



SOOS
SOUTHERN OCEAN
OBSERVING SYSTEM

Delivering Sustained, Coordinated, and Integrated Observations of the Southern Ocean for Global Impact



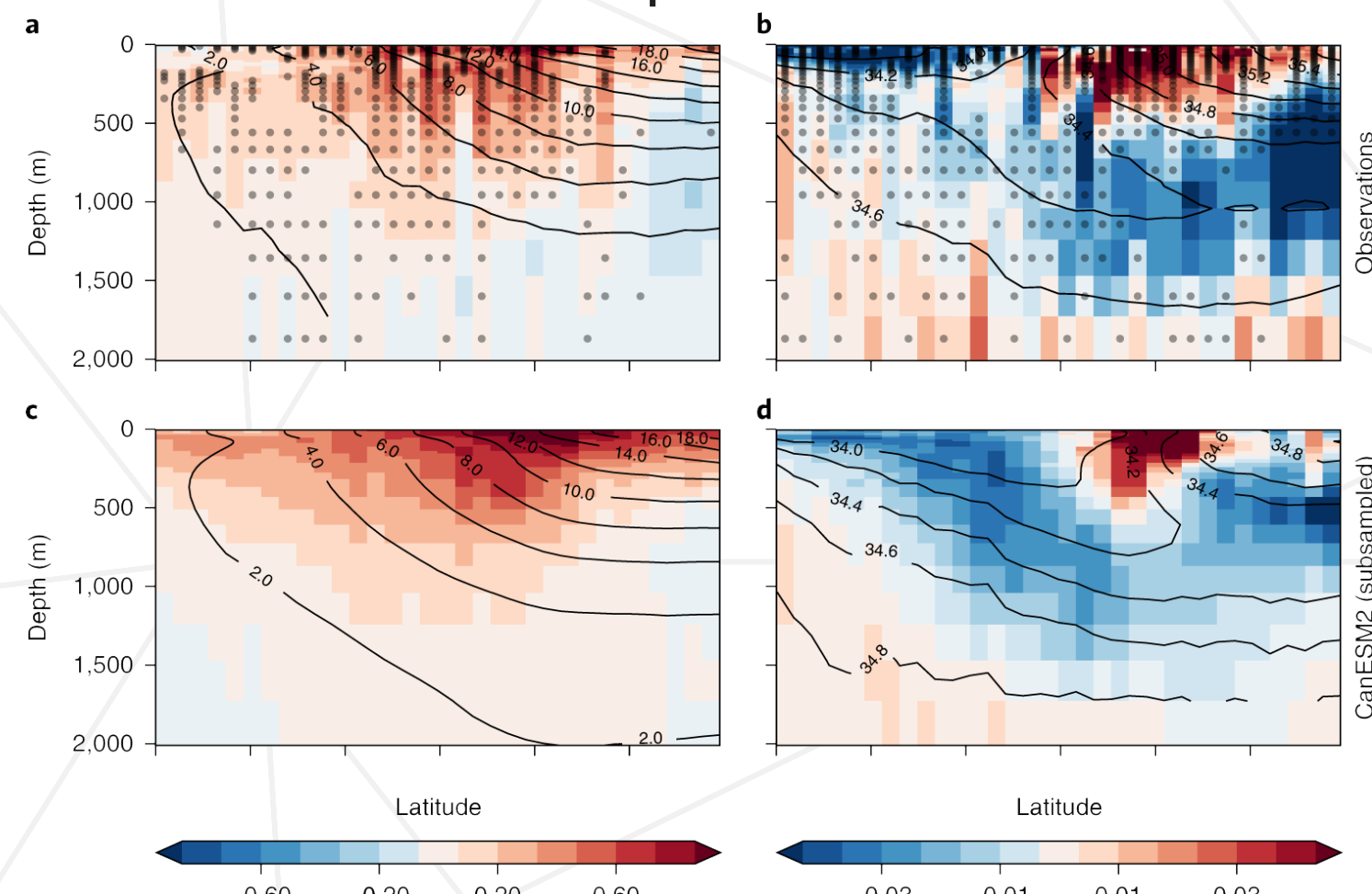
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SOUTHERN OCEAN
OBSERVING SYSTEM

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On behalf of the SOOS Executive Committee, Scientific Steering Committee and the CLiC-CLIVAR-SCAR Southern Ocean Regional Panel (SORP)

Why do we care about the Southern Ocean?

