

TERRITORIO NACIONAL DE LA TIERRA DEL FUEGO,
ANTÁRTICA E ISLAS DEL ATLÁNTICO SUR
ISLAS SHETLAND DEL SUR
DE C. PROMONTORIO NORTE A ESTR. MAC FARLANE
LEVANTAMIENTO AEROFOTOGRAFICO CON APOYO PARCIAL 1954
COMPILACION DE LEVANTAMIENTOS HIDROGRAFICOS DEL S.H.N. HASTA 1956
PROTECCION MARITIMA
ESCALA DEL GRUPO 1:200,000
PROYECTADO EN 1954

A Canadian-led Collaborative Antarctic Seabed Mapping Program

Ian Church
University of New Brunswick
FEMME 2026



POLAR
POLAIRE



OCEAN
MAPPING GROUP

Canada's Interest in Antarctica



Antarctic Treaty System

- 12 Original countries (center ring)

Two levels

- Consultative (center & mid ring)
- Non-consultative (outer ring)
- Canada is active in Antarctica despite not having a base
- Canada's application for consultative status has been blocked in the past

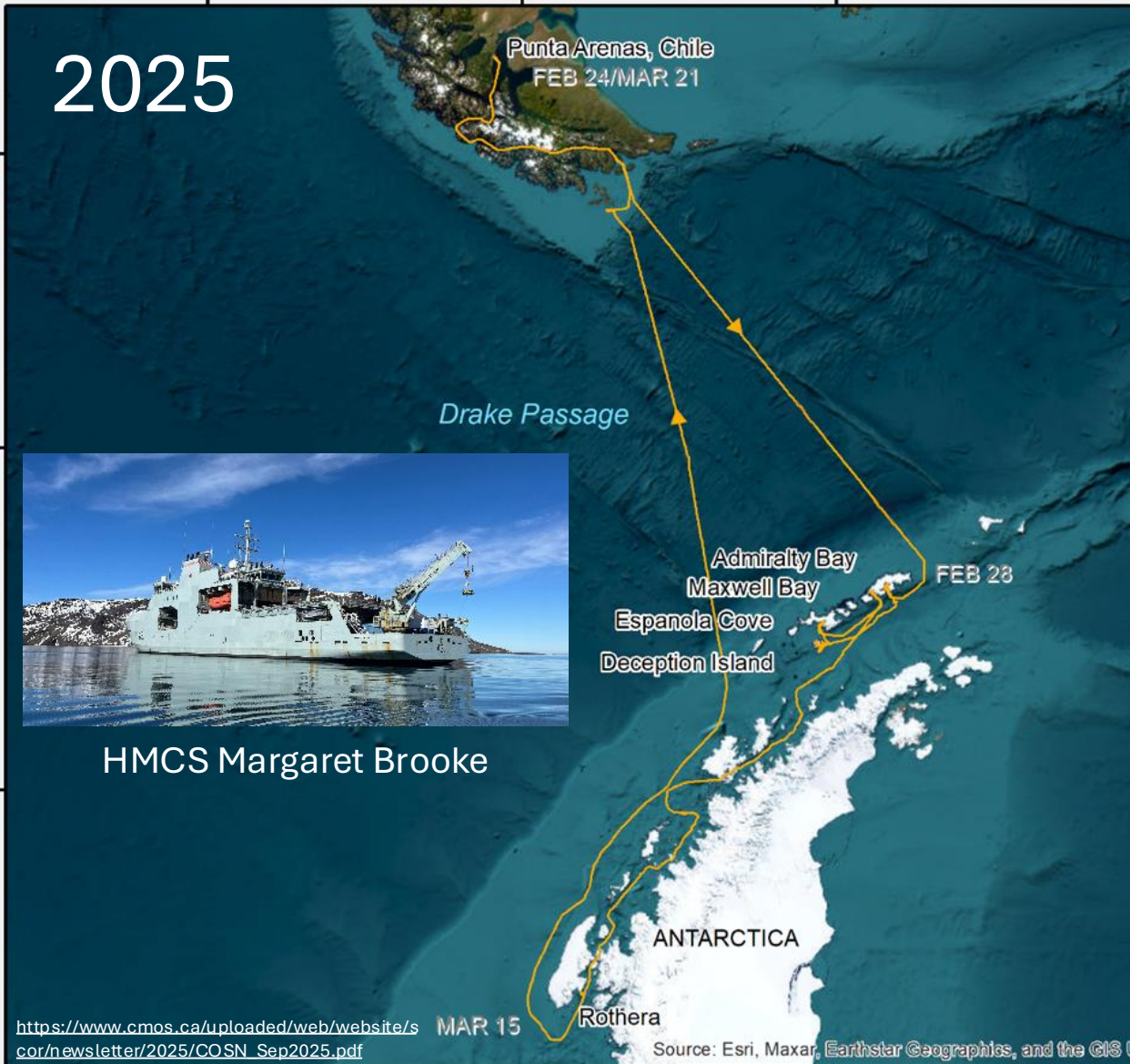
IHO Hydrographic Commission of Antarctica (HCA)



Canadian Antarctic Research Expeditions



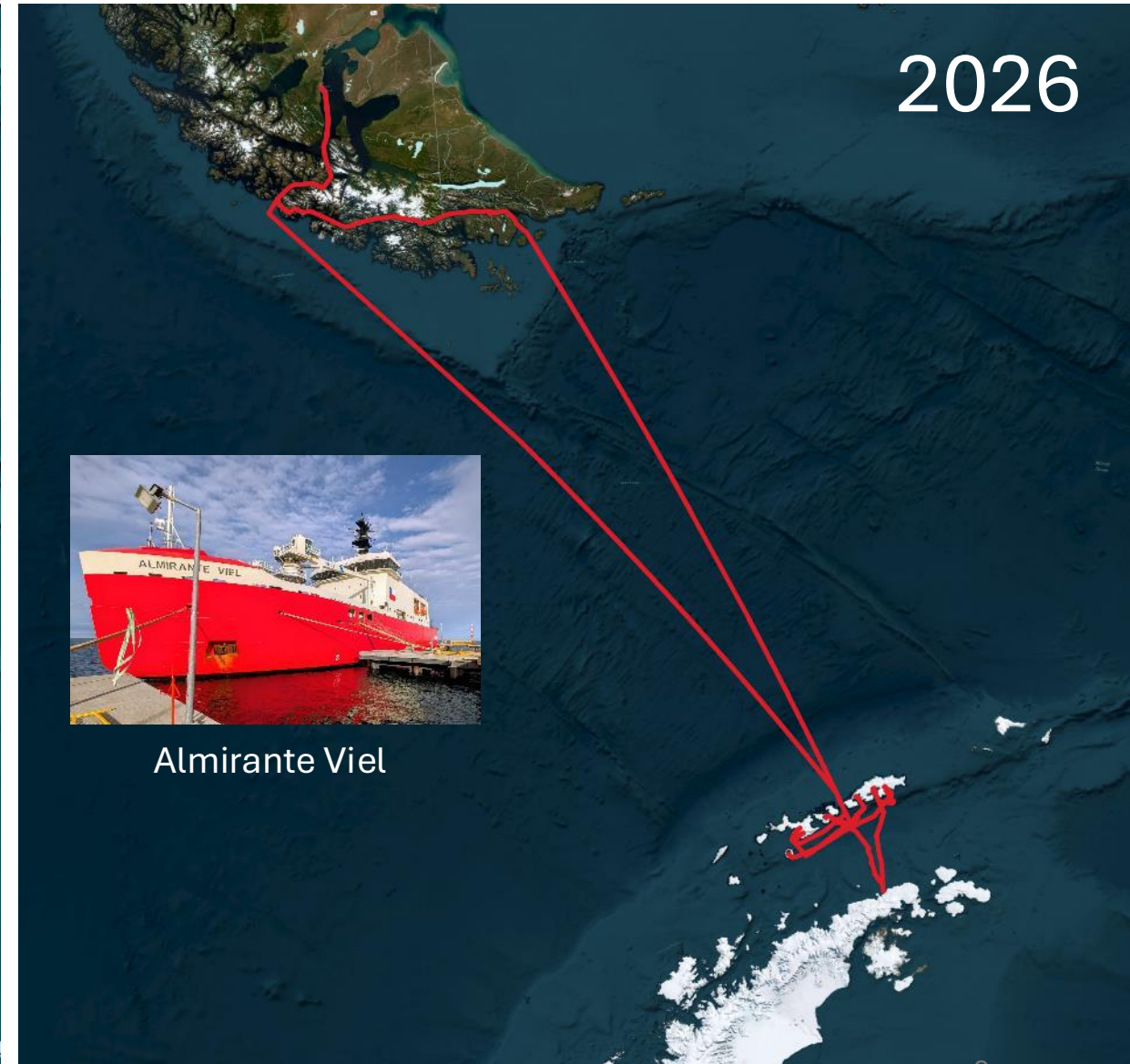
2025



— HMCS Margaret Brooke Track Line

Projection: WGS84

2026



Almirante Viel

CARE2025

HMCS Margaret Brooke

Harry DeWolf-class offshore patrol vessel

Commissioned: October 28, 2022

Role: Arctic patrol and EEZ surveillance

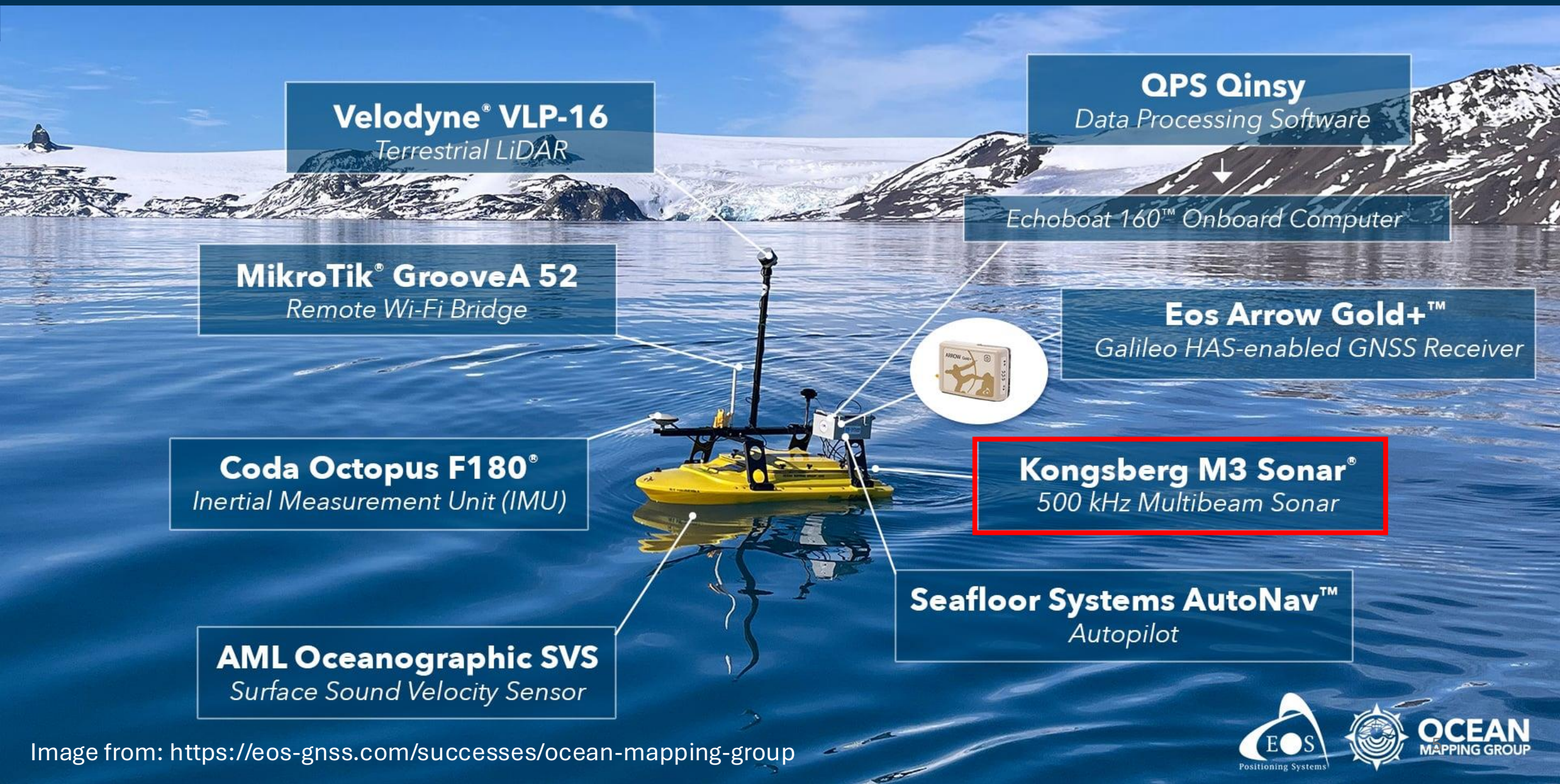
Ice Capability: Polar Class 5 (1-metre ice)

Range: 6,800 nautical miles; 120 days



Canada





Velodyne® VLP-16
Terrestrial LiDAR

QPS Qinsy
Data Processing Software

Echoboat 160™ Onboard Computer

MikroTik® GrooveA 52
Remote Wi-Fi Bridge

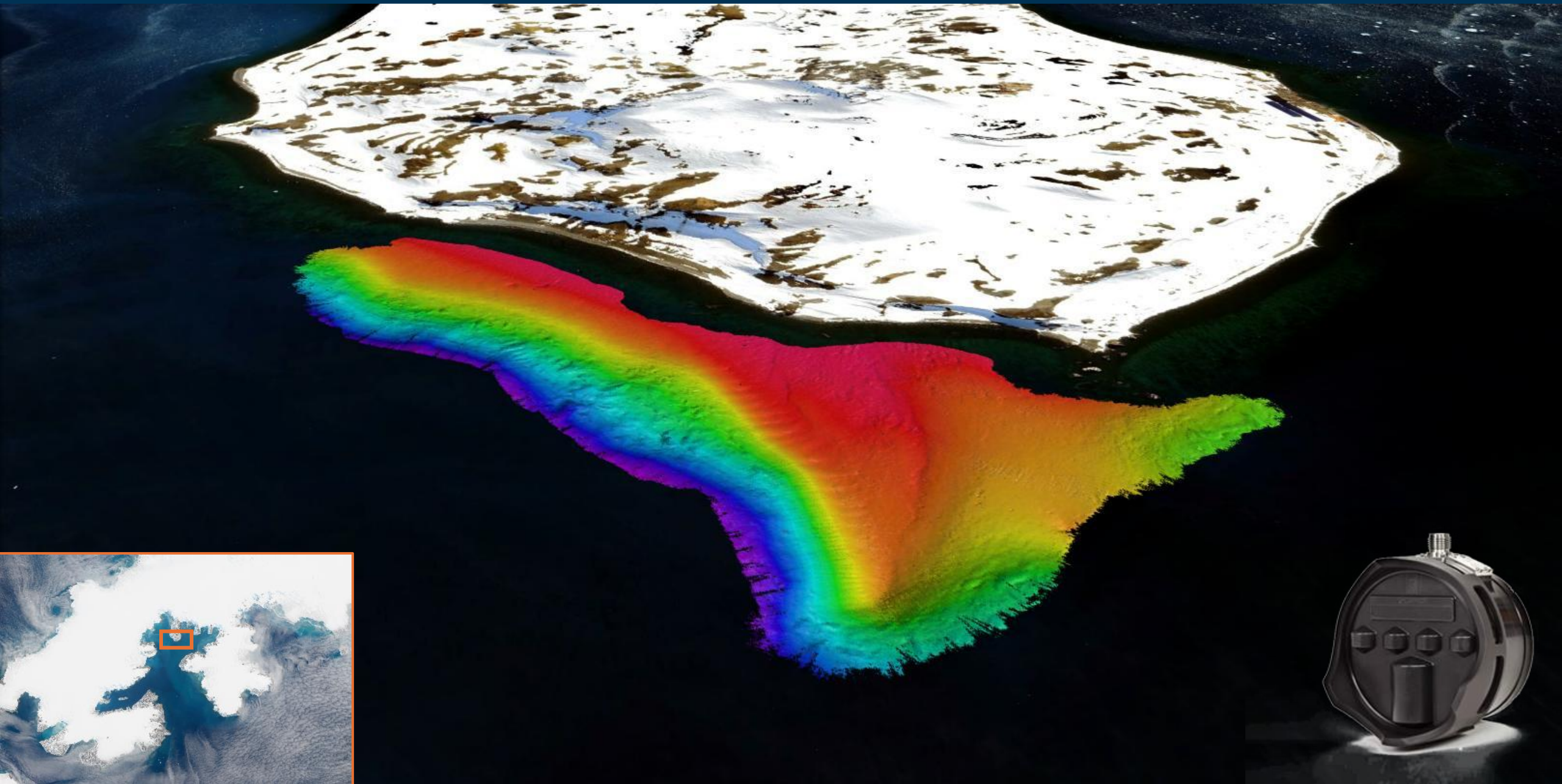
Eos Arrow Gold+™
Galileo HAS-enabled GNSS Receiver

