



SAPRI
South African Polar
Research Infrastructure

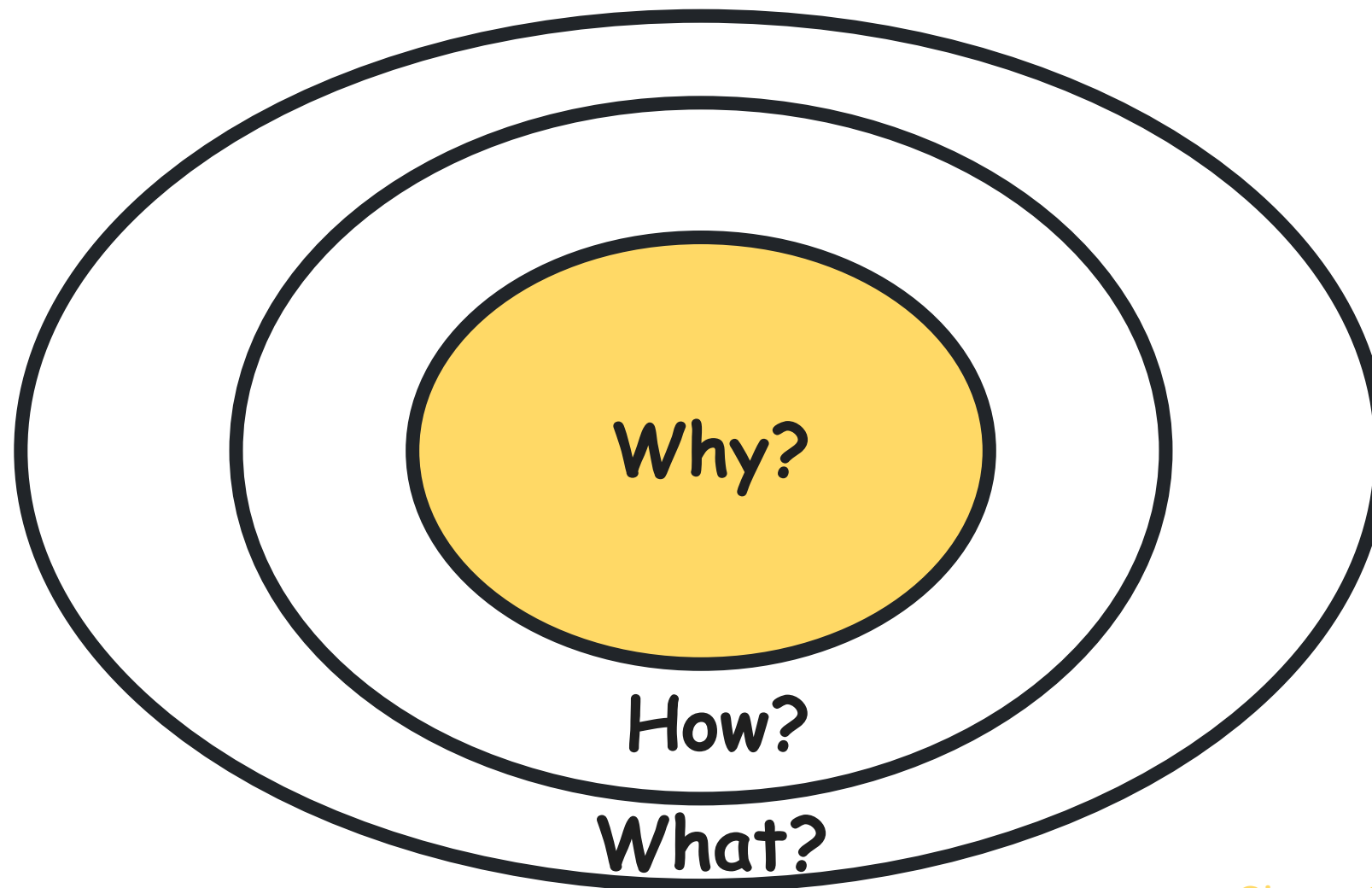
Geosciences Information For Teachers (GIFT) Workshop Ocean Observing and Infrastructure

