

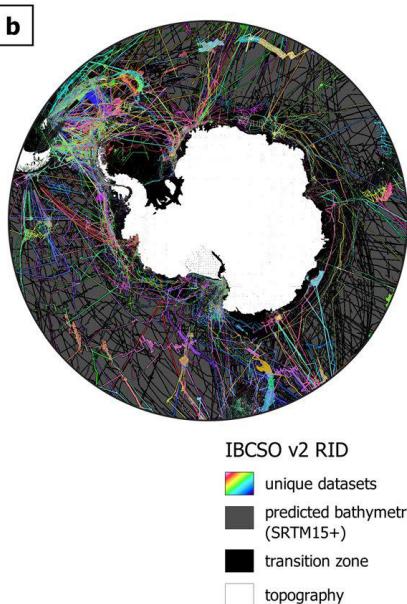
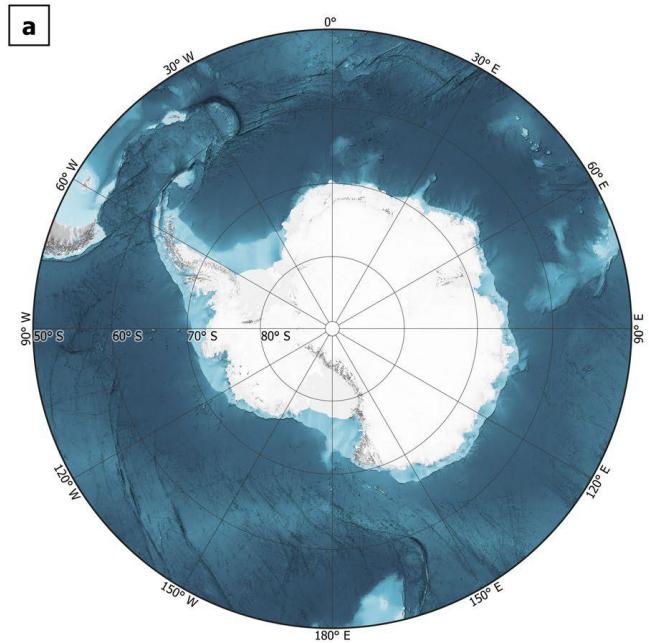


# The International Bathymetric Chart of the Southern Ocean

*Southern Ocean Regional Center*  
**Patrick Schwarzbach**  
on behalf of the IBCSO team

Photo by Sacha Viquerat

# Surface and data distribution of IBCSO v2



- Released in June/22
- covering the Southern Ocean south of 50°S in EPSG 9354
- the Antarctic circumpolar current and other major frontal systems and gateways
- 500 m x 500 m resolution

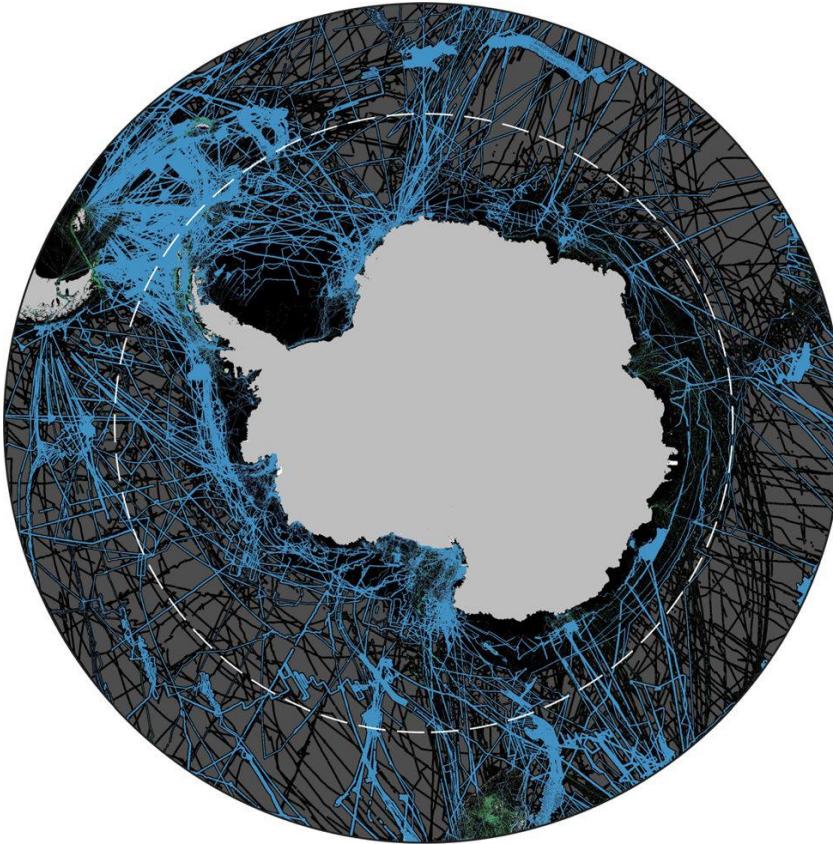
(a) Shaded relief of IBCSO v2 with ice surface topography

(b) Regional Identifier (RID) grid

# Data types

TID	data type	description	weight	no. of datasets
10	Singlebeam	Depth value collected by a single beam echo-sounder	10	766
11	Multibeam	Depth value collected by a multibeam echo-sounder	5, 15, 20, 25, 30	464
12	Seismic	Depth value collected by seismic methods	10	21
13	Isolated sounding	Depth value that is not part of a regular survey or trackline	5	2
14	ENC sounding	Depth value extracted from an Electronic Navigation Chart (ENC)	5	3
17	Combination of direct measurements	Combination of direct measurement methods	5	2
40	Predicted bathymetry based on satellite-derived gravity data	Depth value is an interpolated value guided by satellite-derived gravity data	no weight	[1]
41	Interpolated based on a computer algorithm	Interpolated based on a computer algorithm - depth value is an interpolated value based on a computer algorithm (e.g. Generic Mapping Tools)	no weight	[1]
42	Digital bathymetric contours from charts	Depth value taken from a bathymetric contour dataset	5	1
45	Predicted bathymetry based on flight-derived gravity data	Depth value is an interpolated value guided by helicopter/flight-derived gravity data	10, 5	3
46	Draft of a grounded iceberg	Depth estimated by calculating the draft of a grounded iceberg using satellite-derived freeboard measurement	10	1
70	Pre-generated grid	Depth value is taken from a pre-generated grid that is based on mixed source data types, e.g. single beam, multibeam, interpolation etc.	5	[2]
71	Unknown source	Depth value from an unknown source	5	1
72	Steering points	Steering points - depth value used to constrain the grid in areas of poor data coverage	no weight	[2]

# Type Identifier Grid



- No. of contributors 39
- No. of sources > 90
- No. of contributing countries 18

## Data types (TID)

	singlebeam (various types)
	multibeam
	predicted bathymetry (SRTM15+)
	transition zone
	other
	topography
	60°S latitude

- Seafloor area covered by IBCSO v1  
32.6 Mio km<sup>2</sup>
- Seafloor area covered by IBCSO v2  
77.3 Mio km<sup>2</sup>

