

A large, jagged iceberg floats in a calm, dark blue sea. The iceberg has a prominent vertical crack running down its center, and a smaller, more complex structure is visible to its right. The sky is a pale, hazy blue.

# Comments for Panel 6: International Coordination and Collaboration

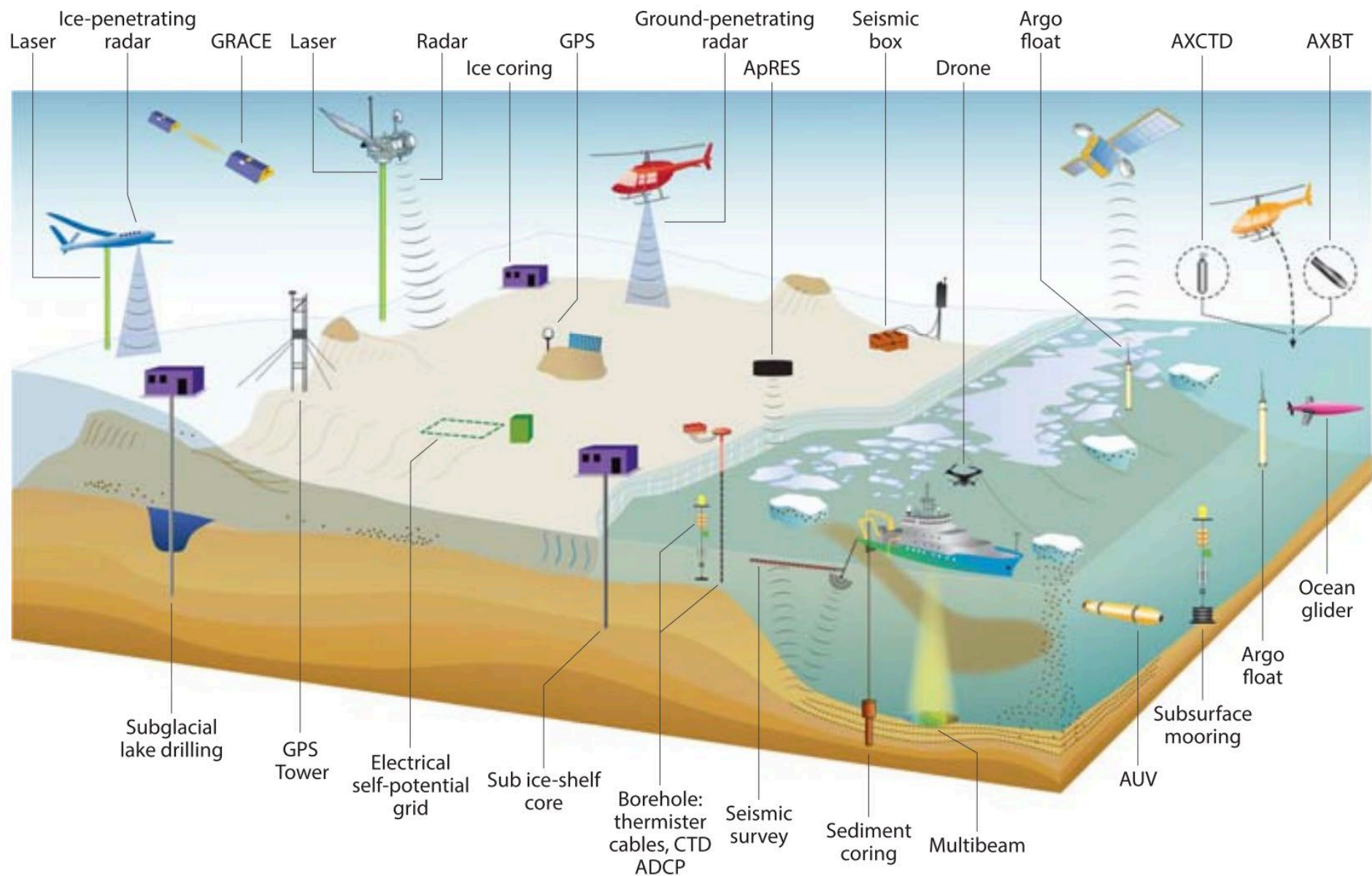
## Moving the Science Forward for IPY5

Julia Smith Wellner  
University of Houston

Exploring Key Research Topics for the Fifth International Polar Year – A NASEM Workshop

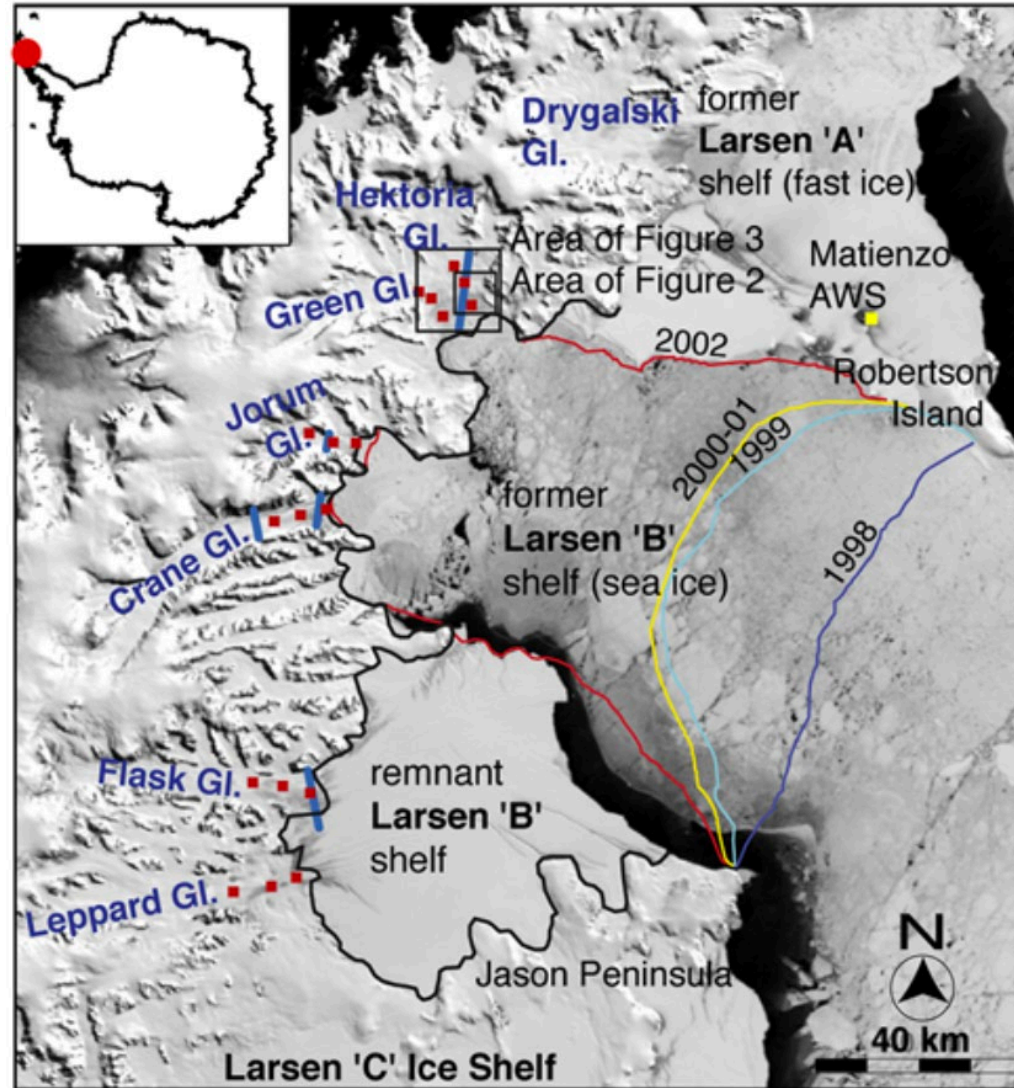
05/21/2025 (online)

# Lots of Ways to Study Ice Sheets





# IPY 4: LARsen Ice Shelf System, Antarctica



Scambos et al., 2004

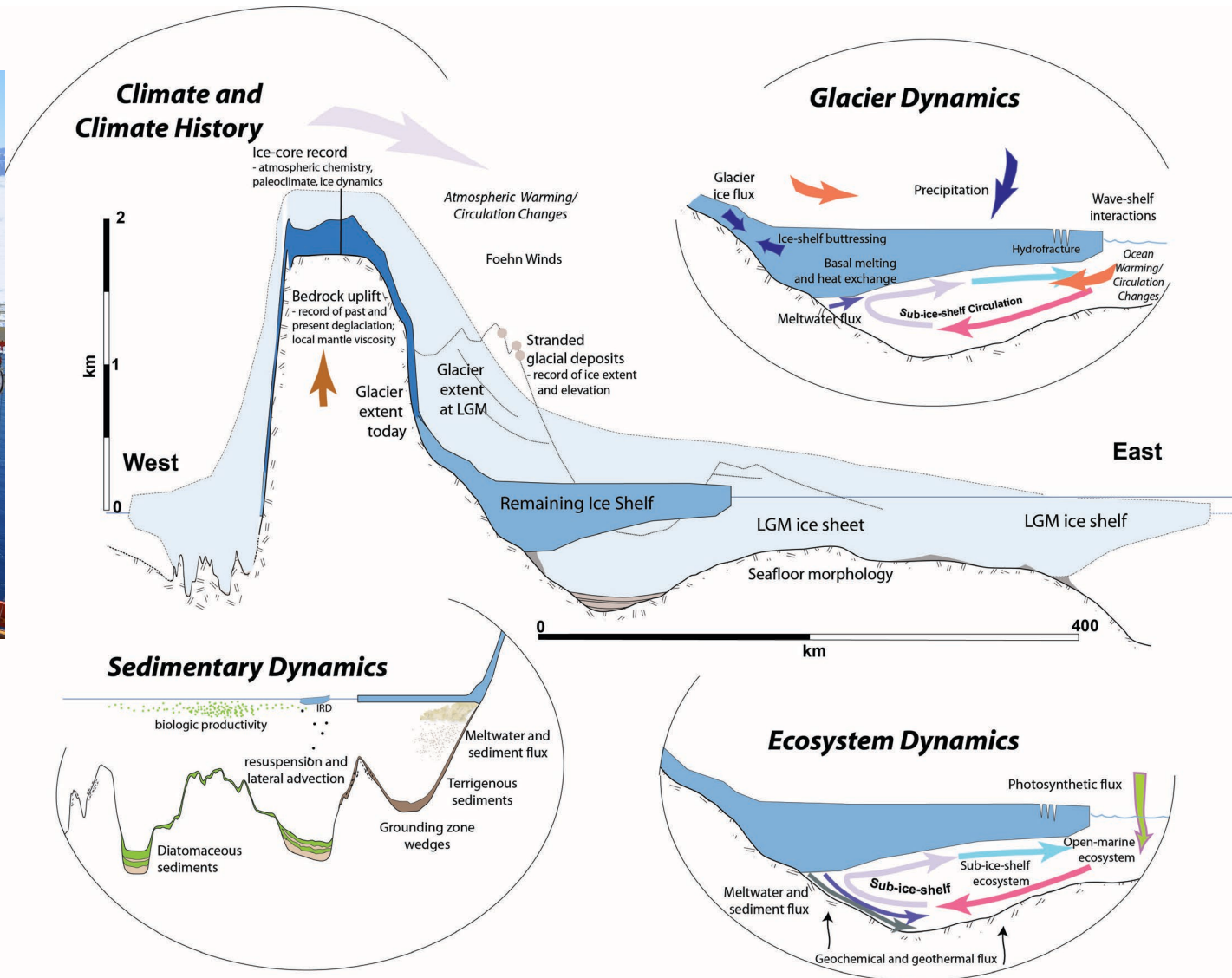
# IPY 4: LARsen Ice Shelf System, Antarctica

Ships and helicopters (mainly)



3-prong approach:

- Marine and Quaternary Geology
- Ice and Oceans
- Biology





# IPY 4: LARsen Ice Shelf System, Antarctica

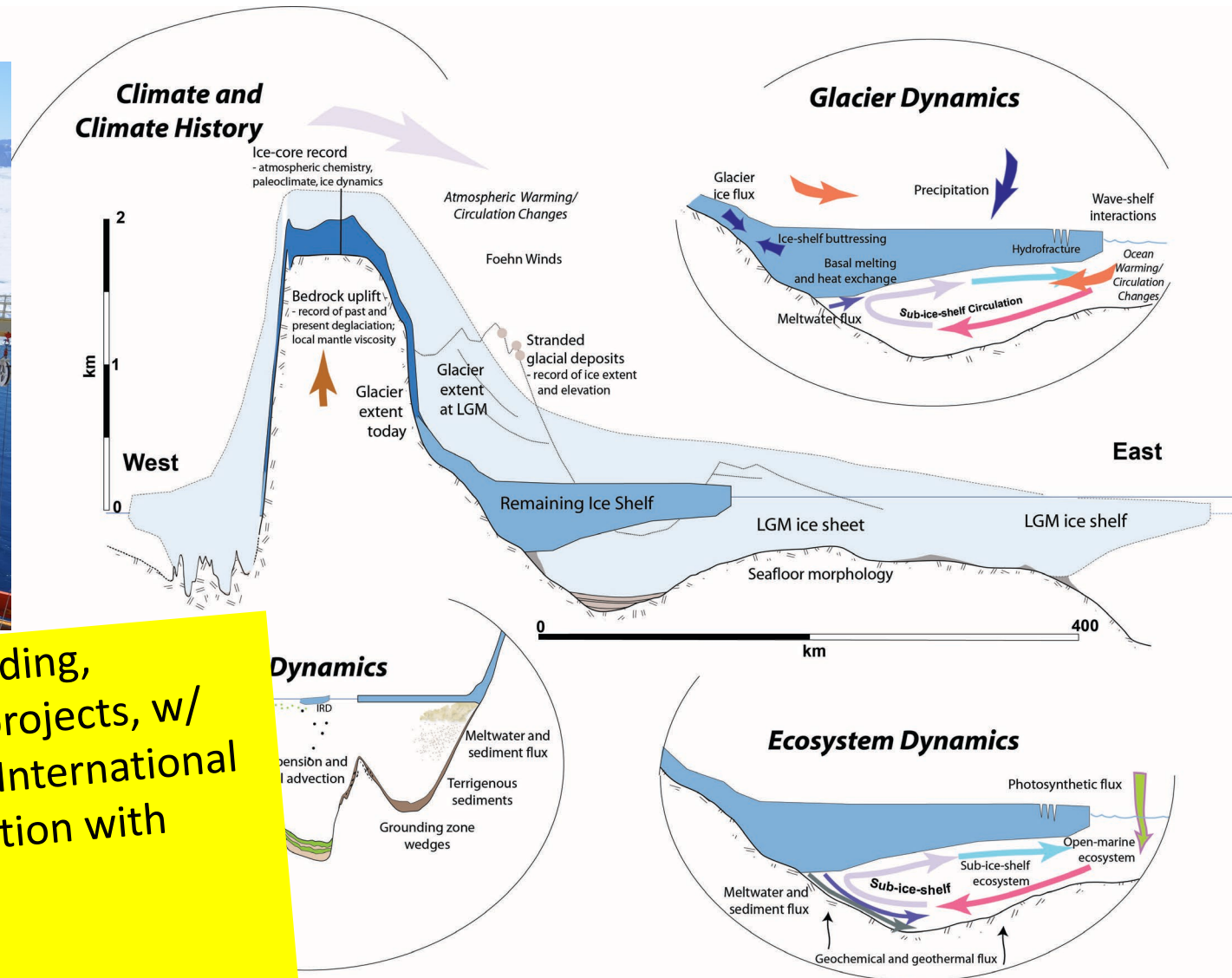
Ships and helicopters (mainly)



3-prong approach

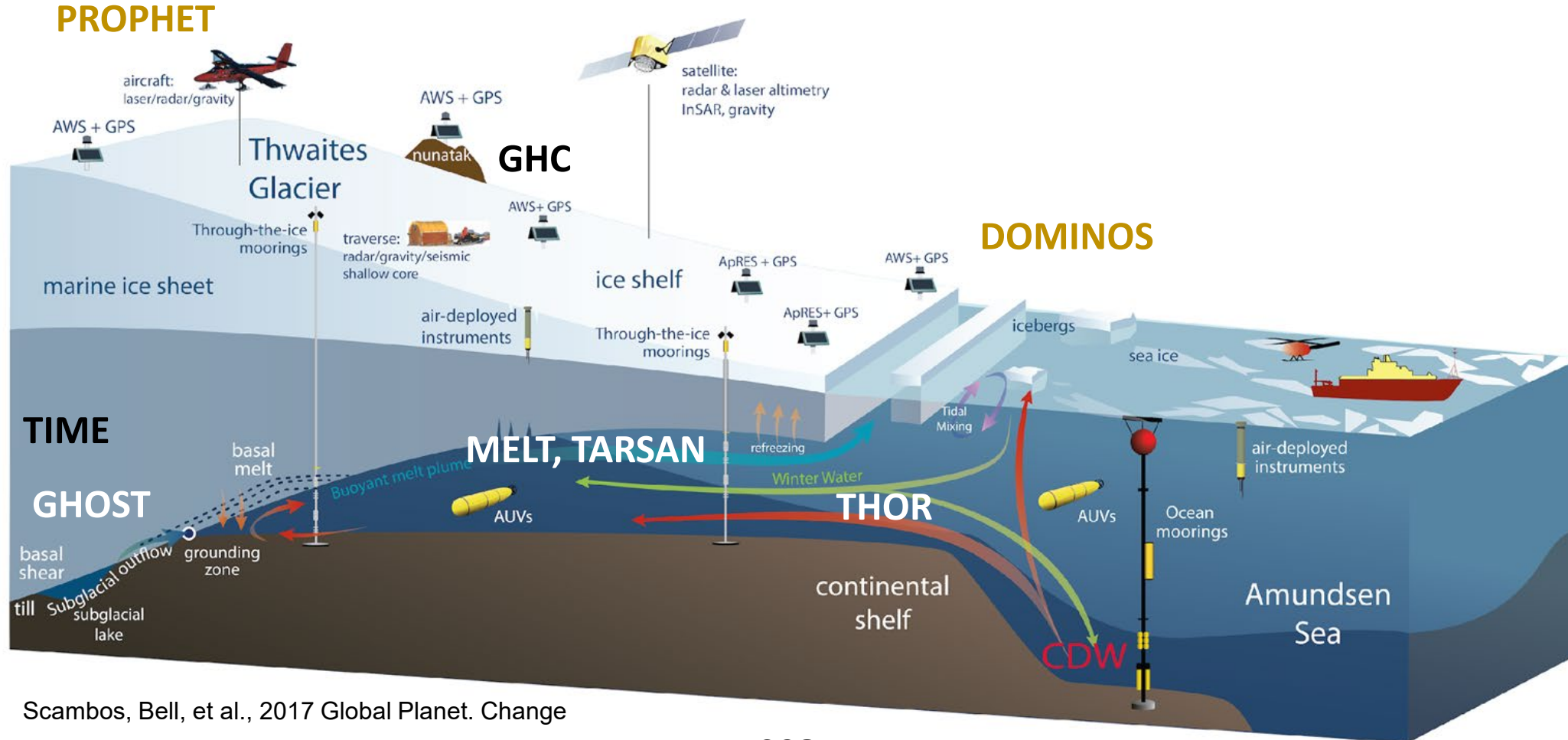
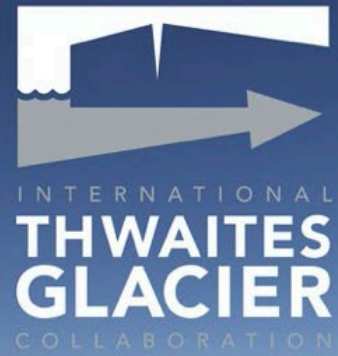
- Marine and Quaternary Geology
- Ice and Oceans
- Biology

1. NSF funding, multiple projects, w/ PI-driven International Collaboration with KOPRI



# International Thwaites Glacier Collaboration (ITGC)

*Eight research proposals and a Science Coordination Office*

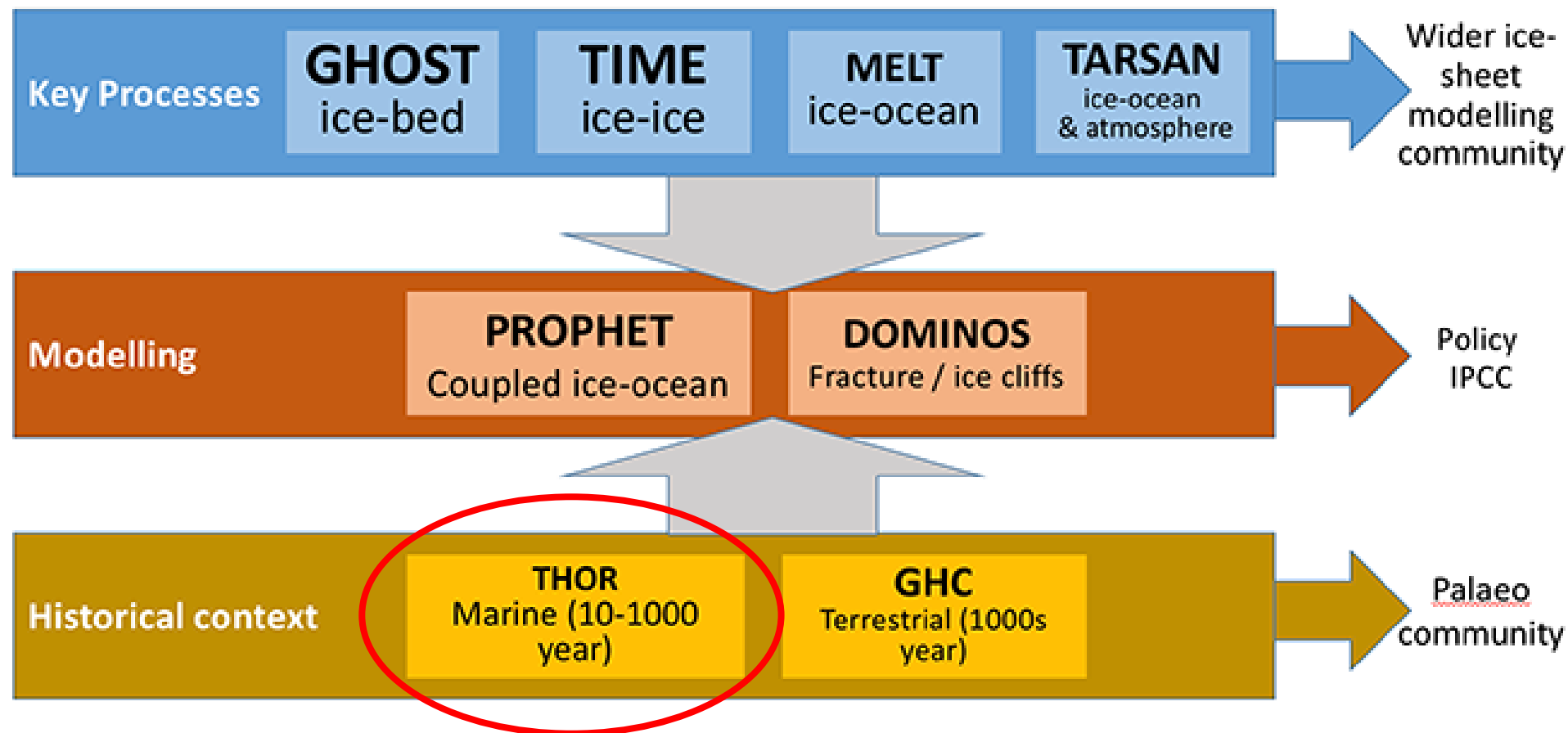


Scambos, Bell, et al., 2017 Global Planet. Change

SCO



# International Thwaites Glacier Collaboration



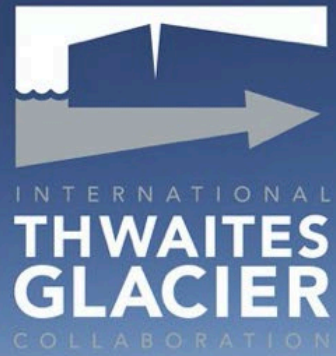
# THOR

## (THwaites Offshore Research)

PIs: Julia Wellner (University of Houston) and Claus-Dieter Hillenbrand (BAS)

Co-Is: John Anderson (Rice University)  
Ali Graham (University of South Florida)  
Rob Larter, Kelly Hogan and James Smith (BAS)  
Rebecca Minzoni (University of Alabama)  
Frank Nitsche (LDEO)  
Lauren Miller (University of Virginia)

Students (to date): R. Clark, R. Comas, V. Fitzgerald, R. Hopkins, A. Lehrmann, A. Lepp, J. Marschalek, E. Mawbey, J. Kirkham, S. Munevar, L. Taylor, J. Villafranca





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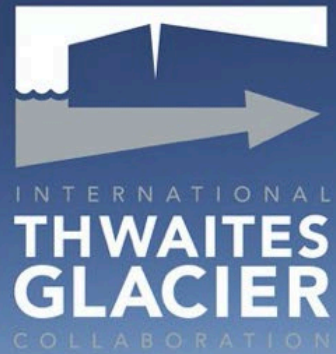
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2. US-UK Partnership!

Additional partners  
(KOPRI, Sweden,  
Germany) added by  
PIs



# NSF Lead Agency Agreements

Dear Colleague Letter

## **NSF-Swiss NSF Lead Agency Opportunity**

January 27, 2023

---

Invites U.S.-Swiss collaborations at the intersection of the Swiss National Science Foundation's three research divisions and participating NSF programs.

Dear Colleagues:



# NSF Lead Agency Agreements

Dear Colleague Letter

## **NSF-Swiss NSF Lead Agency Opportunity**

January 27, 2023

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Invites U.S.-Swiss collaborations at the intersection of the Swiss National Science Foundation's three research divisions and participating NSF programs.