Tammy Morris

GIFT Workshop | 10 August 2024

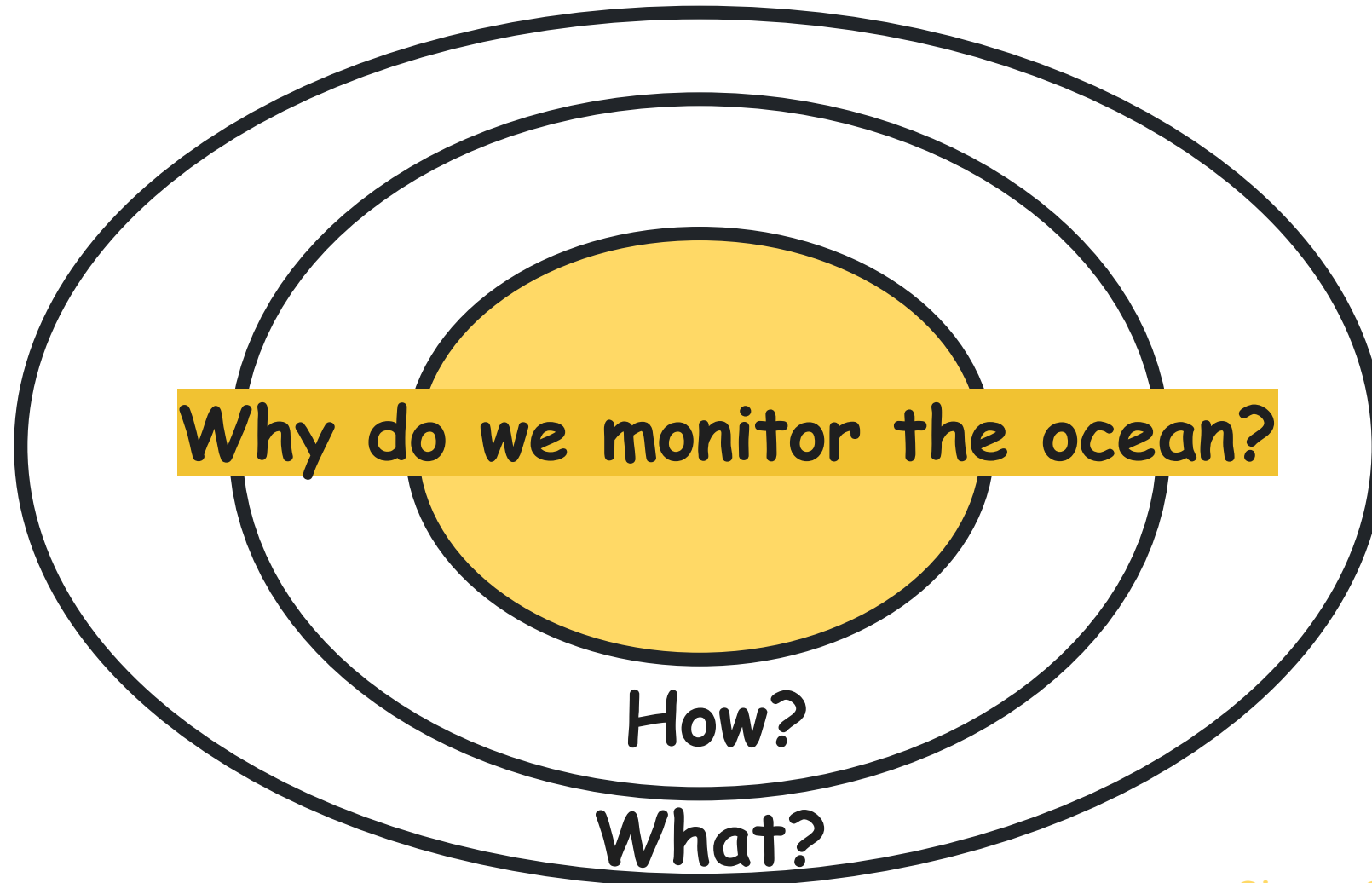


The Golden Circle



~Simon Sinek, *Start with Why*

The Golden Circle



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70%



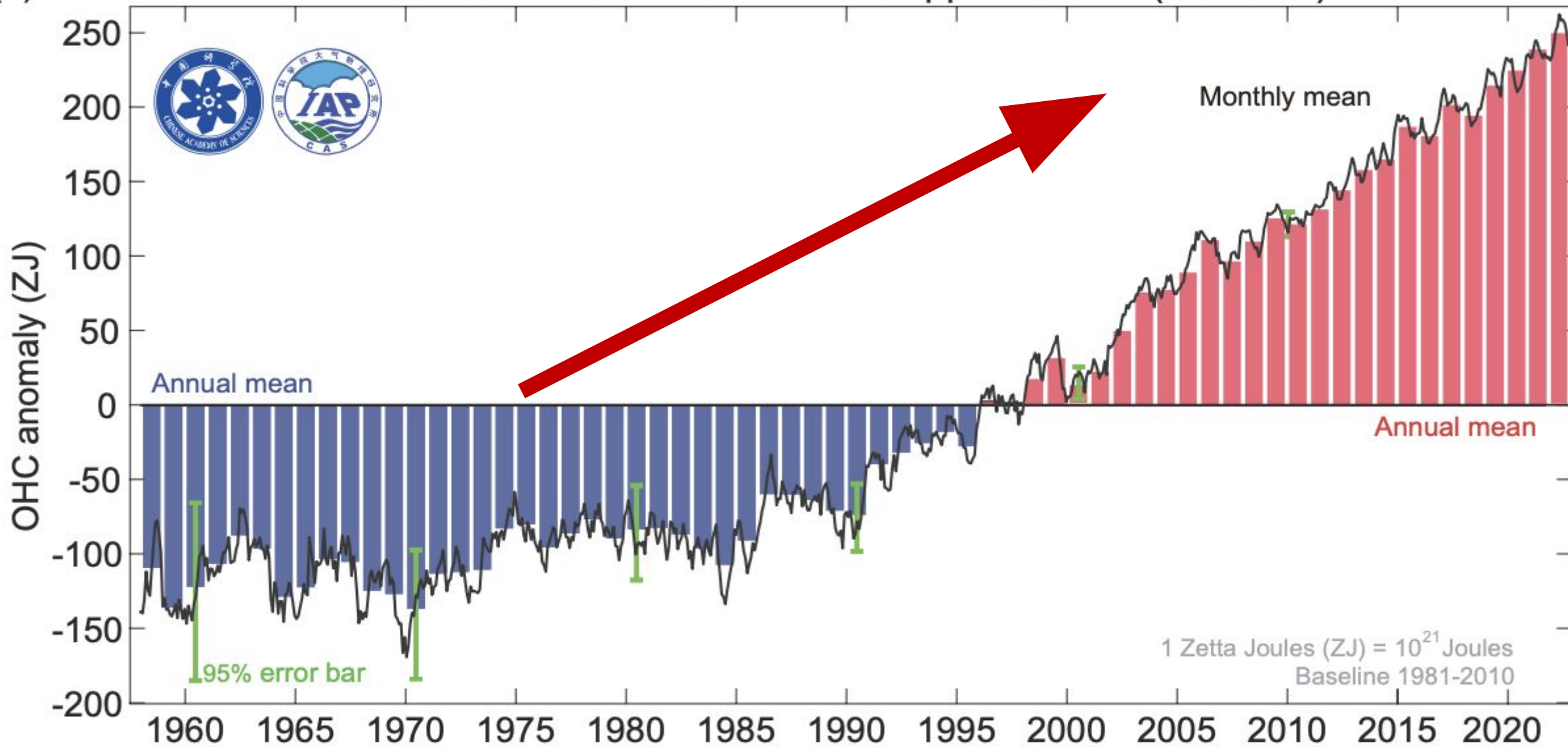
The iconic “Blue Marble” photograph taken by the Apollo 17 astronauts on their way to the moon in 1972. *Image credit: NASA*

An underwater photograph showing a school of small fish swimming in clear, blue water above a sandy seabed. The lighting creates shimmering patterns on the sand.

90%

(a)

Global ocean heat content in the upper 2000 m (IAP/CAS)



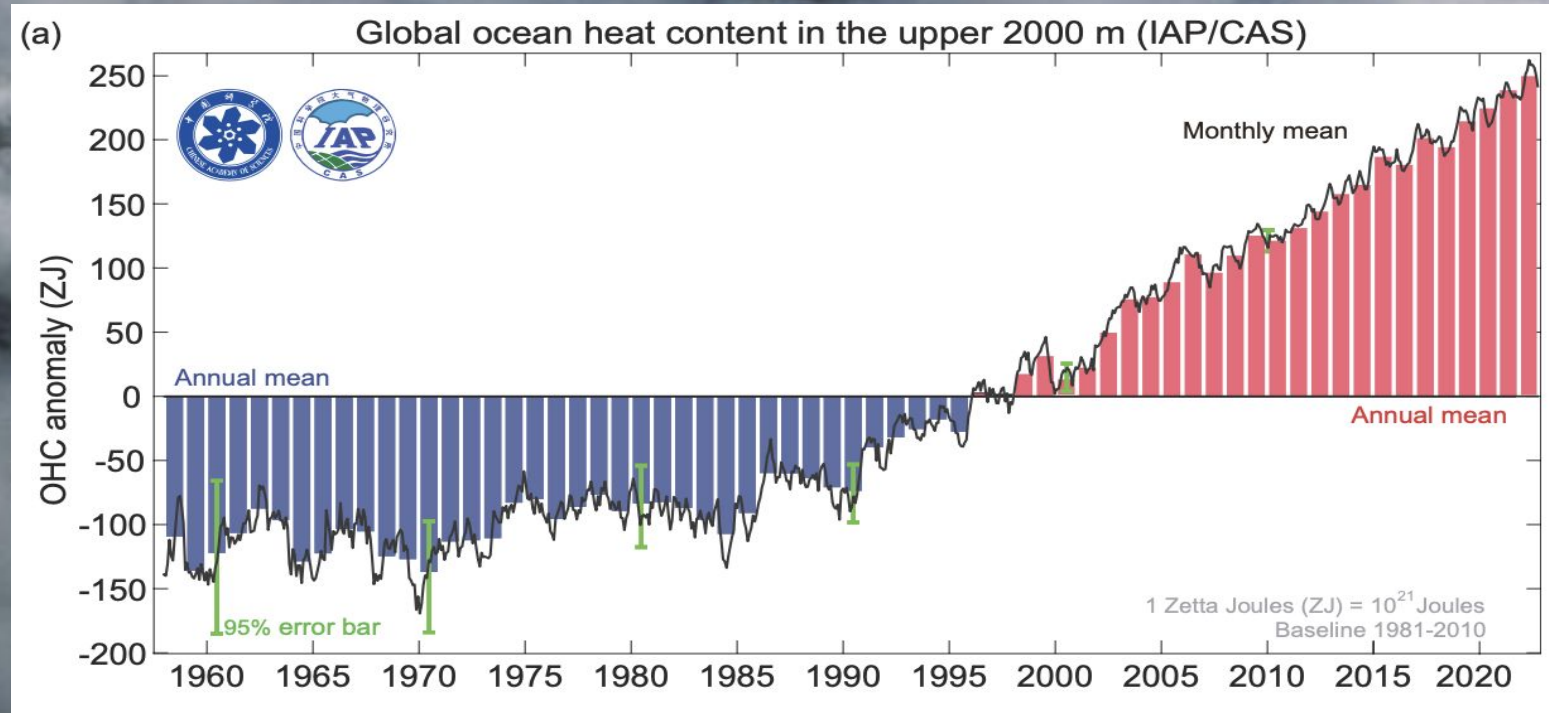
Global upper Ocean Heat Content (OHC) from 1958 through 2022 according to two different data centers (Cheng et al 2023)

A black and white photograph of the atomic bombing of Nagasaki, showing a massive mushroom cloud rising from the city. The cloud has a thick, dark column of smoke and debris rising from the ground, topped by a large, billowing, white cloud that spreads across the sky. The surrounding landscape is visible, showing the city and the sea.