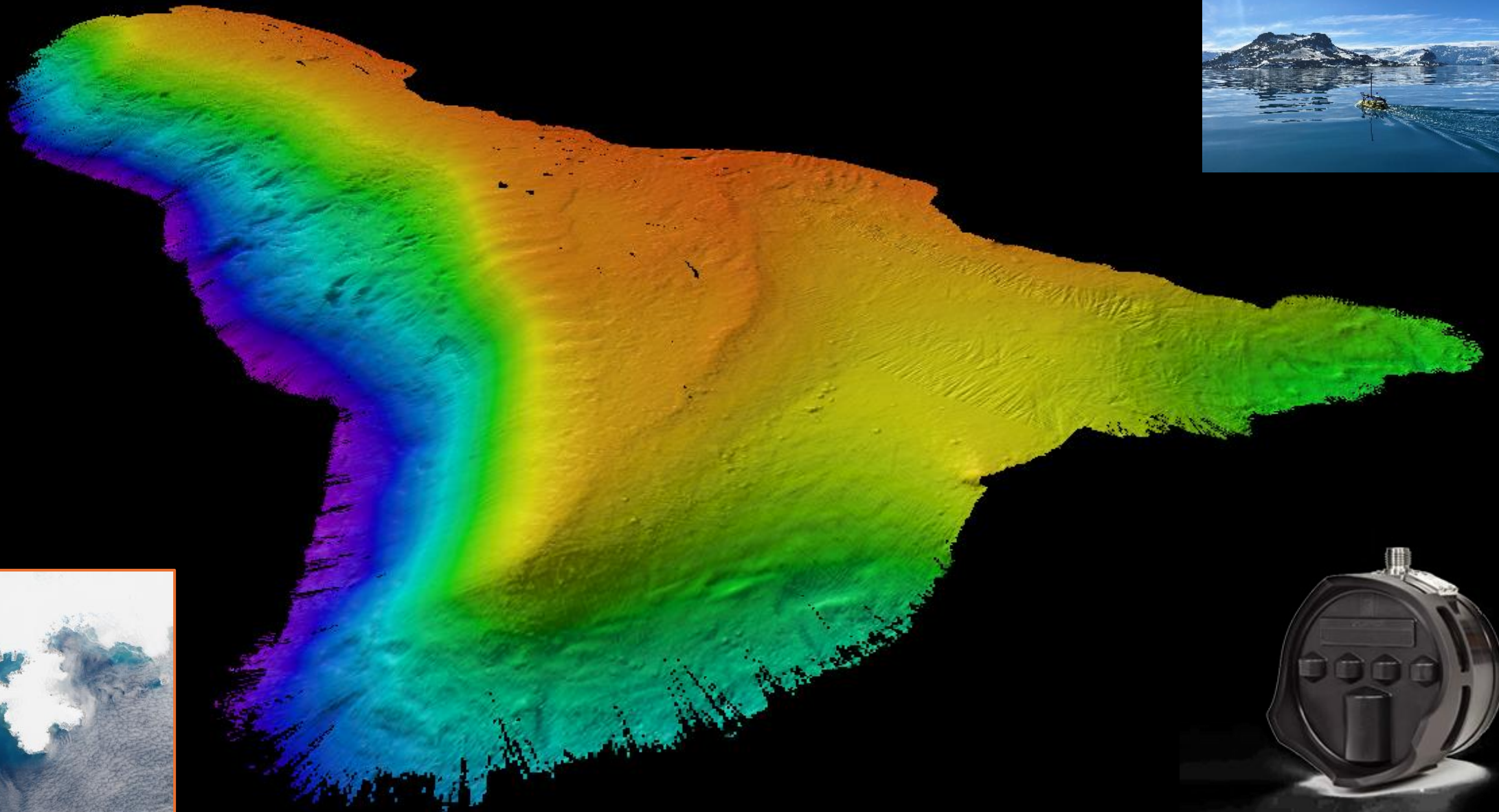
Coda Octopus F180®
Inertial Measurement Unit (IMU)

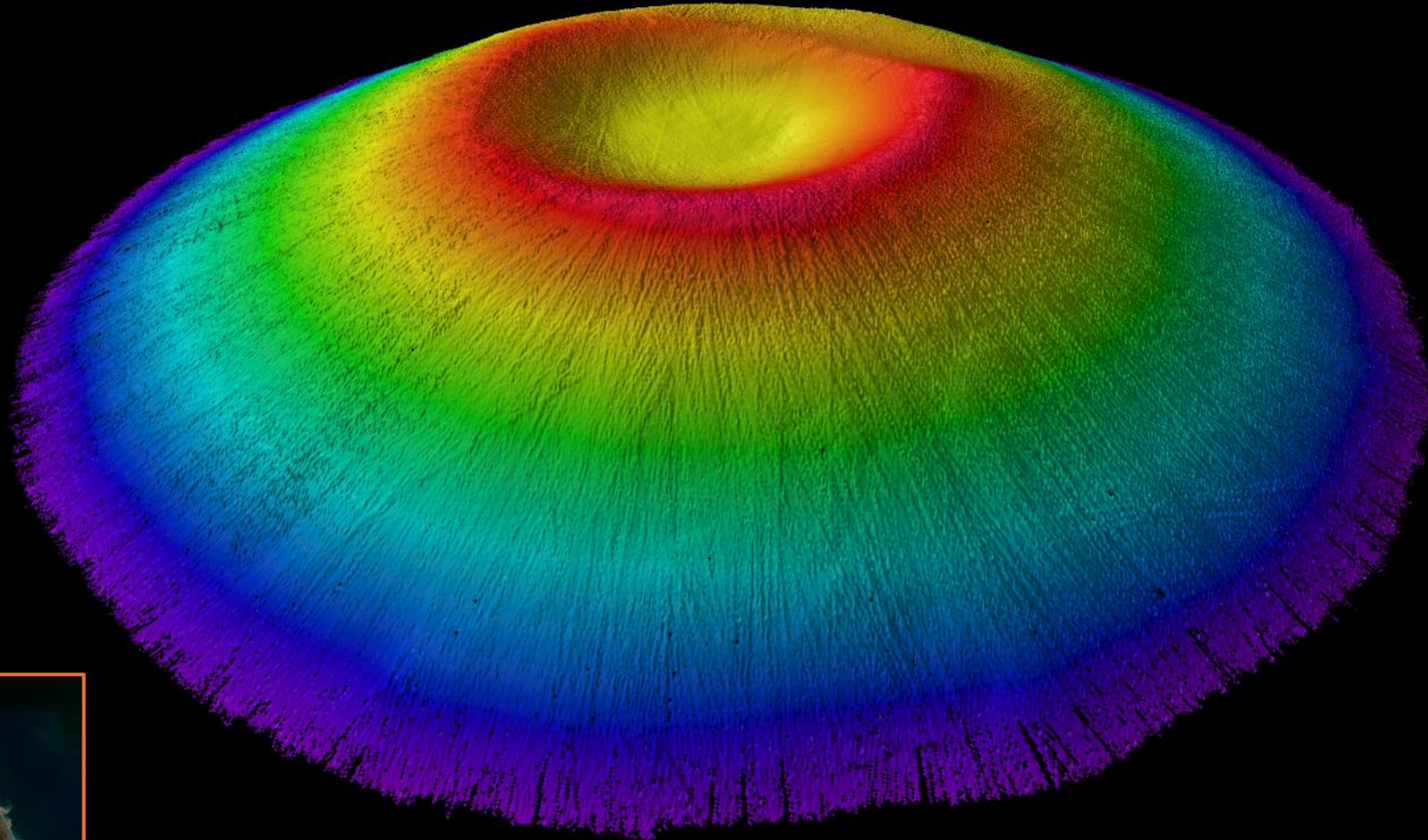
Kongsberg M3 Sonar®
500 kHz Multibeam Sonar

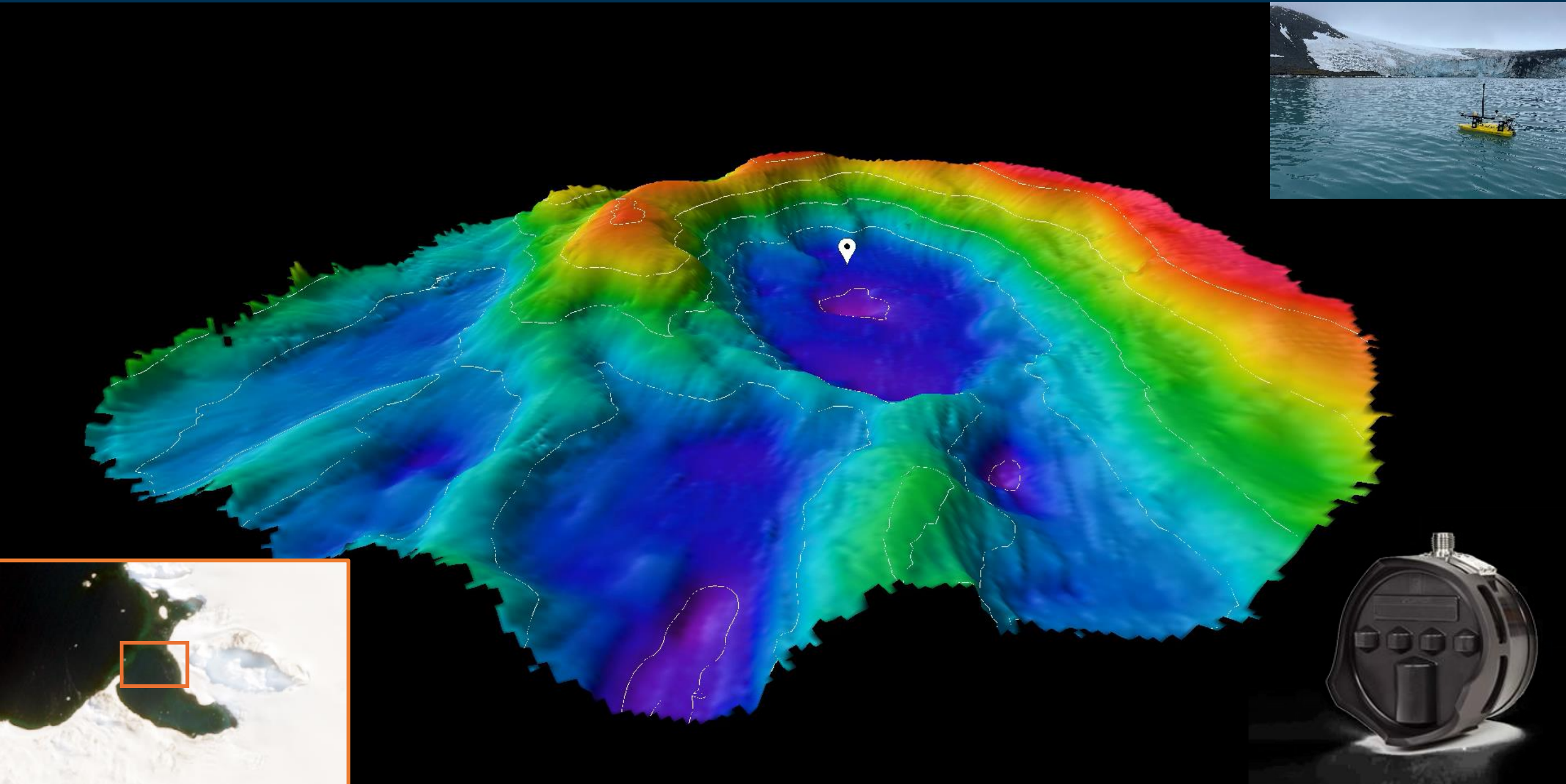
AML Oceanographic SVS
Surface Sound Velocity Sensor

