

Science, Service, Stewardship



Gateway to the Arctic: Defining the eastern portion of Bering Strait



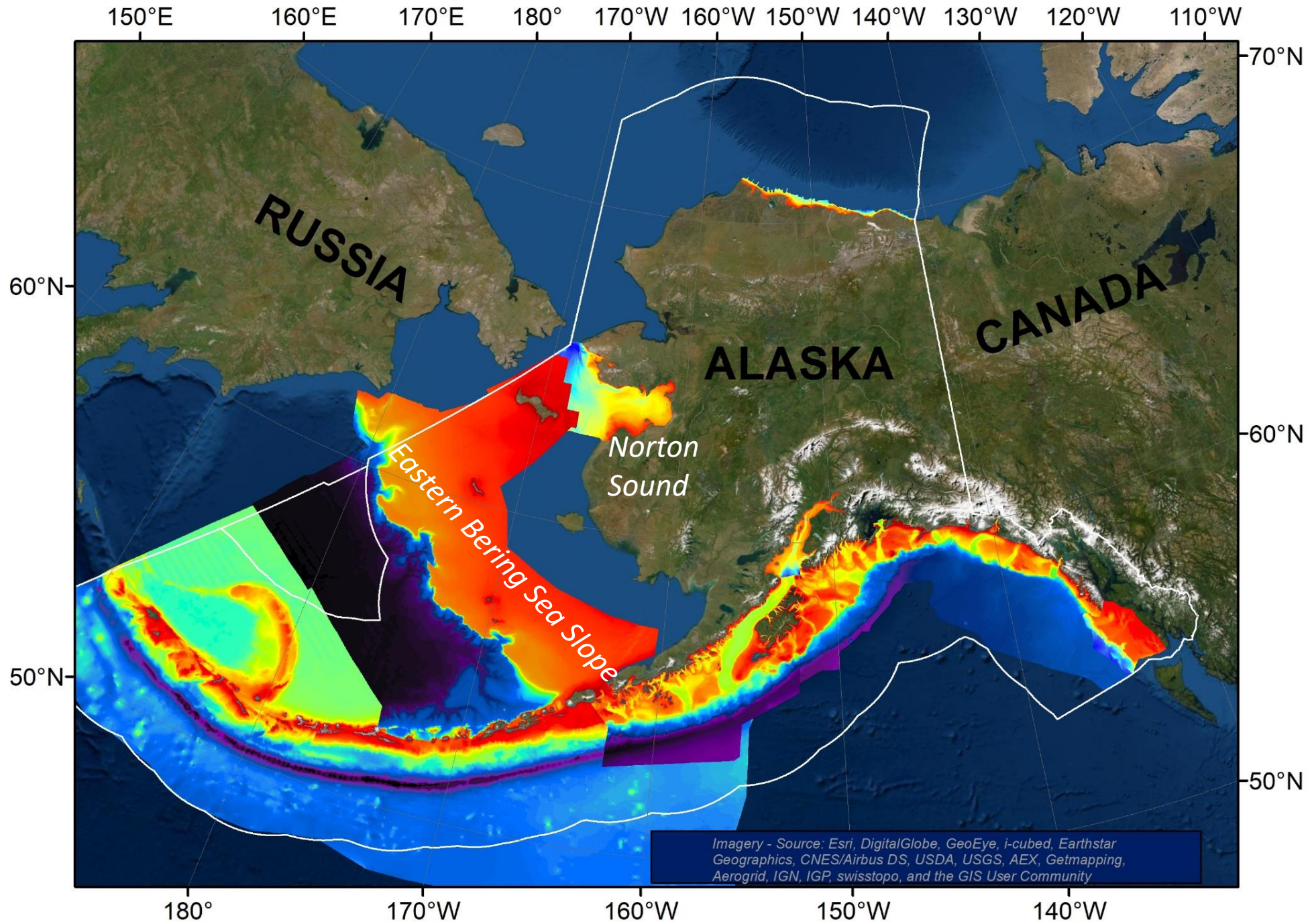
Mark Zimmermann – Fisheries Biologist

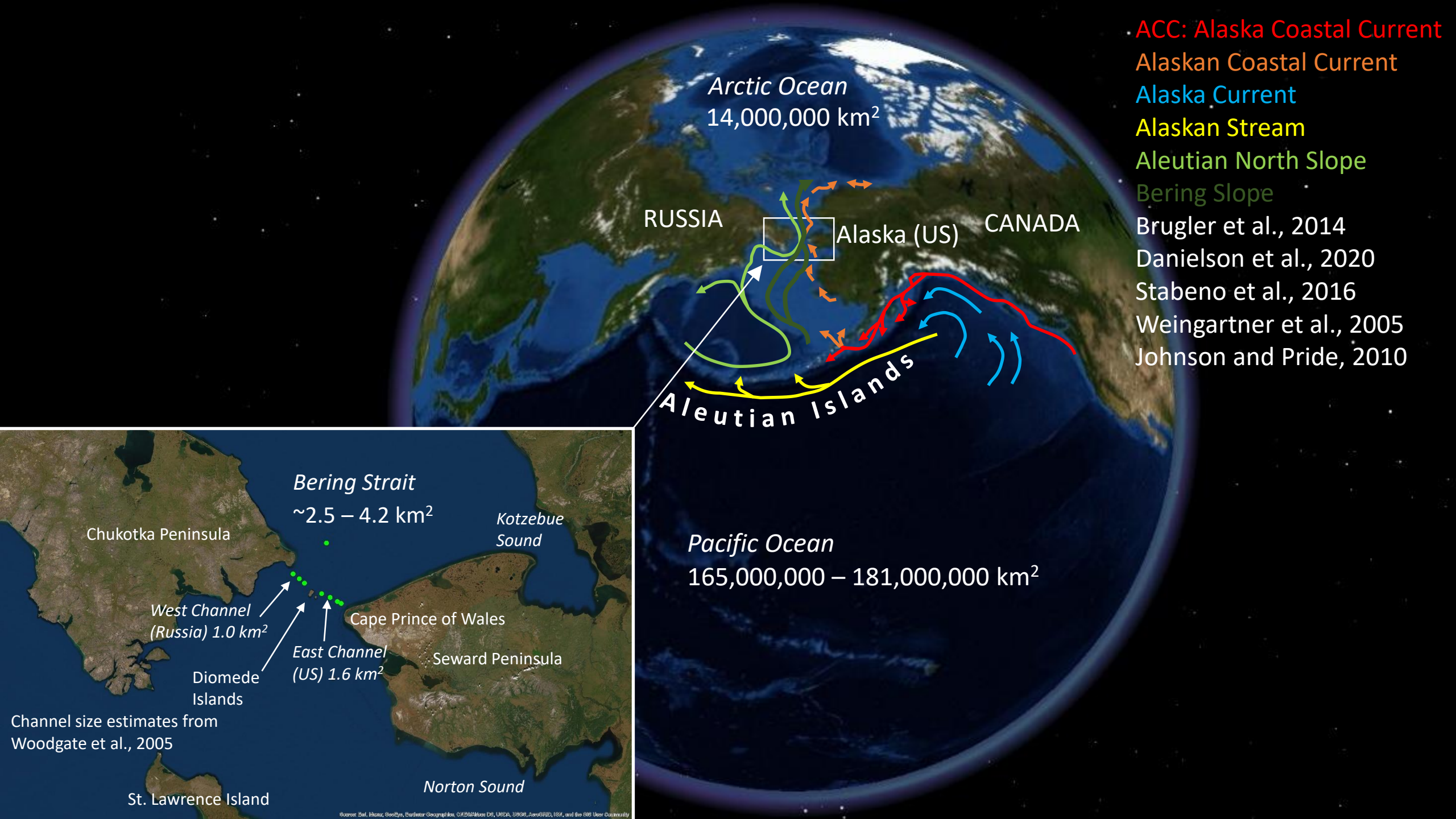
Rebecca A. Woodgate – Oceanographer

Megan Prescott – GIS Technician

NOAA

**NATIONAL
MARINE
FISHERIES
SERVICE**





- ACC: Alaska Coastal Current
- Alaskan Coastal Current
- Alaska Current
- Alaskan Stream
- Aleutian North Slope
- Bering Slope
- Brugler et al., 2014
- Danielson et al., 2020
- Stabeno et al., 2016
- Weingartner et al., 2005
- Johnson and Pride, 2010