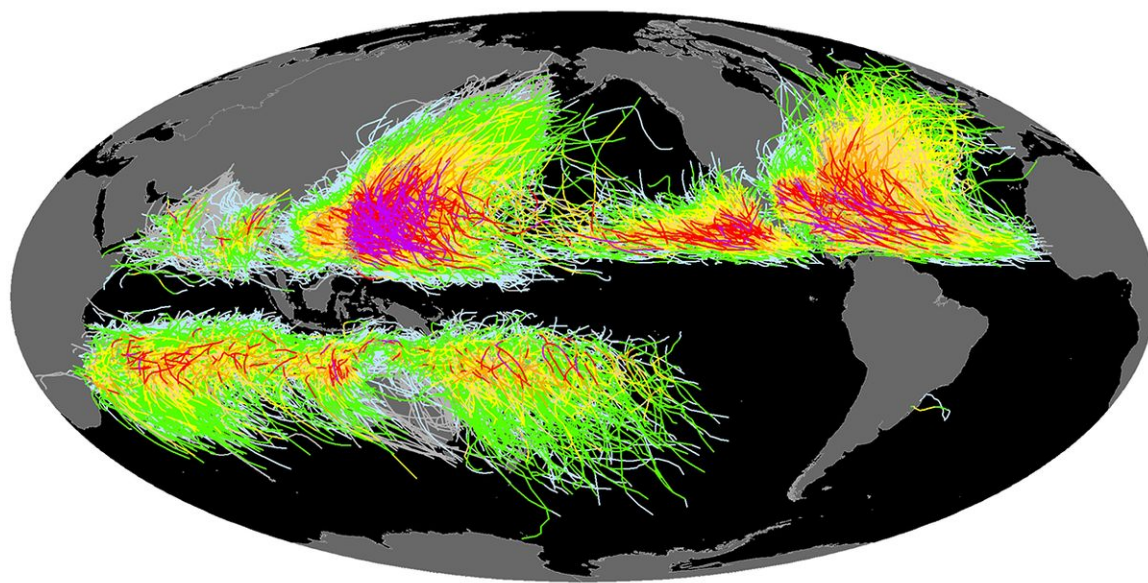
1.5×10^{13} Joules

Credit: US National Archives

1 zettajoule = 1345 atomic bombs



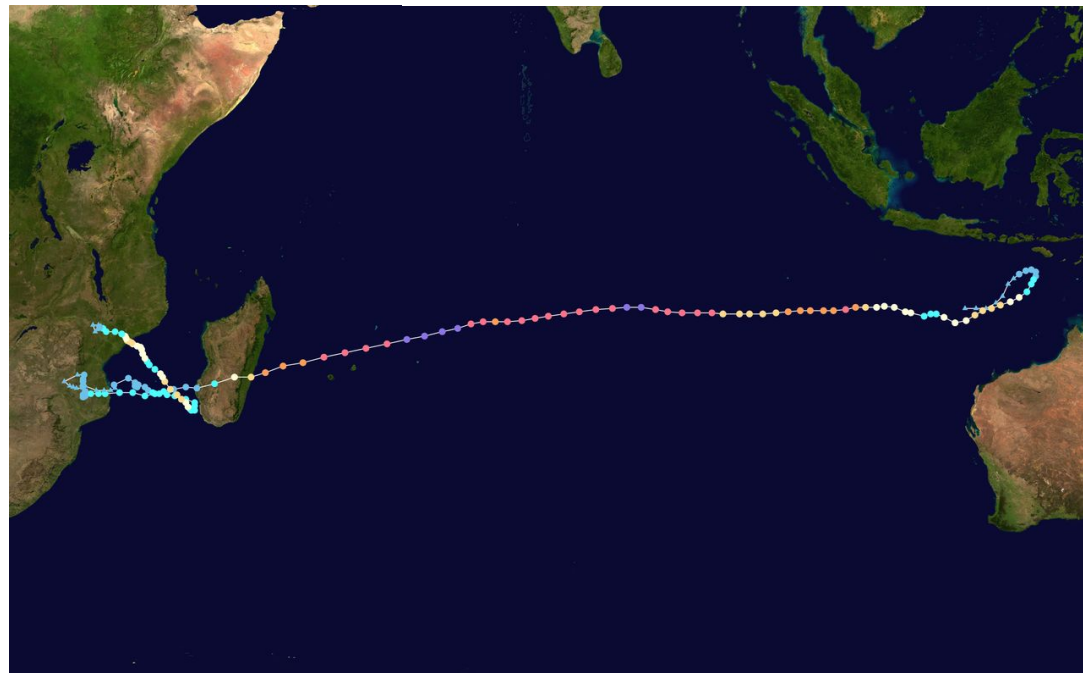
We are literally boiling the ocean!



The International Best Track Archive for Climate Stewardship (IBTrACS) stores global tropical cyclone information.

Saffir-Simpson Hurricane Wind Scale

Intensity Missing	—	Category 1	—
Tropical Depression	—	Category 2	—
Tropical Storm	—	Category 3	—
	—	Category 4	—
	—	Category 5	—

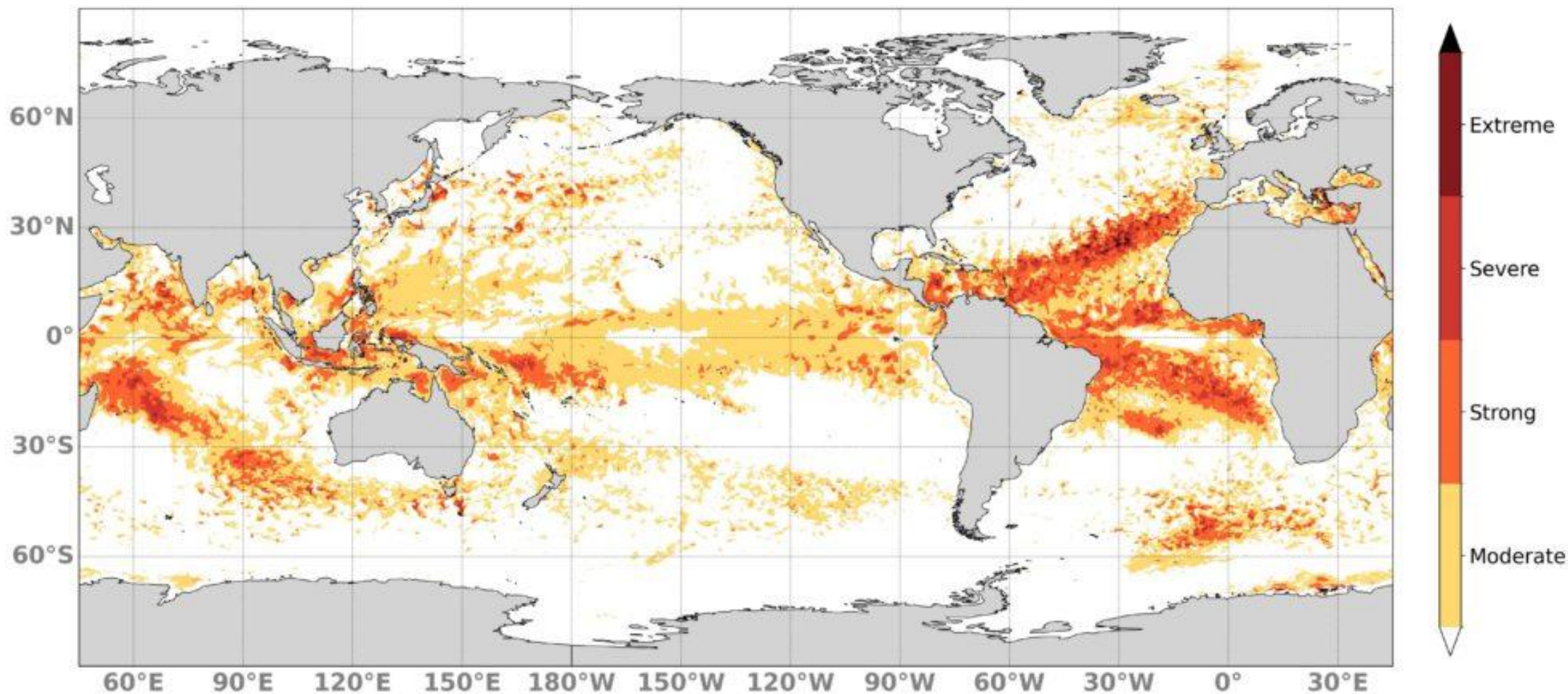


Cyclone Freddy, 2023
(credit The Conversation).