Seafloor Systems AutoNav™
Autopilot









Canadian Antarctic Research Expedition 2026



Two weeks – March 2026

33 Canadians:

- 15 RCN
- 5 DND / CCG
- 10 Scientists
- 3 Hydrography Team



Equipment

Living with the
Limitations of an Ice
Breaker Install

K-Sync

CS90

EK80

SX90

OS 150

OS 75

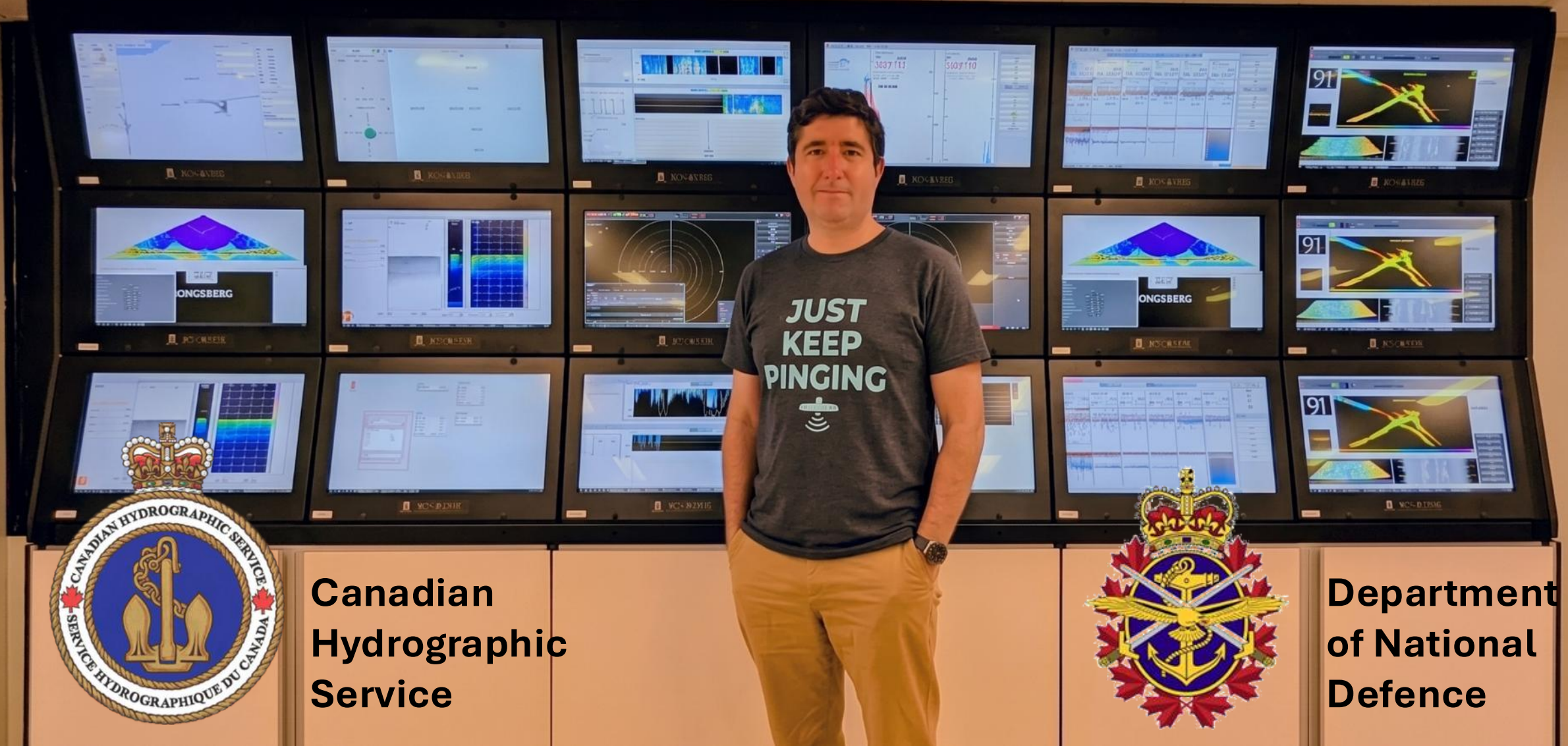
EA 640

EM 124

Hipap

SBP 29

Combining a Strategy for Research Mapping with Charting Procedures and Workflows



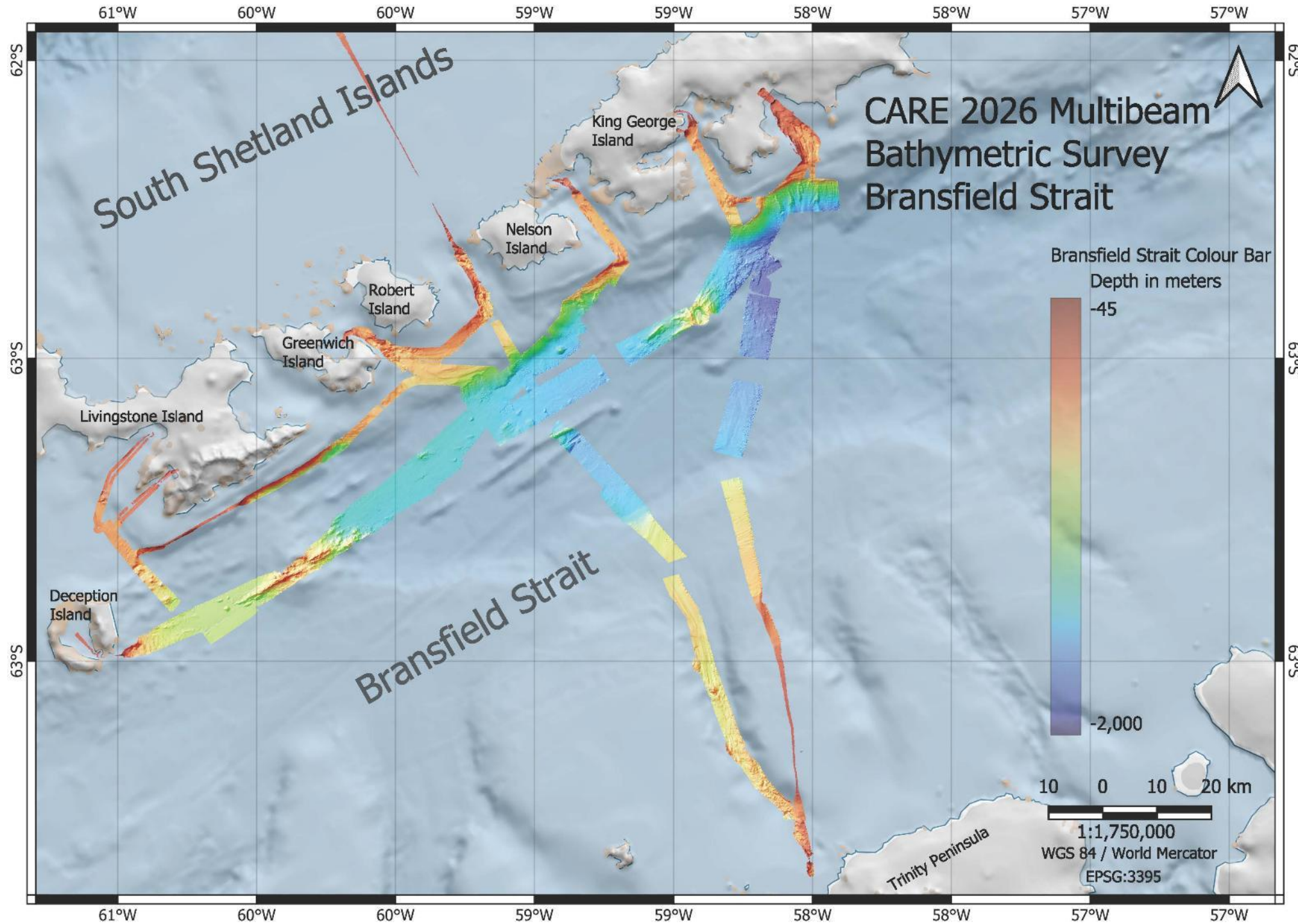
**Canadian
Hydrographic
Service**



**Department
of National
Defence**

Overview

- 1900 km of Track lines
- Over 6000 km² of Multibeam sonar data
- Including HCA Priority Data



King George Bay

ENC **OVR X2.5** BEST CHA
TGT VID
True, Ground Stab 12 min

ite Monitor
ive Route
Validation Status
Route Current — Next —
Inn Next Next

rr WP
g / Rng WOP
ne To WOP
VOL / DTG

ext Log Turn To * Rate *min
adius NM Dist NM
XTD XTL
Actual NM 0.11 NM AP Mode
Motors

ETA HS

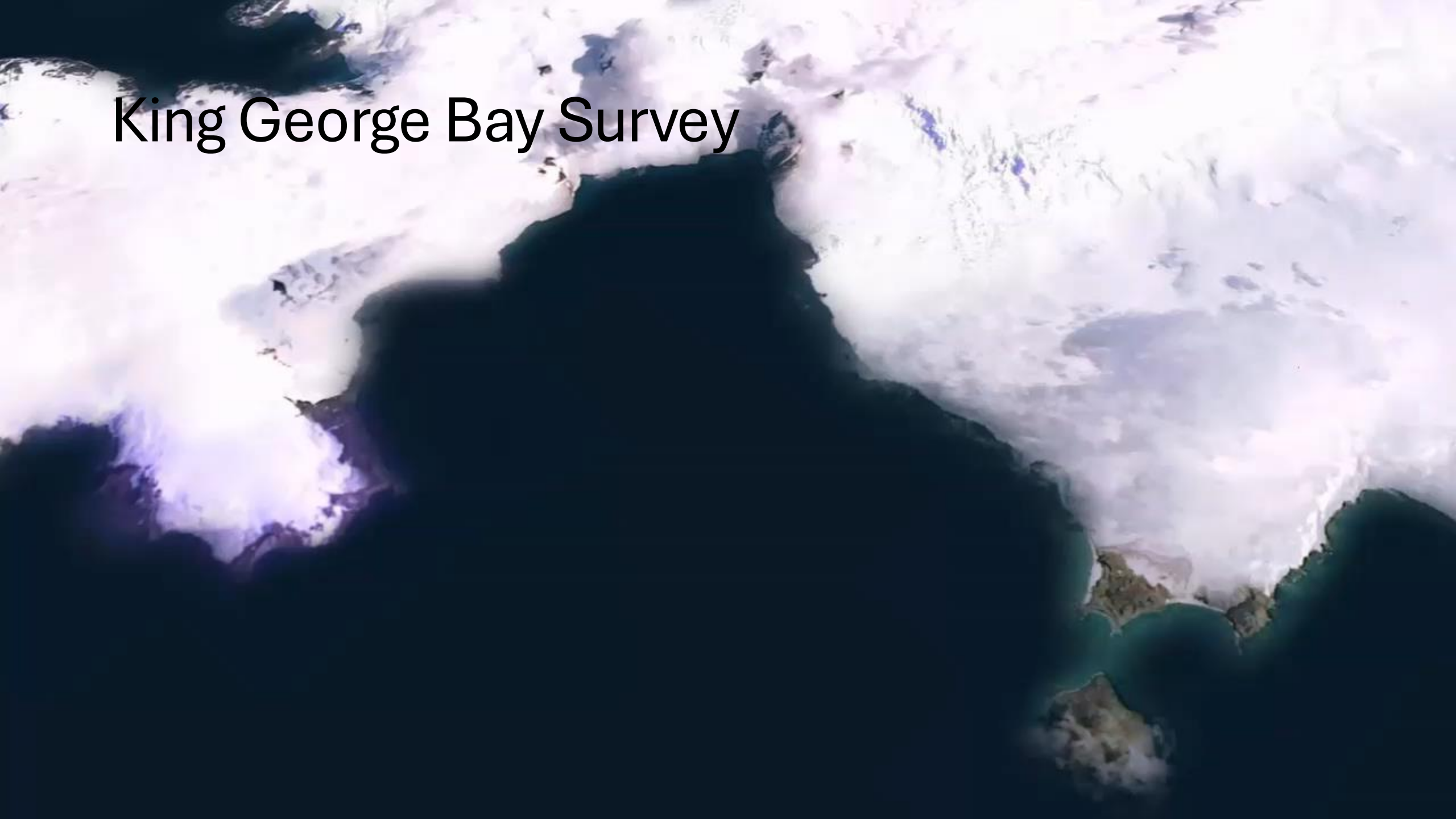
Wind Pane: 24.6 kn
Wind Wind Pane
240 kn
Rind 1
W N S E



ROT
STW
COG
SOG

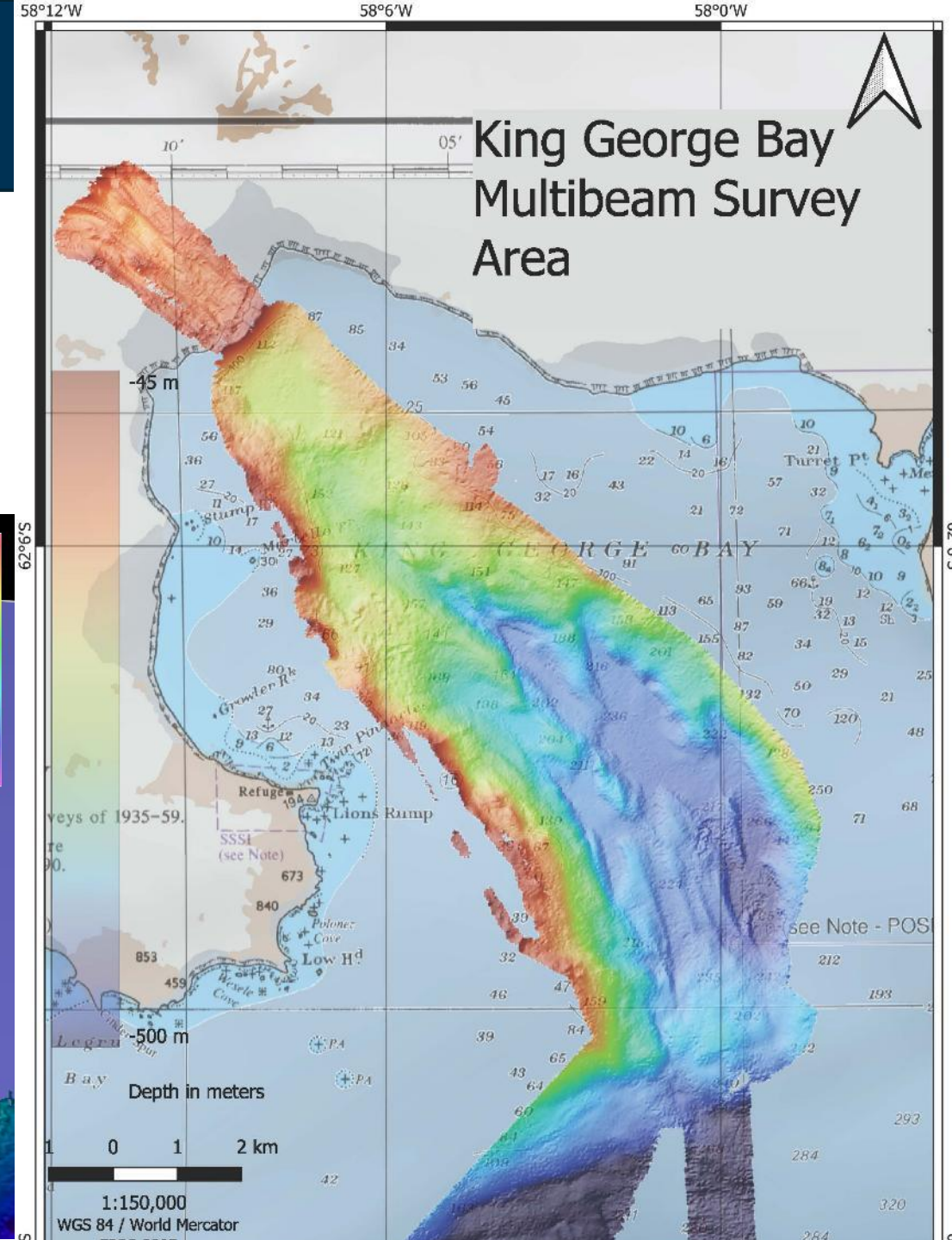
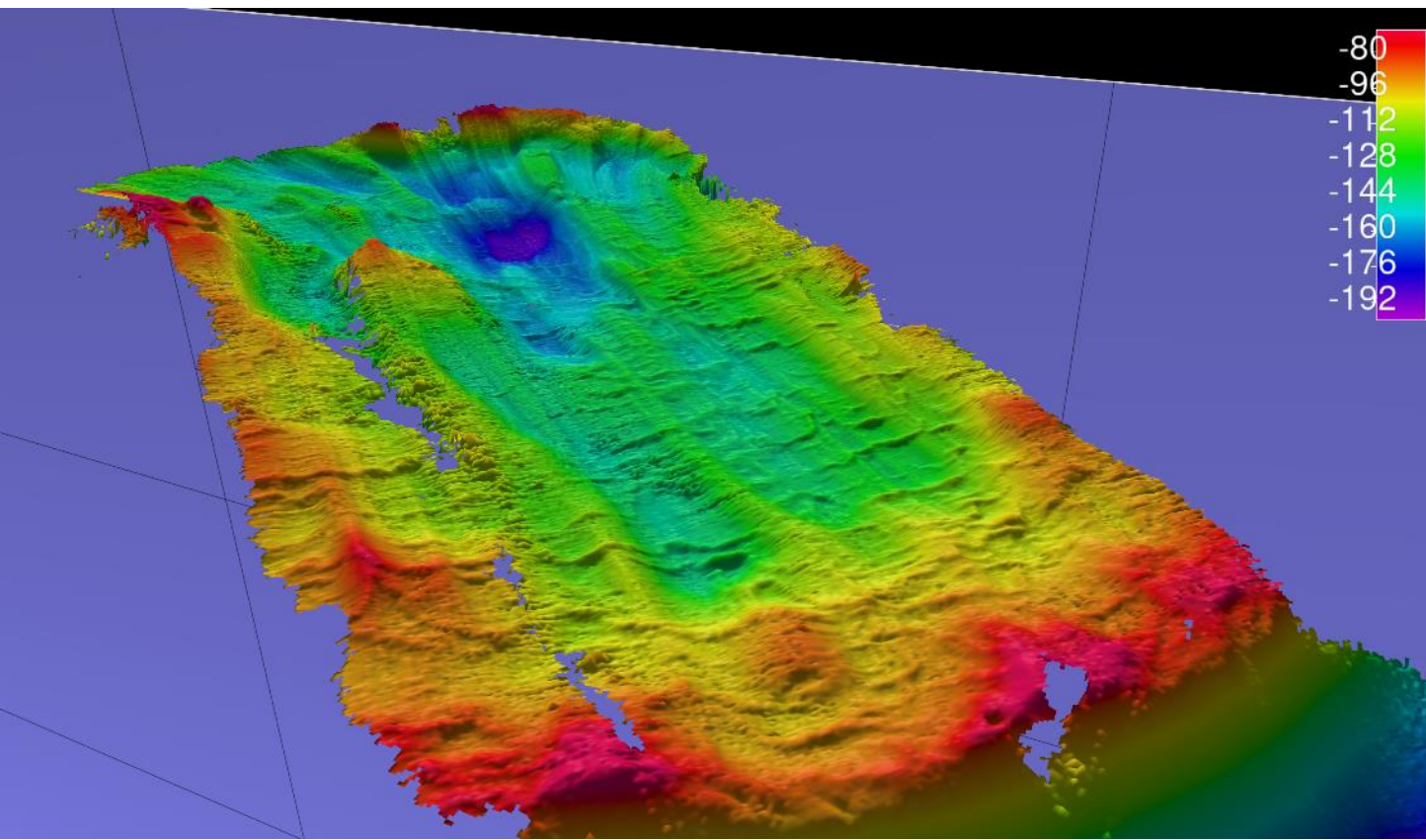