# Coverage

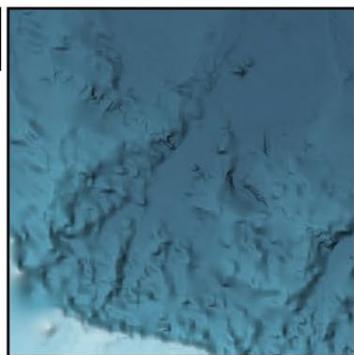
Total Coverage (Direct Measurements)*	23.79 %
Multibeam	22.32 %
Singlebeam	1.37 %
Other data type	0.10 %

\*This value is related to 500 m x 500 m resolution, considering oceans cells south of 50°S containing direct measurements, divided by all ocean cells south of 50°S

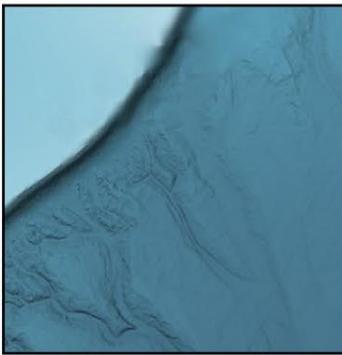
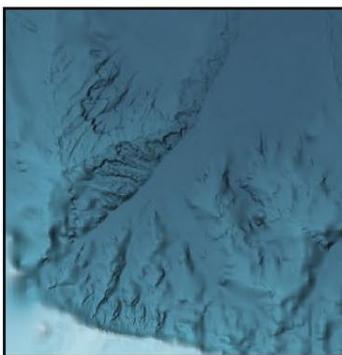
# Improvements over IBCSO v1

Cosmonauts Sea  
Totten Glacier

IBCSO v1



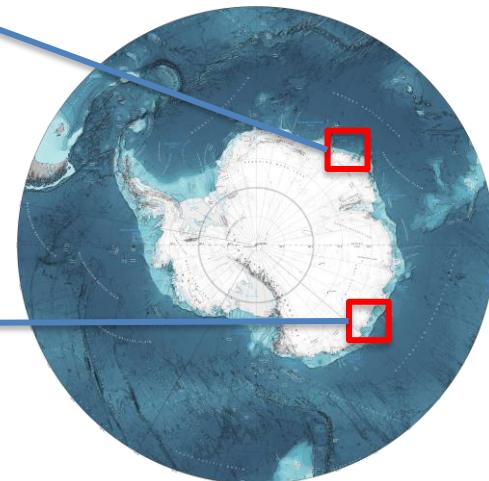
IBCSO v2



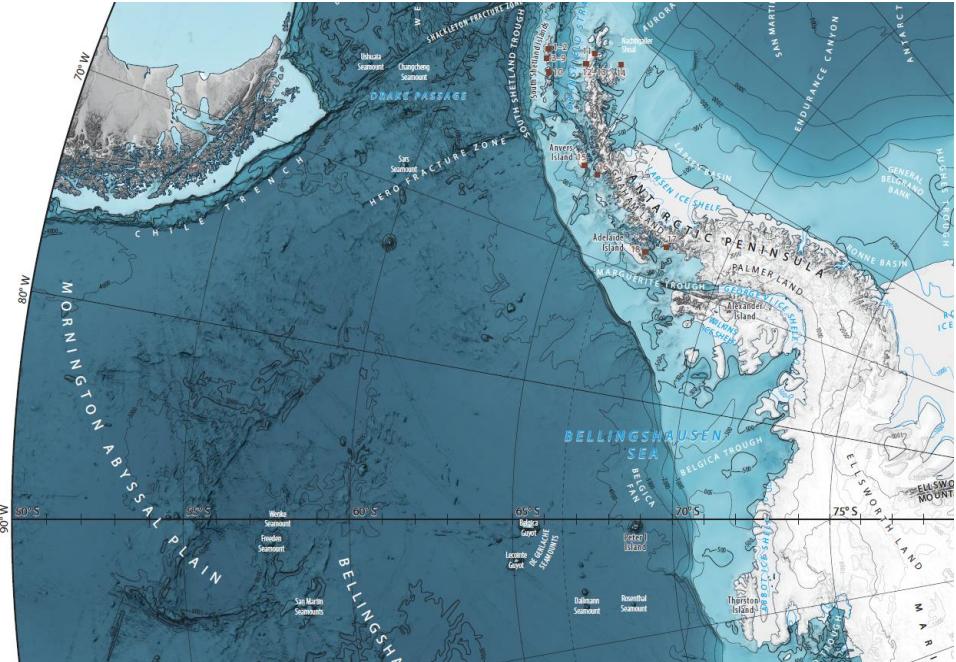
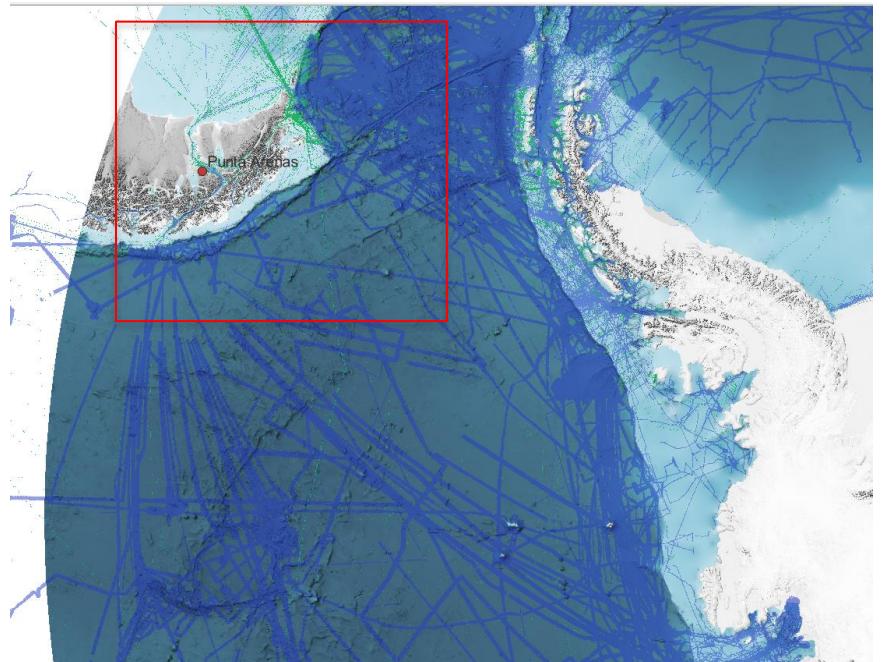
←