Arctic Ocean
14,000,000 km²

RUSSIA Alaska (US) CANADA

Aleutian Islands

Pacific Ocean
165,000,000 – 181,000,000 km²

Bering Strait
~2.5 – 4.2 km²

Chukotka Peninsula

Kotzebue Sound

West Channel
(Russia) 1.0 km²

Cape Prince of Wales

Diomedede Islands

East Channel
(US) 1.6 km²

Seward Peninsula

Channel size estimates from
Woodgate et al., 2005

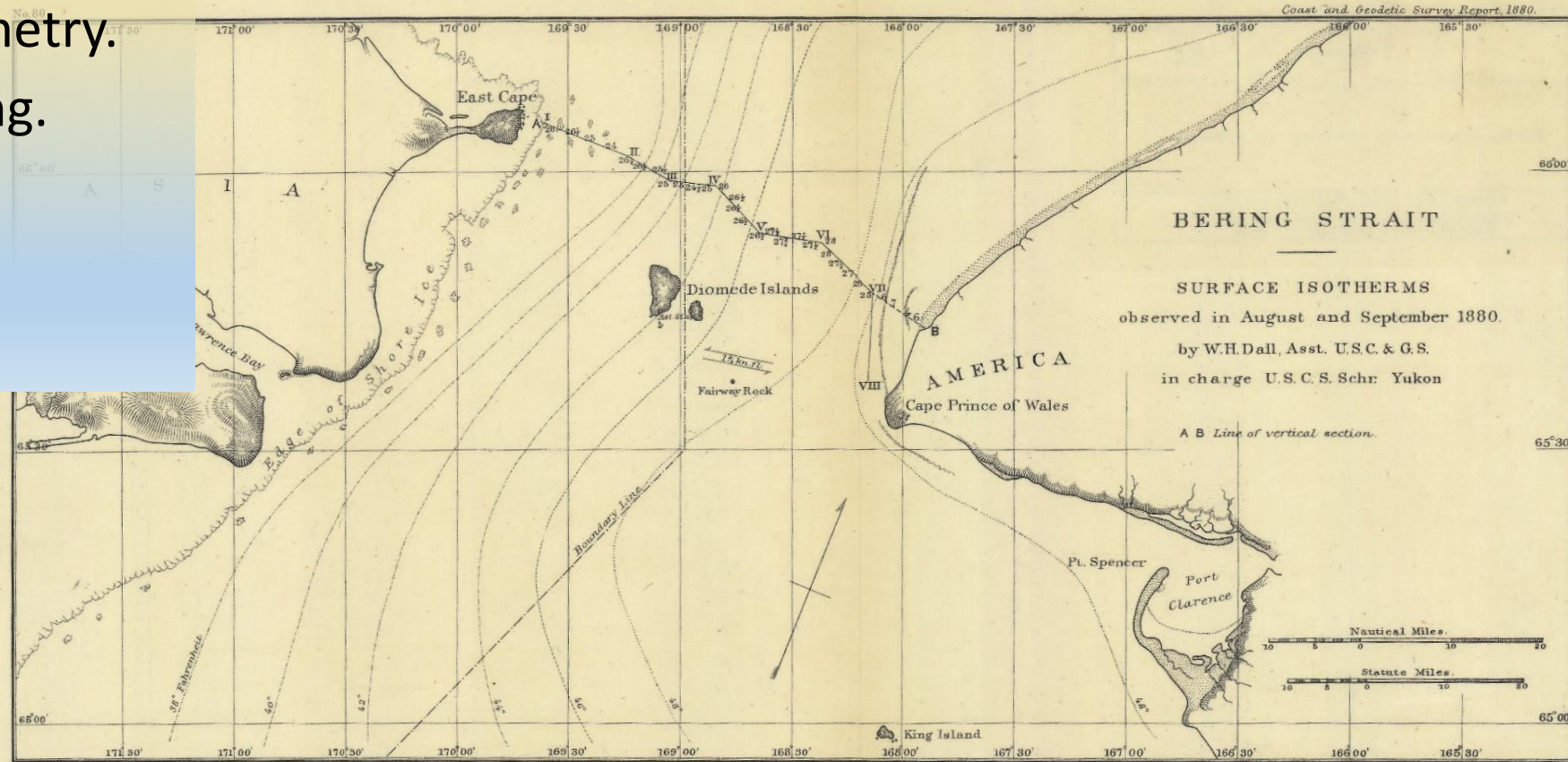
St. Lawrence Island

Norton Sound

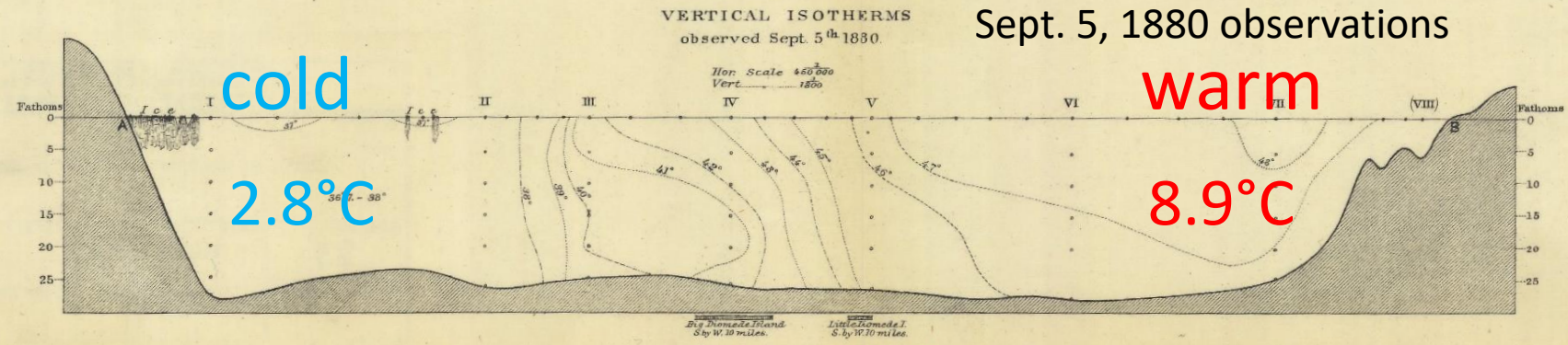
Source: Bal. Inoué, SwEpa, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Outline

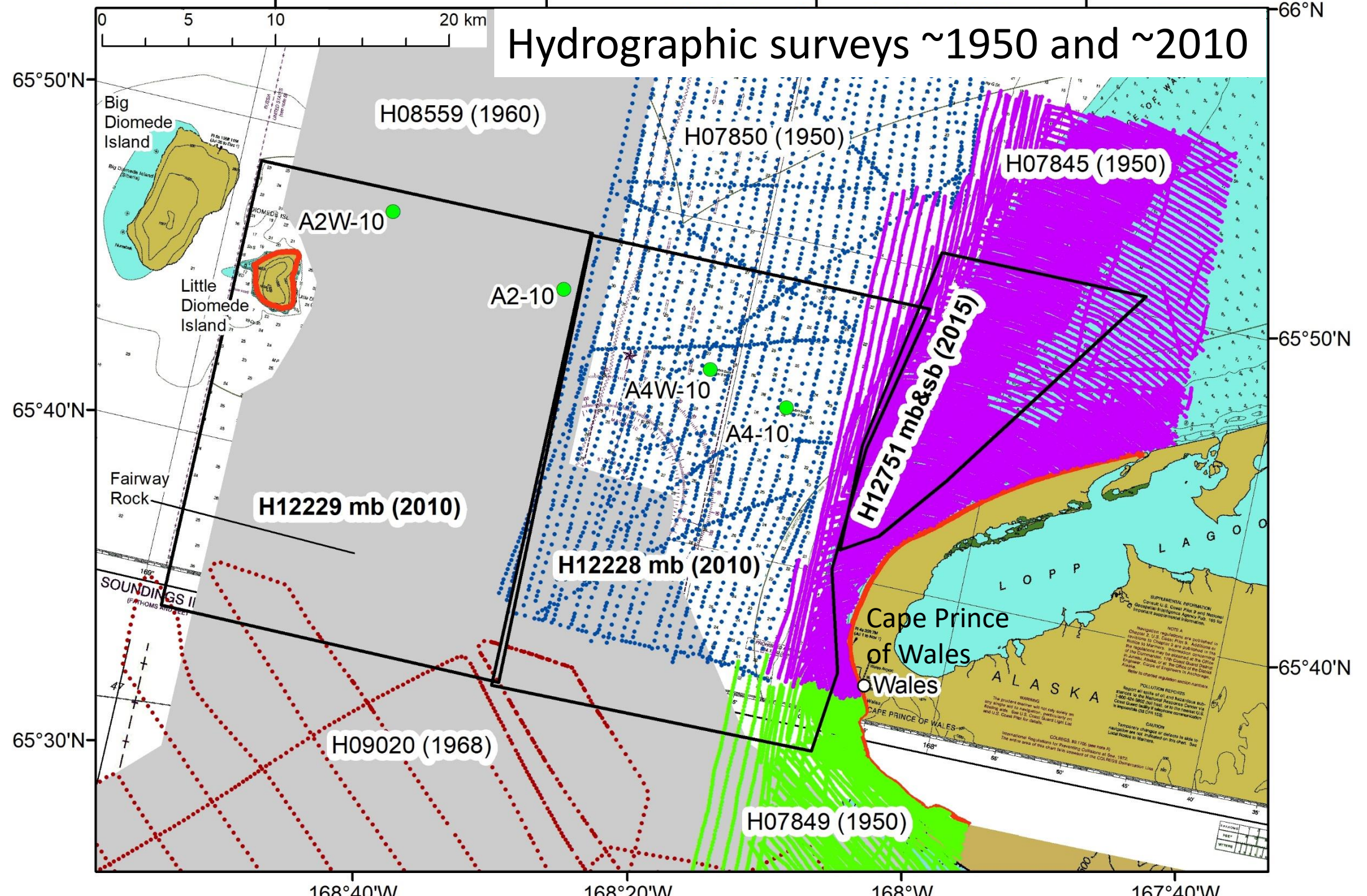
- Eastern Bering Strait bathymetry.
- Strait cross-sectional opening.
- Cross-section at moorings.
- Depth change over time.
- Seafloor features.