Dear Colleagues:

3. Build your own  
international funding!



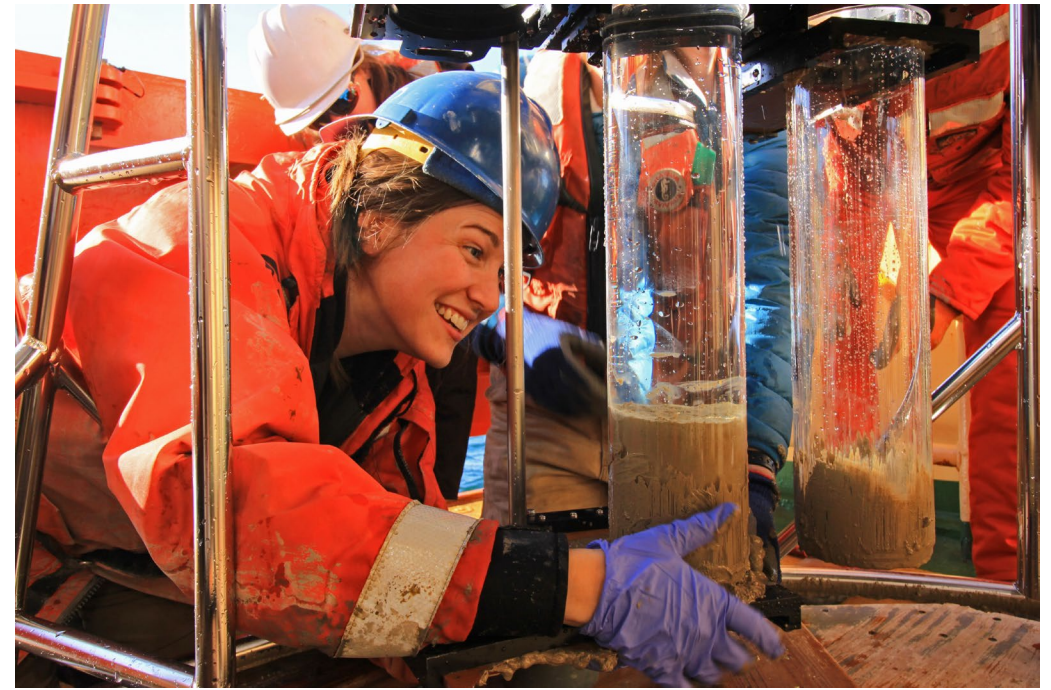
# WELCOME TO THE SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

Initiating, developing and coordinating  
high quality international scientific  
research in the Antarctic region





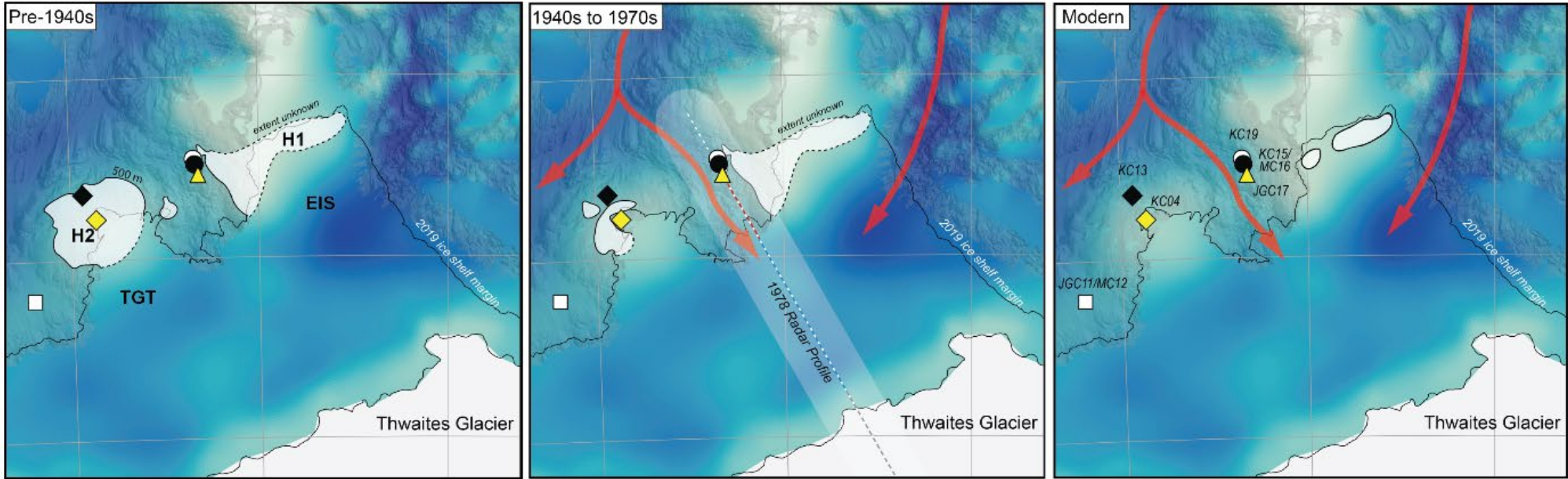
Studies of ice-ocean interactions require getting to the ice-ocean boundary.



Repositories can be a good resource when field access not available.

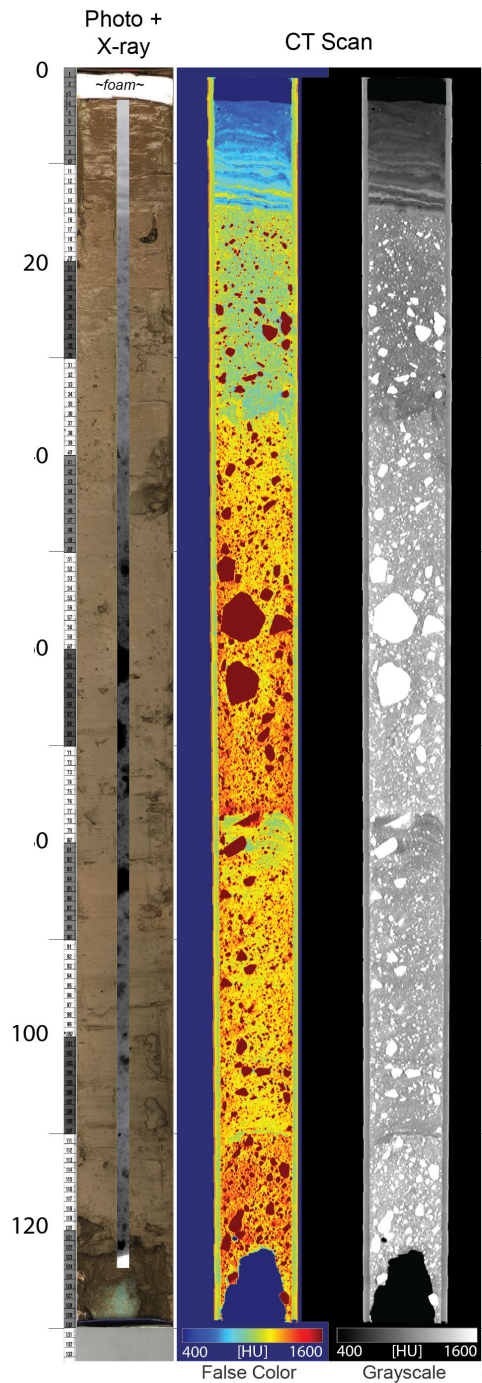


Rapidly changing! Icebreaker allows access adjacent to ice, sometimes at location of past sub ice work.



Clark et al., 2024, PNAS

Dividing science by platform creates artificial boundaries between approaches to same questions.











## **Dr. Allison Cusick**

Biological Oceanographer  
Postdoctoral Scholar

# **Exploring Key Research Topics for the Fifth International Polar Year**

Panel 6: International Coordination and Collaboration –  
Moving the Science Forward for IPY5



U.S. National Science Foundation

2013



# Building the Citizen Science Program FjordPhyto



10,000 individual National Antarctic Program staff (COMNAP 2023)

122,000 individual private sector travelers (IAATO 2023)

62 expedition vessels (vs USA 1 research vessel) (2025)

2016 – Conceptualization of a collaborative program began





# Collaborating with the Expedition Cruise Sector Through Citizen Science

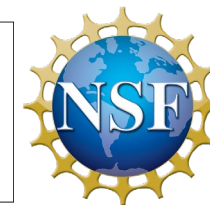


Citizen Science also known as:  
*Participatory science, community science, crowdsource science, volunteer monitoring, Public Participation in Science, Technology, Engineering, Math (STEM)*

“The practice of engaging the public in a scientific project—a project that produces reliable data and information usable by scientists and that is open to the same system of peer review that applies to conventional science.”  
(McKinley et al. 2017)



UNIVERSIDAD  
NACIONAL  
DE LA PLATA



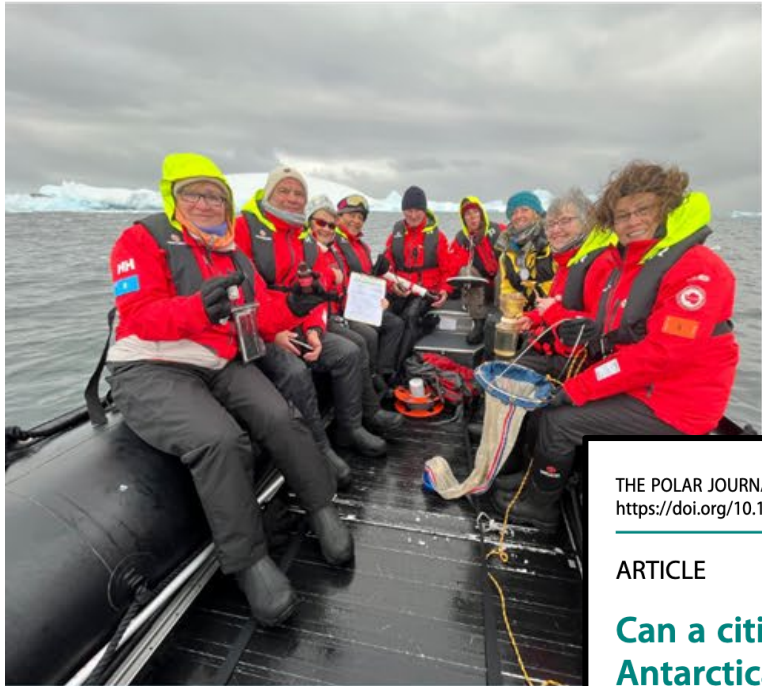




**Collaborating with 16 Operators and 24 Vessels**




# Engaging >10,000 Travelers









THE POLAR JOURNAL  
<https://doi.org/10.1080/2154896X.2025.2492488>

 **Routledge**  
Taylor & Francis Group

ARTICLE

 OPEN ACCESS  Check for updates

## Can a citizen science project enrich travellers' experience in Antarctica? Case study of a preliminary evaluation of the FjordPhyto project

Allison Cusick <sup>a</sup>, Brooke Dixon <sup>b,c</sup>, Daniela Cajiao <sup>d</sup>, Robert Gilmore <sup>e,f</sup>,  
Ted Cheeseman <sup>g,h</sup> and Martina Mascioni <sup>i,j</sup>

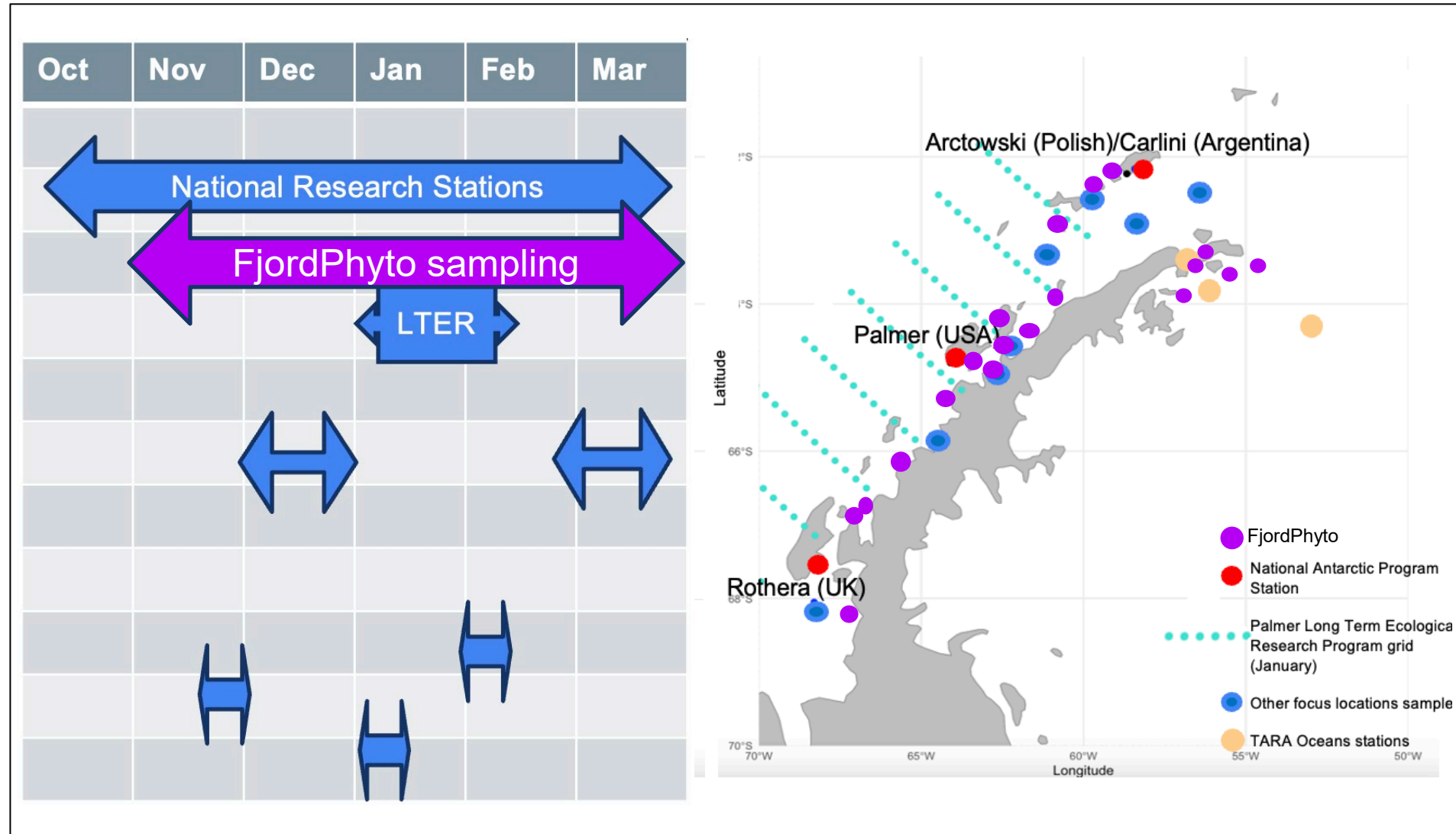




# When Collaboration Scales, We Can Learn More, Faster



- **Sampling events**
  - 1000
- **Temporal:**
  - Nov-Mar
  - since 2016
- **Spatial:**
  - 43 sites in the coastal region



# How do we shape polar research?



**POLAR EARLY CAREER  
WORLD SUMMIT**  
Boulder, Colorado, US

22 - 24 March  
**2025**

## Input on the Polar Early Career World Summit (PECWS) 2025 priority synthesis

From 22–24 March 2025, 120 polar early career researchers (ECRs) gathered for **the Polar Early Career World Summit (PECWS)** and developed 12 vision statements, 75 priorities, and 186 reasonings and actions. This material will guide international priority setting and coordination processes in polar research, like the 4th International Conference on Arctic Research Planning and the International Polar Year 2032-2033.