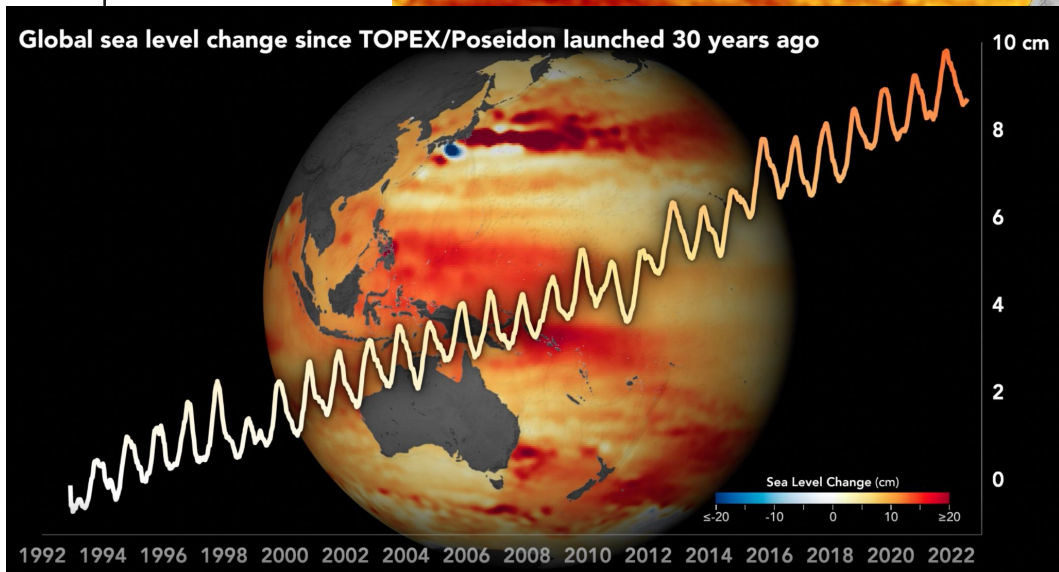
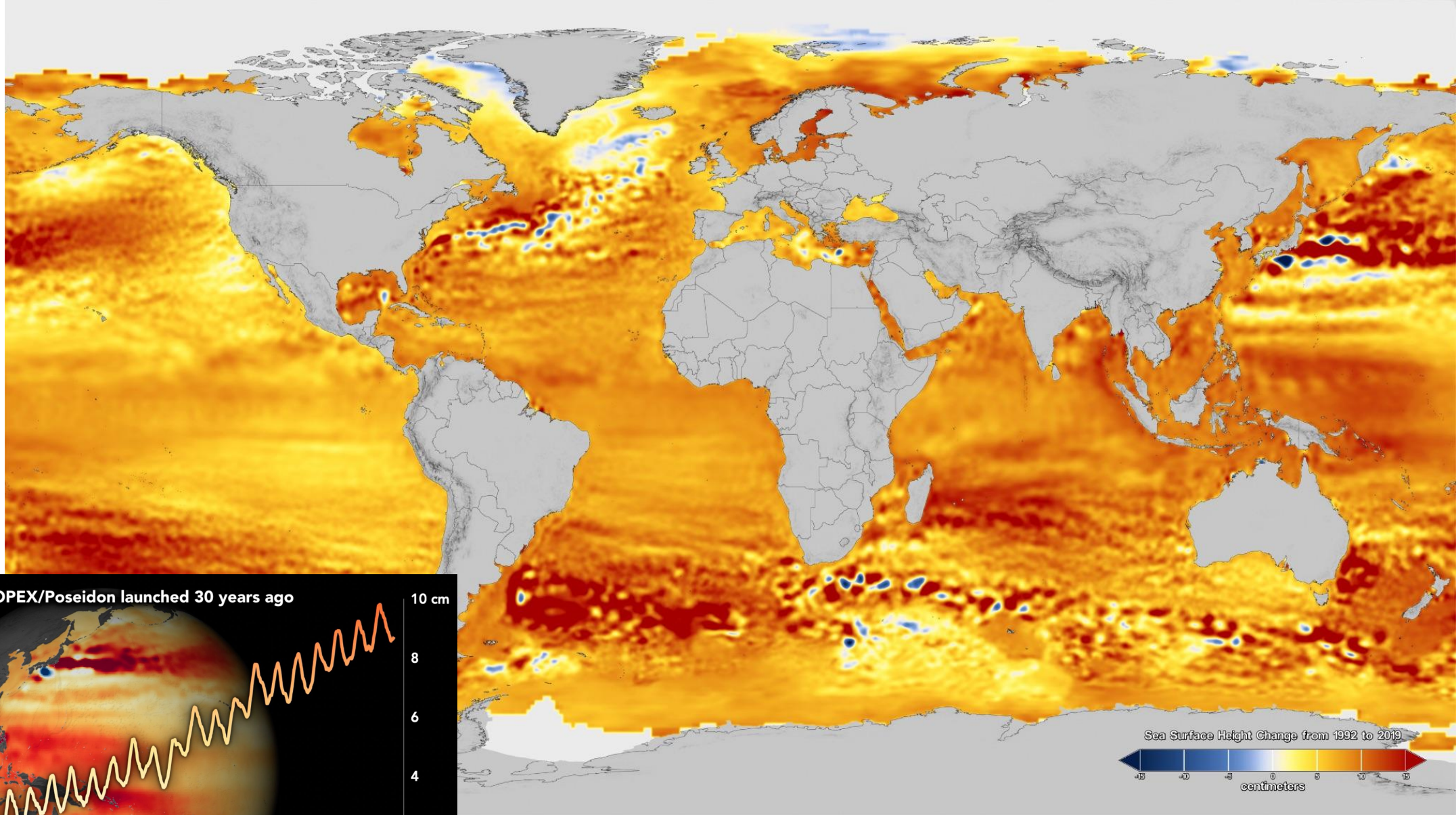


Marine Heatwave Category Map - 2024-01-09

Data: GLO12 analysis

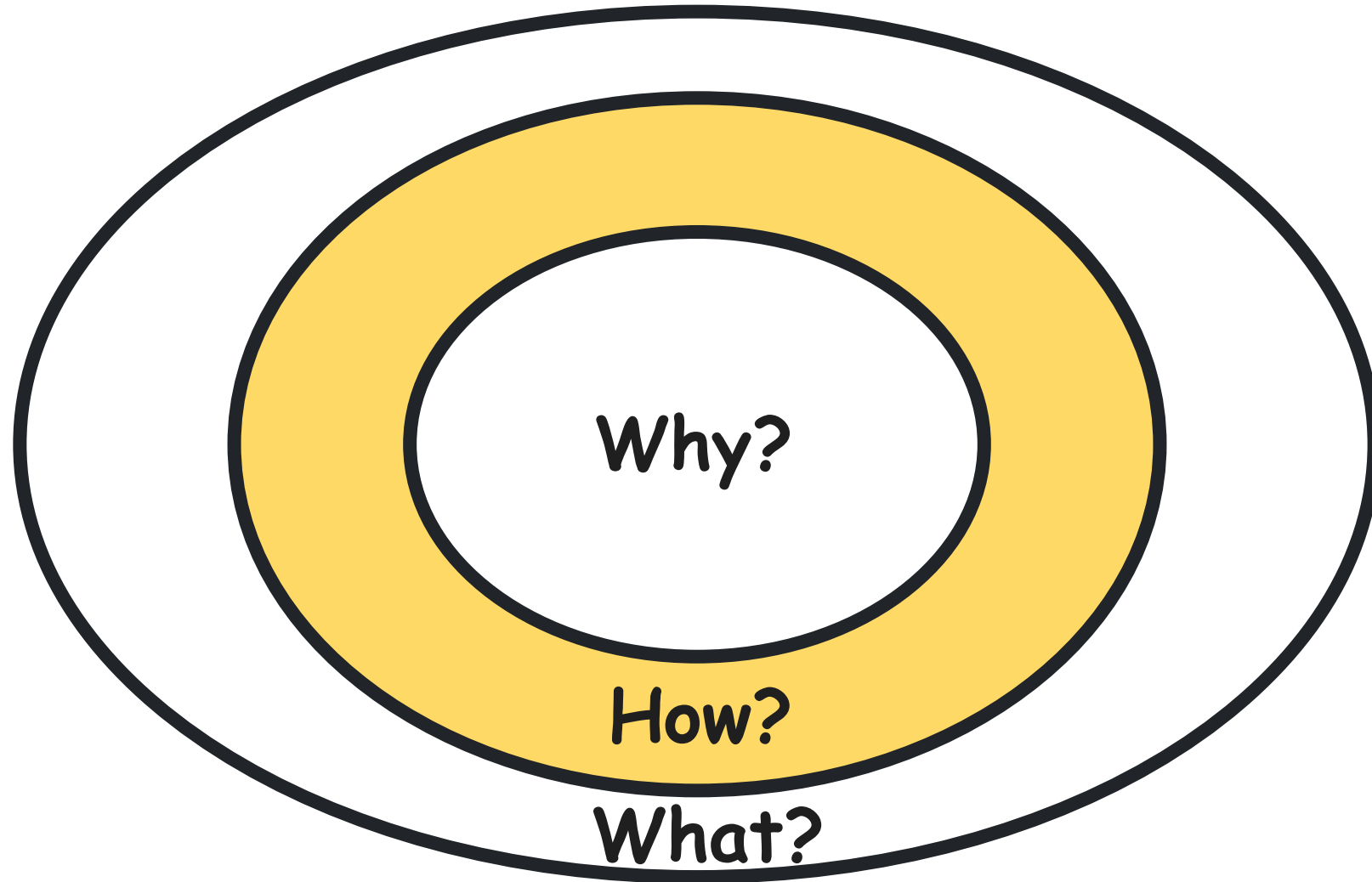


Marine heatwaves have increased in duration, severity and intensity globally, impacting fisheries and biodiversity (Credit: Mercator Ocean International)