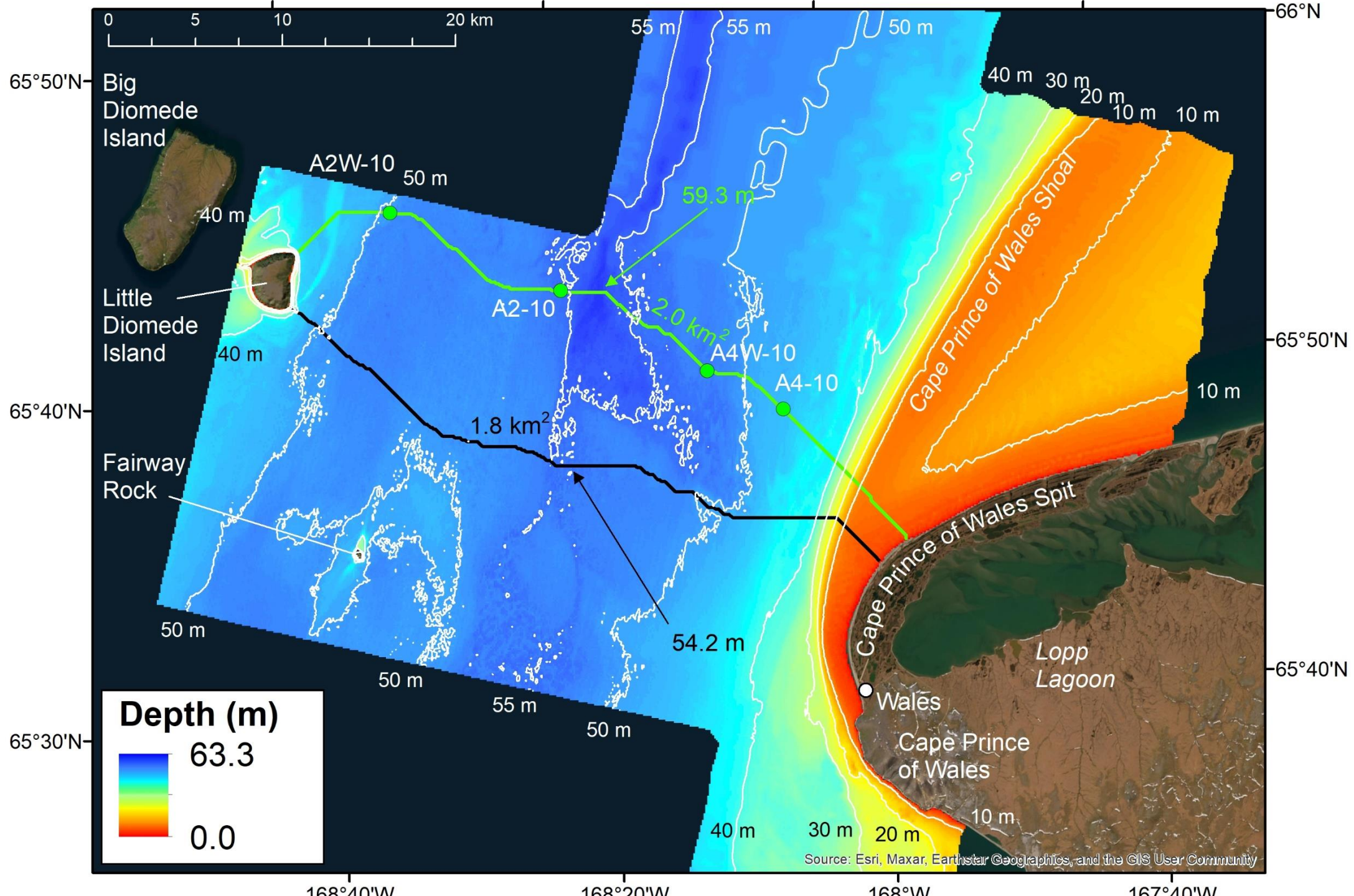


William H. Dall,
Sept. 5, 1880 observations

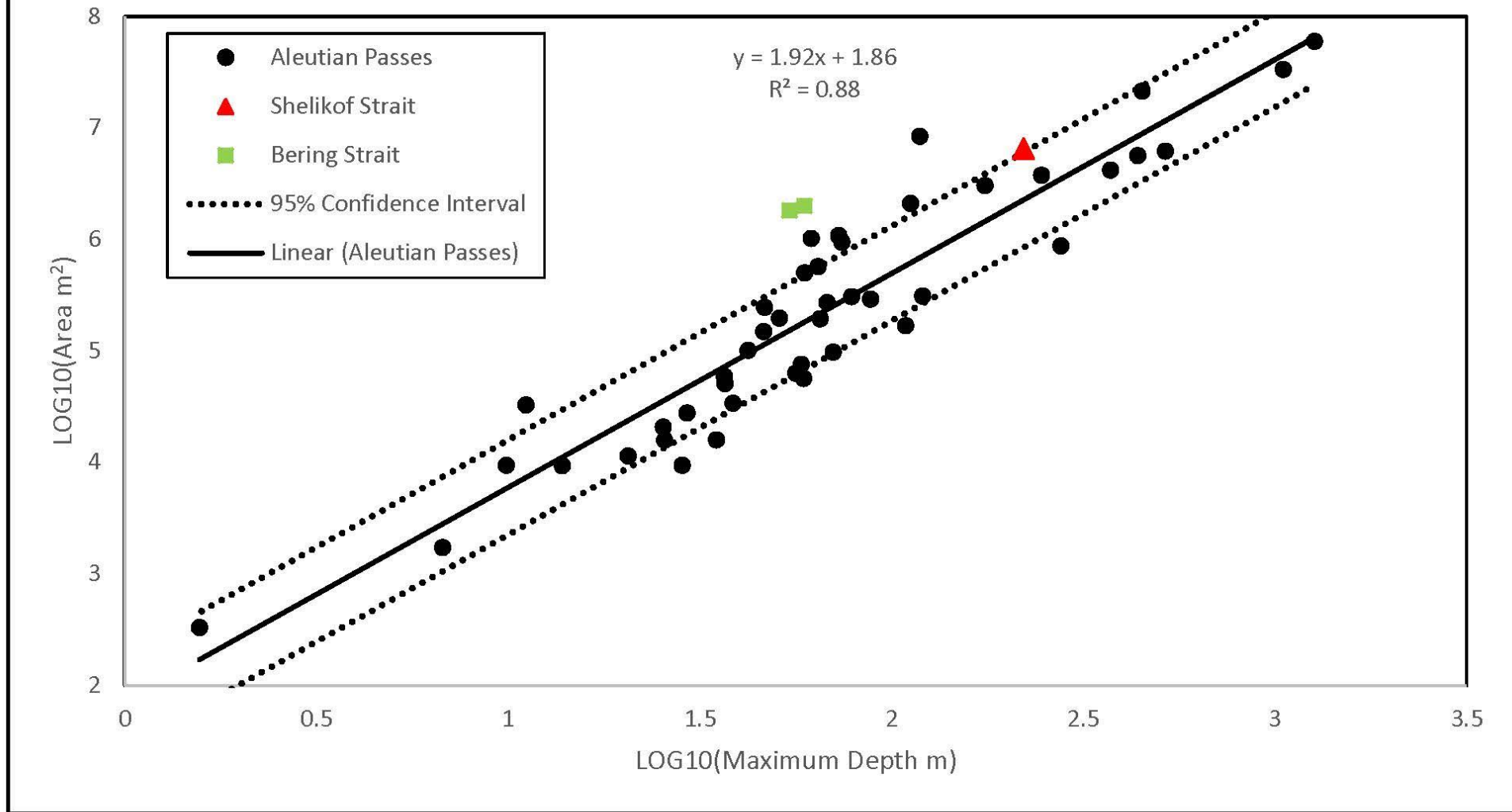


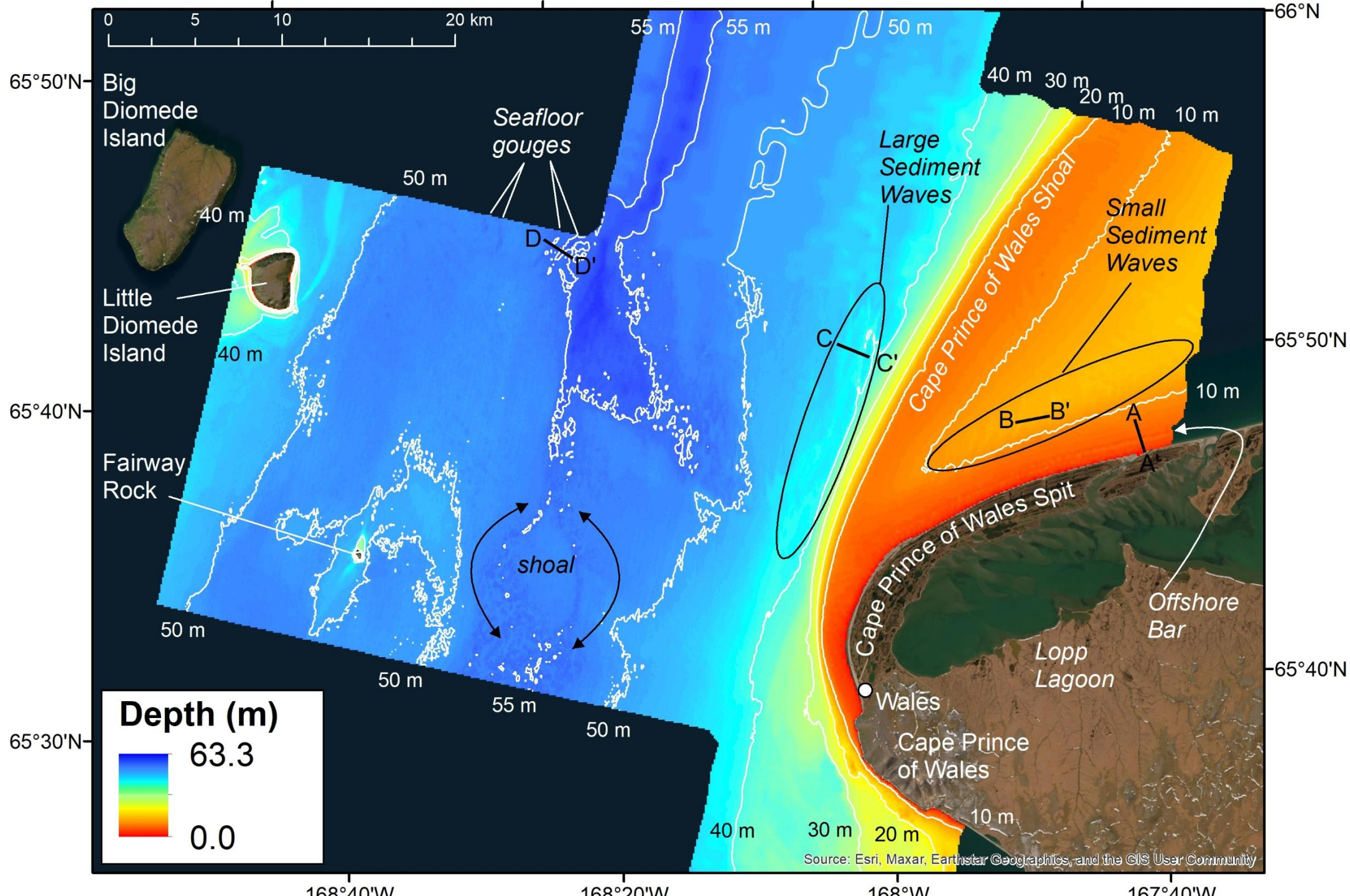
Hydrographic surveys ~1950 and ~2010



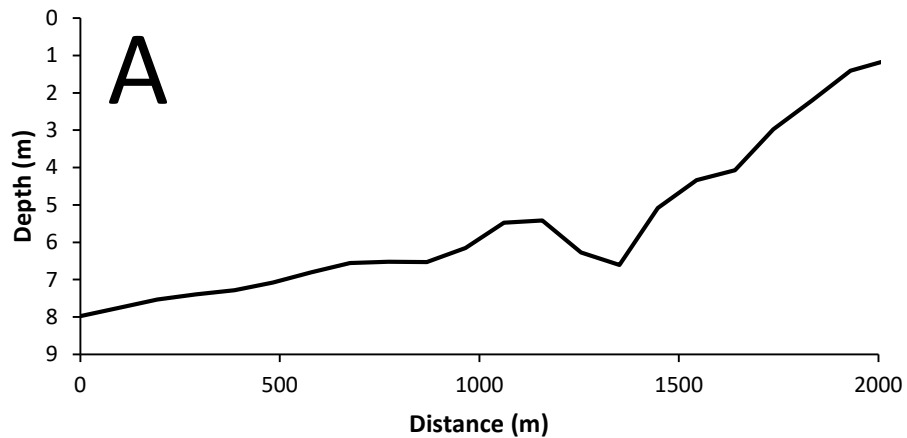


Maximum depth versus area of passes

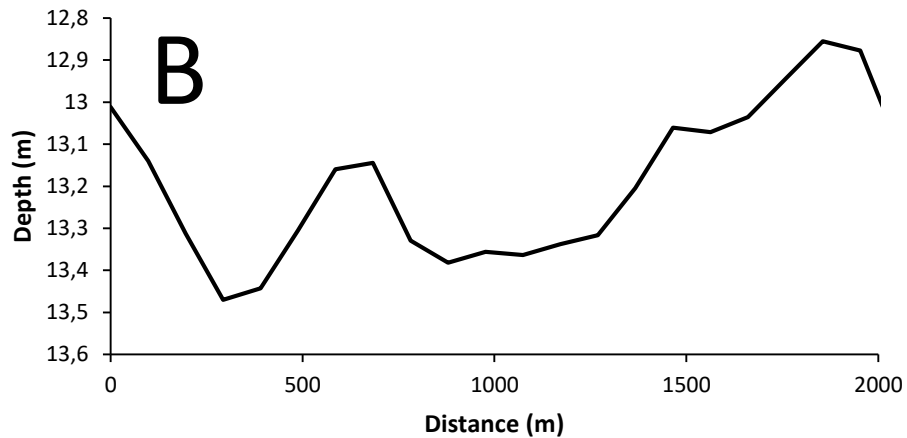




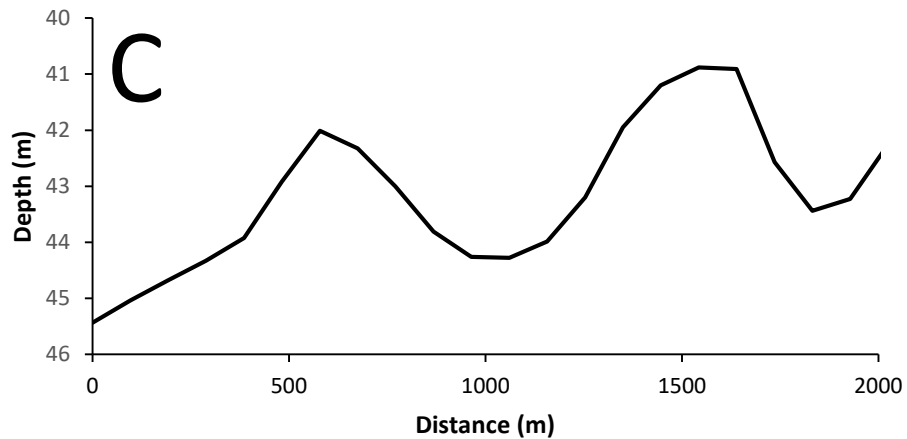
Offshore Bar