@womanscientist  
[www.womanscientist.com](http://www.womanscientist.com)



## SUMMARY

Champions – to lead initiatives

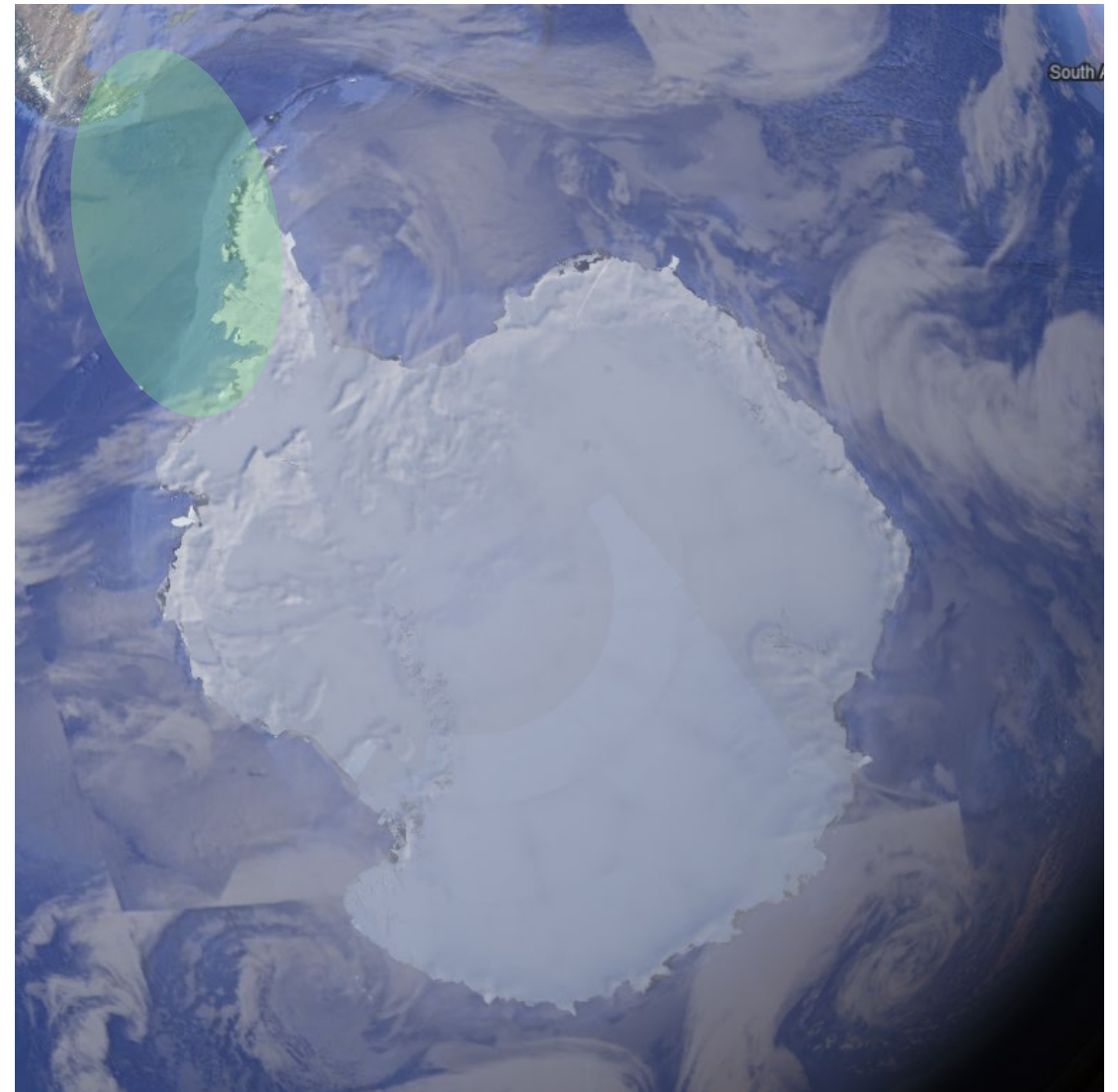
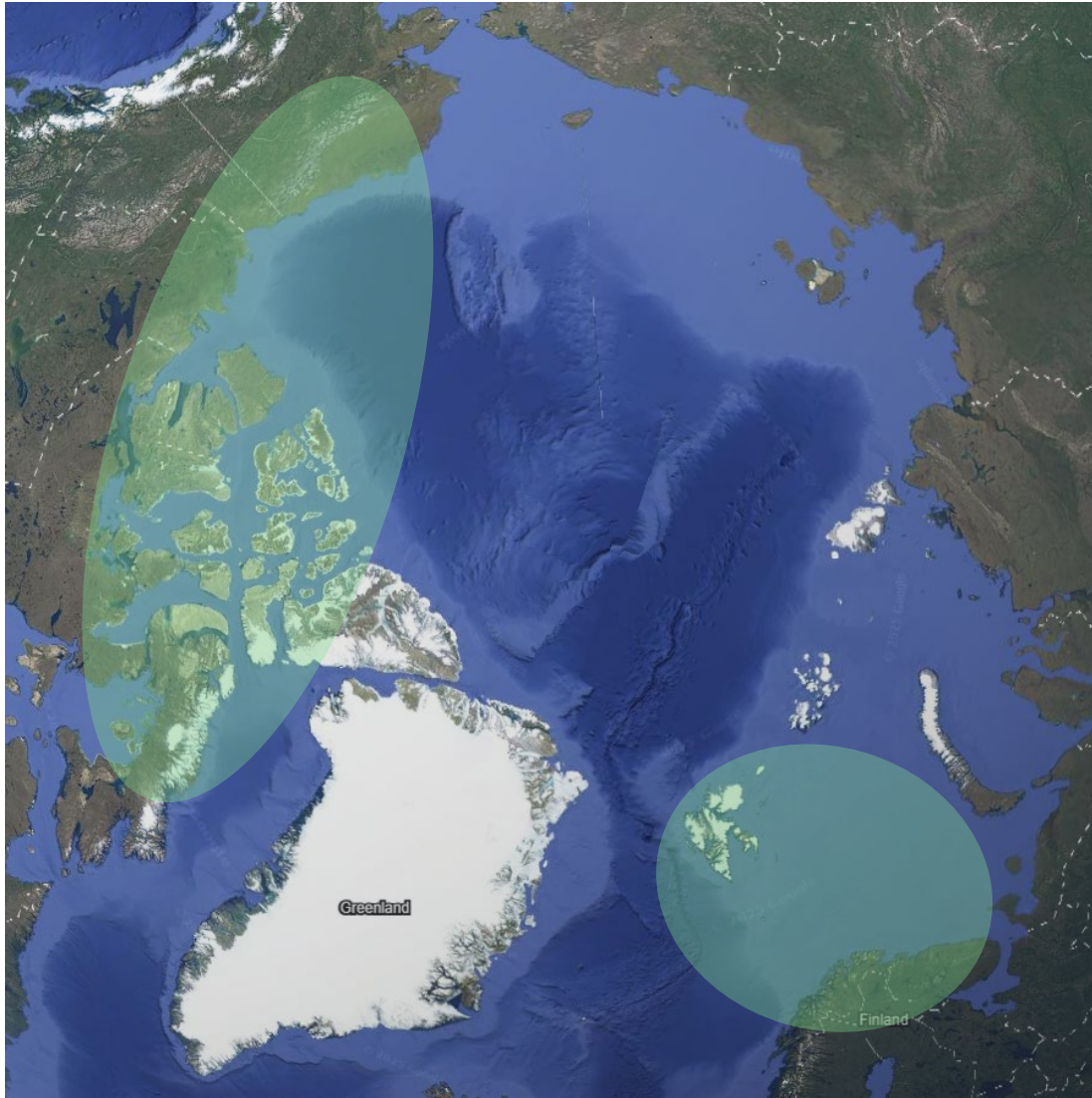
Training – Institution/lab independent

Fellowships – More and shorter duration

Sampling effort - Increased to successive seasons



## Panel 6: International Coordination and Collaboration – Moving the Science Forward for IPY5



Andrew King  
Dept of Oceanography  
Norwegian Institute for Water Research



- Climate change and ocean acidification
- Primary production and nutrients/trace elements/ $\text{CO}_2$
- Ocean observing systems and technology



# Norwegian Ships of Opportunity Program (NorSOOP): at a glance

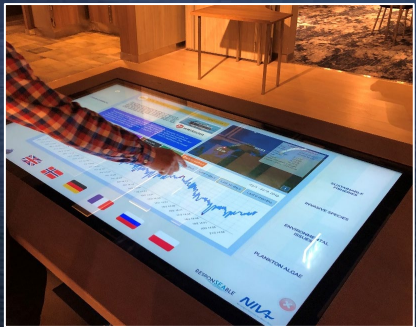
3) Satellite remote sensing cal/val



2) Above-water instruments



4) Ocean literacy & citizen science



1) FerryBox sensor system for EOVs + lab space

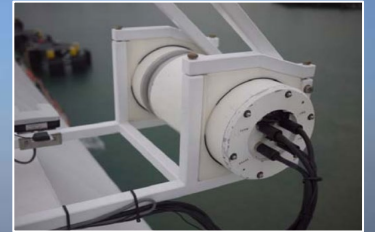
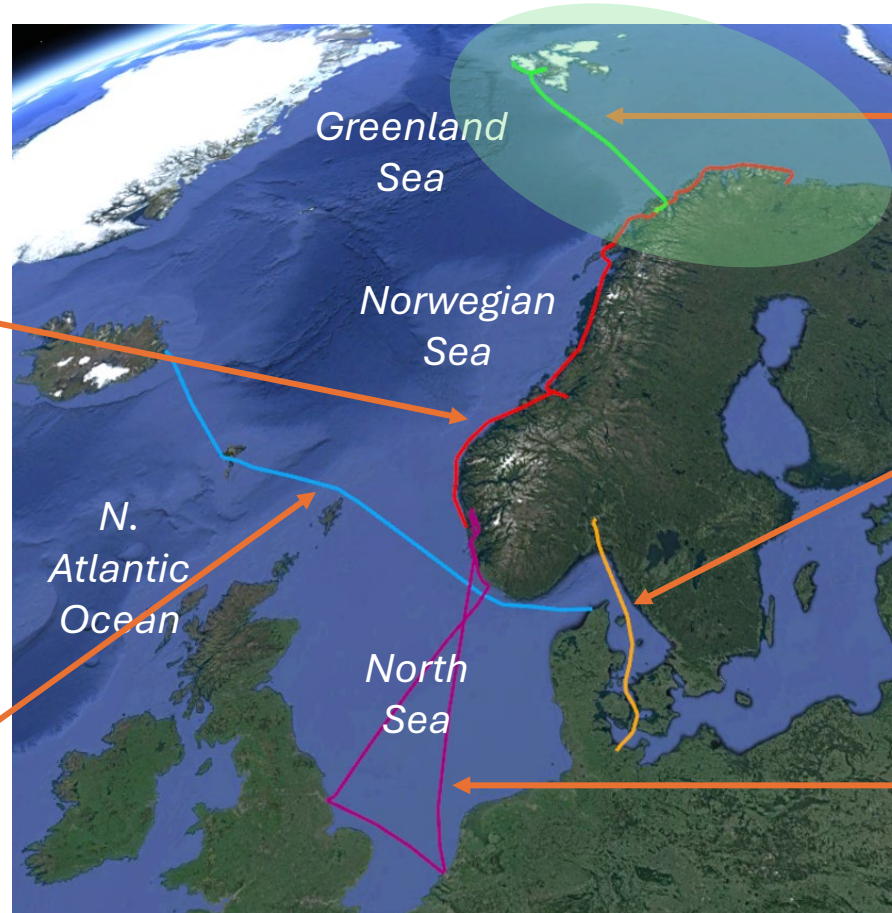


photo credit: Color Line



# NorSOOP: Norwegian Arctic observations



**EuroGOOS**  
European Global Ocean  
Observing System



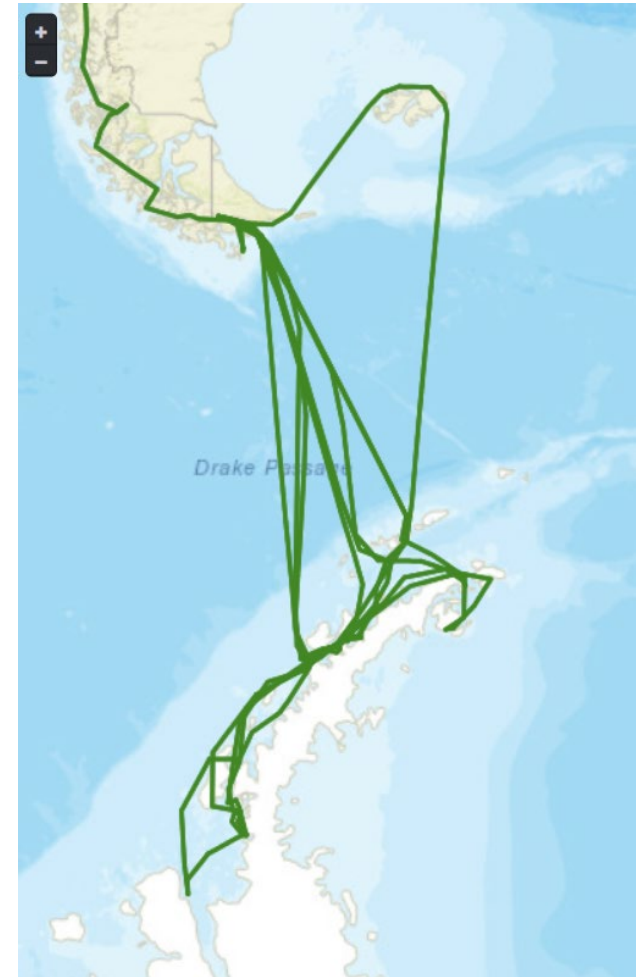
**FerryBox**  
EuroGOOS Task Team



# NorSOOP: North American Arctic and Southern Ocean observations



- Annual Northwest Passage cruises on two ships since 2018 (Hurtigruten Expeditions)