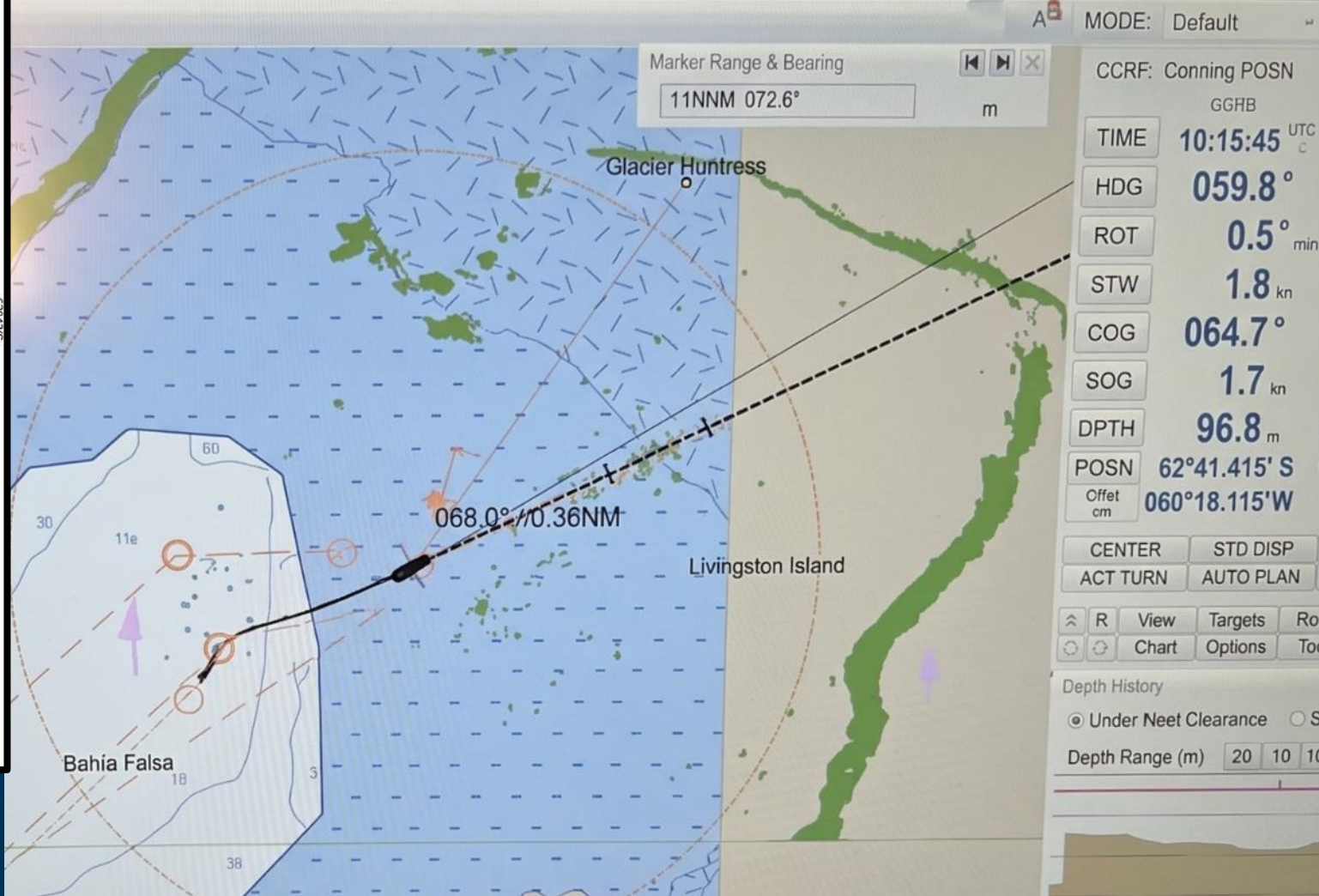
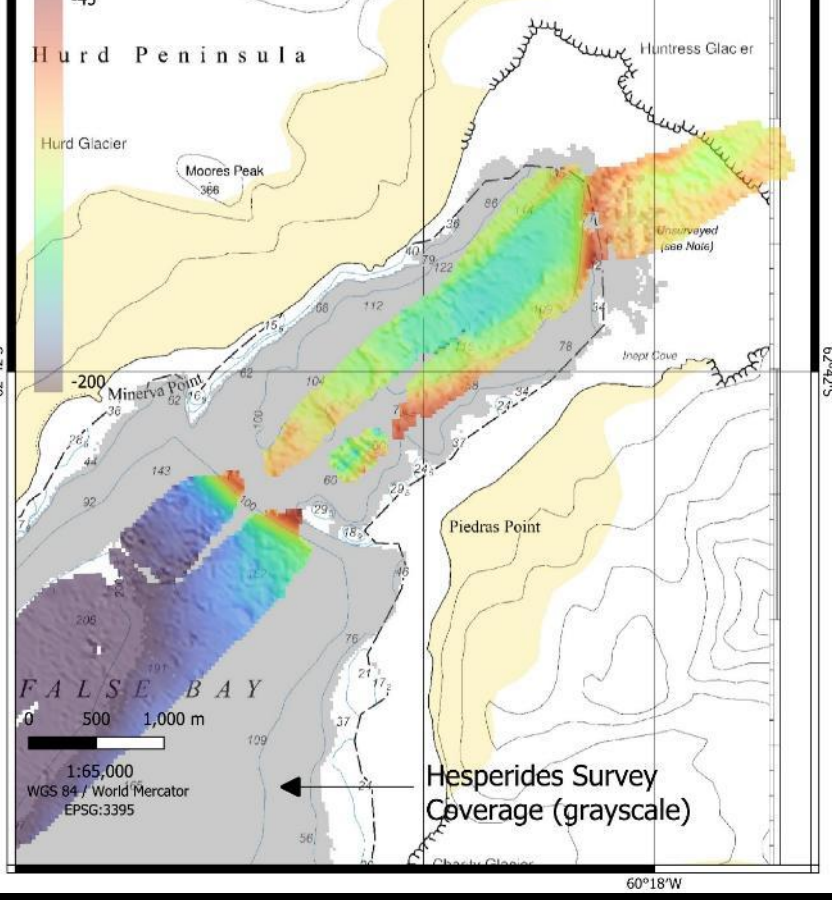
King George Bay Survey



King George Bay Survey

- Data Gaps from Bottom Tracking Issues
- Detection of Uncharted Shoal / Chart Registration Issues
- Glacial History – Recessional Moraines



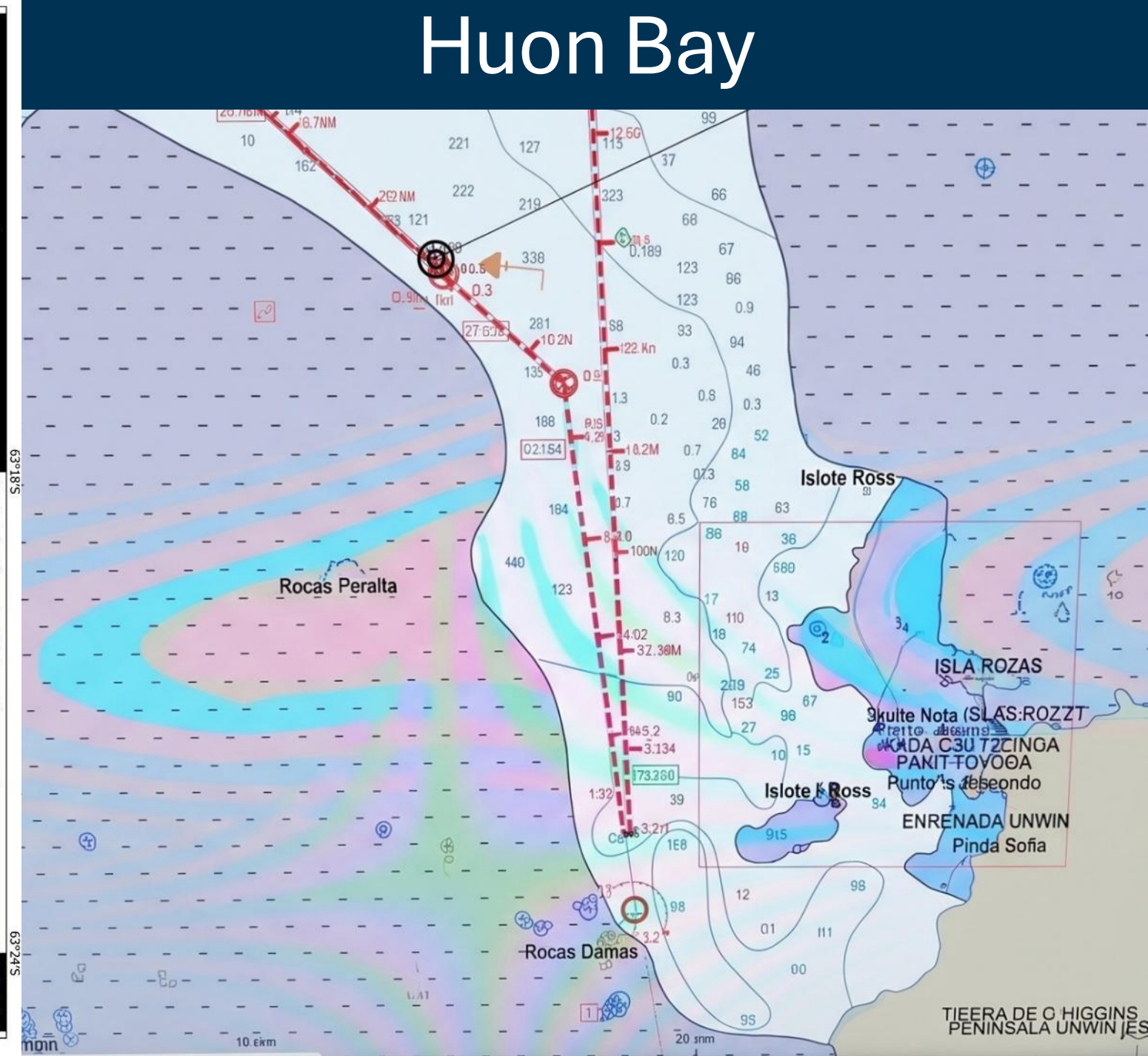
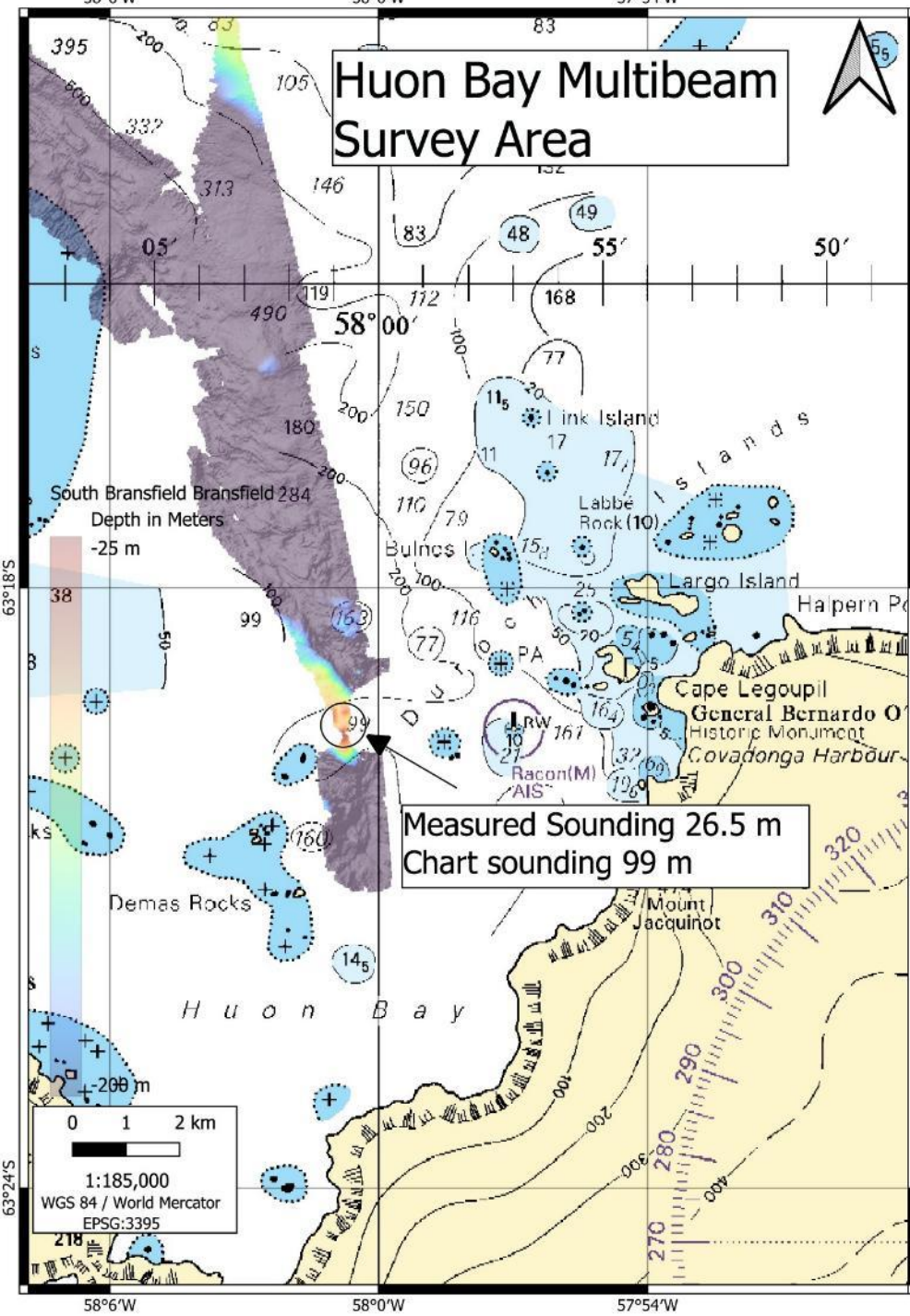