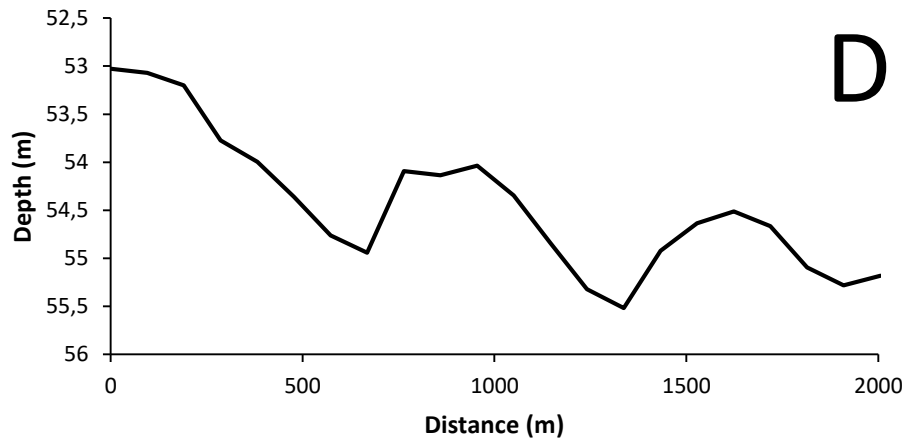
Small Sediment Waves



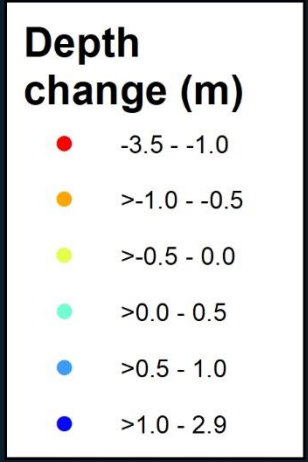
Large Sediment Waves



Eastern Seafloor Gouges



Erosion and deposition



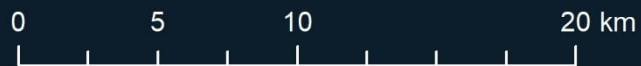
65°50'N
Big Diomedede Island

Little Diomedede Island

65°40'N

Fairway Rock

65°30'N



168°10'W

168°20'W

168°W

167°10'W

66°N

65°50'N

65°40'N