- ~10+ crossings of Drake Passage per ship per year (Hurtigruten Expeditions and Viking Expeditions)



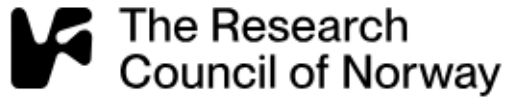
MS Roald Amundsen



Viking Octantis and Polaris

# Key funding/coordination bodies

## Norwegian and EU



## Early career researchers



Researcher Project for Early Career Scientists (FRIPRO)



**Marie Skłodowska-Curie Actions**  
Developing talents, advancing research



**European Research Council**  
Established by the European Commission

**Starting Grant**



INTEGRATING RESEARCH INFRASTRUCTURES - CONNECTING SCIENTISTS - ENABLING TRANSNATIONAL ACCESS  
FOR HEALTHY AND SUSTAINABLE MARINE AND FRESHWATER ECOSYSTEMS



# Key points messages for later use

- Norway is an Arctic and Polar nation with commitment and history in polar exploration and research
- Ocean observing sensors and platforms for new *in situ* data can contribute to IPY5 activities
- Cooperation with ship companies can be beneficial in several respects – cost-effective, promotion of responsible cooperation/sustainable development, foster links with local communities and citizen science/ocean literacy, good platform for testing sensor prototypes
- There are several national and European level funding mechanisms and coordination bodies that can contribute to IPY5 planning and funding; close dialogue with other initiatives is important



# LIONESS:

Collaborative Pathways  
to Understanding Polar Climate Change

Won Sang Lee & The LIONESS Consortium



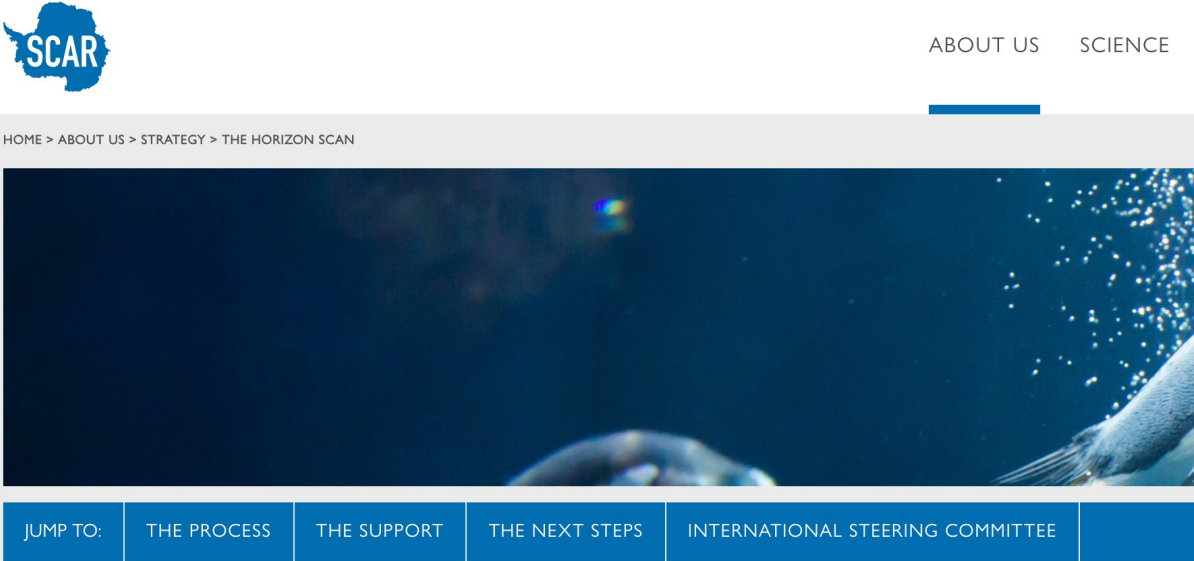


## > Discussion Questions:

- **How do we develop internationally coordinated research questions and partnerships, from idea development, funding, to operations/implementation?**
- Are there new/emerging opportunities to promote and implement this coordination (e.g. remote and/or share technologies)?
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- **Question to participants:** where do you see opportunities to support enhanced international collaboration and coordination



# > SCAR Horizon Scan



## THE HORIZON SCAN

The 1<sup>st</sup> SCAR Antarctic and Southern Ocean Science Horizon Scan assembled the world's leading Antarctic scientists, policy makers, leaders, and visionaries to identify the most important scientific questions that will or should be addressed by research in and from the southern Polar Regions over the next two decades. The SCAR Science Horizon Scan was developed, organized and managed by an **International Steering Committee**.

The Horizon Scan activity was concluded in 2014 and **this web page is now an archive** of information and associated documents, which provides easy access to all aspects of the Horizon Scan planning, updates, and various supporting resources.

STEFAN CHRISTMANN/CORBIS




The aurora australis over the German Antarctic research base, Neumayer-Station III.

## Six priorities for Antarctic science






**Mahlon C. Kennicutt II, Steven L. Chown** and colleagues outline the most pressing questions in southern polar research, and call for greater collaboration and environmental protection in the region.





# Thwaites Glacier


















The International Thwaites Glacier Collaboration



[Home](#) [About](#) [Projects](#) [News & Events](#) [Education](#) [Resources](#) [Field Activities](#) [Q](#)

UK and US scientists are collaborating to investigate one of the most unstable glaciers in Antarctica, the Thwaites Glacier, roughly the same size as Florida or Britain. [Learn more about the mission.](#)

## Project Partners






## Ocean-Cryosphere Exchanges in ANTarctica: Impacts on Climate and the Earth System

OCEAN ICE

PROJECT

OCEAN ICE is a Horizon Europe project, funded by the European Commission and UKRI. The project started on the 1st of November 2022 and will run for 4 years until 31st October 2026.





## > Discussion Questions:

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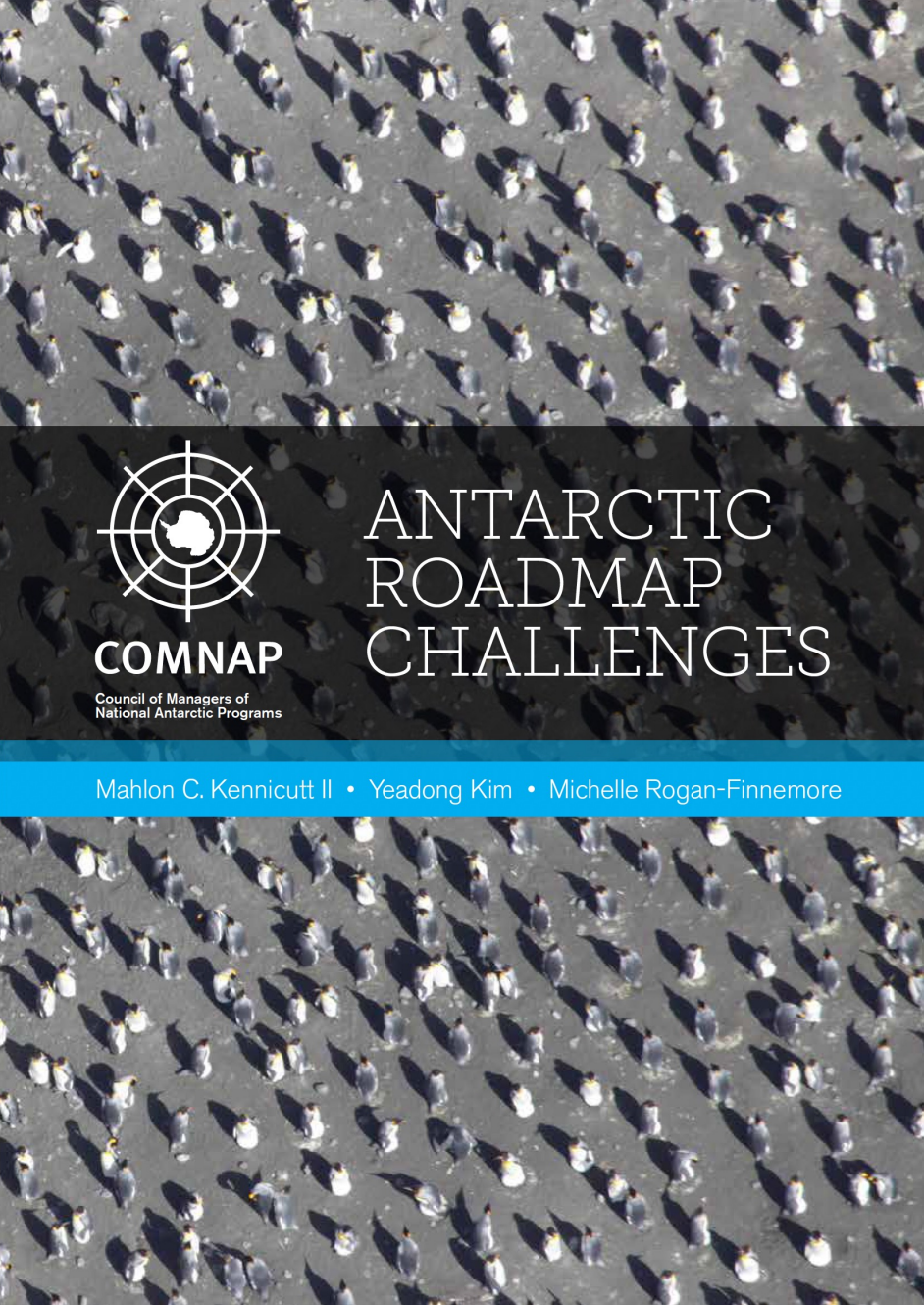
**Mission to Antarctica and the Southern Ocean:  
collecting year-round and circumpolar observations  
in 2027-2030 as a contribution to the UN Ocean Decade  
and towards the 5th IPY**