Livingston Island



Huon Bay

Huon Bay Multibeam Survey Area



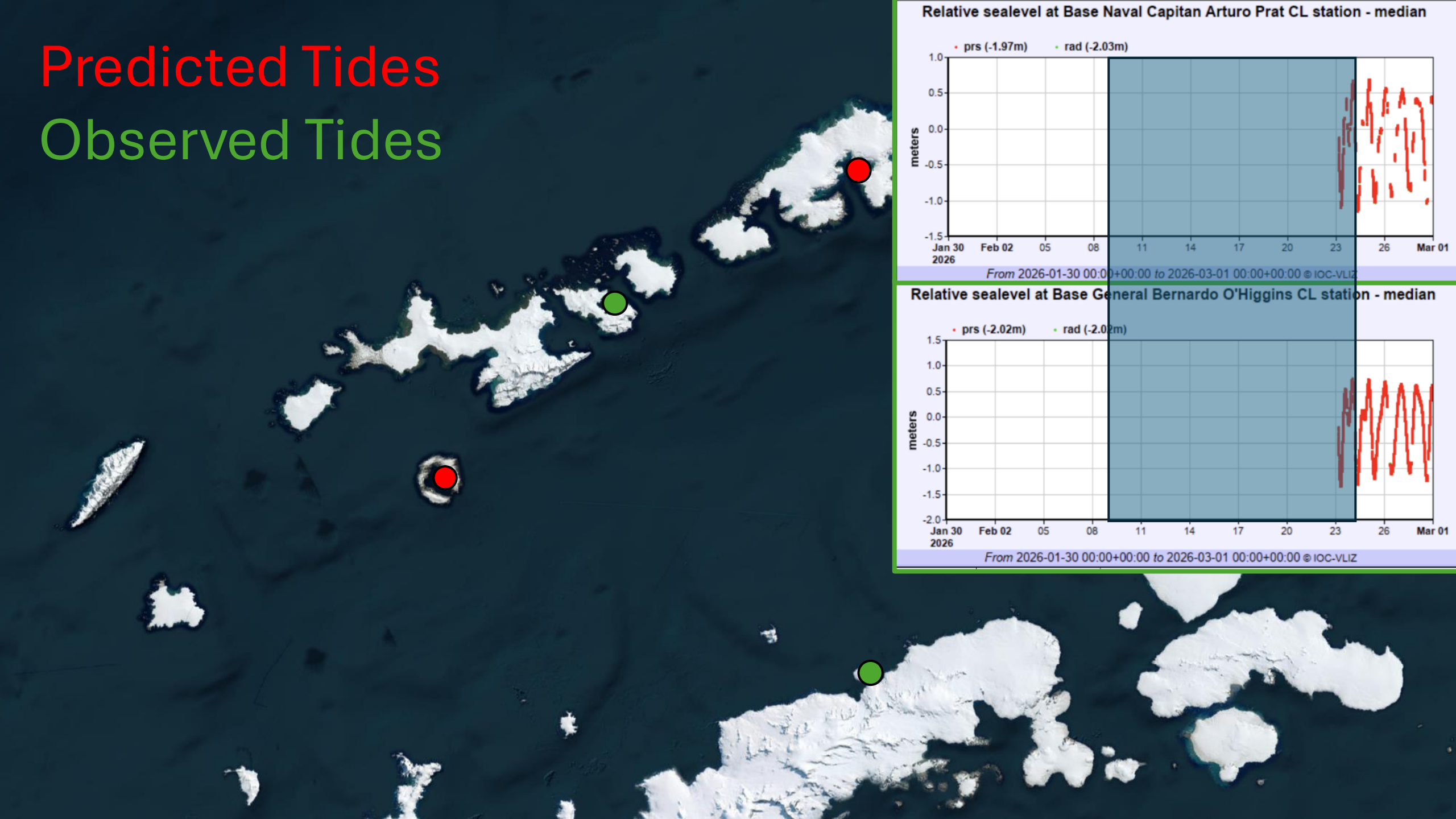
Overcoming the Challenges of Opportunistic Mapping

- **Vertical Referencing**
 - Water Levels vs ERS solution
 - Connection to other datums with a reverse WLR → ERS solution
- **Sound Speed Profiles**
 - Overcoming Environmental Unknowns

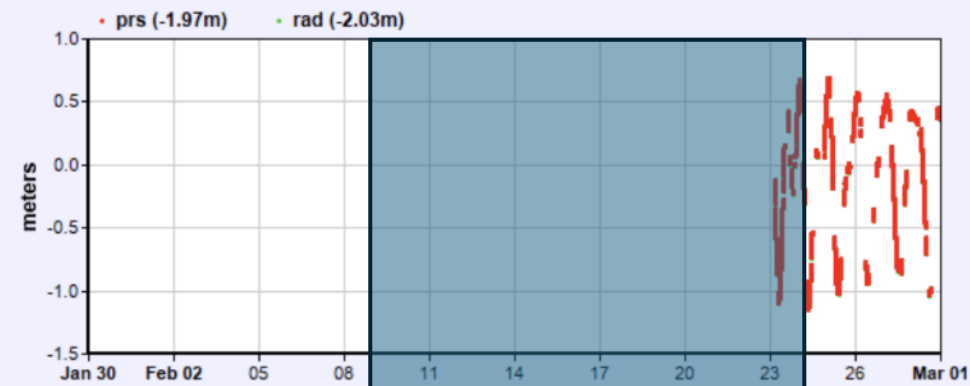


Predicted Tides

Observed Tides

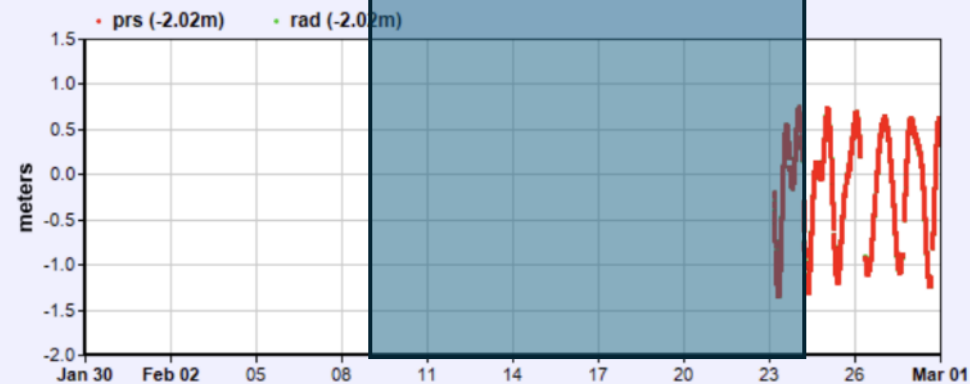


Relative sealevel at Base Naval Capitan Arturo Prat CL station - median



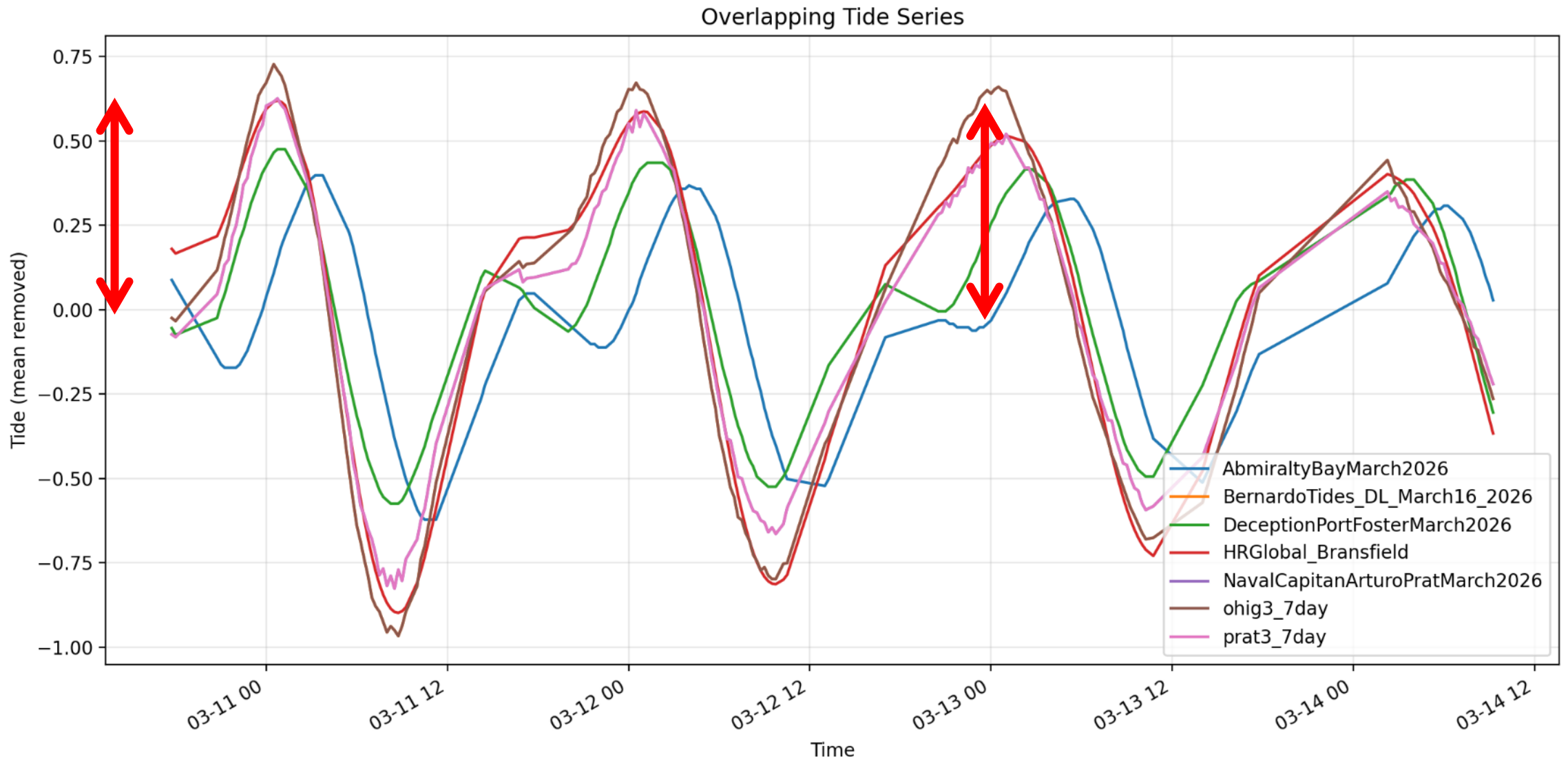
From 2026-01-30 00:00+00:00 to 2026-03-01 00:00+00:00 © IOC-VLIZ