Strong detail enhancements

←



# Mornington Abyssal Plain to Bellingshausen Sea

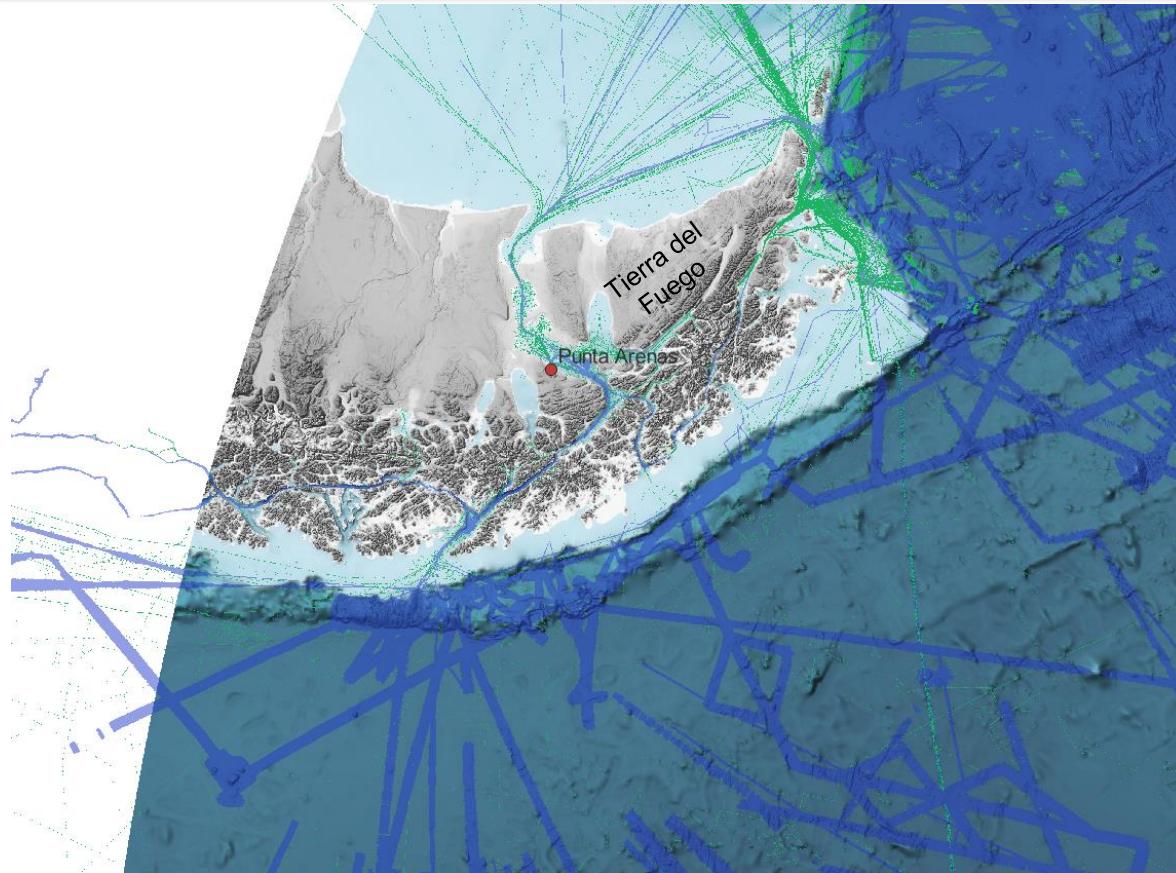


# South Tip of South America

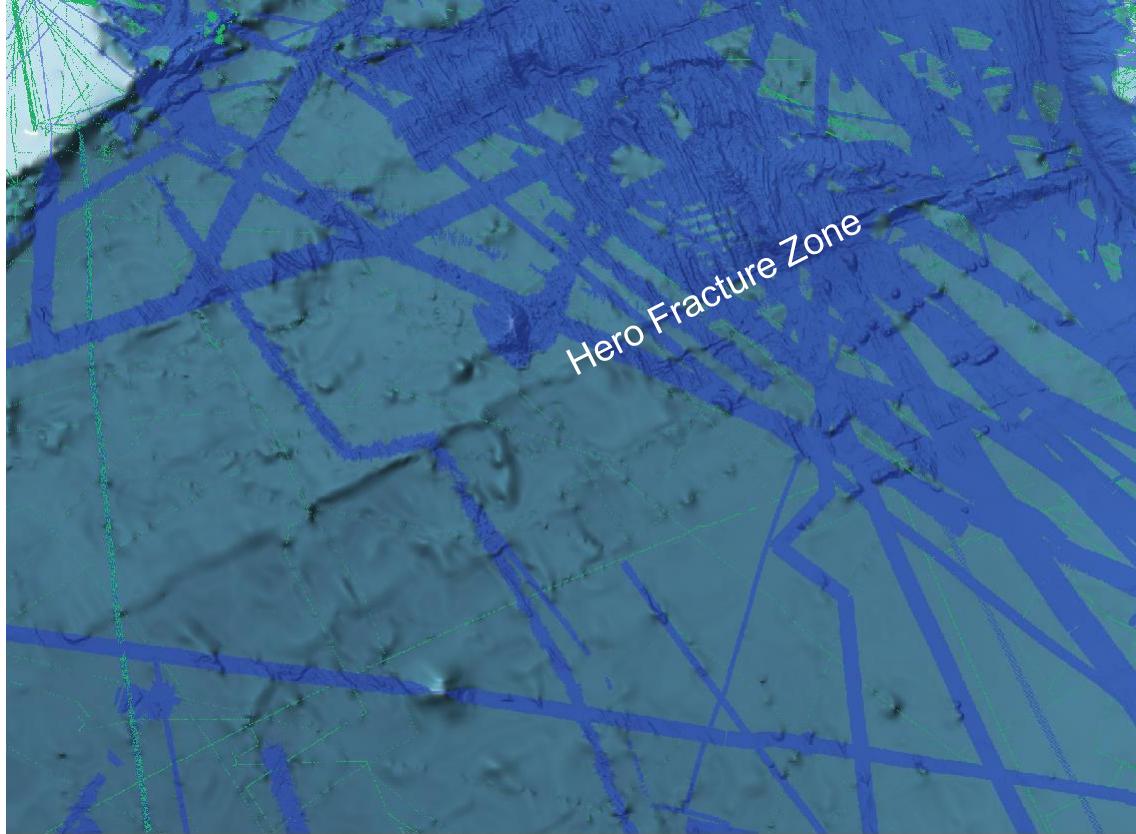
IBCSO  
International Bathymetric Chart  
of the Southern Ocean