Cape Prince of Wales Shoal

Cape Prince of Wales Spit

Lopp Lagoon

Wales

Cape Prince of Wales

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Seafloor features

Chukchi Sea

Big Diomede Island

Little Diomede Island

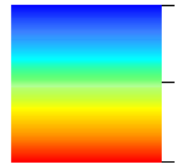
Fairway Rock

Cape Prince of Wales Shoal

Lopp Lagoon

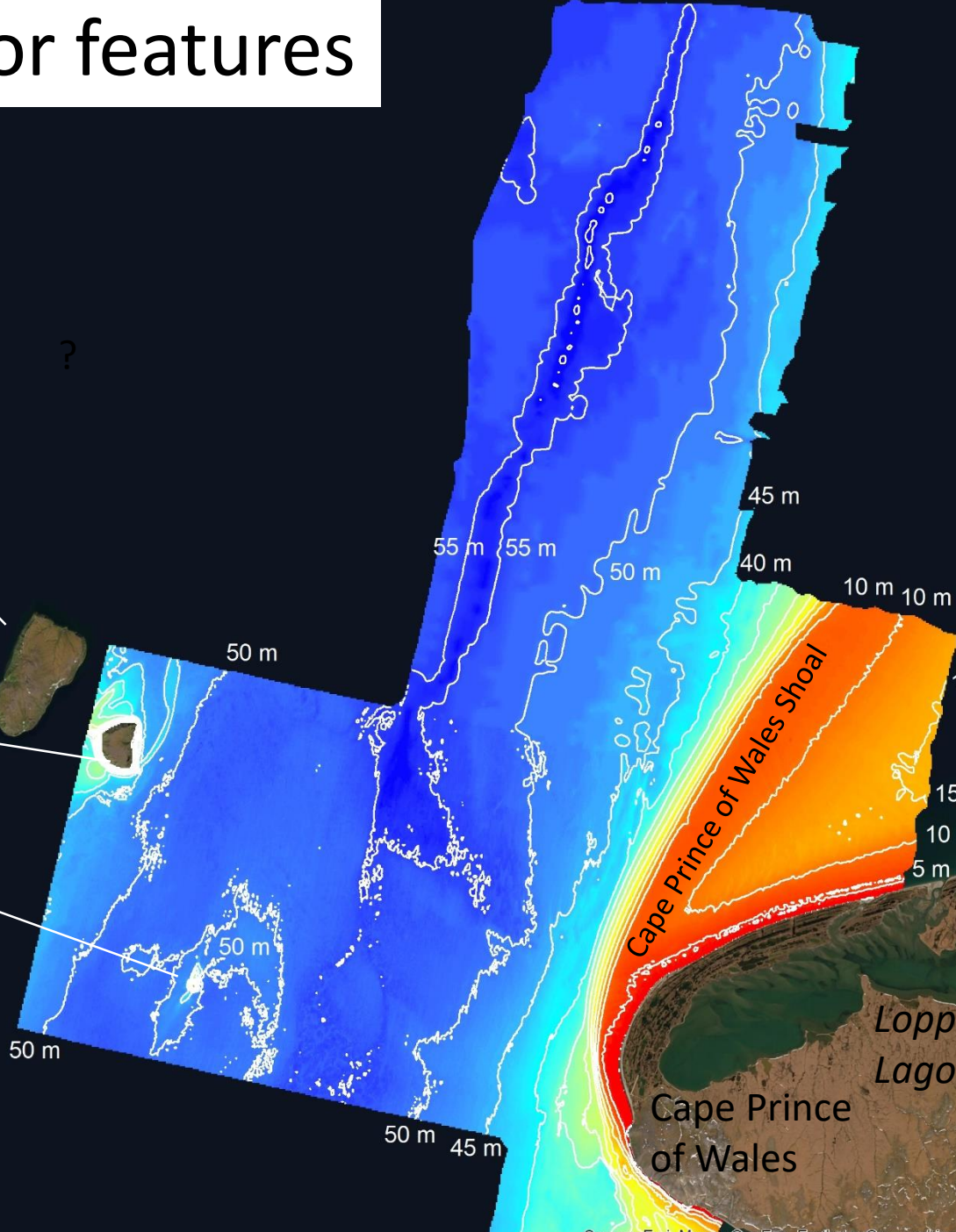
Cape Prince of Wales

Depth (m)