It is **warming faster** than any other sector of the global ocean, accounting for 60-90% of the total anthropogenic ocean heat uptake since the industrial period.



Temperature (a, c) and salinity changes (b, d) from observations and models, indicating significant warming (red) in the last decade (2006-2015) in comparison to 30 years previous (1950-1980). From Swart et al., 2018.

It's warming directly **impacts the stability of the Antarctic Ice Sheet**, which is the greatest source of uncertainty in projections of future sea-level rise.

The Southern Ocean represents a major 'blind spot' in our climate understanding

It is Earth's **largest sink of anthropogenic carbon**, yet recent research suggest that this sink is weakening - with global consequences.

It is home to one of **Earth's largest seasonal changes** - with the annual growth and retreat of sea ice - influencing surface albedo, driving the movement of heat, freshwater and nutrients around the globe, and supporting diverse and unique ecosystems.

It also **modulates nearly all ecosystems and life in Antarctica** and the rest of the world's oceans, impacting not only ecosystems of uncalculable intrinsic value for conservation and management, but also significant economic value for fisheries and tourist activities.

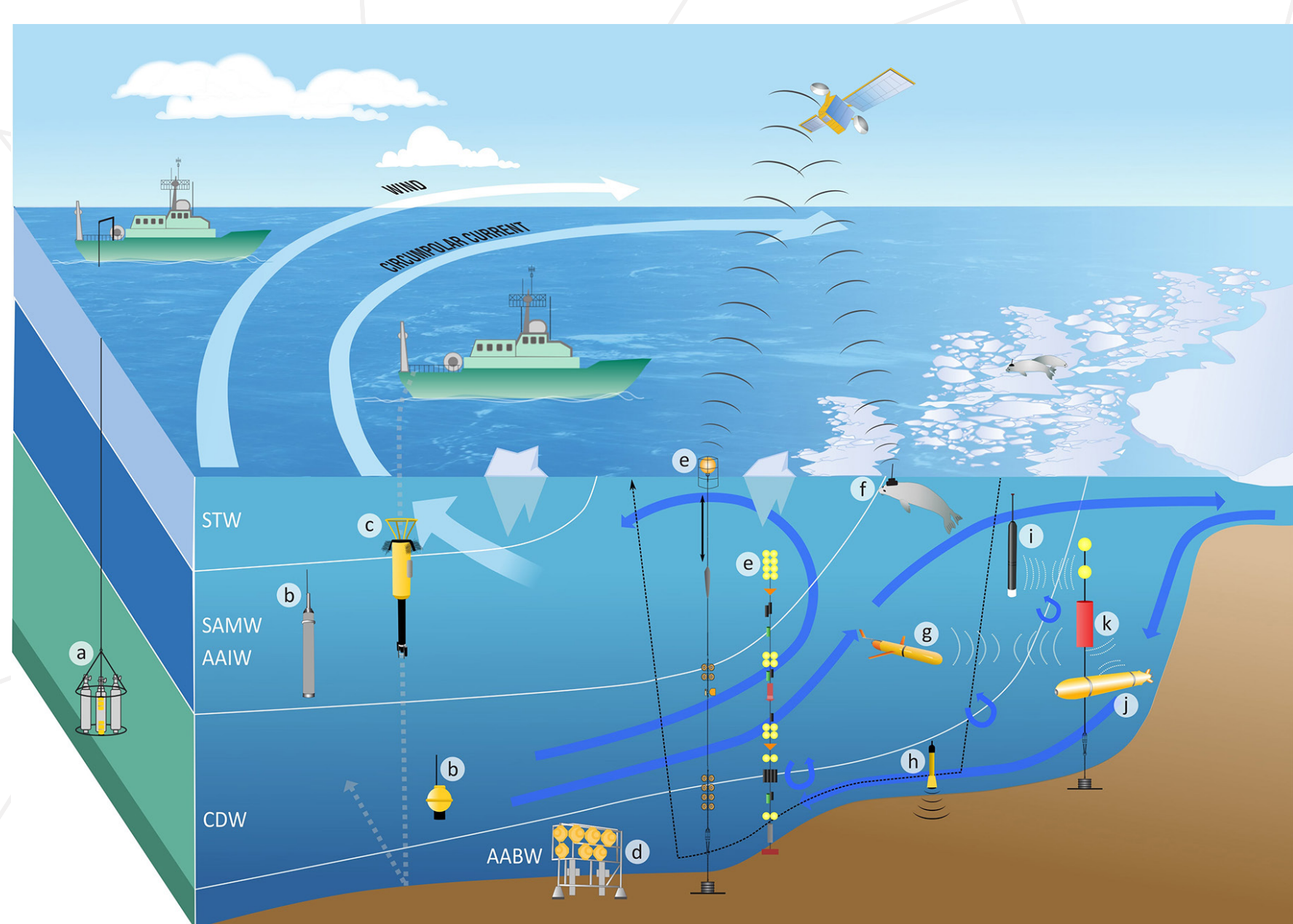


Small sensors on seals provide vital data, not only on water column properties around the Antarctic coast and continental shelf, but also on their feeding and reproductive behaviour. This data is imperative to support conservation efforts. Photo from D. Costa.

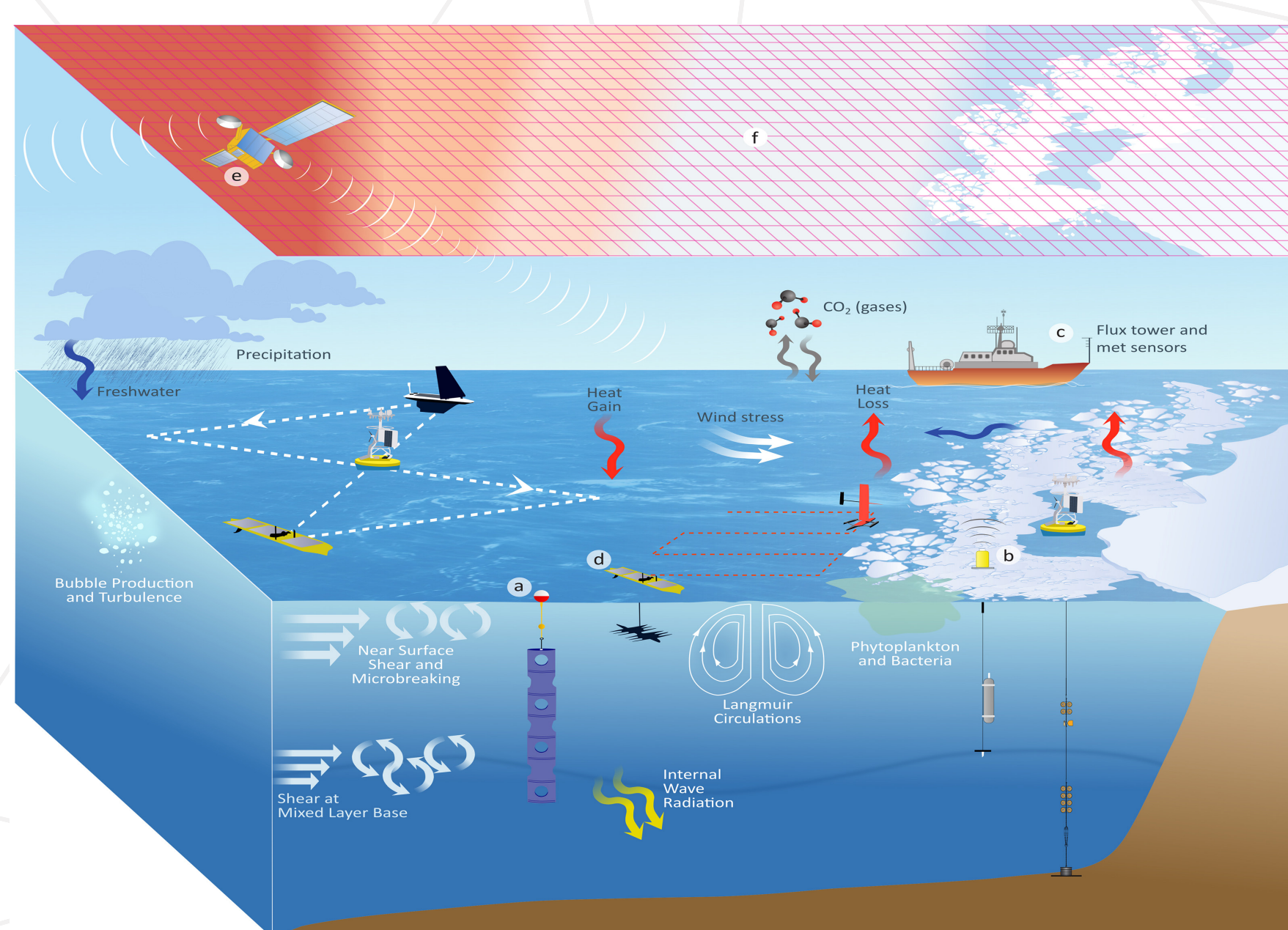
Filling the gaps in our understanding of the Southern Ocean