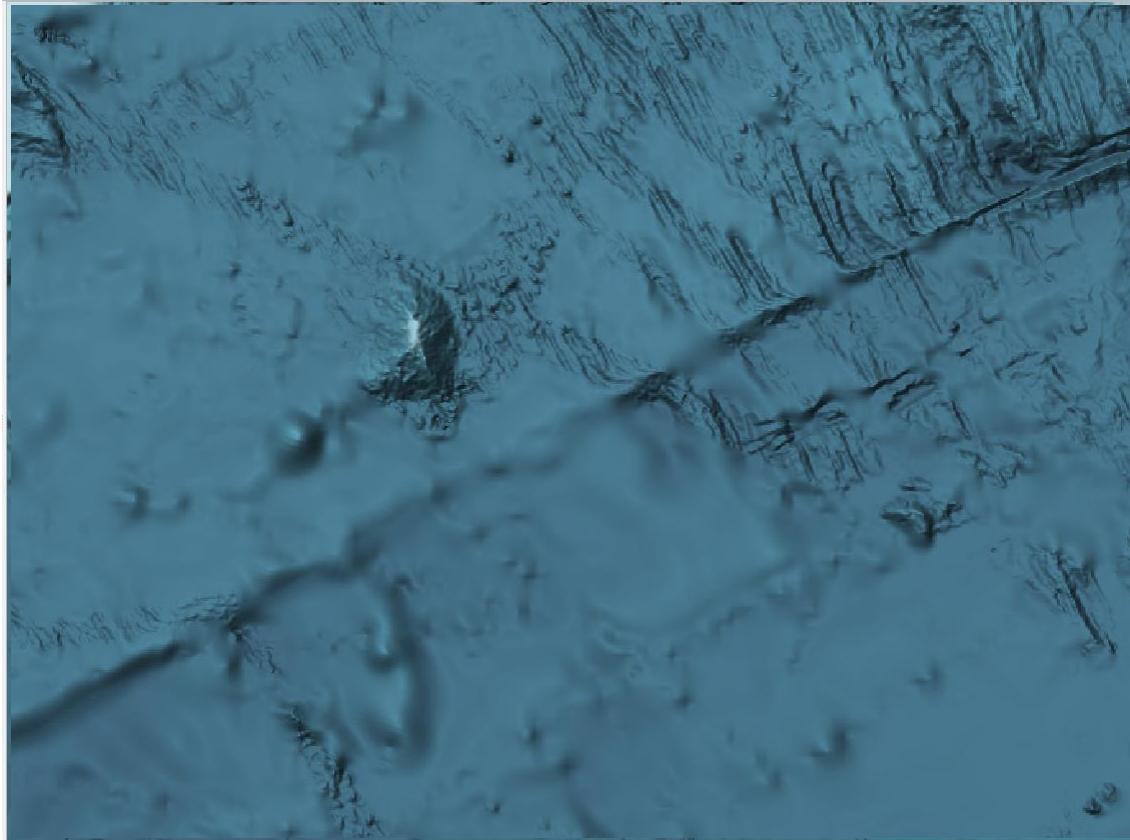
AWI



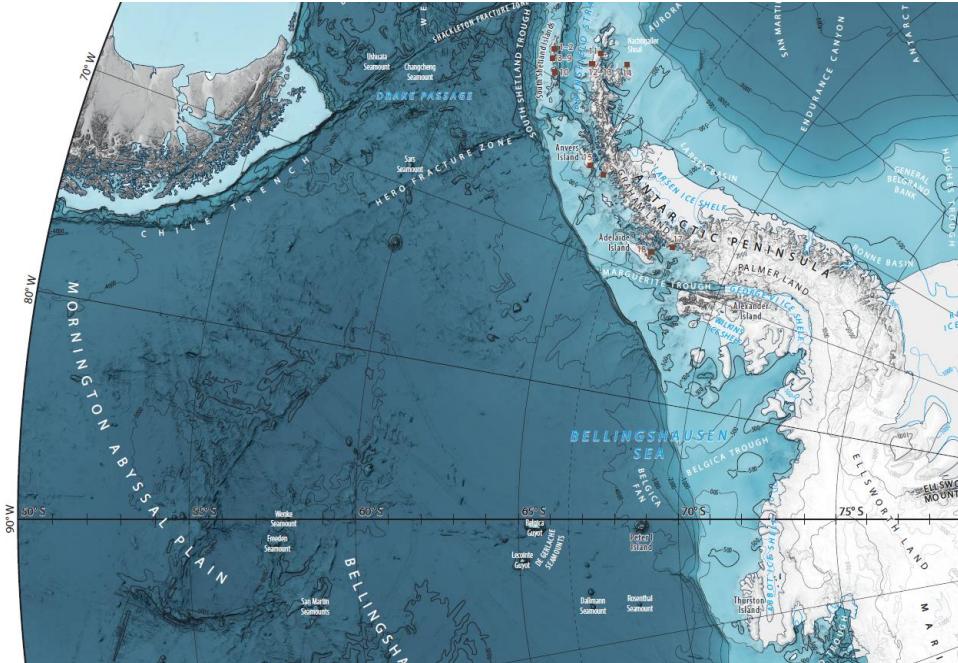
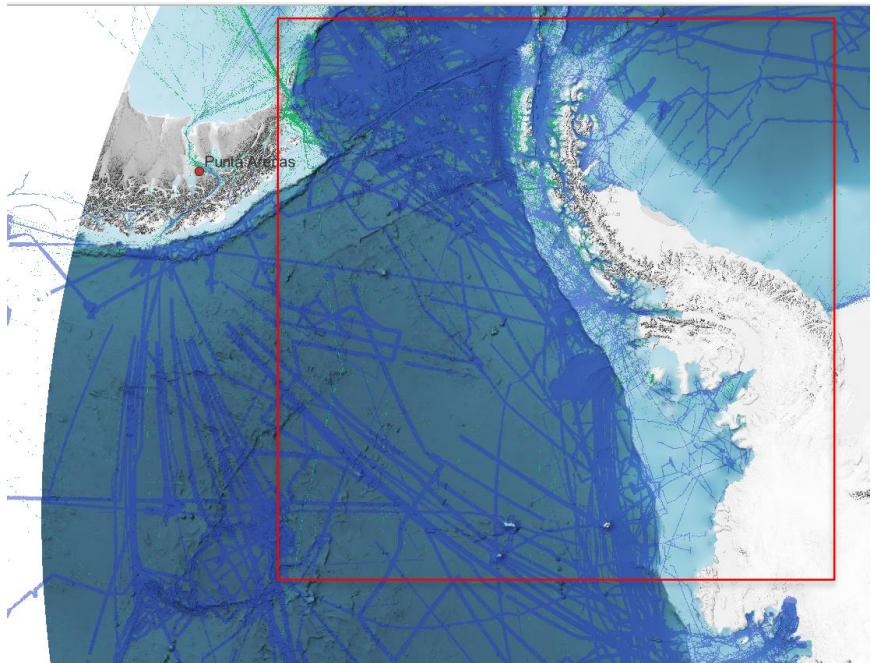
# Hero Fracture Zone