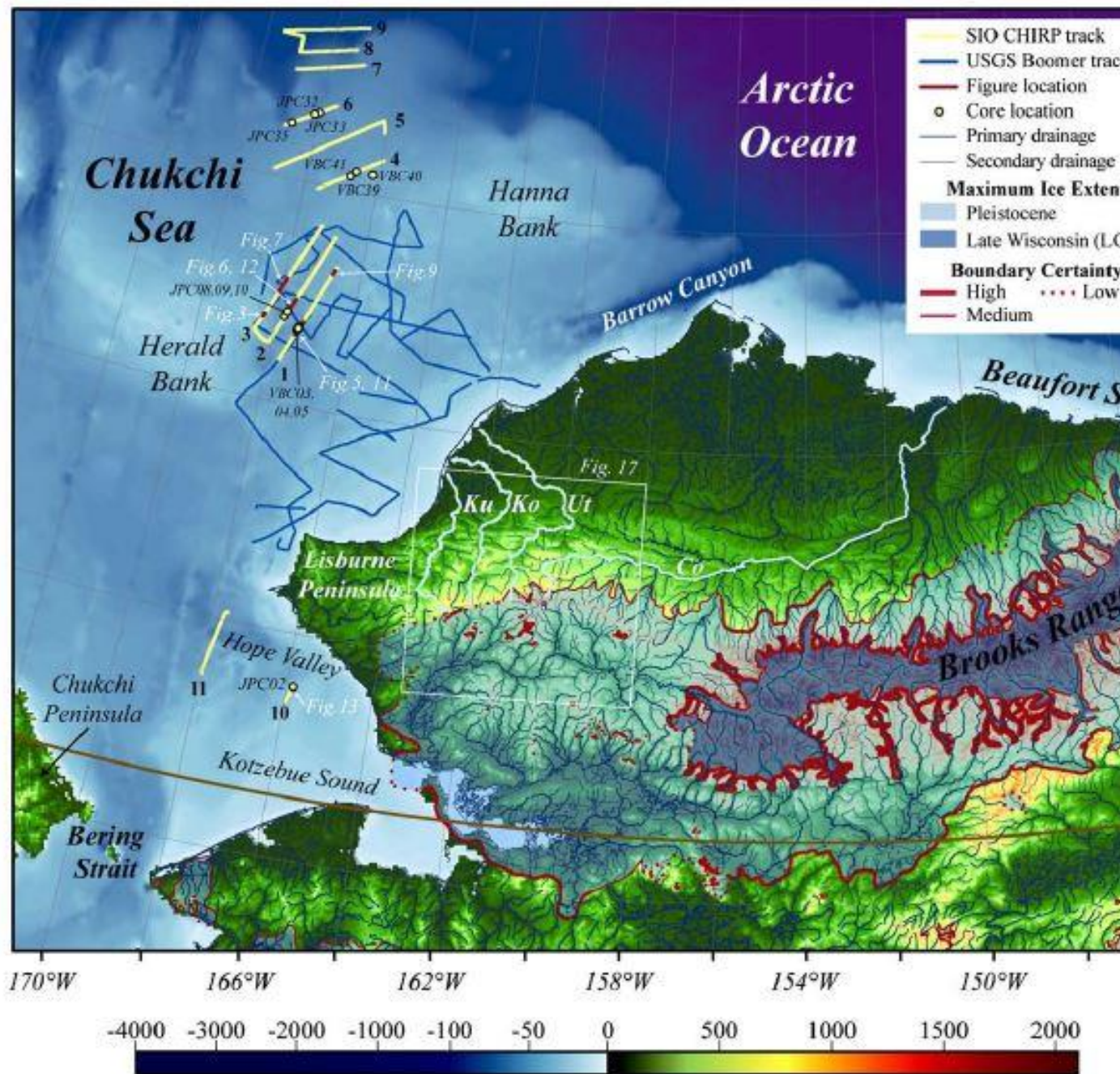
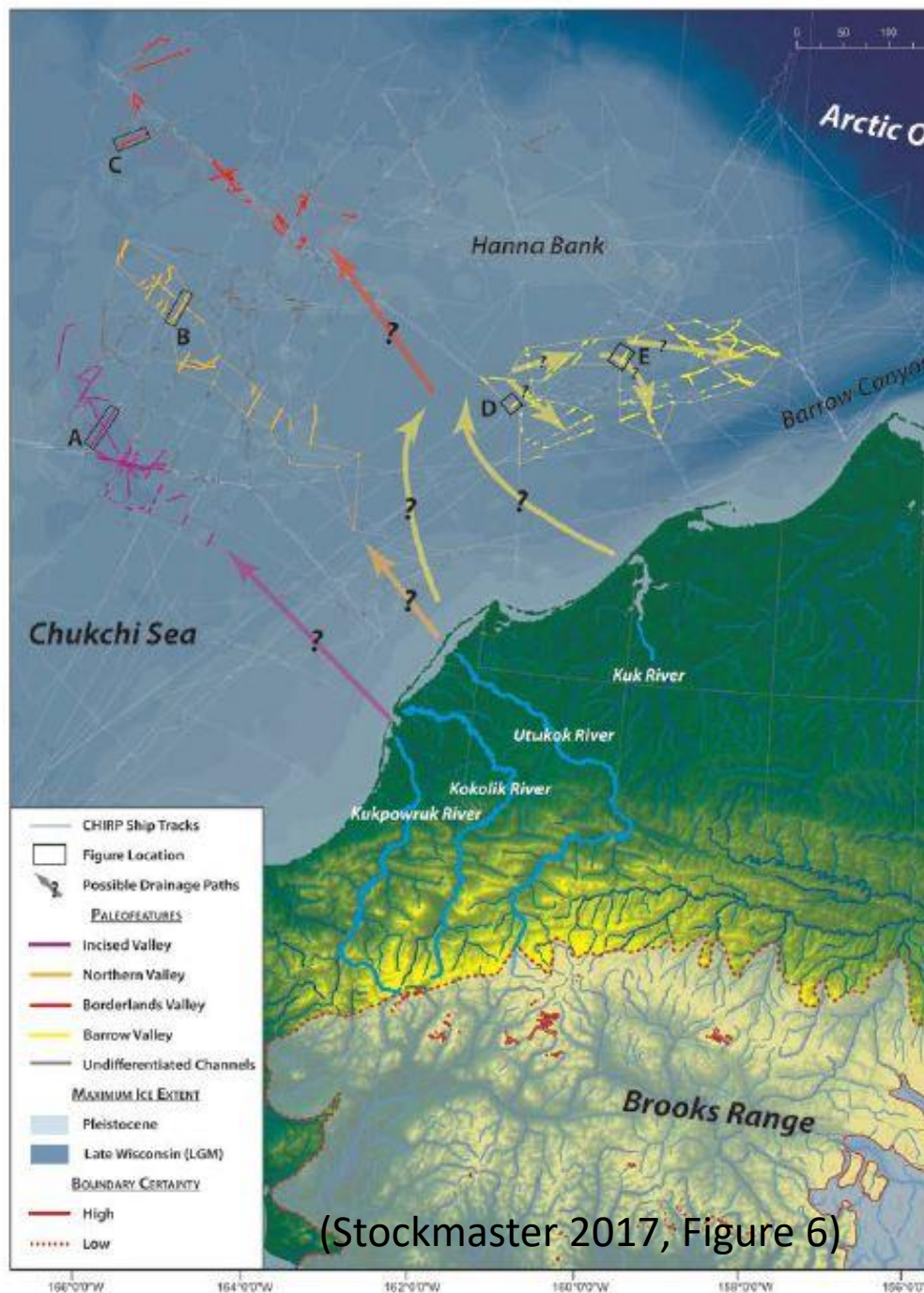