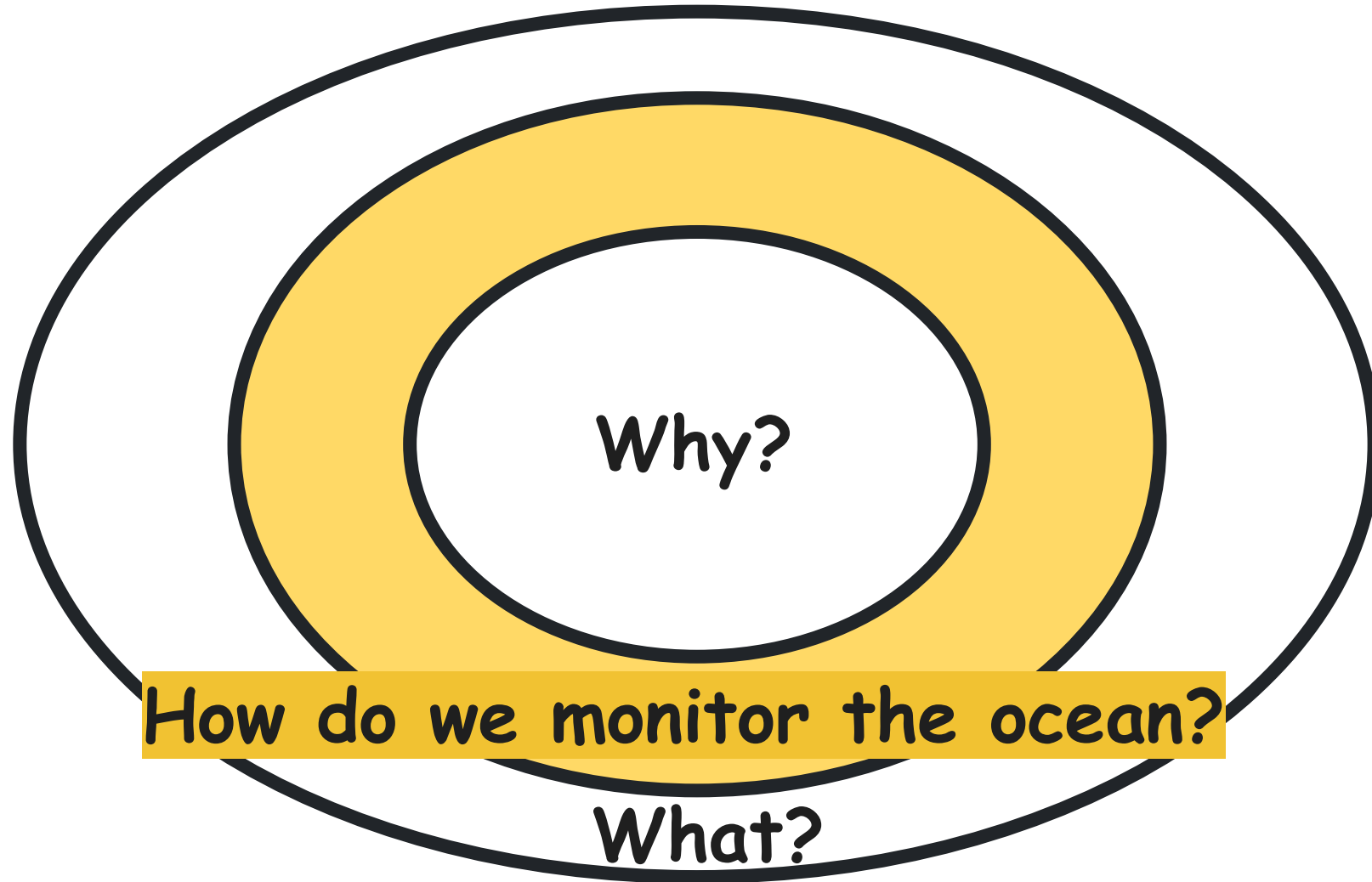
Globally, sea levels have risen by approximately 10 cm in the last 30 years, though not uniformly as shown in the red (increase) and blue (decrease) regions above (Credit: NASA Earthdata)

The Golden Circle

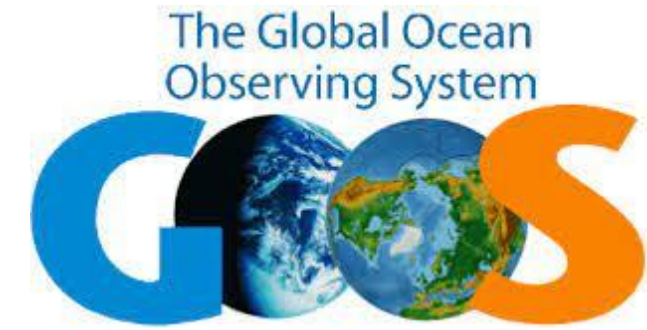
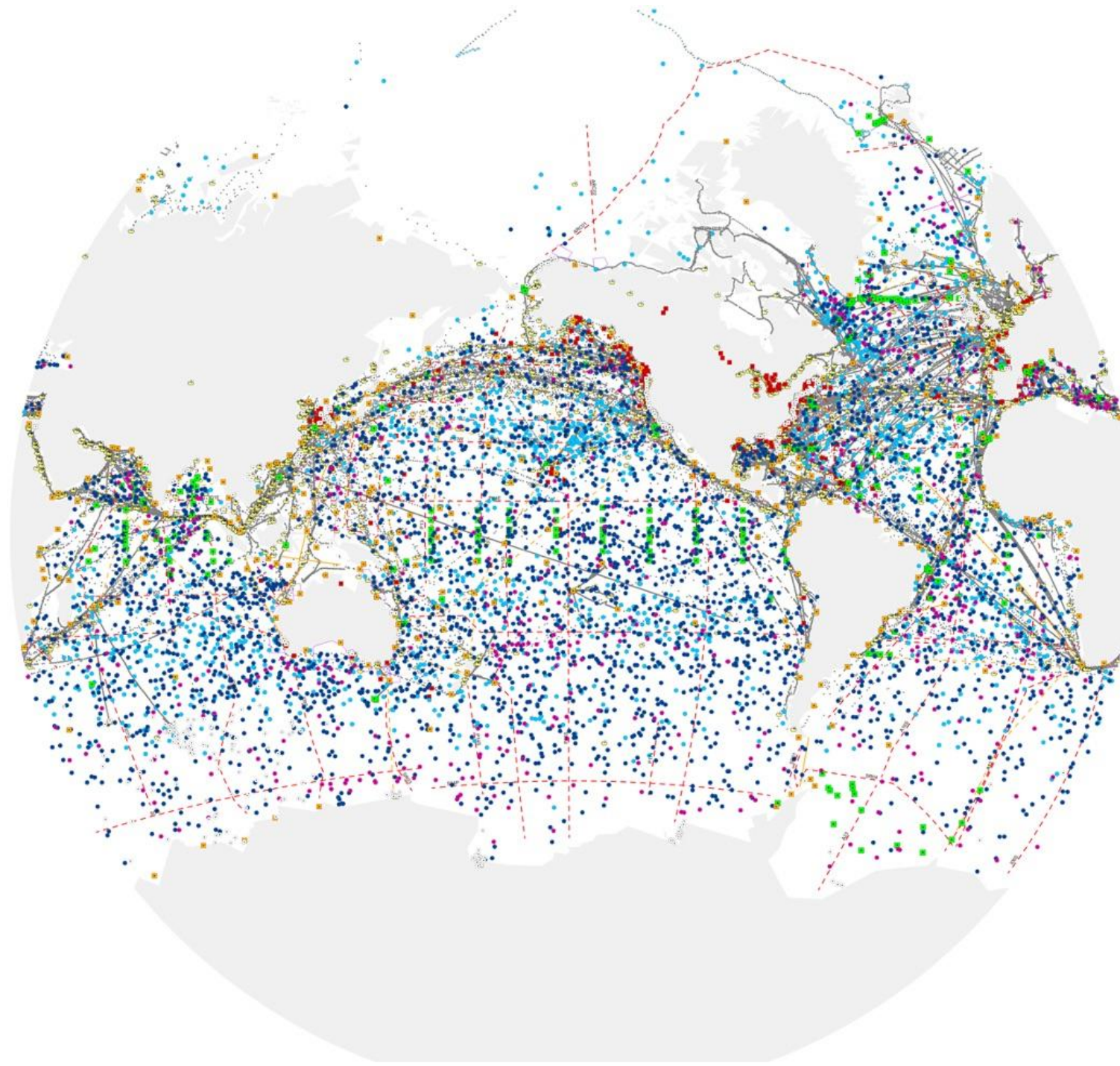