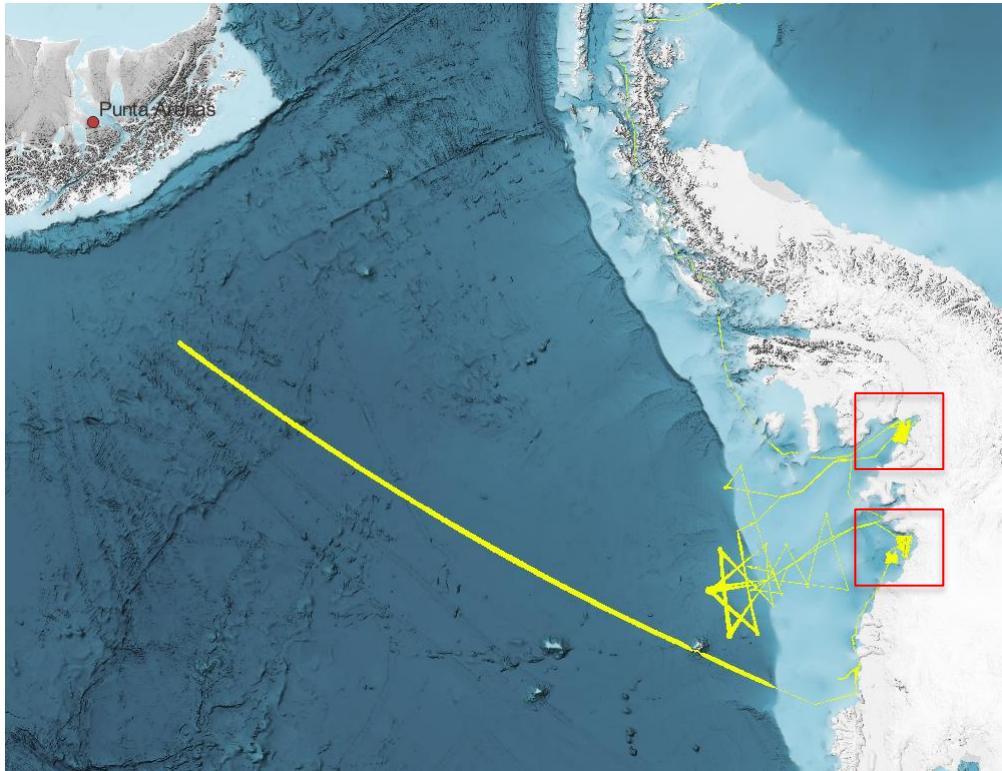
# Hero Fracture Zone



# Mornington Abyssal Plain to Bellingshausen Sea



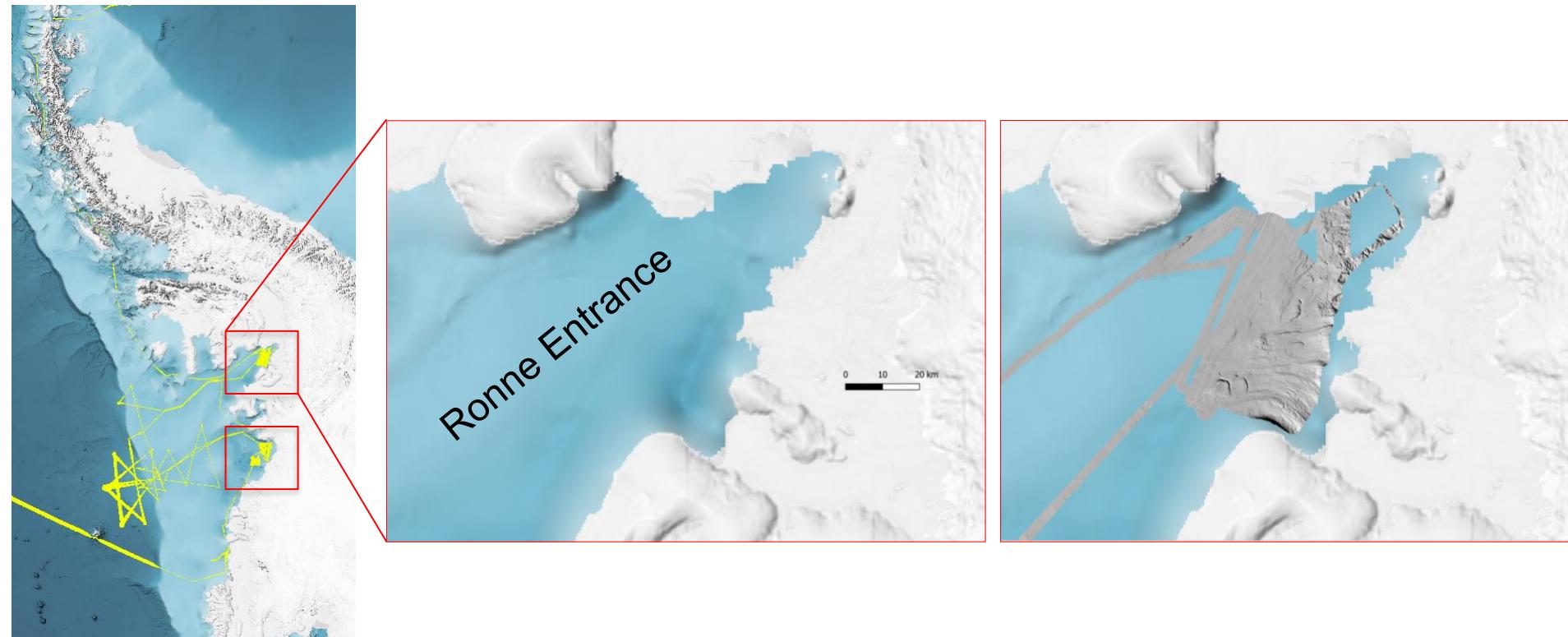
# Polarstern Cruise PS134, Project WAIS BELL



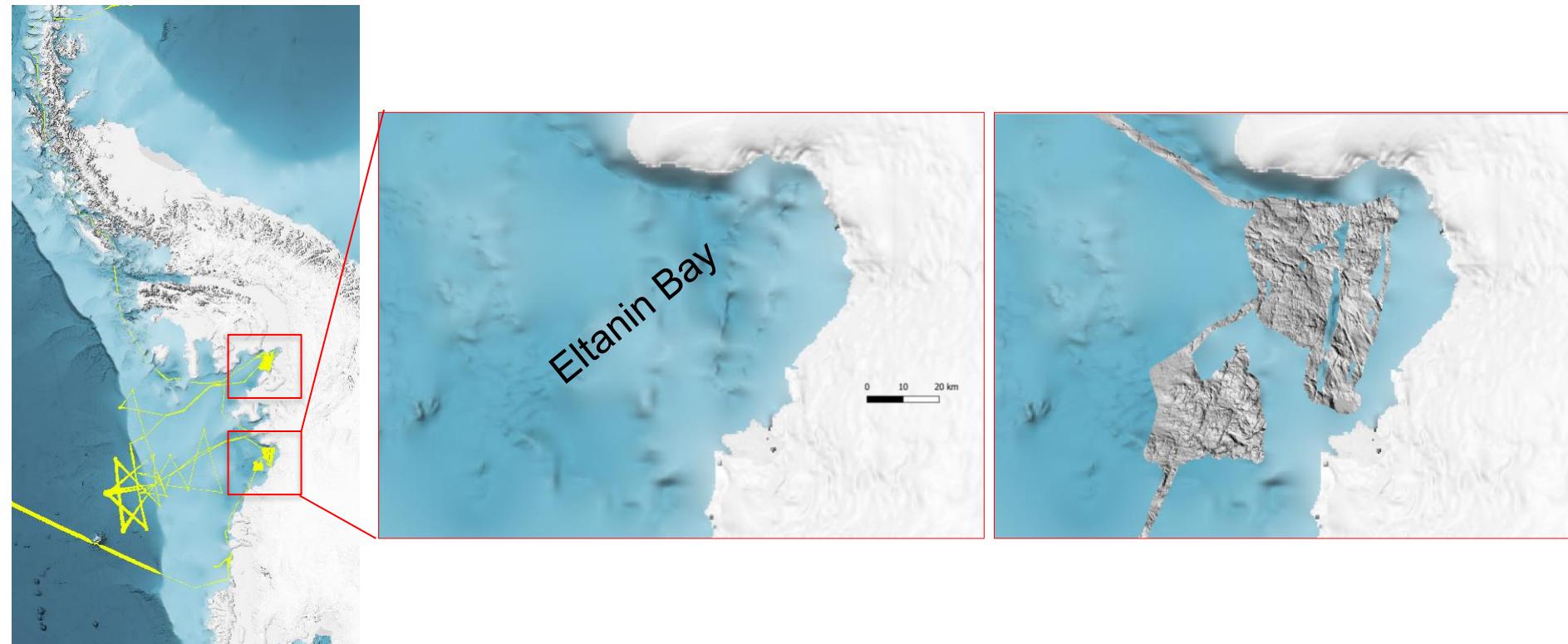
## Project goals:

- Glacial reconstruction and retreat cycles
  - Contribution to sea-level rise
  - 22.12.2022-06.03.2023
- ~ 50 days of bathymetry acquisition down from the northern tip of the Antarctic Peninsula back to South America