Relative sealevel at Base General Bernardo O'Higgins CL station - median

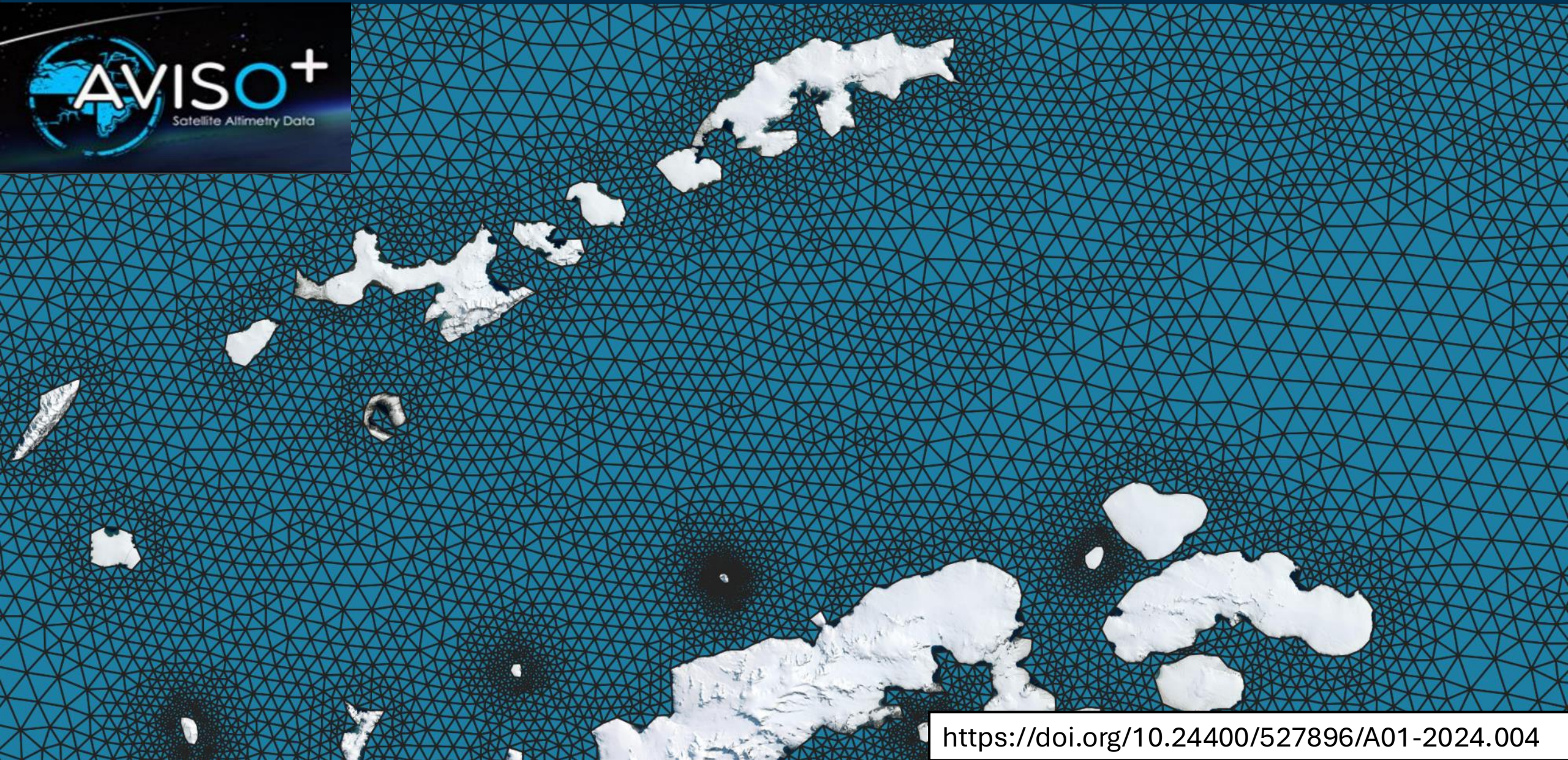


From 2026-01-30 00:00+00:00 to 2026-03-01 00:00+00:00 © IOC-VLIZ

Prediction Comparison



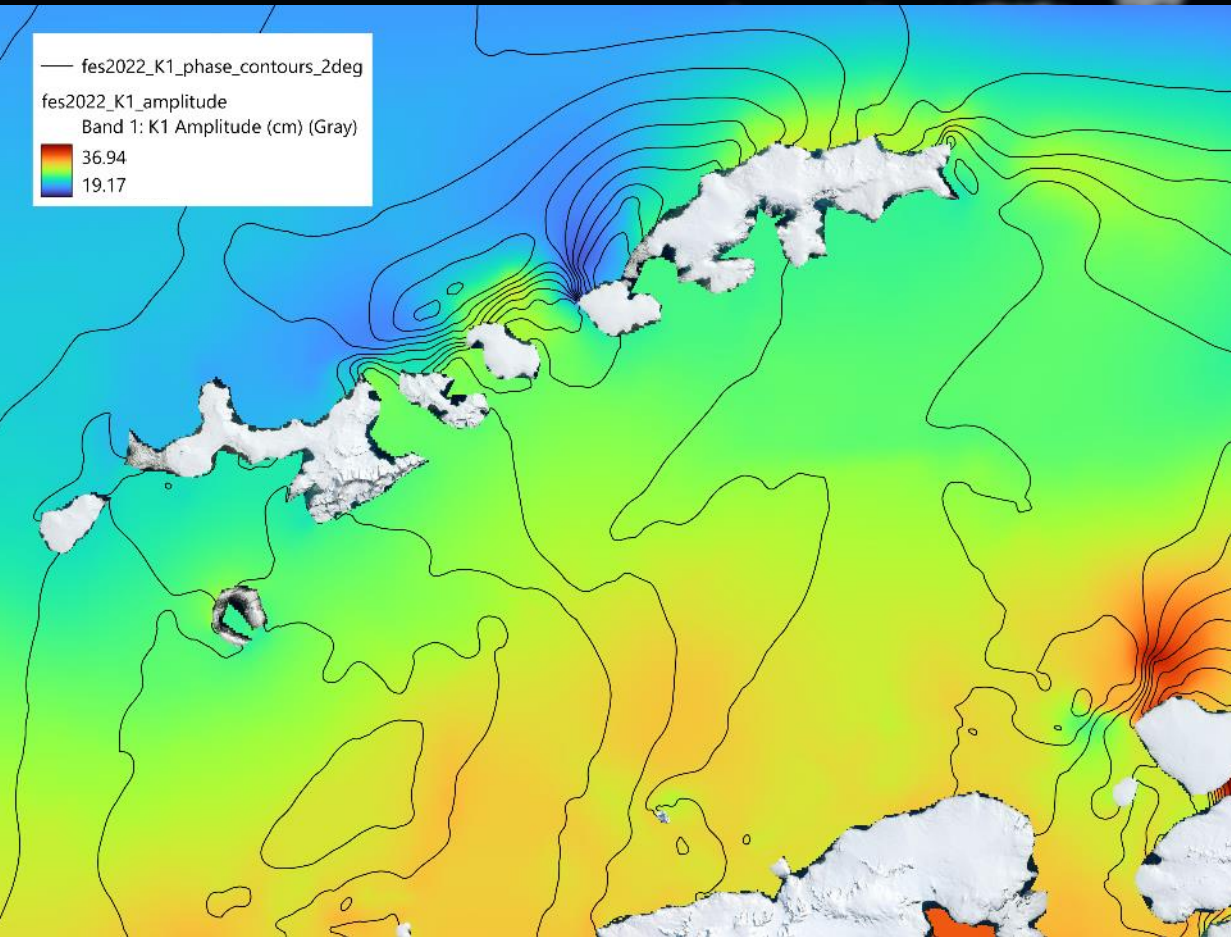
FES2022 Grid Resolution – 2D Tides



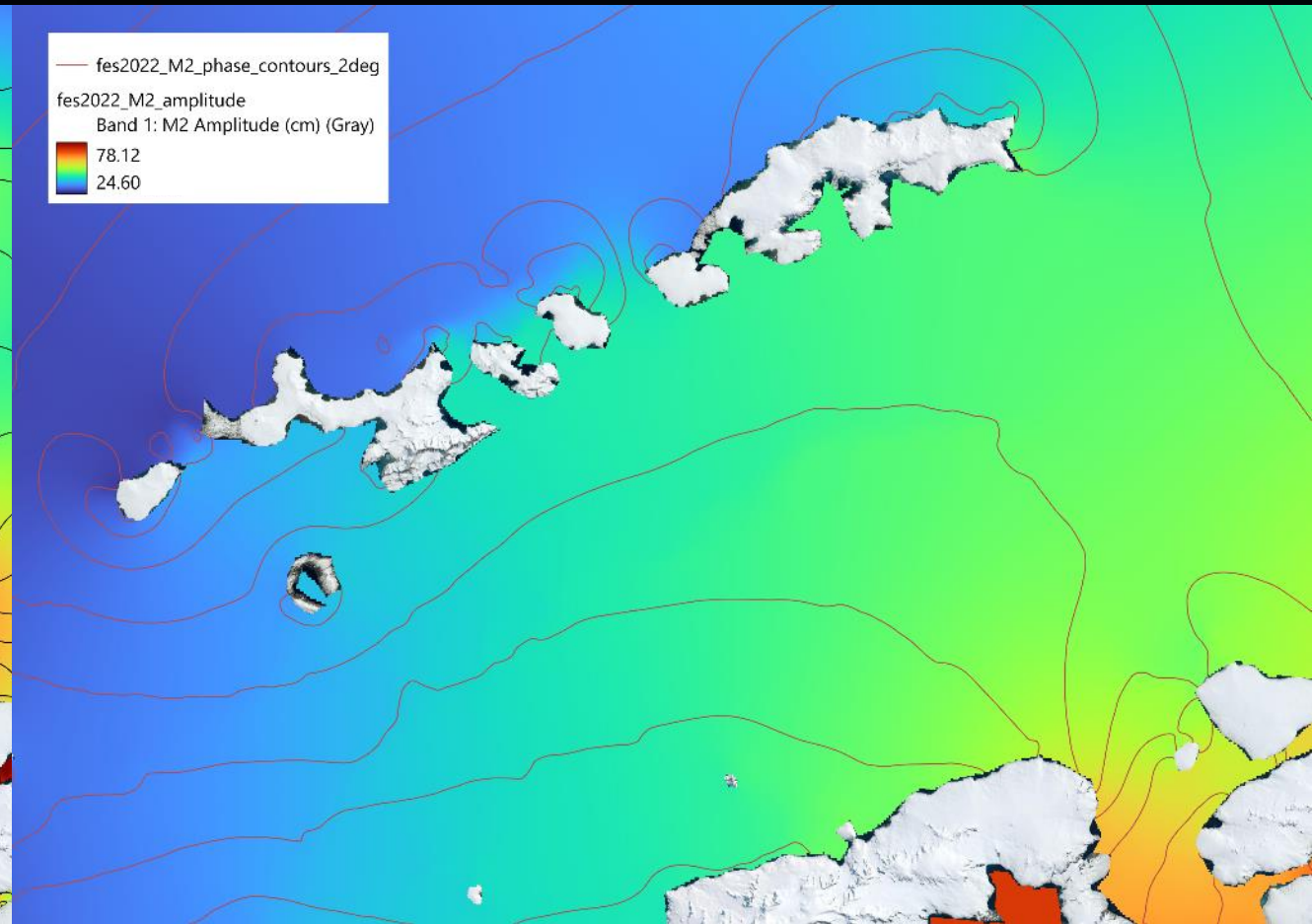
FES2022 Tidal Model Application



K1 Diurnal Tide

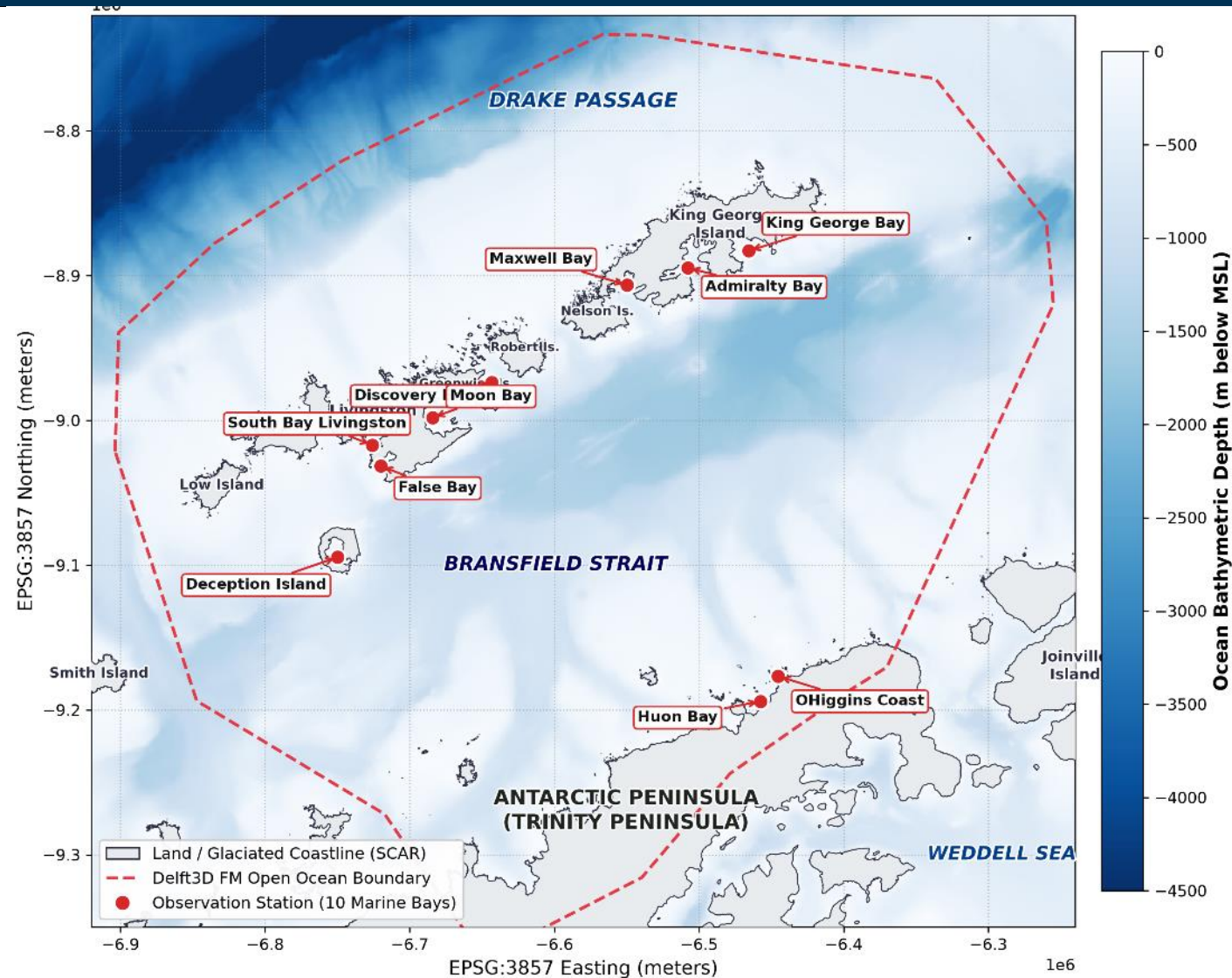


M2 Semi-Diurnal Tide

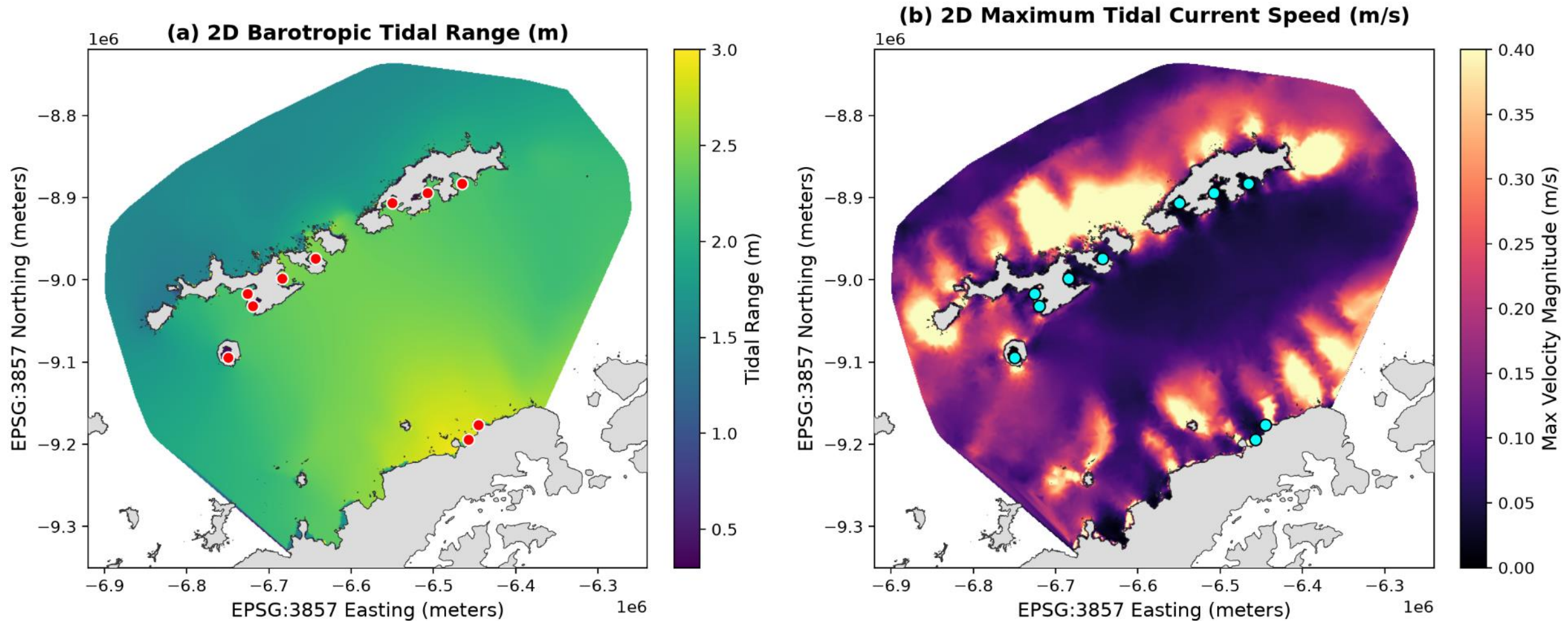


Custom 3D Baroclinic Model with Temp and Salinity

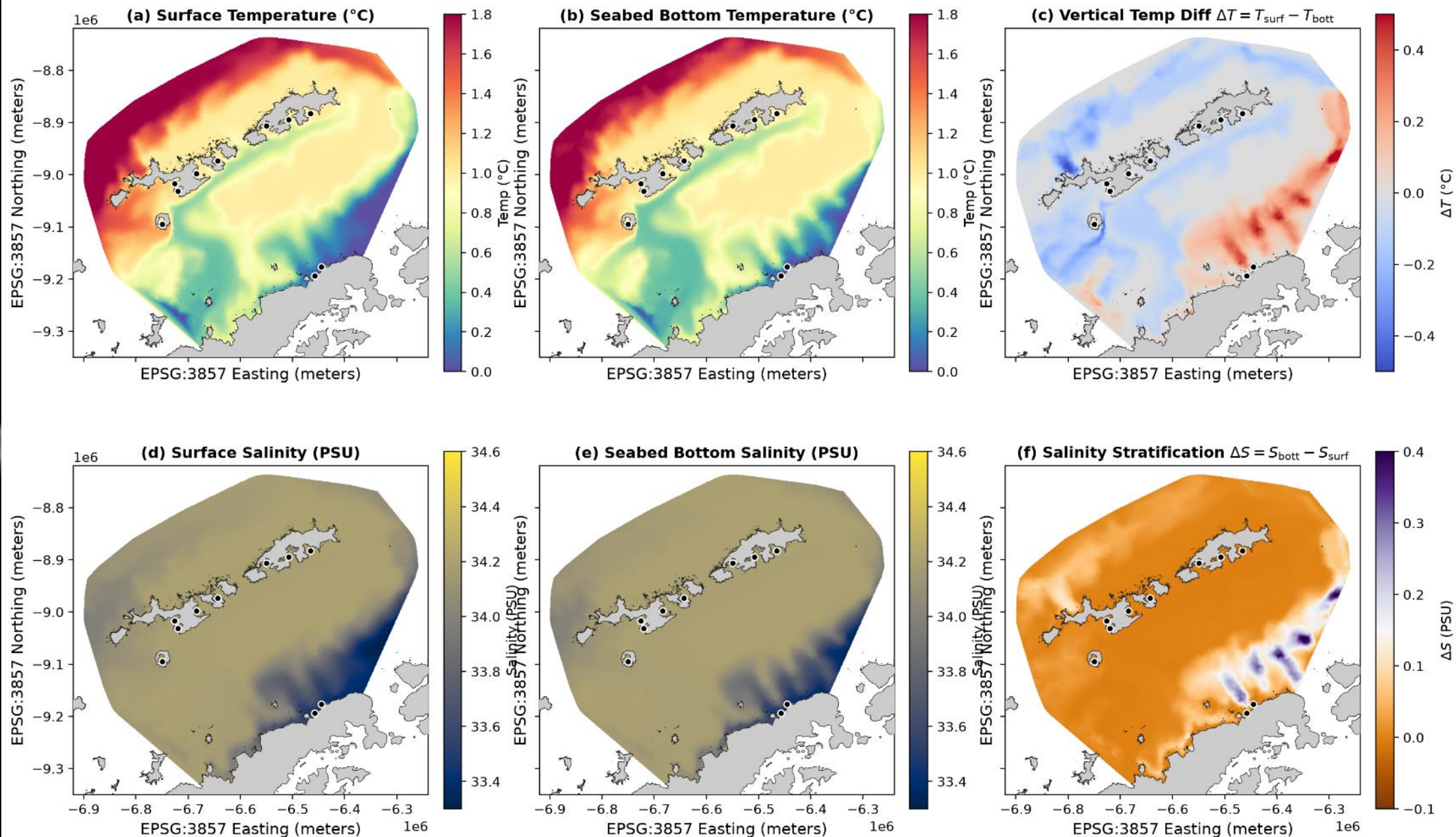
- Support the Transit Mapping
 - Improved tides with higher resolution coastal features and propagation
 - Full temperature and salinity data for the domain