~Simon Sinek, Start with Why

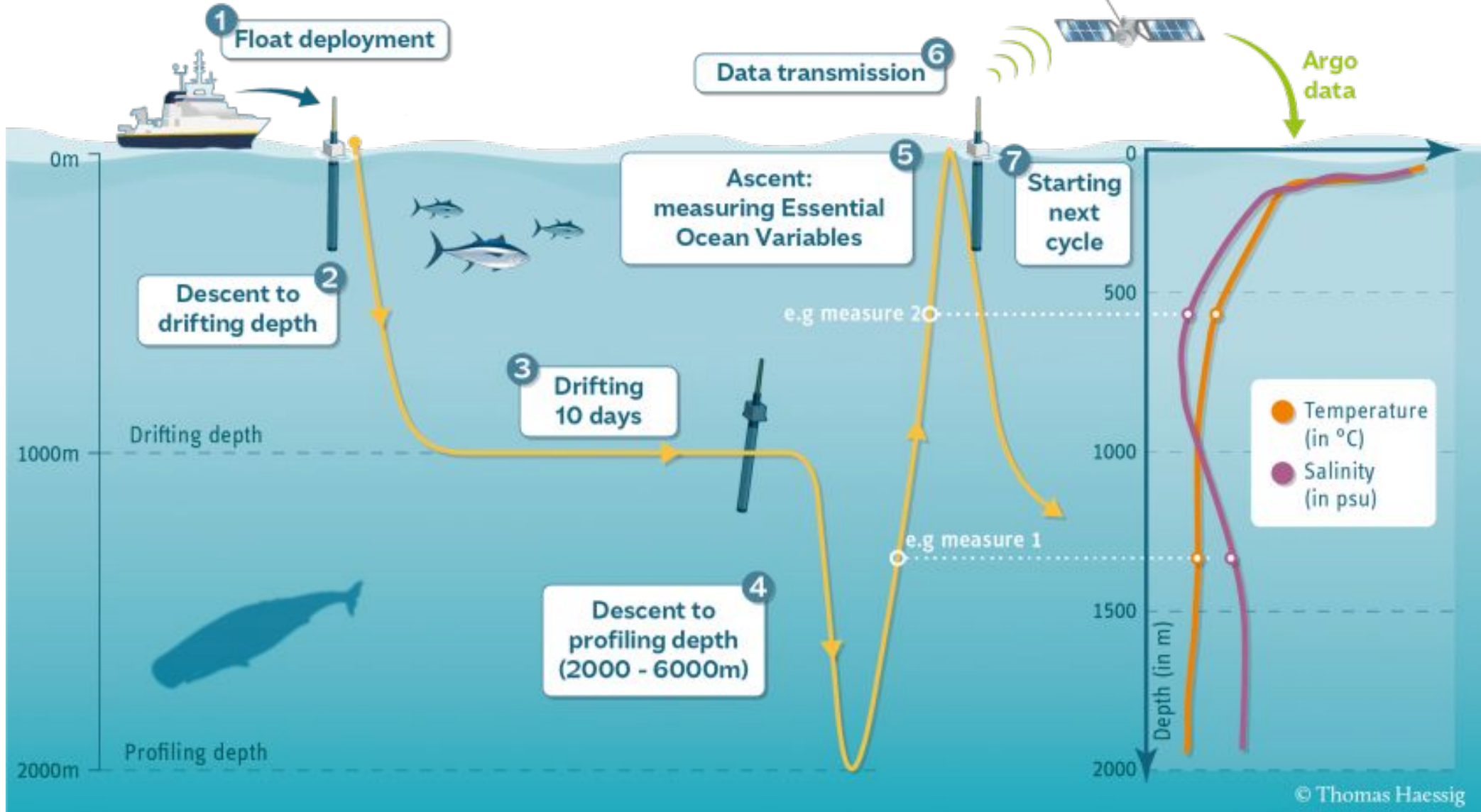
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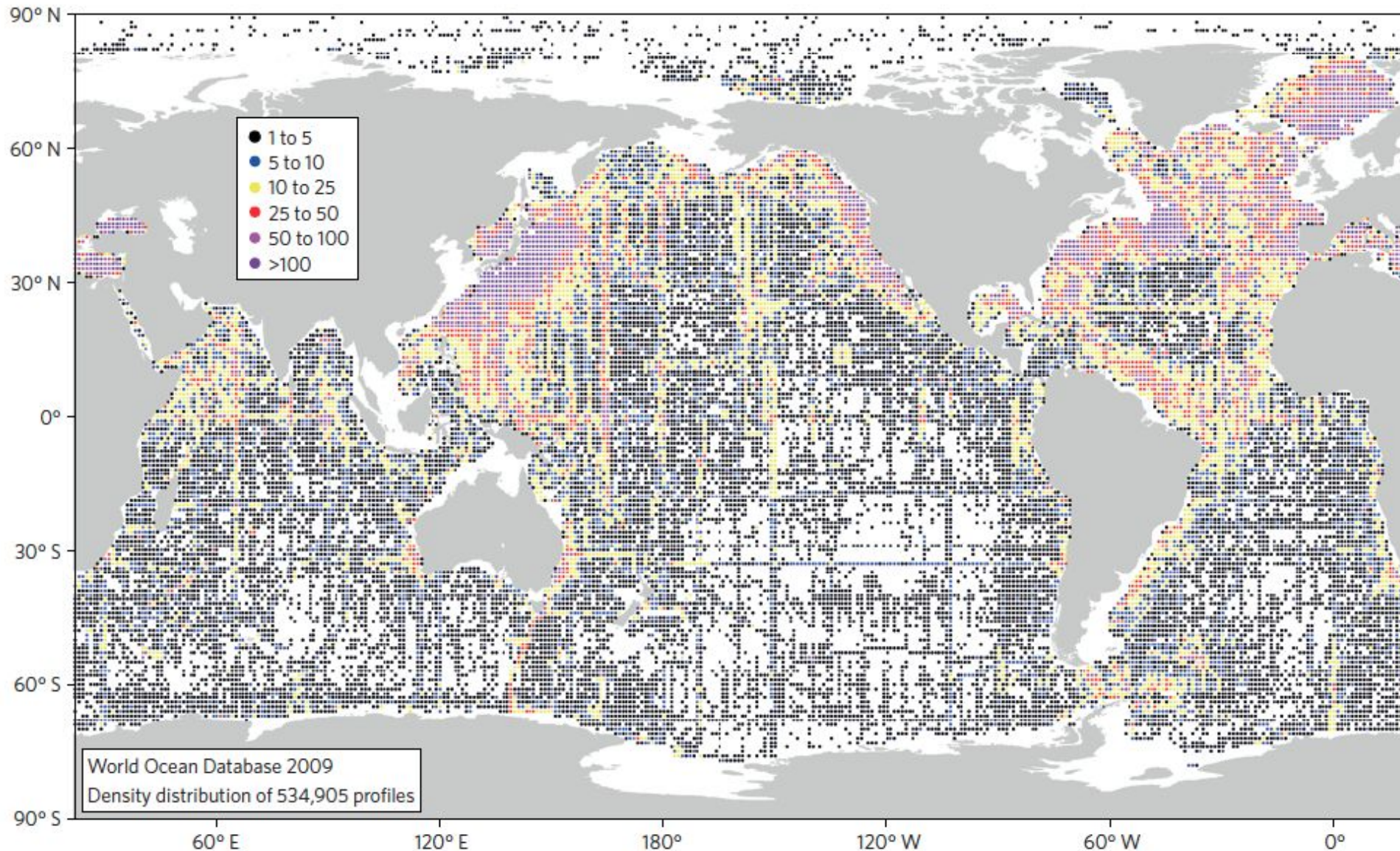