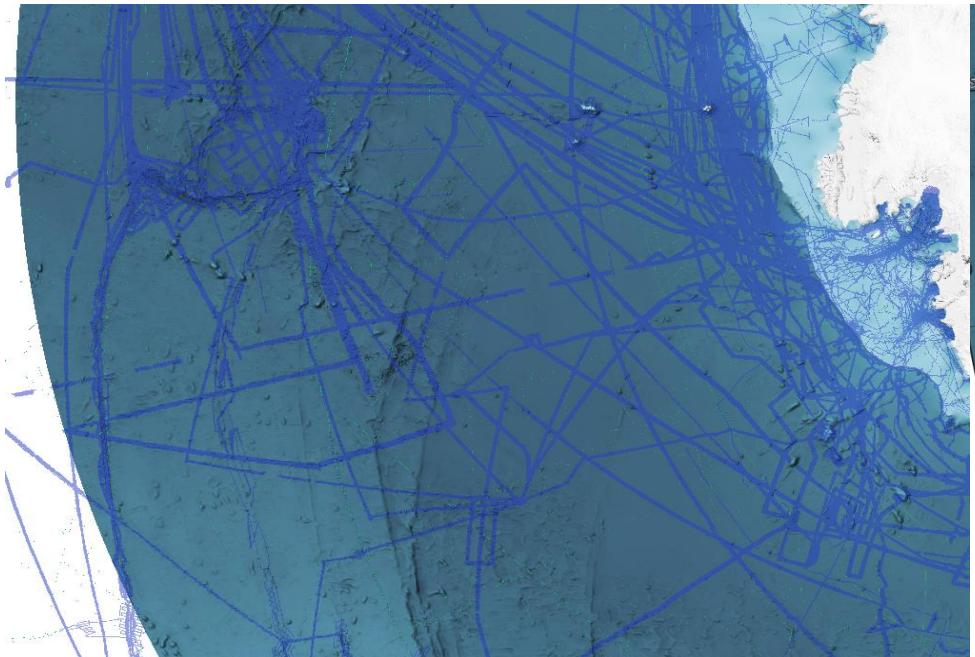
# Polarstern Cruise PS134, Project WAIS BELL



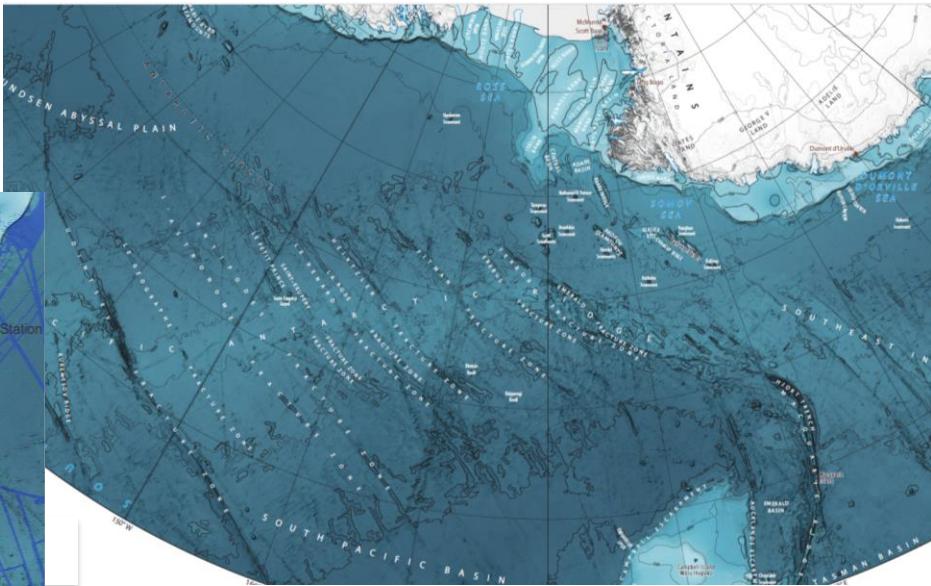
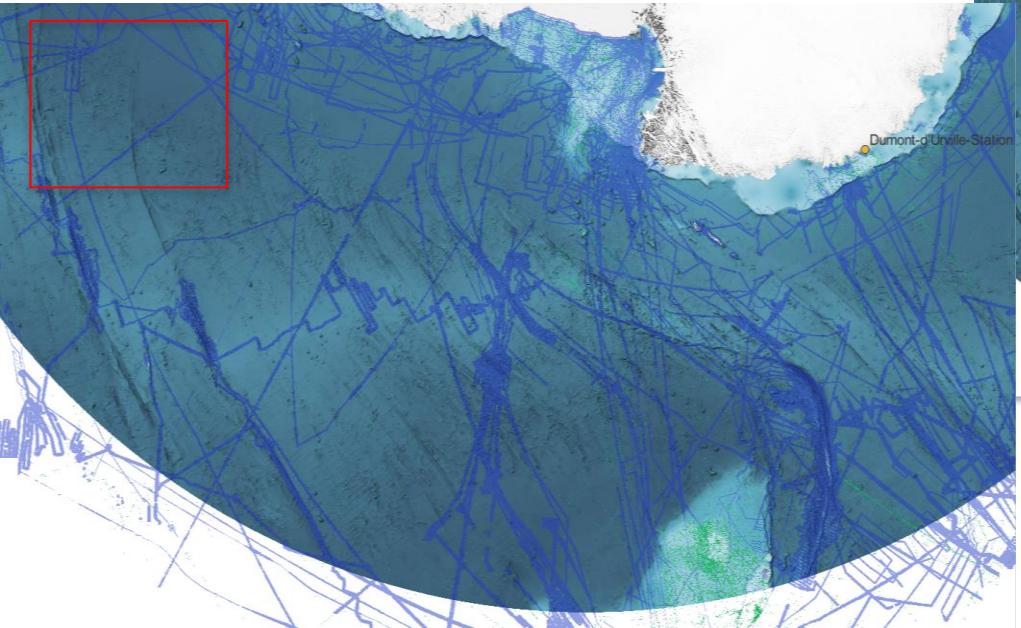
# Polarstern Cruise PS134, Project WAIS BELL



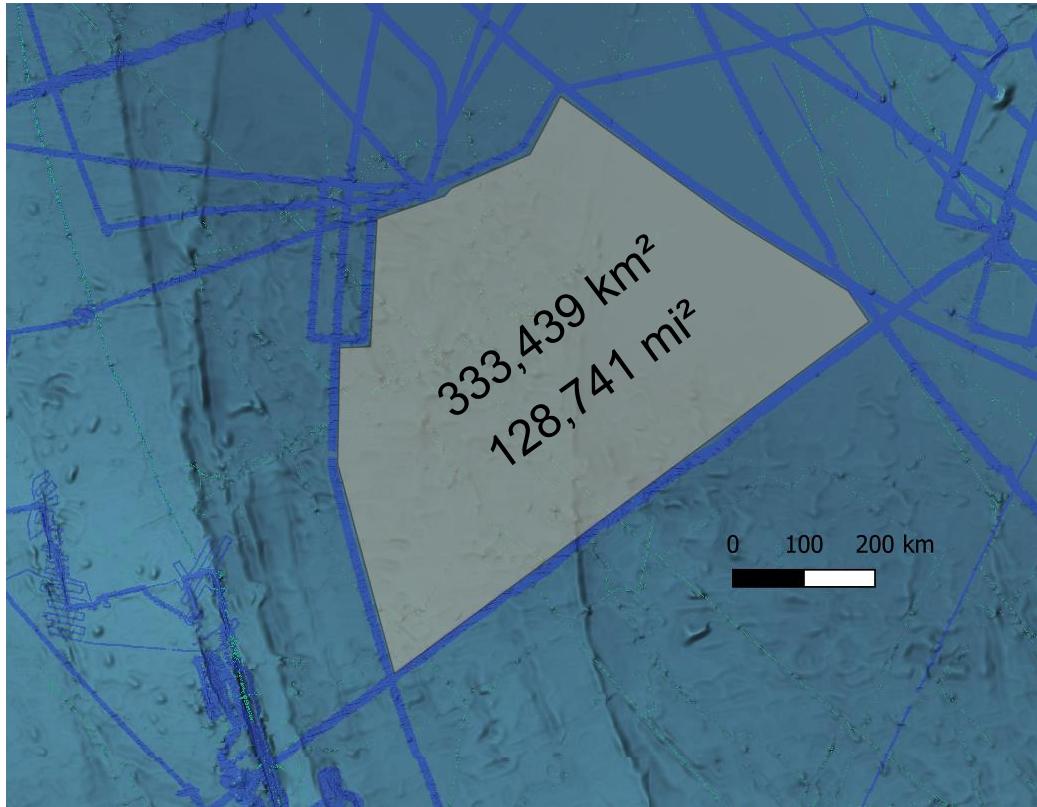
# Bellingshausen to Amundsen Abyssal Plain