## Antarctica InSync

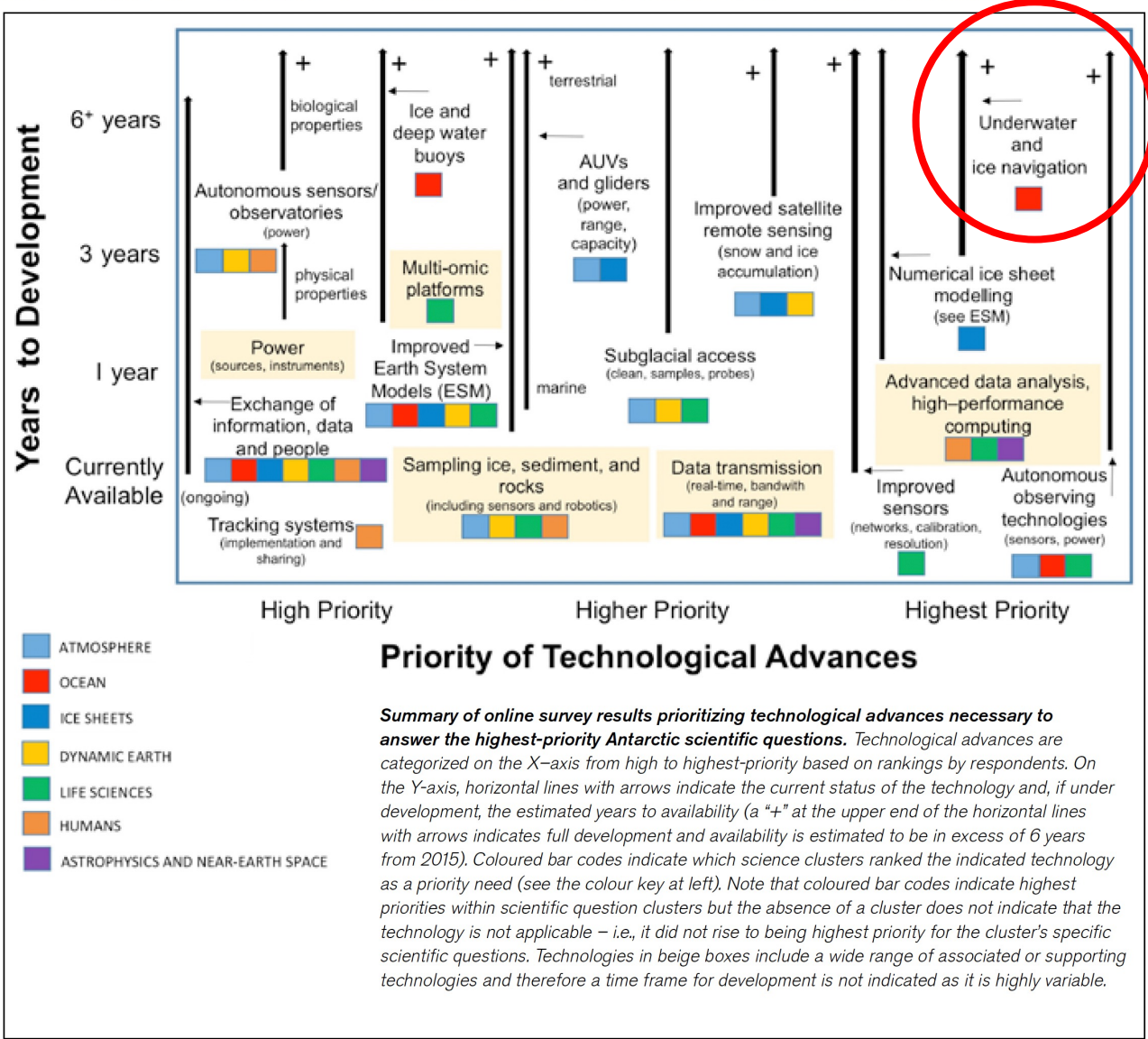
Antarctica International Science &  
Infrastructure for Synchronous Observation

Antarctica InSync is a global effort to synchronise research across Antarctica and the Southern Ocean, connecting ice, ocean, climate, and life to protect this vital region.





**Figure 1.** Summary of the estimated years to development/availability of those technological advances identified as highest priority



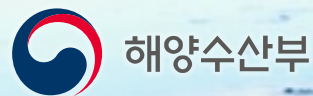




TOM CRUISE

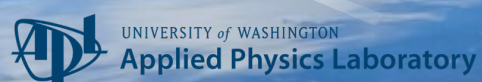
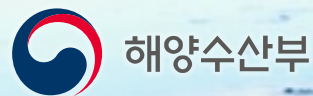
# MISSION-IMPOSSIBLE





# **A**coustic **N**av & comms **T**echs for **S**ubmersible **U**nits **B**elow **I**ce & **C**avity **E**xploration





# MISSION-POSSIBLE

**A**coustic  
**N**av & comms  
**T**echs for  
**S**ubmersible  
**W**ins  
**B**elow  
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## > High-level bilateral discussions





# K-NOW !

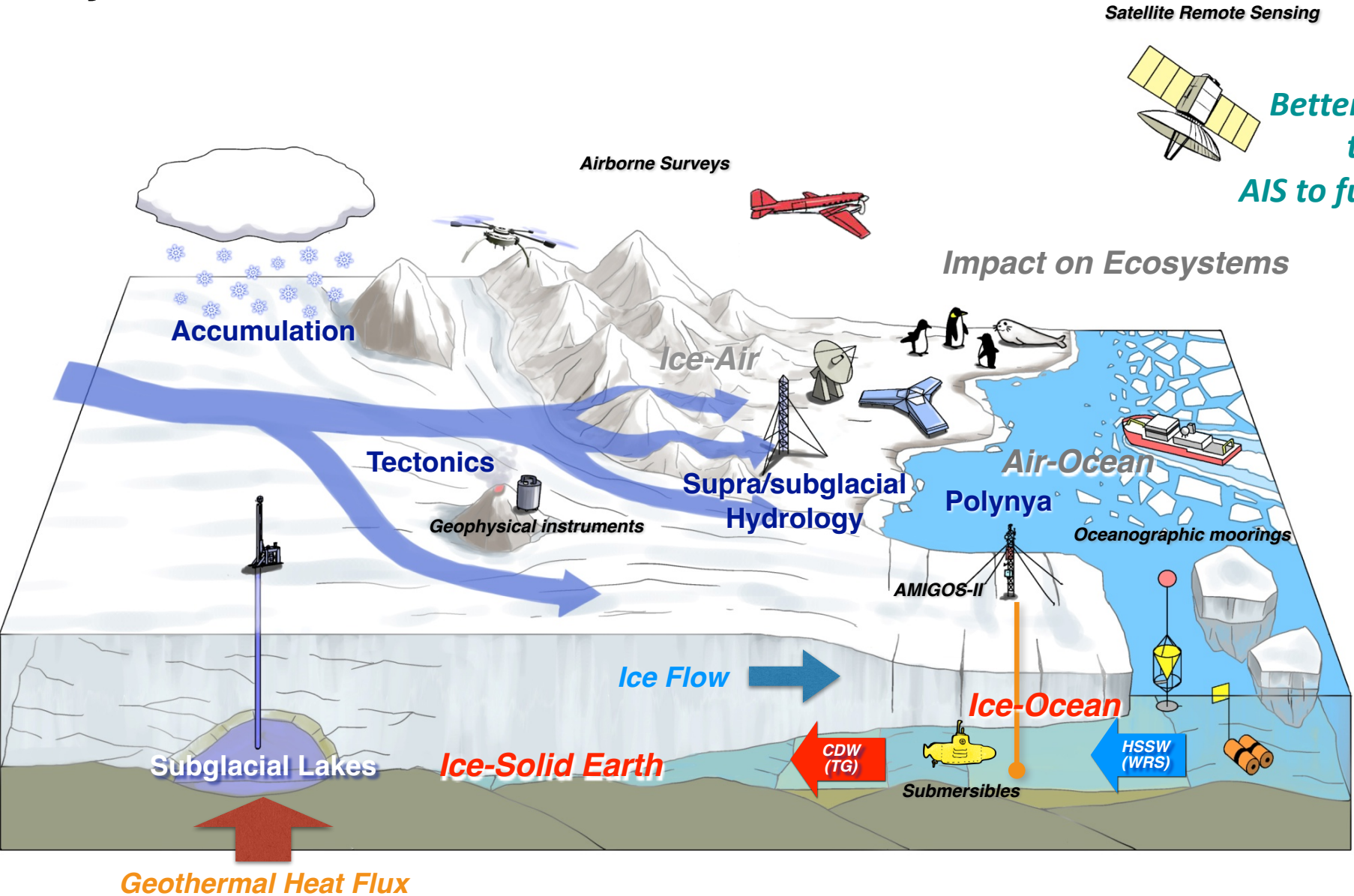
A large, flat-topped iceberg floats in the middle of a dark blue ocean. The iceberg is white with some blue-tinted shadows on its sides. In the background, more ice formations are visible on the horizon under a clear blue sky with a few wispy clouds.

[ June 2023 - December 2031 ]

Korea Network for Observation and prediction of  
Ice sheet and sea level changes in a Warming world

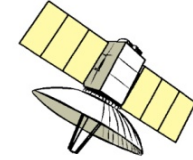


> A complex system

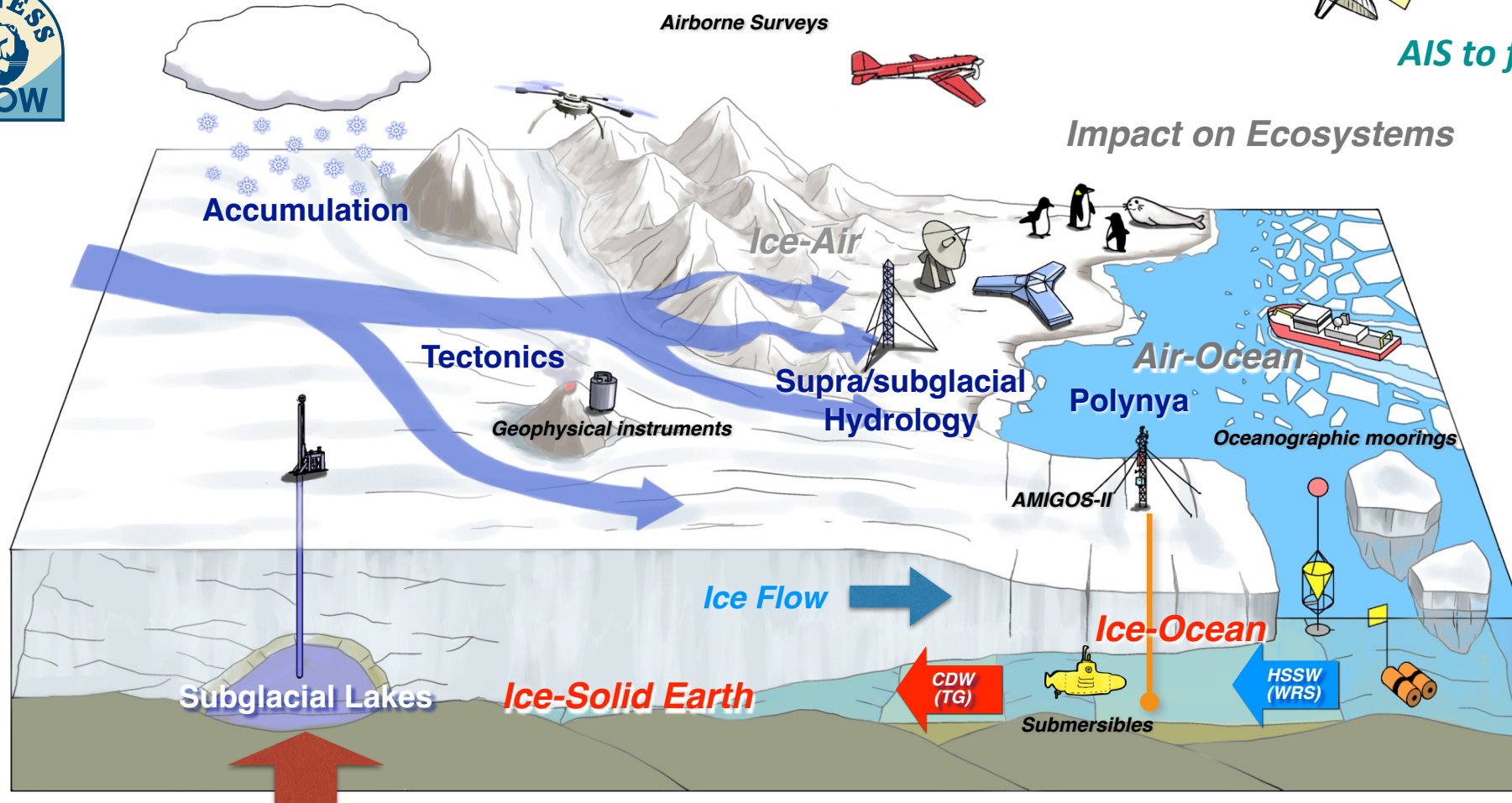




Satellite Remote Sensing



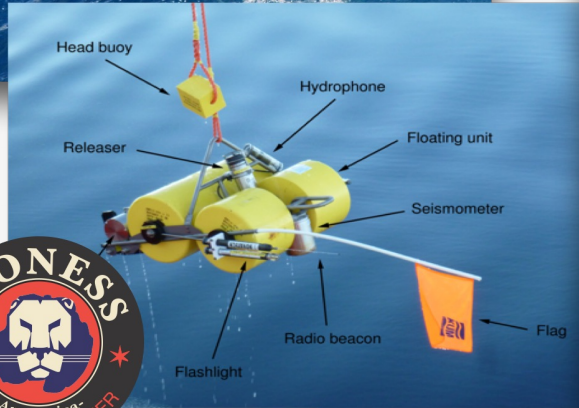
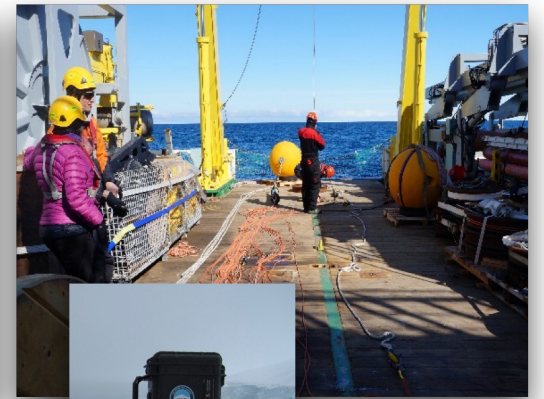
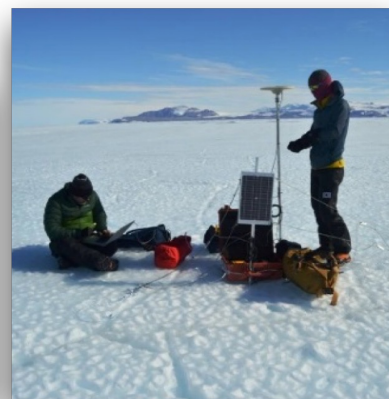
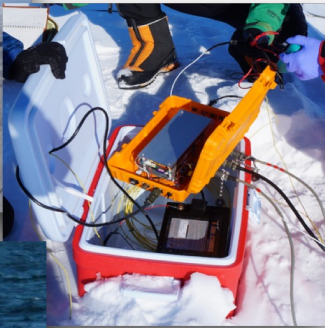
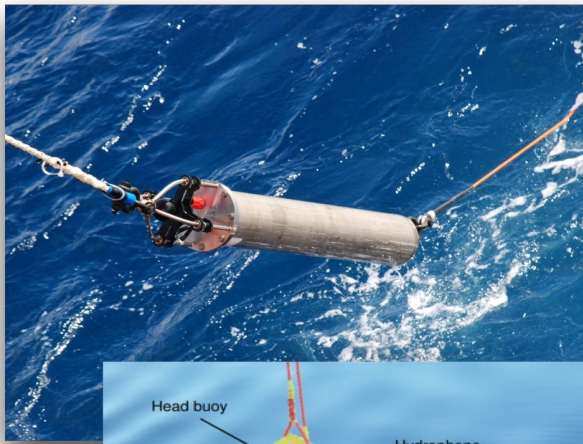
Better understanding of  
the contribution of  
AIS to future sea level rise