-  Ship based aerological measurements - SOT/ASAP
-  Ship based meteorological measurements - SOT/VOS
-  Ship based meteorological measurements - SOT/VOS
-  Ship based aerological measurements - SOT/ASAP
-  HF radars
-  Animal borne sensors
-  Sea level gauge - GLOSS
-  Biogeochemical and deep floats - Argo
-  Profiling floats - Argo
-  Interdisciplinary moorings - OceanSITES
-  Drifting and polar buoys - DBCP
-  Moored buoys - DBCP
-  Ship based oceanographic measurements - SOT/SOOP-XBT
-  Ship based oceanographic measurements - SOT/SOOP-XBT
-  Repeated transect - GO-SHIP
-  OceanGliders

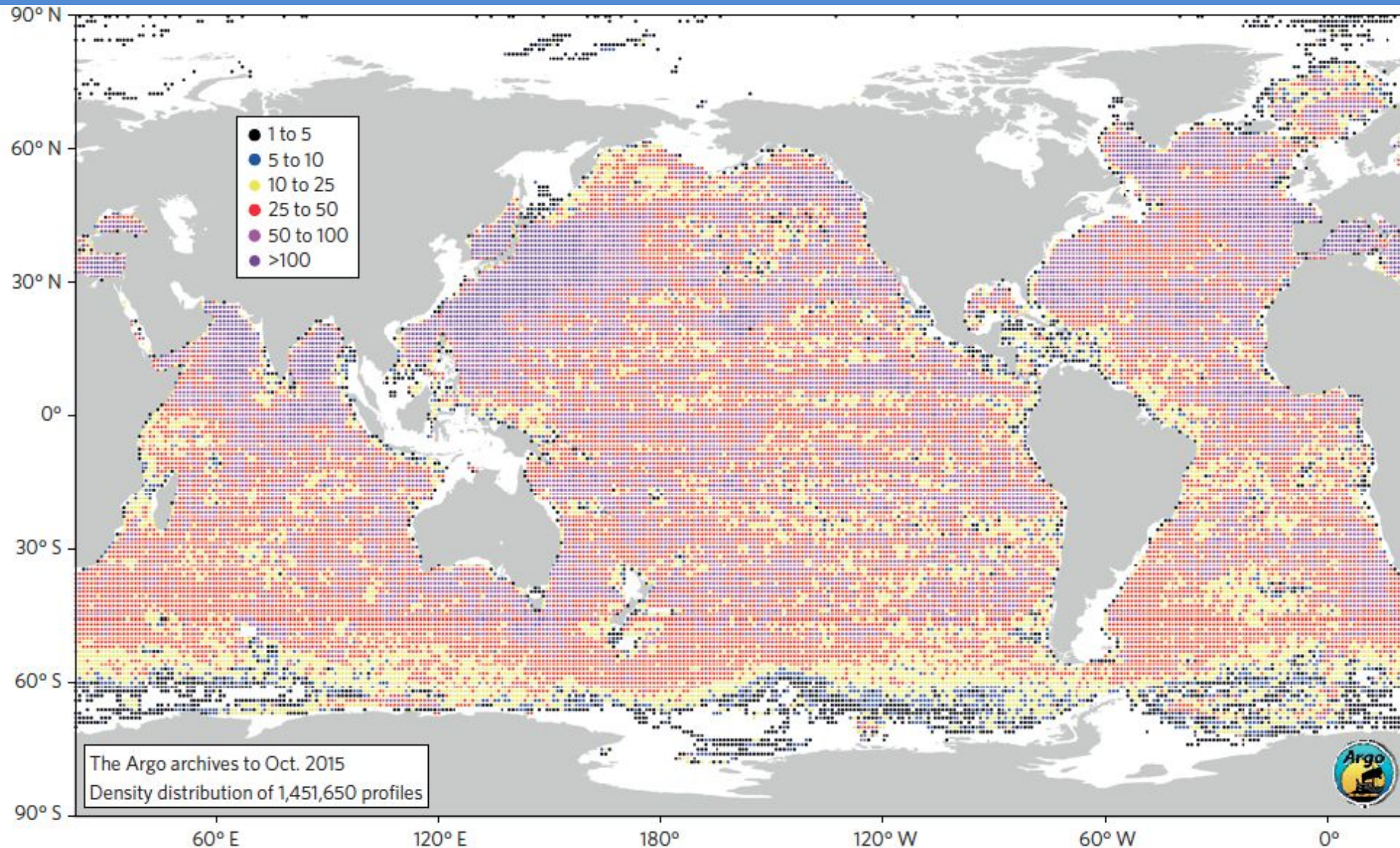


Argo float profiling mission and SOLOII Argo float (argo.ucsd.edu)

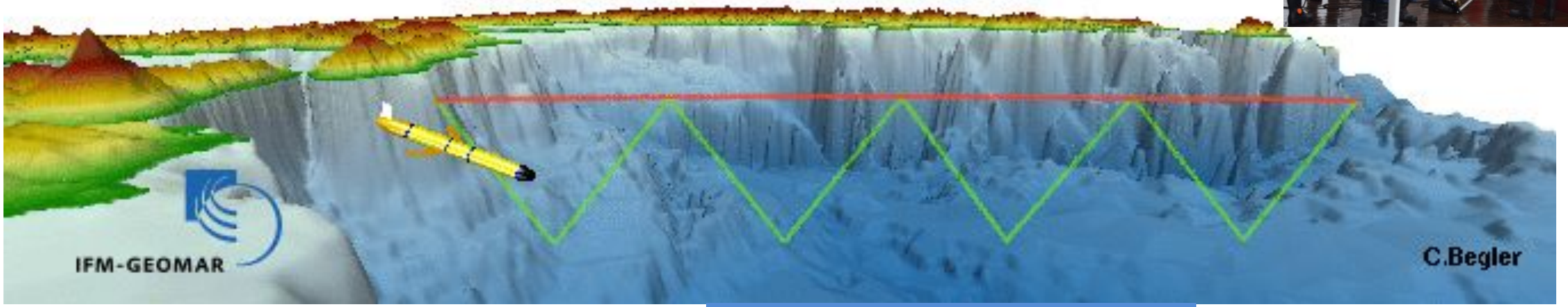
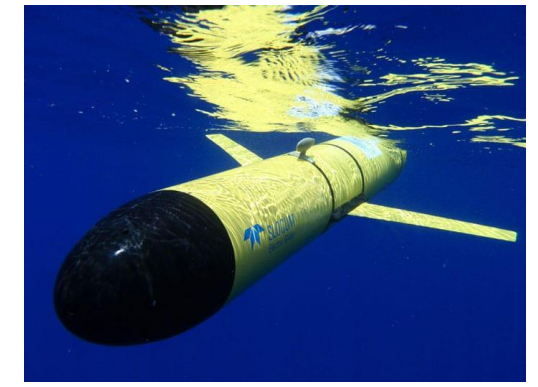
Most complete assembly of all profiles (0.5 million largely shipboard) over past 100 years from the World Ocean Database - 2009



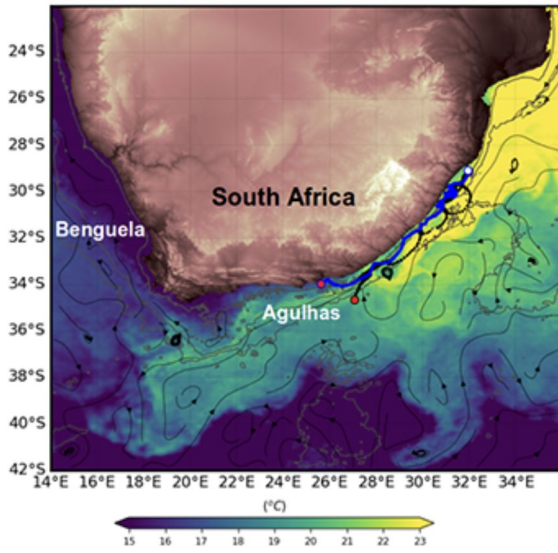
1.5 million Argo profiles between January 1999 and October 2015 (and we have since accumulated even more!)