# Amundsen Abyssal Plane to Hjort Trench



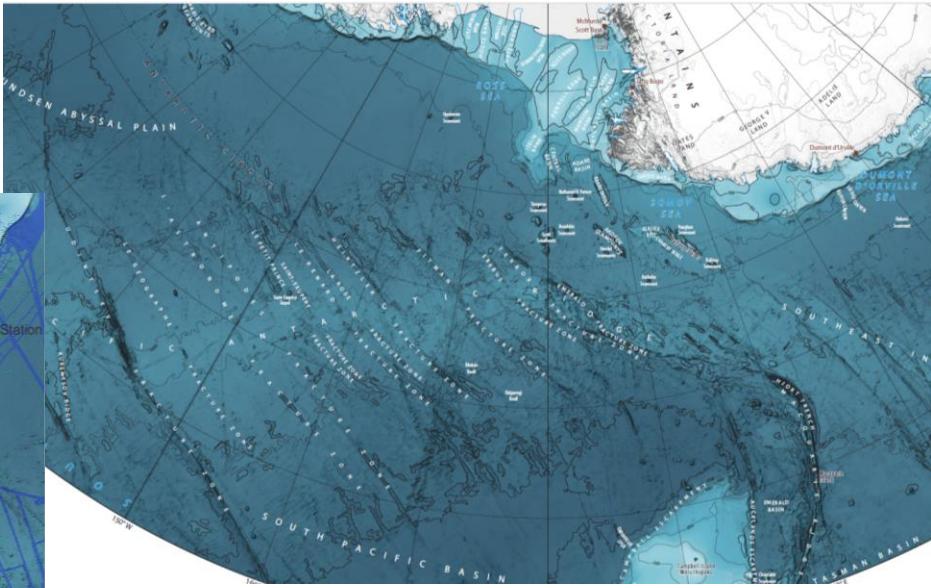
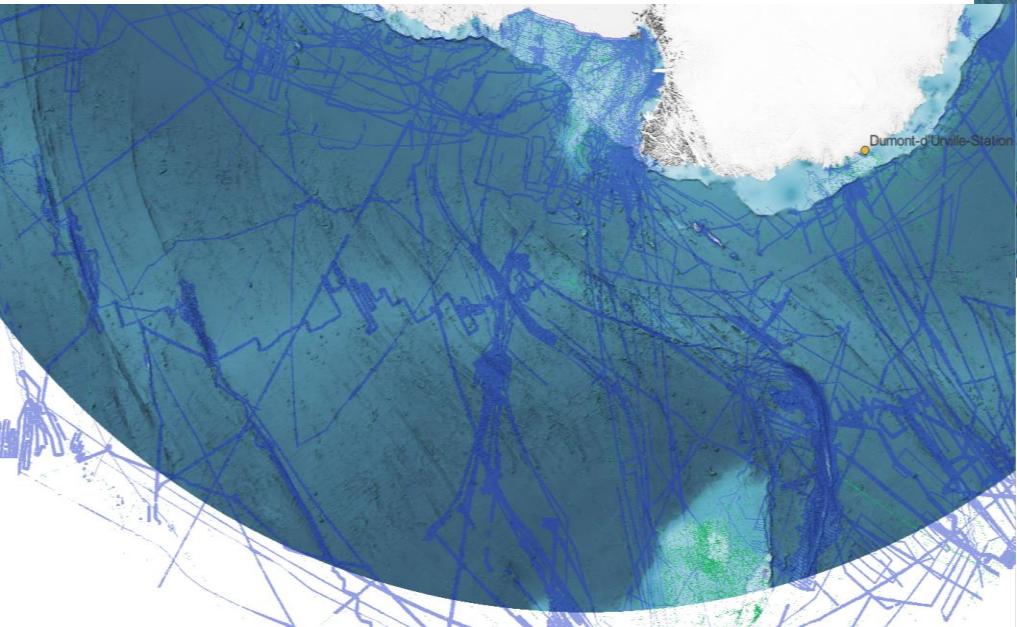
# Example Area



Peru has a total area of  
1,285,216 km<sup>2</sup> (496,224 mi<sup>2</sup>)

- This gap is equivalent to  $\frac{1}{4}$  of Peru

# Amundsen Abyssal Plane to Hjort Trench



# How to contribute?

## Contribute data

<https://seabed2030.org/get-involved/>

<https://seabed2030.org/our-product-2/>

## Additional information

- <https://ibcso.org/> (IBCSO-Website)
- <https://doi.pangaea.de/10.1594/PANGAEA.937574?format=html#download> (IBCSO-grids)
- <https://www.nature.com/articles/s41597-022-01366-7> (Publication)

# Contributors



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Lamont-Doherty Earth Observatory  
COLUMBIA UNIVERSITY | EARTH INSTITUTE



