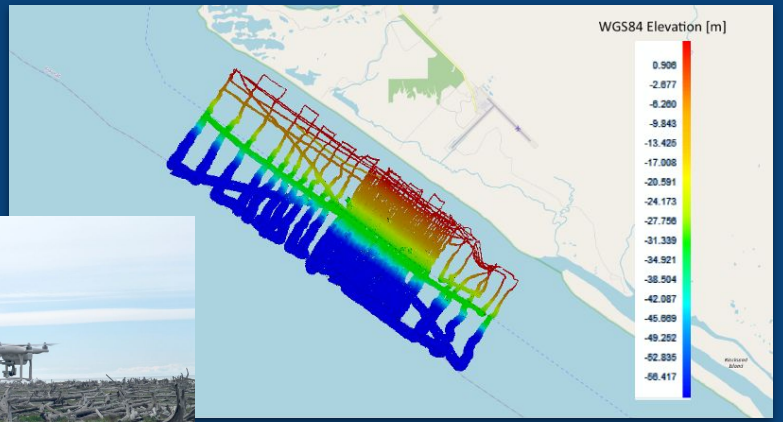
[1]Alaska Sea Grant State Fellow

- IEC Standards TC114 62600 -101, -201, -301 all require bathymetry (e.g. <10m horizontal spacing+any changes in bathy+hazards; following IHO, 2018, etc.)

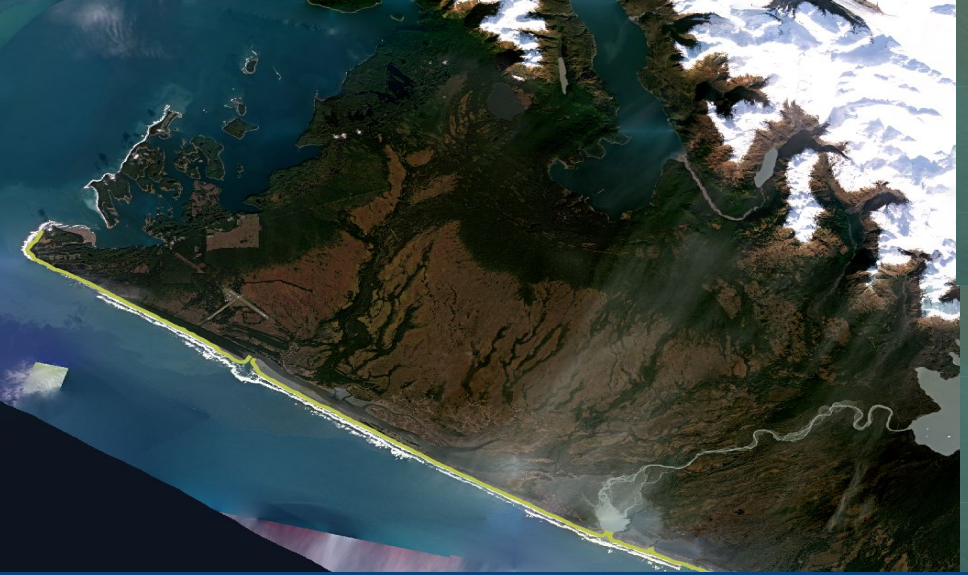
WHAT DATA IS REQUIRED?
Yakutat Wave Example

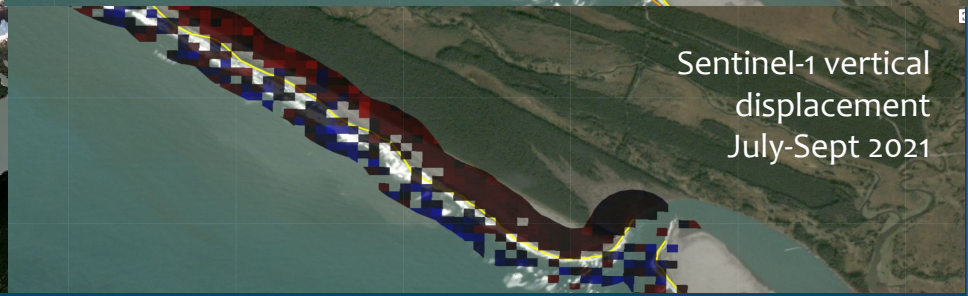






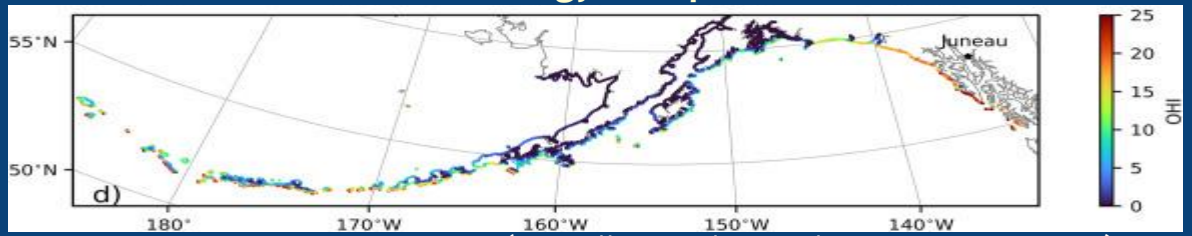
- 2016 wave resource assessment required bathymetry for wave modeling
- Follow-on assessments of coastal morphology and other site hazards





- End goal: topobathymetric surface, coastal position + quantifying change to assess site suitability/hazards
  - utilize multibeam sonar, UAVs, GNSS-based transects & satellite imagery to get there

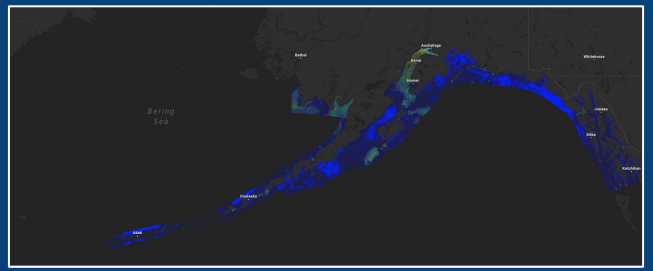
Wave Energy Hot Spots



From Garcia-Medina et al., 2020 (https://doi.org/10.1016/j.renene.2021.02.005.)