Significant investment in data collection over the last decade has enhanced our knowledge of the Southern Ocean and its impact on the Earth system. Yet, the Southern Ocean remains one of the **most poorly observed regions on Earth**, leading to uncertainty in estimates of future states and consequences for the Earth system. To prioritise data collection efforts, the Southern Ocean community identified eight key issues that need to be addressed, through international collaboration:

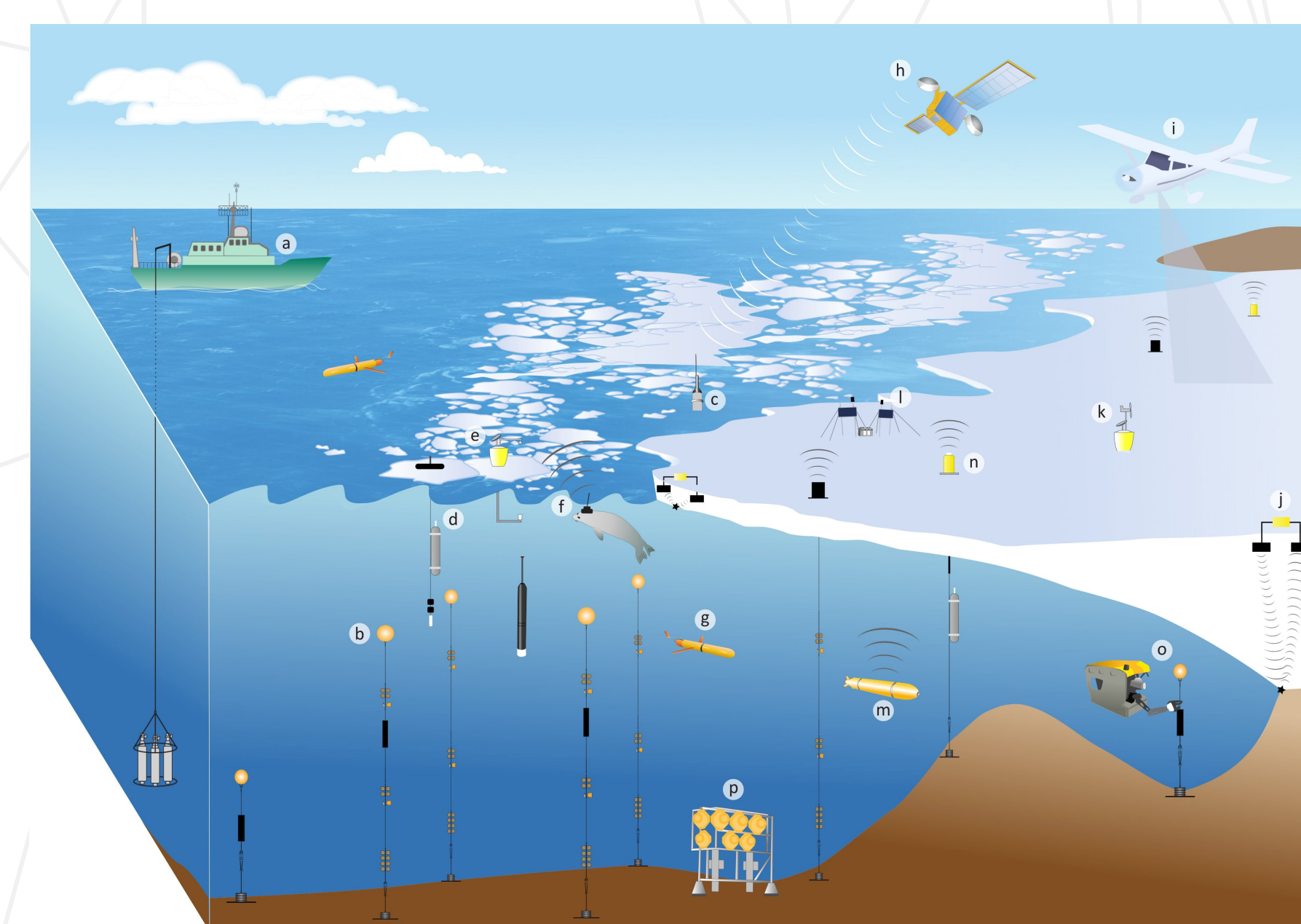
1 Observing Antarctic Bottom Water Production Processes