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Argentine Navy – <https://www.argentina.gob.ar/armada>  
Atmosphere and Ocean Research Institute, The University of Tokyo – <https://www.aori.u-tokyo.ac.jp/>  
Auburn University – <http://www.auburn.edu/>  
Australian Antarctic Data Centre – <https://data.aad.gov.au/>  
Australian Geological Survey Organisation – <http://www.ga.gov.au/>  
Australian Hydrographic Service – <https://www.hydro.gov.au/>  
Boise State University – <https://www.boisestate.edu/>  
British Antarctic Survey – <https://www.bas.ac.uk/>  
British Geological Survey – <https://www.bgs.ac.uk/>  
British Oceanographic Data Centre – <http://www.bodc.ac.uk/>  
Bureau of Mineral Resources, Geology and Geophysics – <http://www.ga.gov.au/>  
California Institute of Technology – <http://www.caltech.edu/>  
Carnegie Museum of Natural History – <https://carnegiemnh.org/>  
Center for Oceanographic and Hydrographic Research – <https://www.cioh.org.co/index.php/es/>  
Colgate University – <http://www.colgate.edu/>  
College of Charleston – <http://www.cofc.edu/>  
Commonwealth Scientific and Industrial Research Organisation – <http://www.csiro.au/>  
Consortium for Ocean Leadership – <http://oceaneadership.org/>  
Defense Mapping Agency – <https://www.nga.mil/Pages/Default.aspx>  
Department of Scientific and Industrial Research –  
Directorate of Hydrography and Navigation –  
<https://www.marinha.mil.br/dhn/>  
Duke University – <http://www.duke.edu/>  
Earth and Space Research – <http://www.esr.org/>  
Federal Institute for Geosciences and Natural Resources – <https://www.bgr.bund.de>  
Federal Institute of Hydrology – <http://www.bafg.de/EN>  
Federal Maritime and Hydrographic Agency of Germany – <http://www.bsh.de/en/Index.jsp>  
Federal Research Centre For Fisheries – <https://www.thuenen.de/de/ueber-uns/historie/bfafi-fischereiforschung/>  
Finnish Institute of Marine Research –  
Florida Institute of Technology – <http://www.fit.edu/>  
French Research Institute for Exploitation of the Sea – [http://w2.ifremer.fr/institut\\_eng](http://w2.ifremer.fr/institut_eng)  
General Bathymetric Chart of the Oceans – <https://www.gebco.net/>  
Geological and Mining Institute of Spain – <http://www.igme.es/>  
GEOMAR Helmholtz Centre for Ocean Research Kiel – <http://www.geomar.de/en/>  
GEOMAR Helmholtz Centre for Ocean Research Kiel – <http://www.geomar.de/en/>

Geoscience Australia – <http://www.ga.gov.au/>  
GNS Science – <http://www.gns.cri.nz/>  
Green Eyes LLC – <http://gescience.com/>  
Hamburg Ship Model Basin – <http://www.hsva.de/>  
Hamilton College – <https://www.hamilton.edu/index.cfm>  
Hydrographic and Oceanographic Service of the Chilean Navy – <http://www.shoa.cl/>  
Institute of Earth Physics of Paris – <http://www.ipgp.jussieu.fr/en>  
Institute of Geological Sciences – <http://www.nas.gov.UA/EN/Org/Pages/default.aspx?OrgID=0000249>  
Institute of Marine Science – [http://www.ismar.cnr.it/index.html?set\\_language=en&cd=en](http://www.ismar.cnr.it/index.html?set_language=en&cd=en)  
International Hydrographic Organization – <https://iho.int/>  
Italian Navy Hydrographic Office – <http://www.marinadifesa.it>  
Japan Aerospace Exploration Agency – <http://global.java.jp/>  
Japan Agency for Marine-Earth Science and Technology – <http://www.jamstec.go.jp/e/>  
Japan Coast Guard, Hydrographic and Oceanographic Department – <https://www1.kaih.go.jp/jhd-E.html>  
Japanese Antarctic Research Expedition – <https://www.nipr.ac.jp/english/antarctic/jare.html>  
Japan Oceanographic Data Centre – <https://www.jodc.go.jp/>  
Jet Propulsion Lab – <http://www.jpl.nasa.gov/>  
Kiel University – <http://www.uni-kiel.de/index-e.shtml>  
Korea Polar Research Institute – <http://eng.kopri.re.kr/>  
Laboratory of Marine Physics and Chemistry, Pierre and Marie Curie University –  
Lamont-Doherty Earth Observatory – <http://www.ledo.columbia.edu/>  
Land Information New Zealand – <https://www.linz.govt.nz/>  
Leibniz Institute for Tropospheric Research – <https://www.tropos.de/en/>  
Lockheed Martin (United States) – <http://www.lockheedmartin.com/>  
Louisiana State University – <http://www.lsu.edu/>  
Marine Geoscience Data System – <https://www.marine-geo.org/>  
Marine National Facility – <http://mnf.csiro.au/>  
Marine Technology Unit – <http://www.utm.csic.es/>  
MARUM - Center for Marine Environmental Sciences, University of Bremen – <https://www.marum.de/>  
McPhee Research (United States) – <http://mcpheeresearch.com/>  
Monterey Bay Aquarium Research Institute – <http://www.mbari.org/>  
National Centers for Environmental Information – <https://www.ngdc.noaa.gov/about>  
National Geospatial-Intelligence Agency – <https://www.nga.mil/Pages/Default.aspx>  
National Institute of Oceanography and Experimental Geophysics – <https://www.inogs.it/>  
National Institute of Polar Research – <http://www.nipr.ac.jp/english/>  
National Institute of Water and Atmospheric Research – <https://www.niwa.co.nz/>  
National Oceanic and Atmospheric Administration – <http://www.noaa.gov/>  
National Science Foundation – <http://www.nsf.gov/>

Natural Environment Research Council – <http://www.nerc.ac.uk/>  
Naval Hydrographic and Oceanographic Service – <http://www.shom.fr/en/>  
Northeastern University – <http://www.northeastern.edu/>  
Norwegian Petroleum Directorate –  
Norwegian Polar Institute – <http://www.npolar.no/en/>  
Ocean Drilling Program, Texas A&M University – <http://www.odplegacy.org/>  
Ocean Observatories Initiative – <https://oceanobservatories.org/>  
Oceanographic Centre of Canary Islands – <http://www.ieo.es/es/web/canarias/>  
Olex AS – [https://olex.no/index\\_en.html](https://olex.no/index_en.html)  
Oregon State University – <http://oregonstate.edu/>  
Polar Geospatial Center – <https://www.pgc.umn.edu/>  
Polar Marine Geosurvey Expedition – <http://www.pmgre.ru/>  
Raytheon Polar Services Company – <https://www.rbx.com/>  
Research on Ocean-Atmosphere Variability and Ecosystem Response in the Ross Sea – [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=9419605](https://www.nsf.gov/awardsearch/showAward?AWD_ID=9419605)  
Rice University – <http://www.rice.edu/>  
Rolling Deck to Repository – <https://www.rvdata.us/>  
Rosenstiel School of Marine and Atmospheric Science, University of Miami – <http://rsmas.miami.edu/>  
Royal Institute and Observatory of the Spanish Navy – [http://www.armada.mde.es/ArmadaPortal/page/Portal/ArmaDaEspanola/scientia\\_observatoria/preflang\\_en/](http://www.armada.mde.es/ArmadaPortal/page/Portal/ArmaDaEspanola/scientia_observatoria/preflang_en/)  
Royal Navy – <http://www.royalnavy.mod.uk/>  
Royal New Zealand Navy – <https://www.nzdf.mil.nz/navy/>  
Russian Academy of Sciences – <http://www.ras.ru/>  
Rutgers, The State University of New Jersey – <http://www.rutgers.edu/>  
Science and Engineering Research Council – <https://www.a-star.edu.sg>About-A-STAR/science-and-engineering-research-council>  
Scripps Institution of Oceanography – <https://scripps.ucsd.edu/>  
Second Institute of Oceanography – <http://www.sio.org.cn/>  
South African Navy Hydrographic Office – <http://www.sanho.co.za/>  
Southern African Data Centre for Oceanograph – <http://sadc.ocean.gov.za/index.html>  
Spanish Institute of Oceanography – <http://www.ieu.es/en/>  
Spanish National Research Council – <http://www.csic.es/>  
Stanford University – <http://www.stanford.edu/>  
State Institution National Antarctic Scientific Center – <http://uac.gov.ua/en/>  
World Ocean Circulation Experiment – <https://www.ewoce.org/>



# Thanks for Listening

Photo by Sacha Viquerat