Geothermal Heat Flux

Land-Ice/Ocean Network Exploration using Semiautonomous Systems







# > Experimental field tests



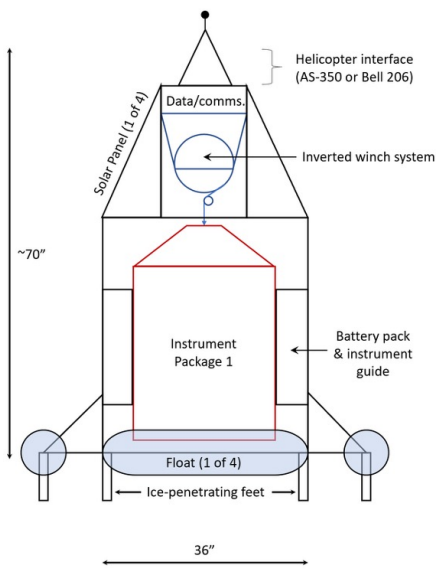
~12 month development inspired by fieldwork opportunities

November '22

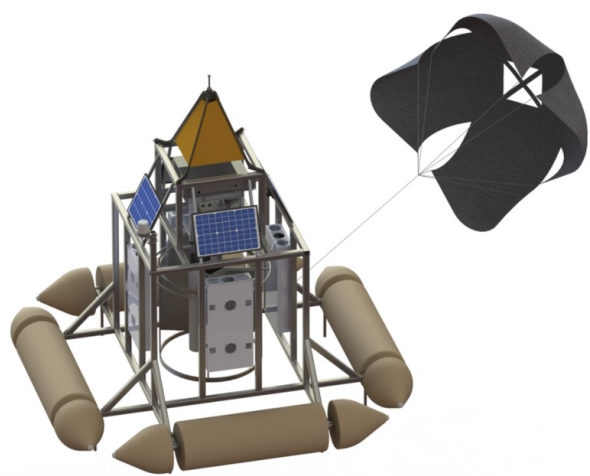
May '23

August - December '23

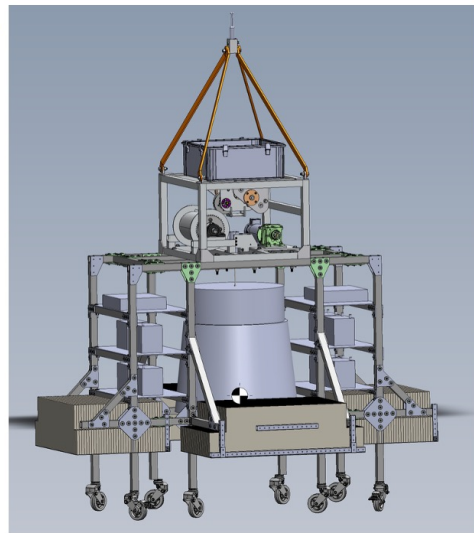
October - January '24



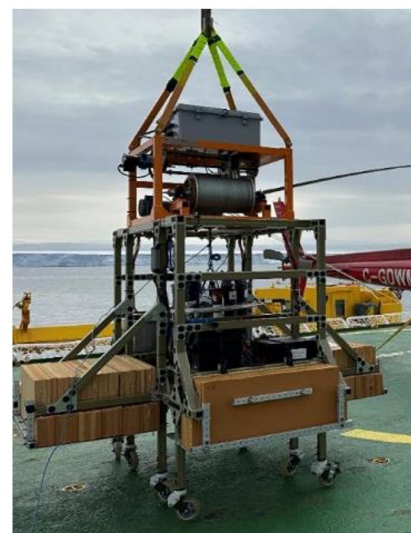
Conceptual Design



Preliminary Design



Detailed Design



Fabrication & Test

[Greenbaum, LIONESS WS, 2024]



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WMO OMM

World Meteorological Organization  
Organisation météorologique mondiale  
Organización Meteorológica Mundial  
Всемирная метеорологическая организация  
المنظمة العالمية للأرصاد الجوية  
世界气象组织



Secrétariat  
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wmo@wmo.int – wmo.int

Rd: 01284/2025-1.4 SIWWR

Our ref.: 01284/2025/SI/WWR

Dr Won Sang Lee  
Korea Polar Research Institute  
South Korea

Email: [wonsang@kopri.re.kr](mailto:wonsang@kopri.re.kr)

4 February 2025

Subject: Endorsement of the ANTSUBICE (Acoustic Navigation and communications Technologies for Submersible Units Below Ice and Cavity Exploration) project

Dear Dr Lee,

The Scientific Steering Committee (SSC) of the World Weather Research Programme (WWRP) has received your application for endorsement for the ANTSUBICE (Acoustic Navigation and communications Technologies for Submersible Units Below Ice and Cavity Exploration) project.

Your project aims to reduce uncertainties in sea level rise projections by developing innovative autonomous under-ice exploration technologies for investigating ice shelf-ocean interactions beneath ice shelves. Your initiative aspires to provide unprecedented insights into the mechanisms driving ice shelf dynamics. These efforts contribute not only to improving predictive climate models but also to foster international partnerships in Polar research. These activities align very well with the open data sharing policy of WMO as well as with the planned activities of the [Polar Coupled Analysis and Prediction for Services \(PCAPS\) project](#) of WWRP.

The project will align with some of the goals of the WWRP Implementation Plan (IP) and will also address some of the AWAR<sup>2</sup>E principles of the WWRP IP.

On behalf of the WWRP SSC, we would like to express our endorsement of this project. You are encouraged to collaborate with the leaders of the PCAPS project, to ensure synergy between these initiatives.

Endorsement by WWRP will benefit the proposer as follows:

- Provide an international framework for the research and the activities of the project, which can help to leverage additional support or funding for the project.
- Increase the visibility of the research activities of the project through the inclusion of links to the project's websites or activities in the WWRP website and e-newsletter.
- Enhance networking and communication through a better connection among the project's partners and the WWRP community.

- 2 -

For further information on endorsed projects regarding branding (the use of the WMO and WWRP logos) and acknowledgements, please refer to the WWRP [Terms of Reference for Endorsed Projects](#).

Yours sincerely,

Dr E. de Coning  
Chief, World Weather Research Programme  
Science and Innovation Department

Rd: 01284/2025-1.4 SIWWR





## > Discussion Questions:

- How do we develop internationally coordinated research questions and partnerships, from idea development, funding, to operations/implementation?
- Are there new/emerging opportunities to promote and implement this coordination (e.g. remote and/or share technologies)?
- How can we overcome known challenges (e.g. formal bilateral national agreements)
- What role might overarching non-government organizations (e.g. the World Meteorological Organization, Intergovernmental Ocean Commission, Global Ocean Observing System) play?
- **What is the role of international committees (e.g. International Arctic Science Committee and Scientific Committee on Antarctic Research) and ongoing priority setting activities (e.g. Fourth International Conference on Arctic Research Planning).**
- **Question to participants:** where do you see opportunities to support enhanced international collaboration and coordination



From Dr. Jamin Greenbaum:

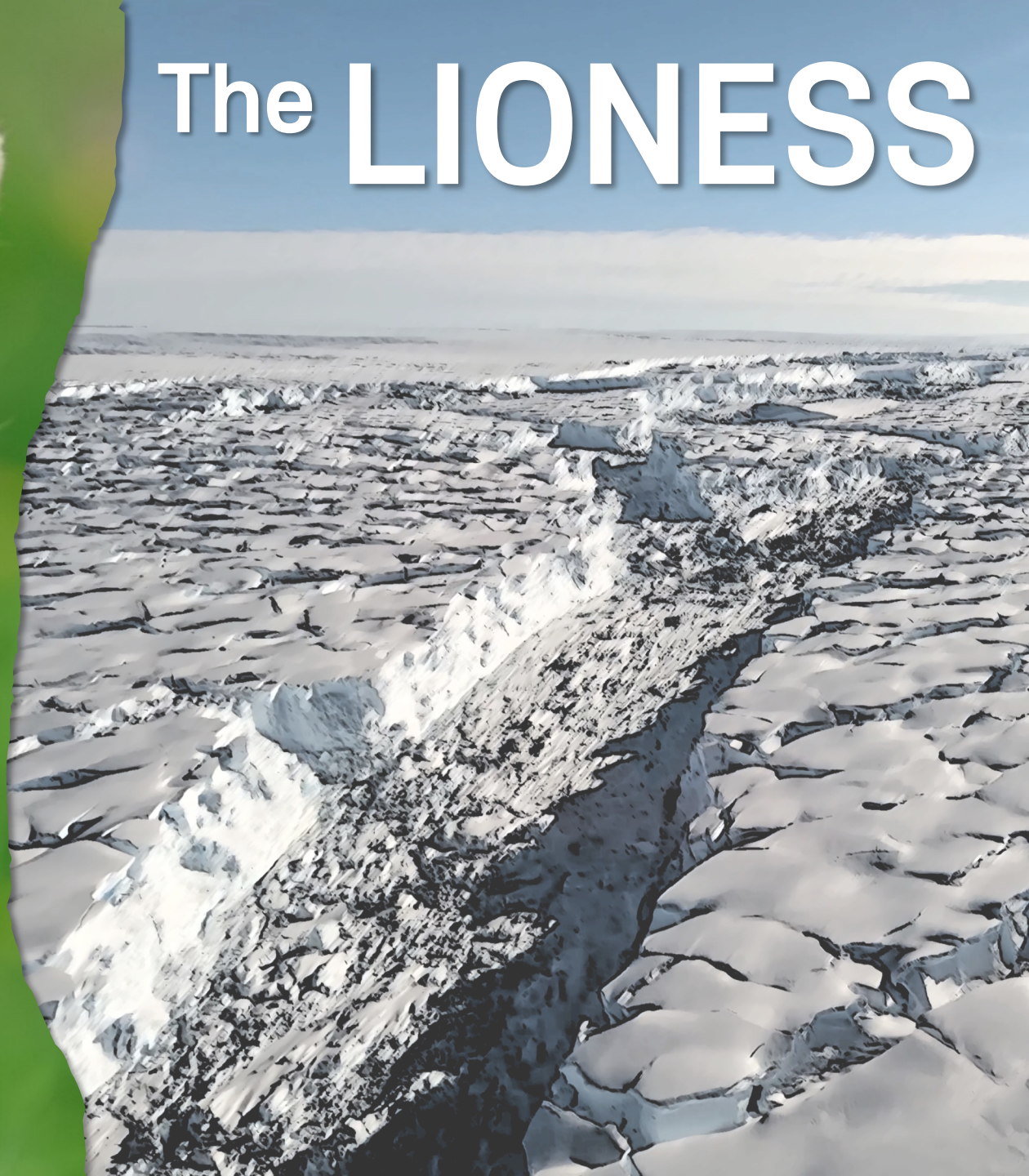
*Reflecting on our discussion, one thing I regret not highlighting more was the topic of how international collaborations can become more accessible to early career researchers (ECRs). With so little facilitation by National Programs, international collaborations are generally unavailable to ECRs unless they have some kind of informal connection.*

*If any of you have thoughts on this --from your own experience or through discussions you may have had or are having within your organizations-- it would be great if you wouldn't mind including something about this in your presentation.*





# The LIONESS





# The LIONESS







The LIONESS

**LIONESS “PUPS”**  
Polar Upsurge Pioneers in Science



- 
- A photograph of a lioness and her cubs in a savanna environment. The lioness is standing in the center, looking towards the camera with her mouth slightly open. She is surrounded by several cubs of varying sizes. The background is a dry, open landscape with sparse vegetation and a clear sky. The text is overlaid on the left side of the image.
- **Mentorship and Guidance**
  - **Collaboration Opportunities**
  - **Networking and Visibility**
  - **Constructive Feedback**
  - **Our ears are always open!!**