2 Reducing uncertainties in Air-Sea and Air-Ocean-Ice Fluxes

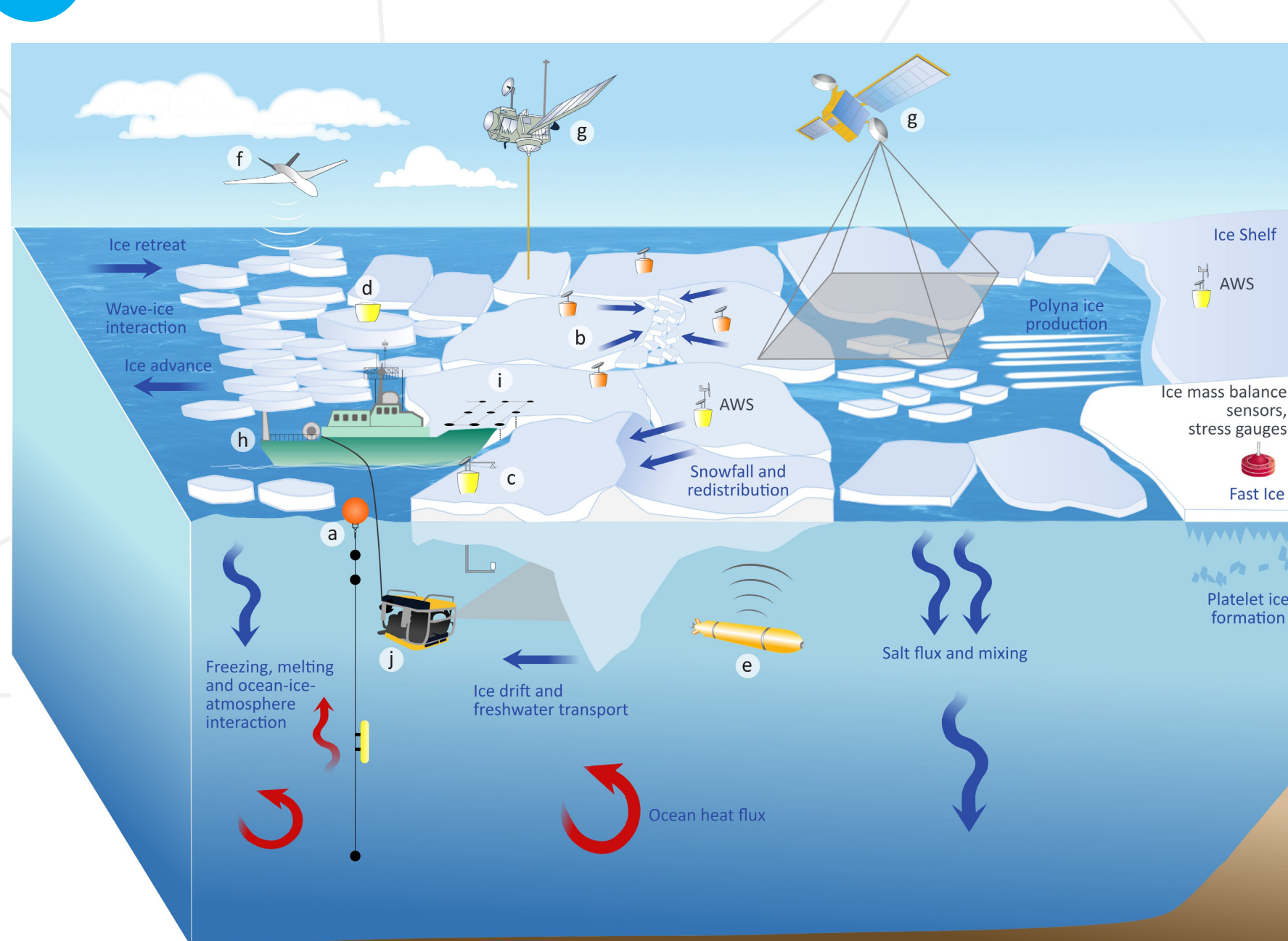


3 Understanding the Contribution of Oceanic Heat to Ice-Shelf Basal Melt



4 Toward a Better Understanding of Processes Controlling Antarctic Sea-Ice Variability & Change

5 Observing Sea-Ice Thickness and Volume

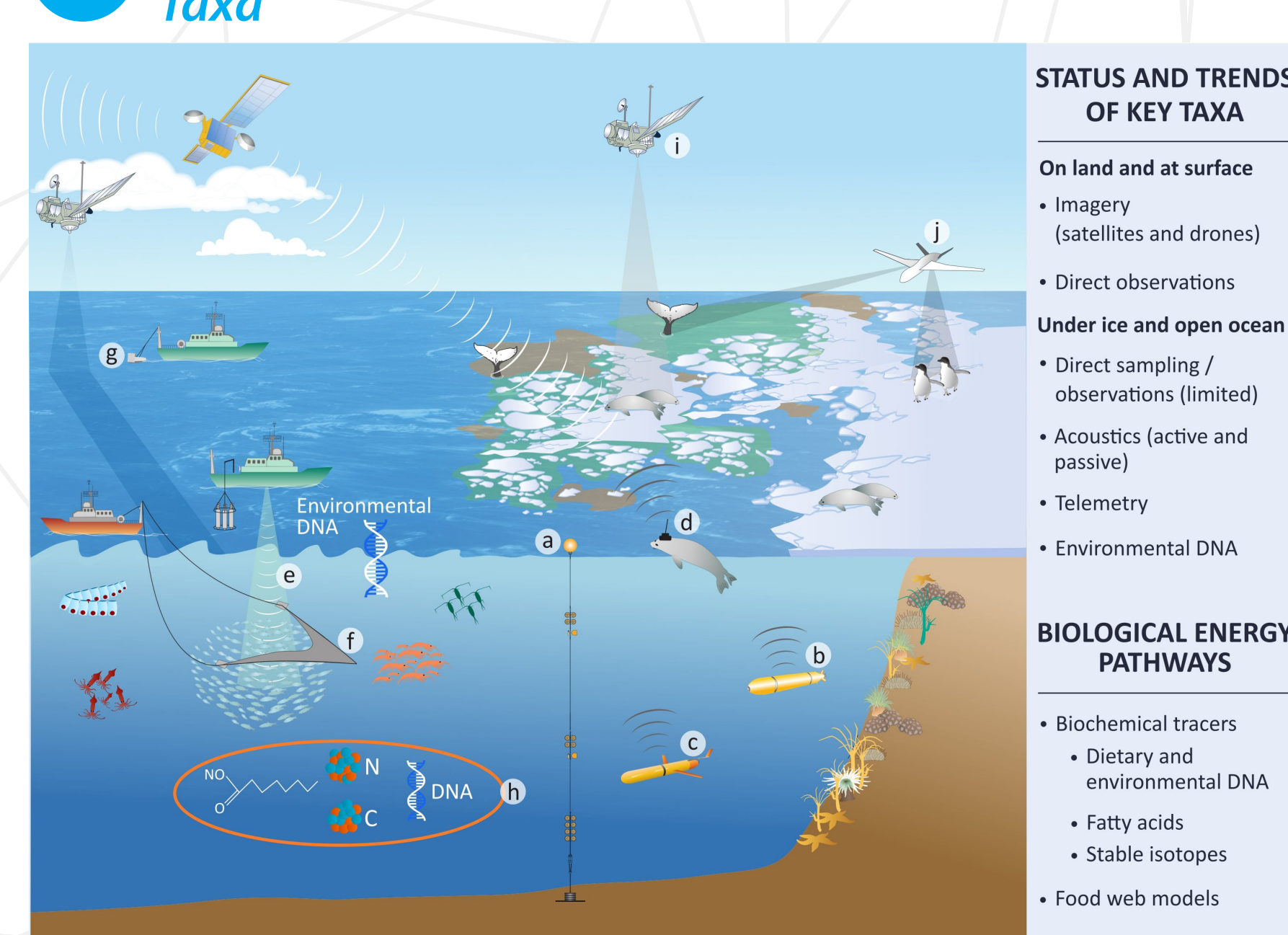


6 Constraining the Seasonal Carbon Cycle



7 Constraining Biological Energy Pathways