- Support the Science Objectives
 - Understanding baroclinic circulation
 - Examine intrusion of warm water accelerating glacial melt
 - Tracers and other Experiments



Tidal Predictions and Operational Constraints

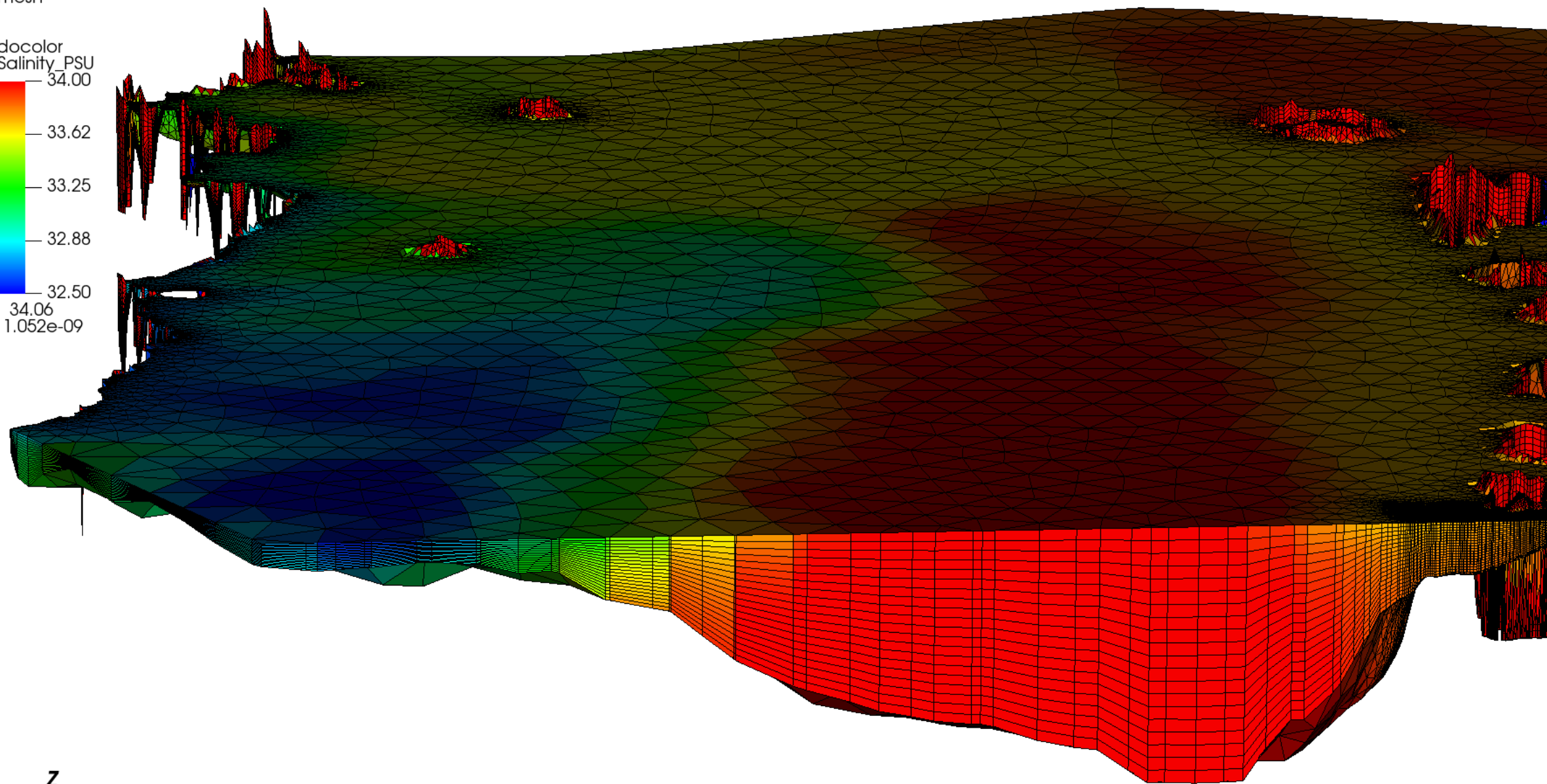
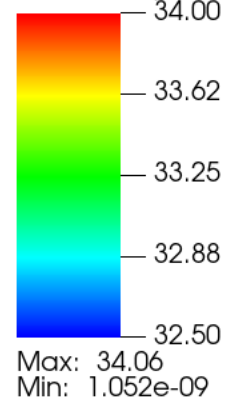


**Antarctica 3D Baroclinic Model (March 2026): Simulated Thermohaline Structure & Stratification
Driven by Copernicus Marine (CMEMS GLO12) 3D Hydrography & FES2022 Tidal Forcing**



Mesh
Var: mesh

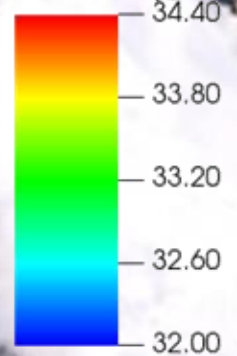
Pseudocolor
Var: Salinity_PSU



z

Mesh
Var: mesh

Pseudocolor
Var: Salinity_PSU

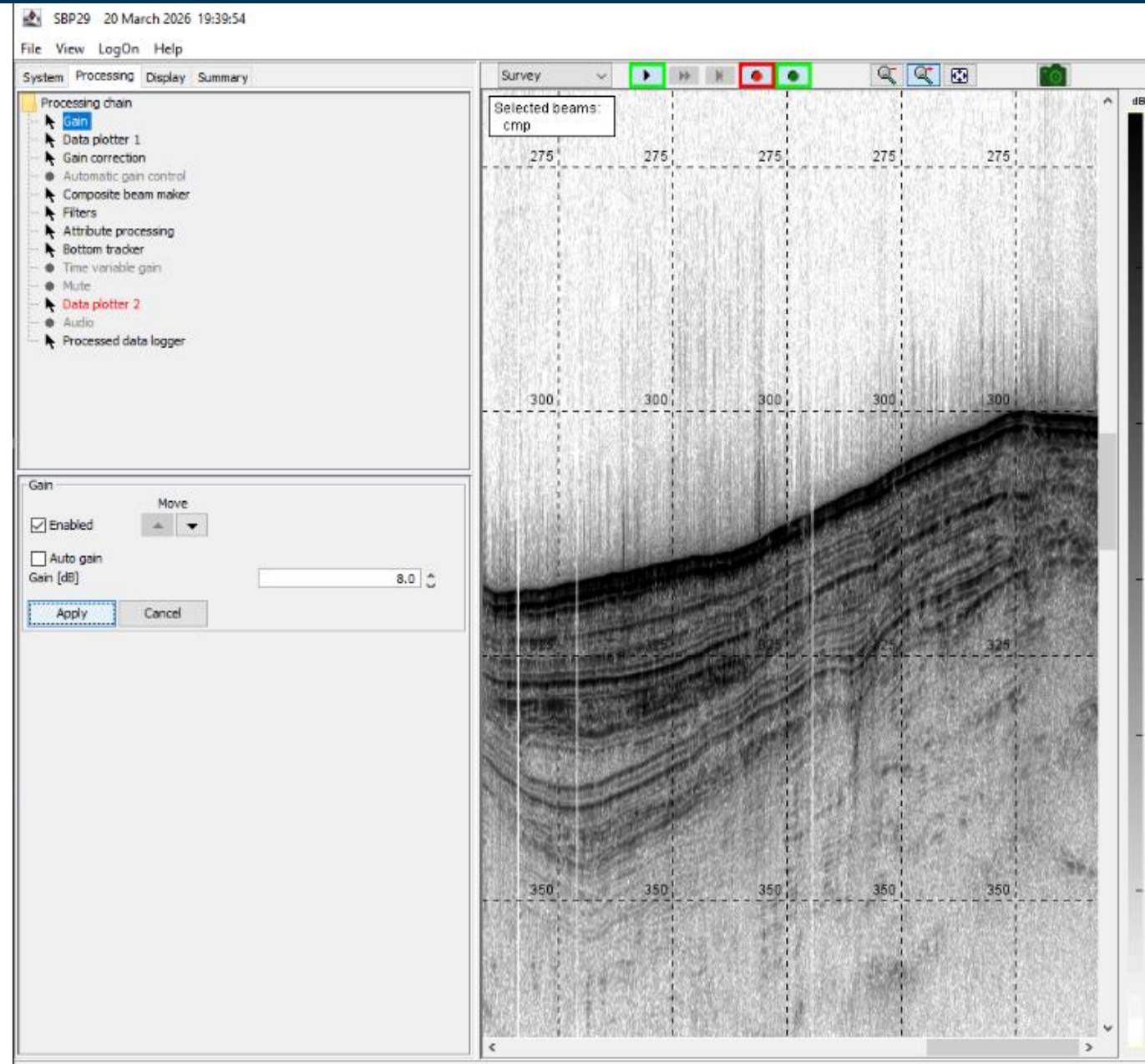
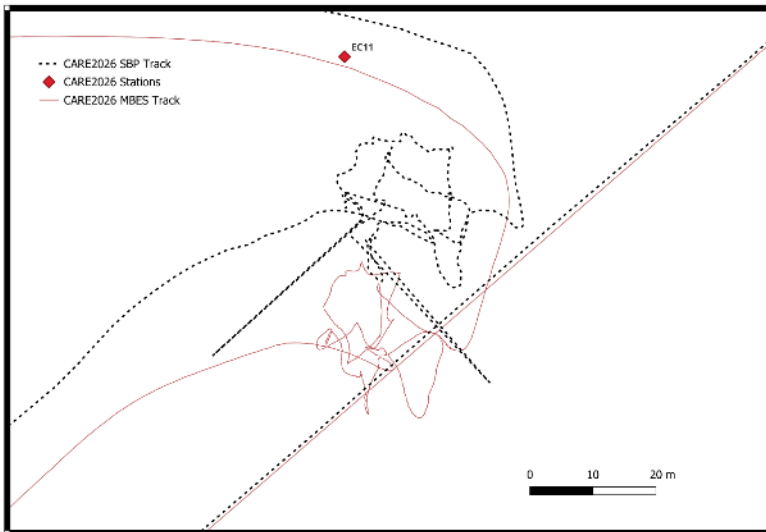