> +100 years ago





## > 2000s and beyond

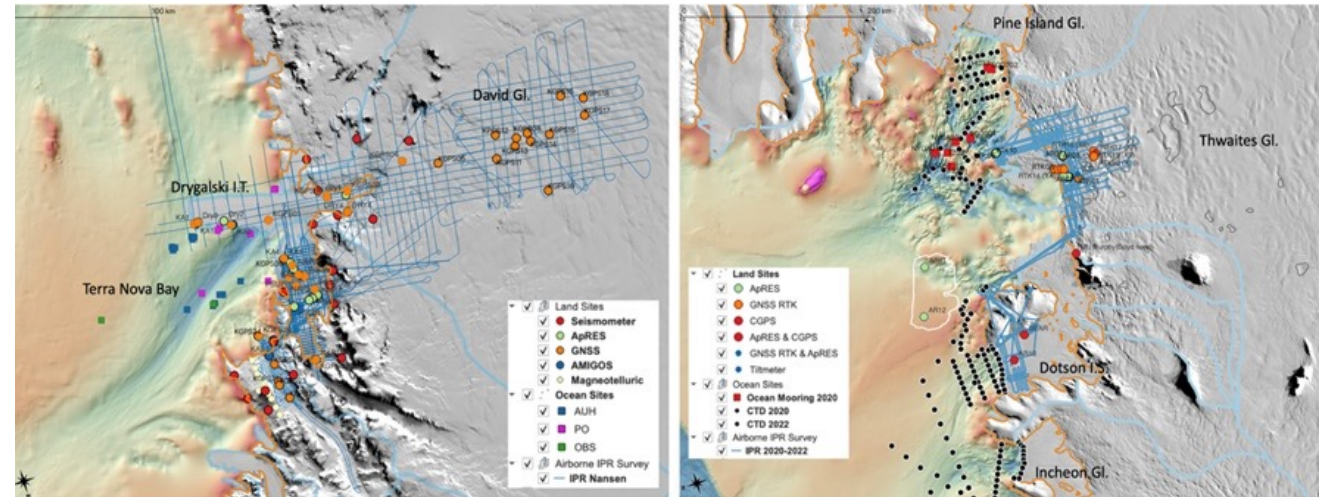
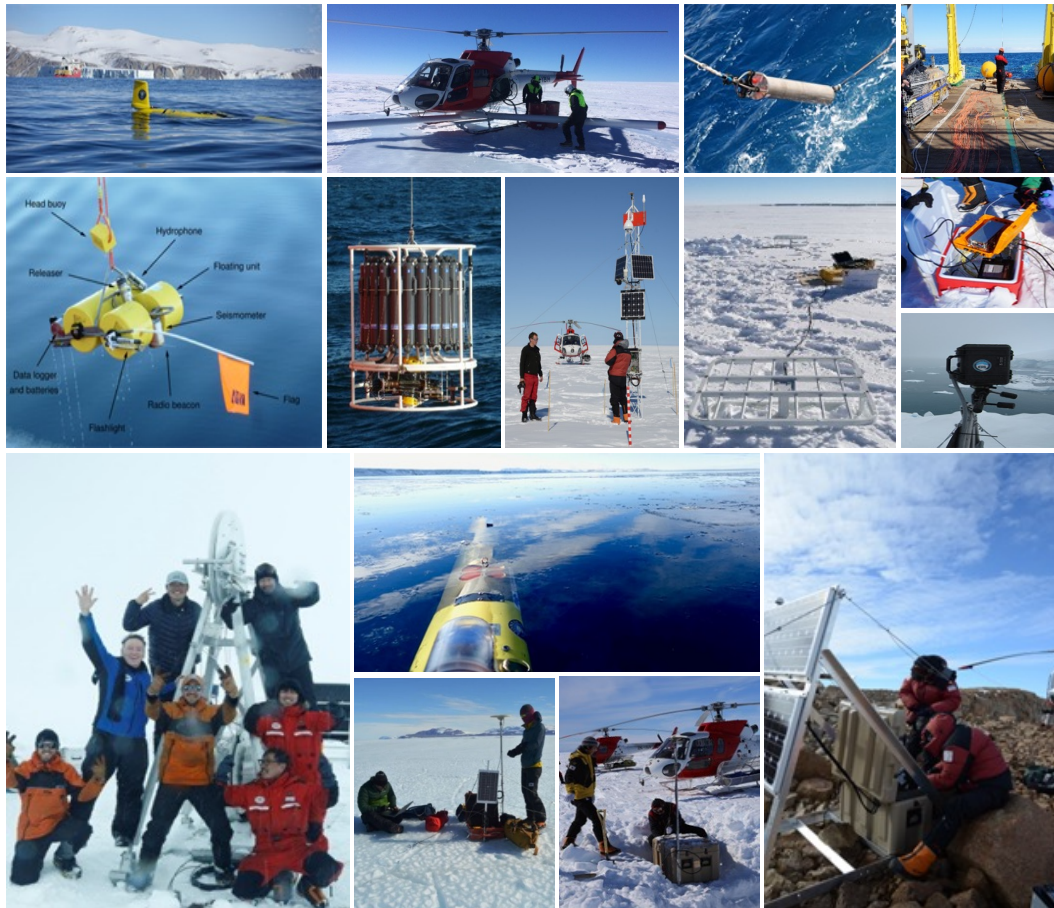


Thwaites, Feb 2020





# Advancing Polar Observations with Large-Scale Infrastructure and International Cooperations



# ICECAP

## (International Collaborative Exploration of the Cryosphere Through Airborne Profiling)

Jason Roberts





# ICECAP overview

Antarctic airborne geophysics – geology, glaciology, oceanography

Expertise in :    Logistics  
                         Instrumentation  
                         Science

12 Antarctic field seasons with a small field team (4-6)

340,000+ line km flown (8.5x around the world)

Support from 10 Antarctic stations

39 Peer reviewed publications and 68 conference presentations

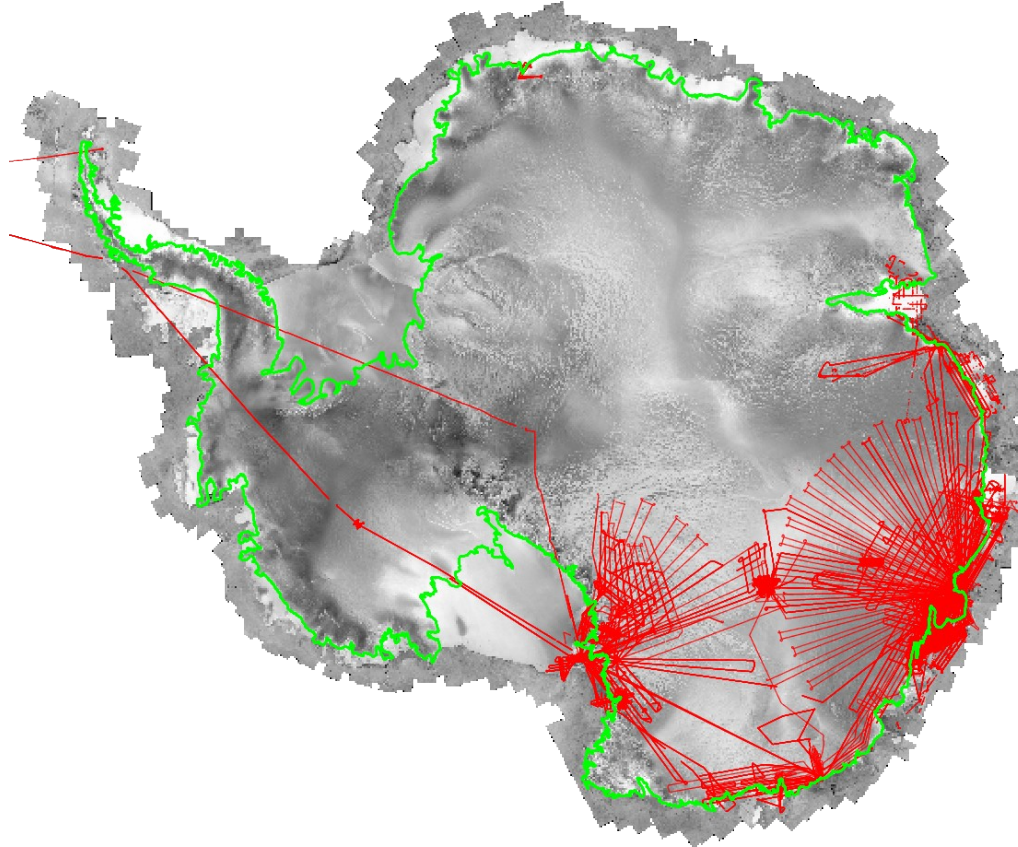
6 major data compilations Bedmap2, Bedmap3, BedMachine, ADMAP, AntGG, IBCSOv2

15 ECR's deployed to the field

16+ grants

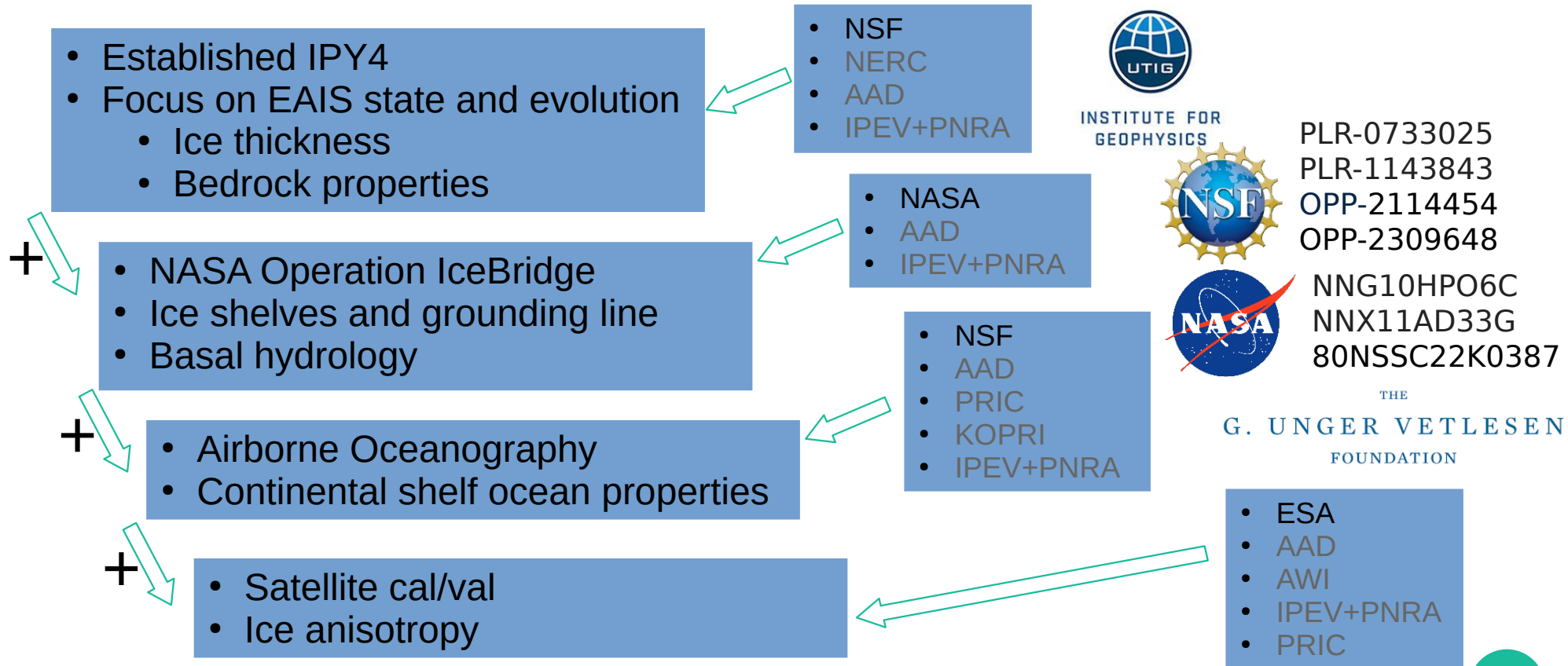
Quid pro quo arrangements with 4 organisations

# ICECAP overview

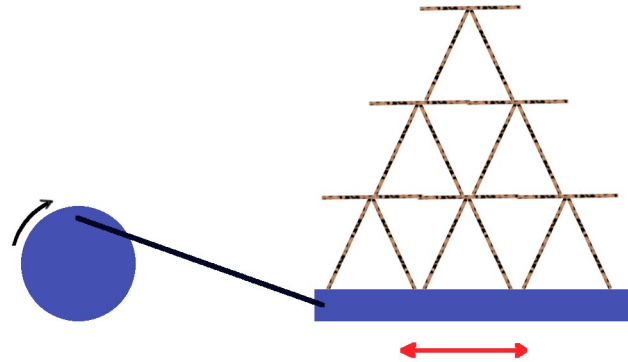




# ICECAP history from ~~30,000~~ 1,500 feet



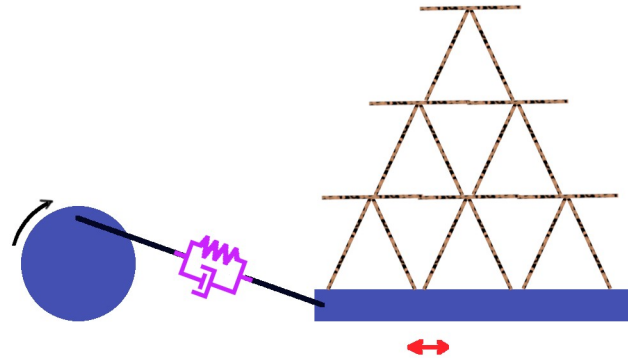
# Fragile funding arrangements



- Multiple inter-dependent proposals
  - Discretionary funding
- } ECR – career ~~defining~~ opportunity



# Adding flexibility



- Robust funding arrangements
- Flexible operational model
  - Define science priorities prior to field season

# Room for improvement

- ECR's on proposals
- Timely decisions
- Formal ECR in-field leadership roles
- Coordination with other field activities



# Summary

Keys to maximise likelihood of a successful Antarctic field science campaign

- **Decouple** requirement for multiple and synchronised successful funding proposals
  - Enable ECR
    - Remove multiple proposal “house-of-cards”
    - Provide formal field leadership roles
- **Flexibility** (operational and funding)