8 Assessing Status and Trends of Key Southern Ocean Taxa



Additional priorities

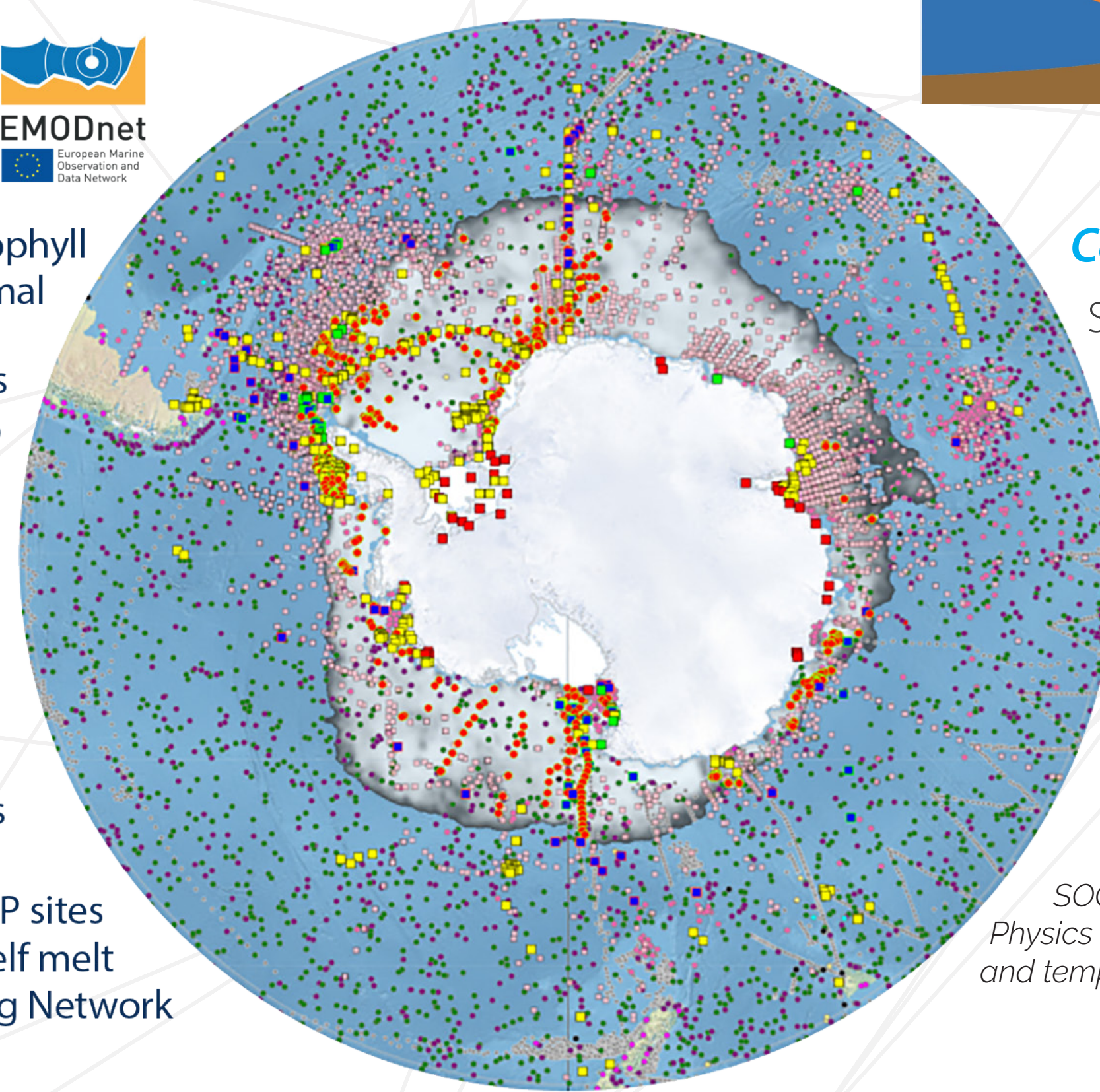
Requirements for the full suite of observations needed by the broad end-user community must be quantified and underpinned by robust observing system design efforts. Further, given the size, complexity and operational cost, a broad suite of technologies is required to observe the Southern Ocean.

For more details on information shown here, please see Newman et al., 2019

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- Sea-ice chlorophyll
- Marine mammal
- CTD profiles
- Drifting buoys
- Ferrybox/ship
- Gliders
- Argo/profiler
- GTS Tesac
- Tide Gauge
- XBT/XCTD
- CPR tows
- Krillbase
- Macro plastics
- Micro plastics
- CCAMLR CEMP sites
- ApRES ice-shelf melt
- SOOS Mooring Network



Connecting and Delivering Southern Ocean Data

SOOS-relevant data come from many nations and many scientific disciplines. We serve well-curated datasets through SOOSmap and are building data discovery tools and networks to help scientists collate the observations they need to support their science.

SOOSmap is an open access, interactive webmap developed by EMODnet Physics that allows users to explore circumpolar datasets; search within spatial and temporal filters; and select platforms, variables, and data layers. It provides direct data downloads where possible (www.soos.aq/soosmap).