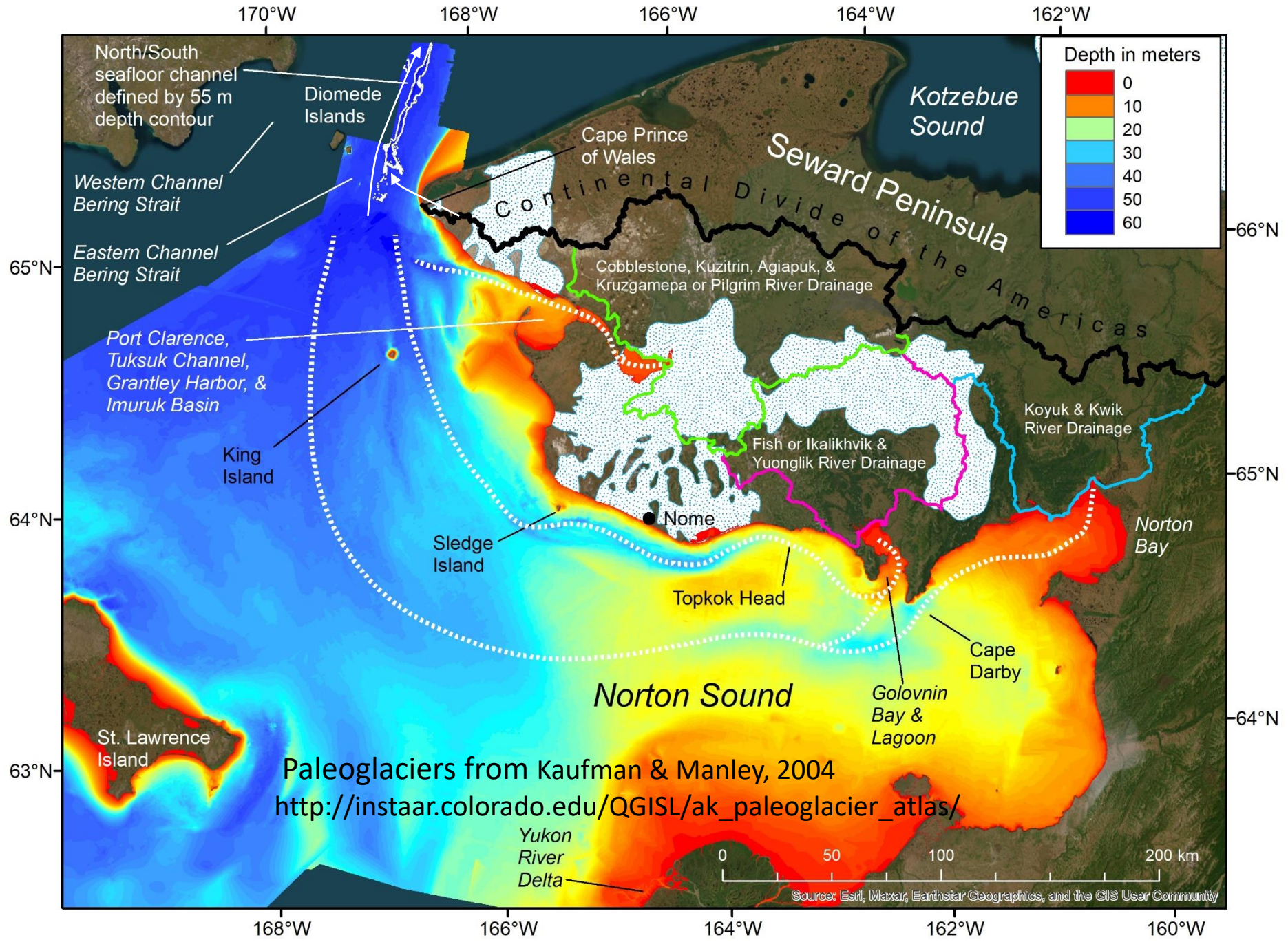
63.3143

0.0



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





North/South seafloor channel defined by 55 m depth contour

Diomed Islands

Western Channel Bering Strait

Eastern Channel Bering Strait

Port Clarence, Tuksuk Channel, Grantley Harbor, & Imuruk Basin

King Island

Sledge Island

St. Lawrence Island

Cape Prince of Wales

Cobblestone, Kuzitrin, Agiapuk, & Kruzgamepa or Pilgrim River Drainage

Fish or Ikalikhvik & Yuonglik River Drainage

Nome

Topkok Head

Cape Darby

Golovnin Bay & Lagoon

Norton Sound

Norton Bay

Yukon River Delta

Kotzebue Sound

Seward Peninsula

Continental Divide of the Americas

Koyuk & Kwik River Drainage

Paleoglaciers from Kaufman & Manley, 2004
http://instaar.colorado.edu/QGISL/ak_paleoglacier_atlas/

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Conclusions

- Eastern Bering Strait 1.8 km^2 , across moorings 2.0 km^2 (Woodgate et al. 2005: 1.6 km^2).
- Deepening $> 1 \text{ m}$, widening over 1950 to 2010.
- Seafloor features – paleodrainages?
- Progress in Oceanography, Vol. 215, 2023.
<https://doi.org/10.1016/j.pocean.2023.103052>