Max: 34.20
Min: 27.39

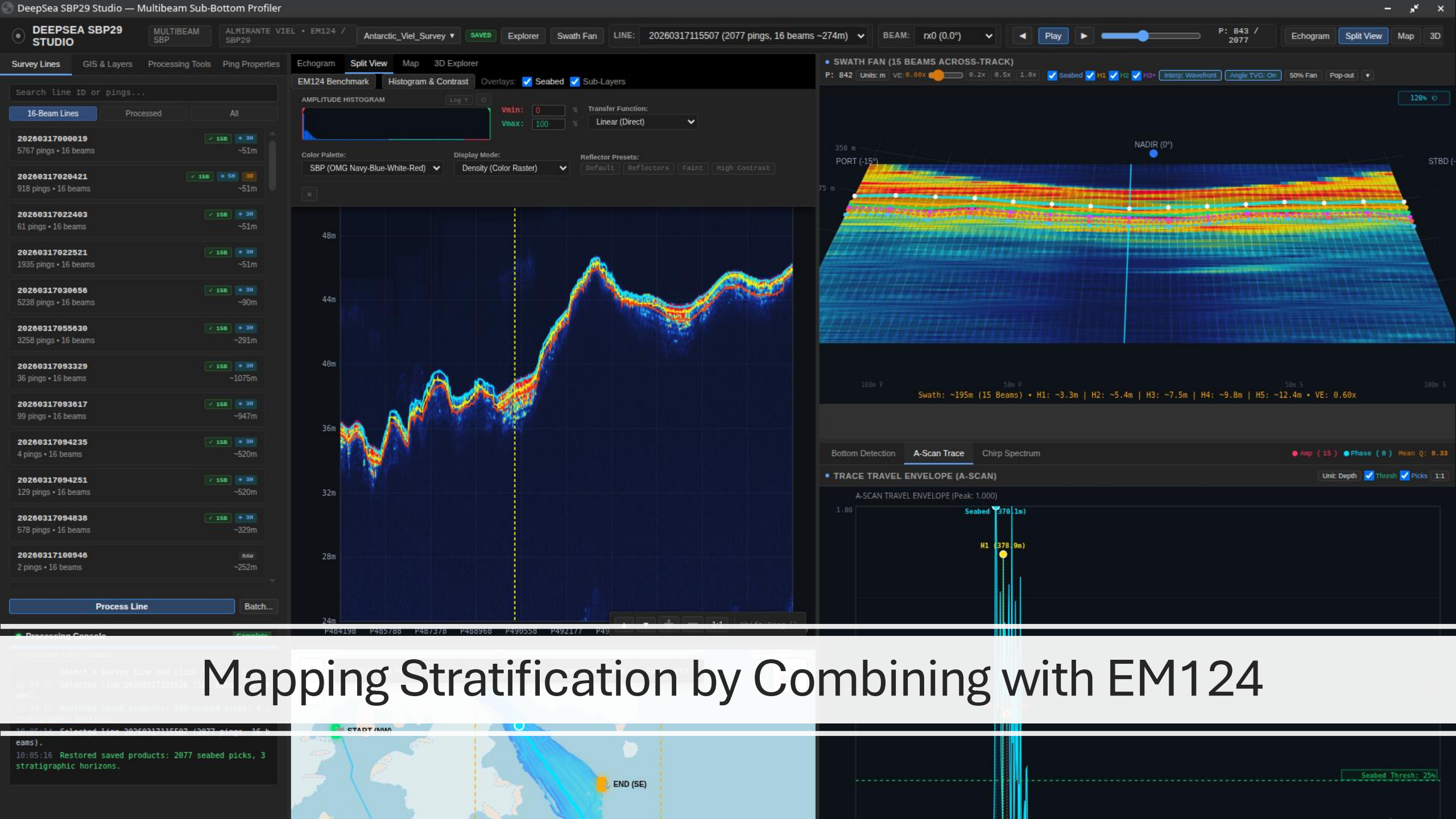
Y

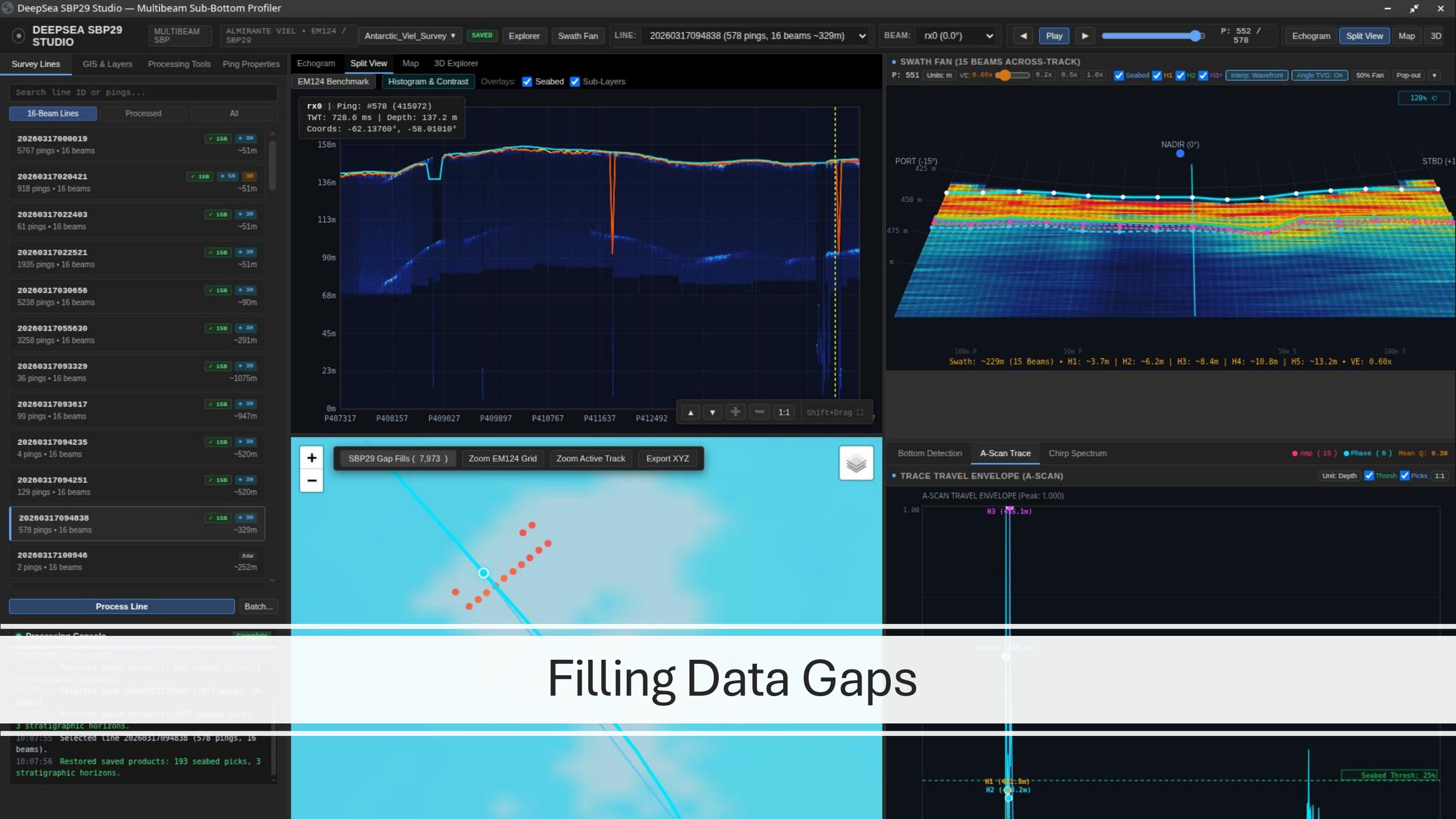
EM124 & SBP29 Processing and Interpretation

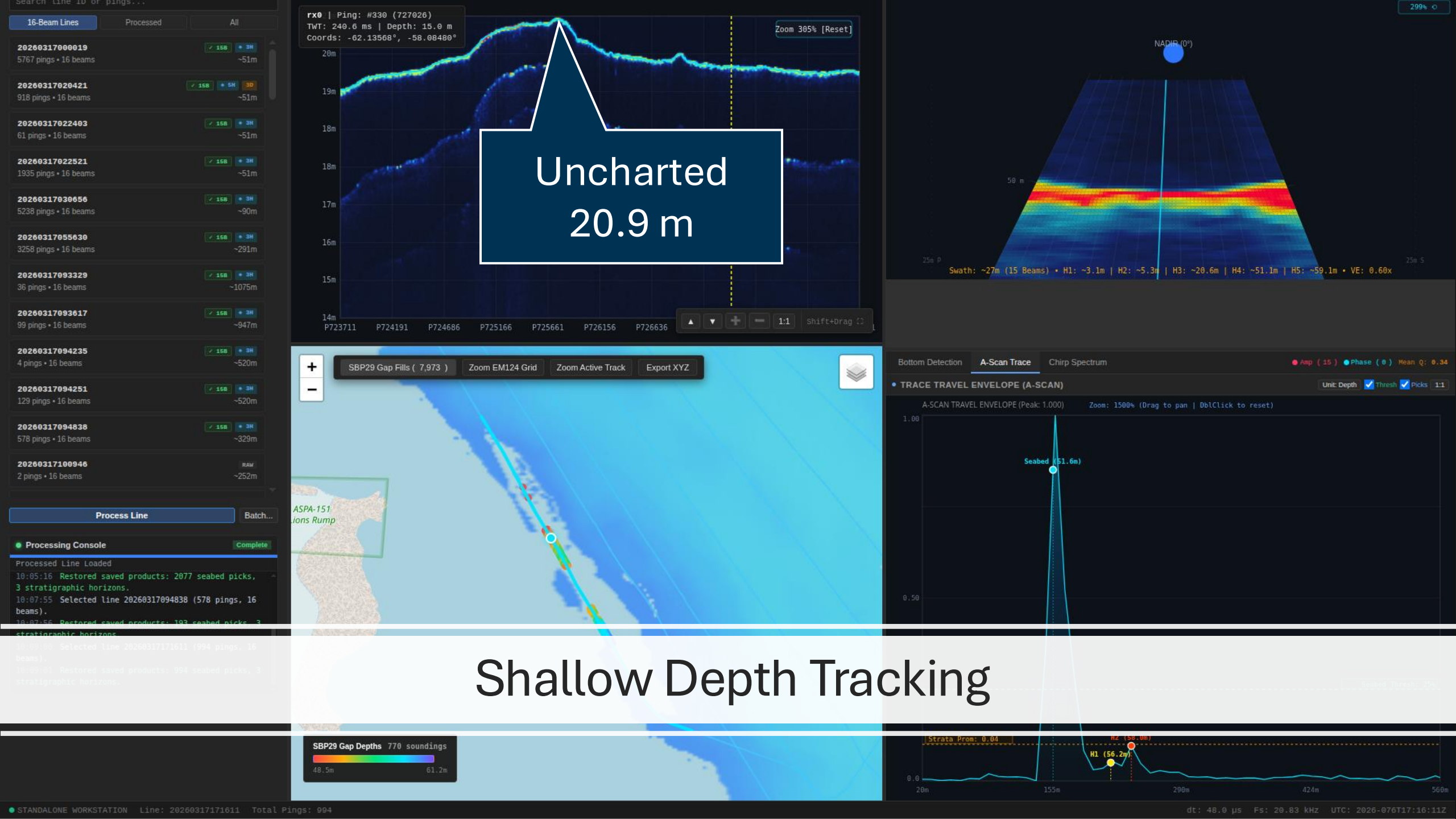
- Combined interpretation to understand the regional geology
- Filling gaps in the EM124 data with the SBP29
- Position Offset noted between EM and SBP!

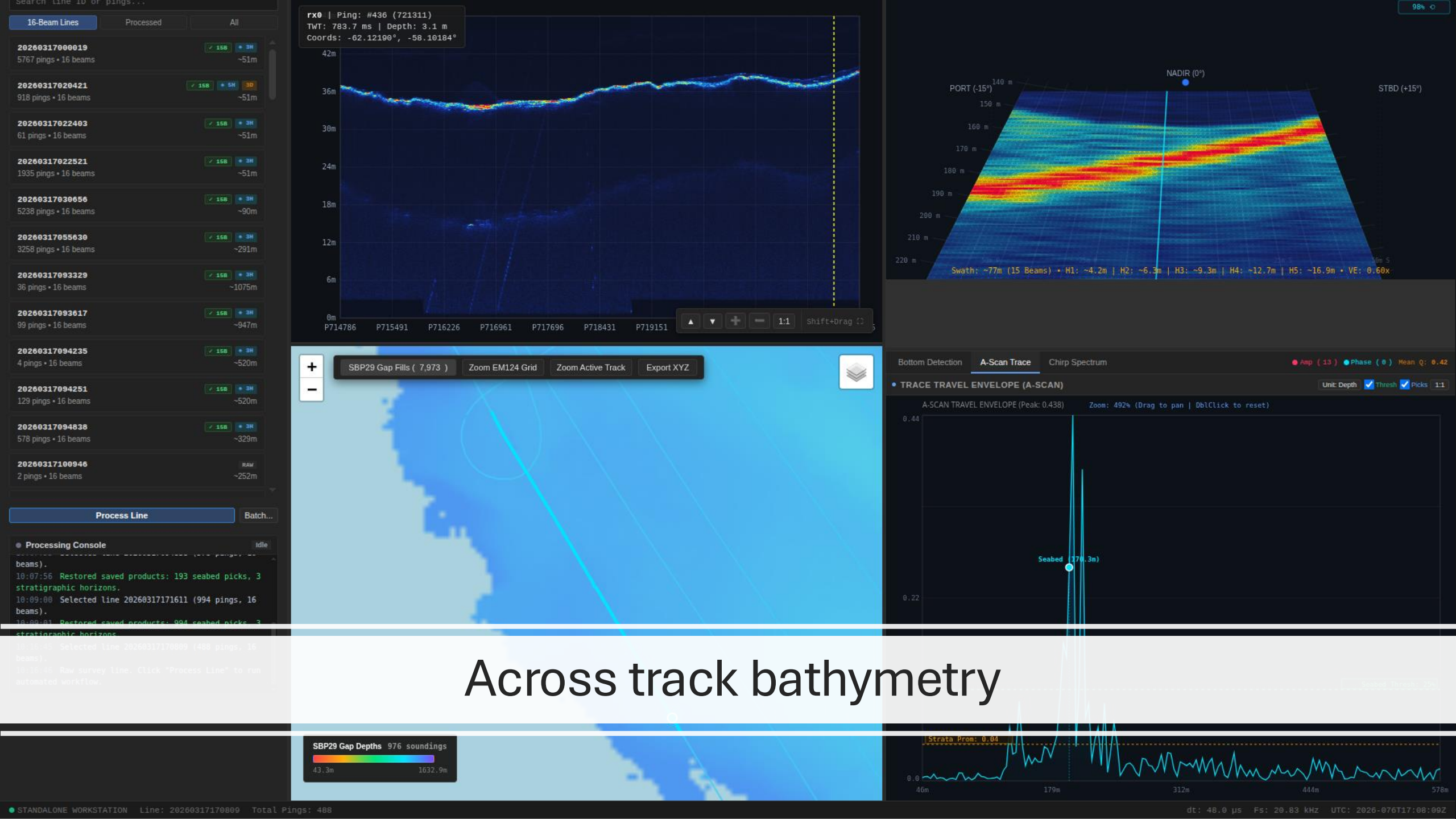












International Collaboration and Support



Canada

Embassy of
Canada to Chile



Canada

Royal Canadian
Navy



Future Expeditions on AOPS / Almirante Viel?

- Charting + Marine Geology + Oceanography
 - Research products & IHO HCA Support
- USVs have limits...
- Small vessel operations in combination with the deep-water system
- Collaboration with SHOA
- Student internships



Image: Angus Robertson

Questions?

Ian.Church@unb.ca



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