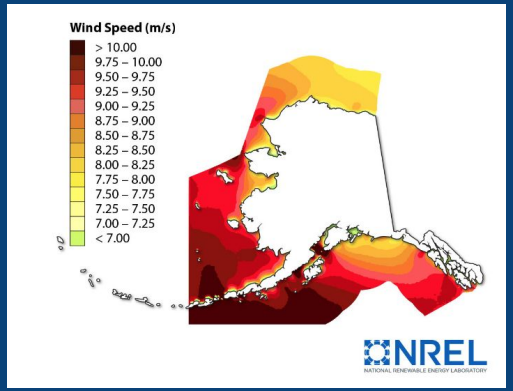
WHERE?

Tidal Energy Hot Spots



From https://maps.nrel.gov/marine-energy-atlas/

Offshore Wind



From Doubrawa et al., 2017 (NREL Technical Report NREL/TP-5000-70553)

+WILDCARDS (e.g. mariculture, etc.)

From AOOS Mariculture Portal (https://mariculture.portal.aoos.org/#map)

End of Presentation

Thank you!

Panel Questions

Enter your questions or comments in the Questions box in the menu pane.

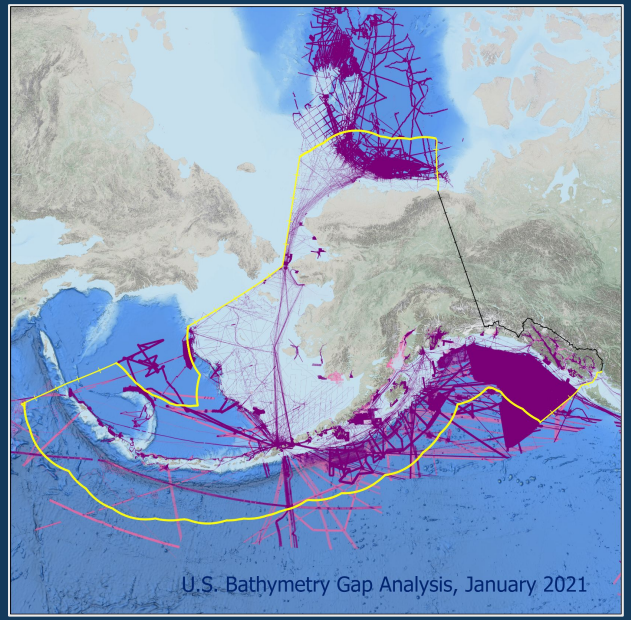
Alaska Coastal and Ocean Mapping Summit
December 2, 2021

Poll Question

Why is mapping important to you?

Alaska Coastal and Ocean Mapping Summit
December 2, 2021

GOT BATHYMETRY DATA?

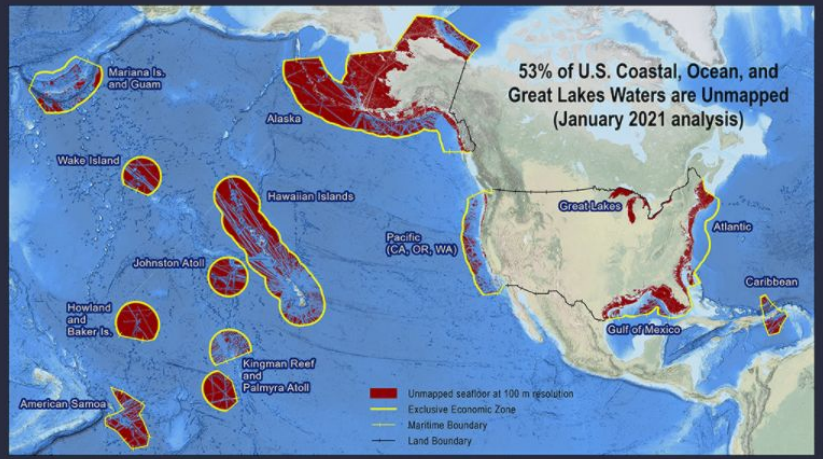


Review the current coverage (shown in purple/pink)

Let us know via the Form at 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 2021, 53% 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. All efforts underscore our collective dependence on collaborative acquisition and sharing of ocean mapping data.

Our goal is to coordinate, acquire, and share ocean mapping data with centralized repositories, such as NCEI and Digital Coast. To improve our knowledge of the ocean and ensure efficient use of limited mapping resources, we want to work with you to increase access to all existing ocean and coastal mapping data that you and other potential partners may have. Please use the following form to let us know if you have data that you are willing to contribute and we will follow up with you.

For more information about interagency ocean and coastal mapping activities, please contact iwgocm.staff@noaa.gov.

BREAK TIME

Back at 10:45am AKT