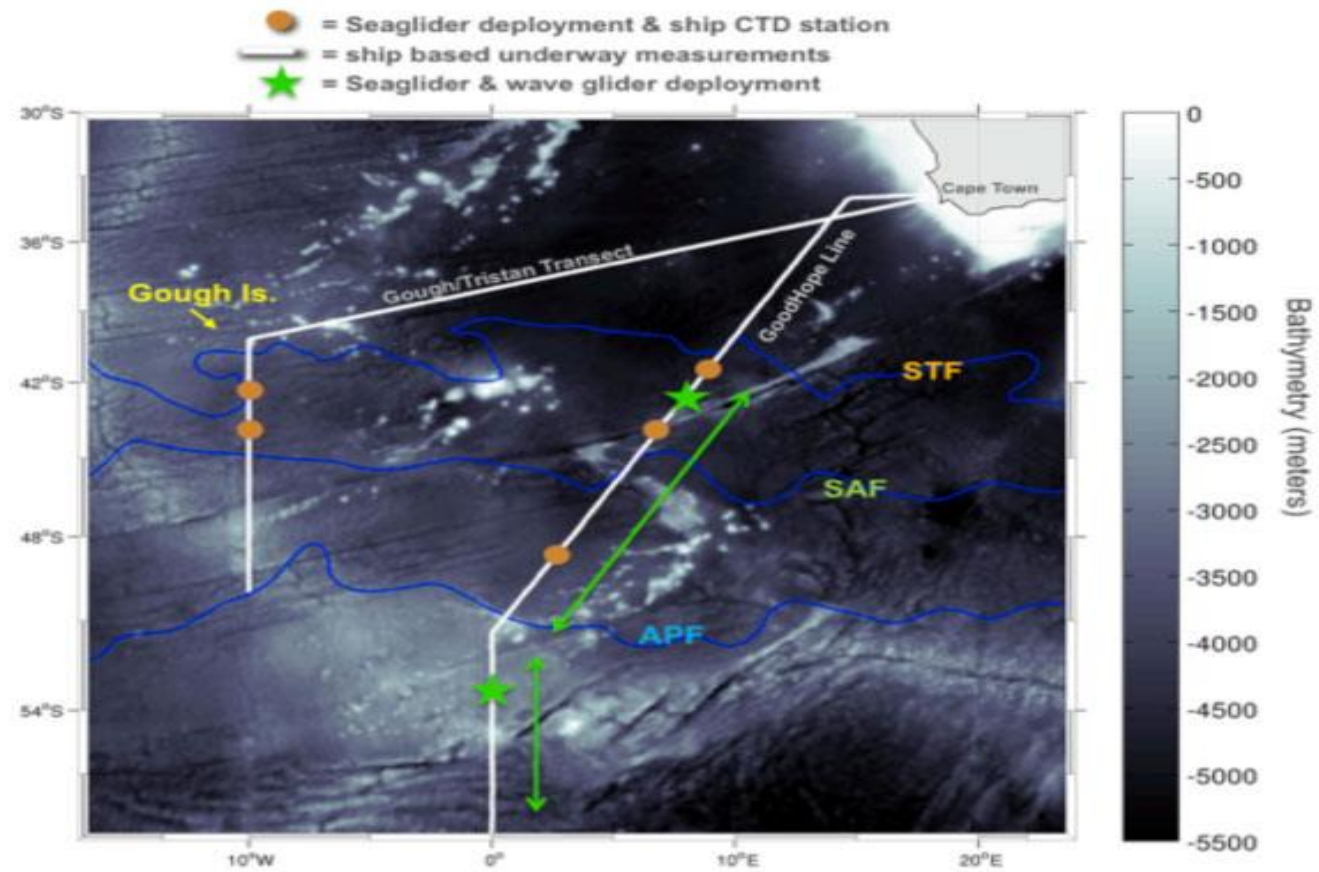




Slocum buoyancy glider operations



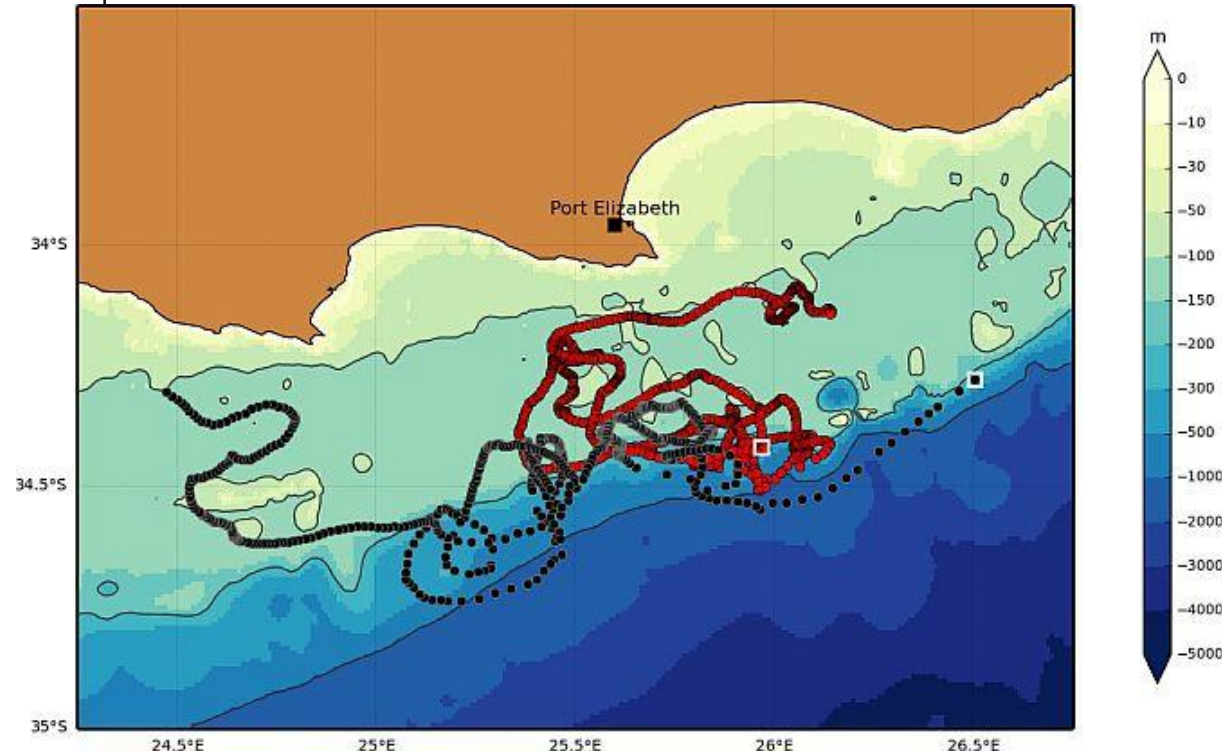
<https://eos.org/science-updates/ocean-gliders-ride-the-research-wave-in-the-agulhas-current>

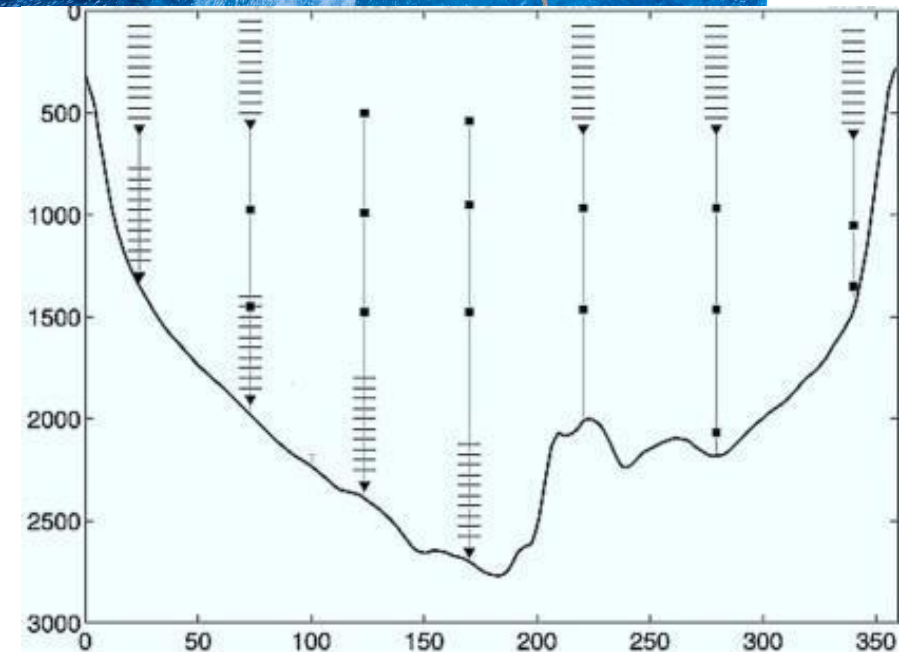
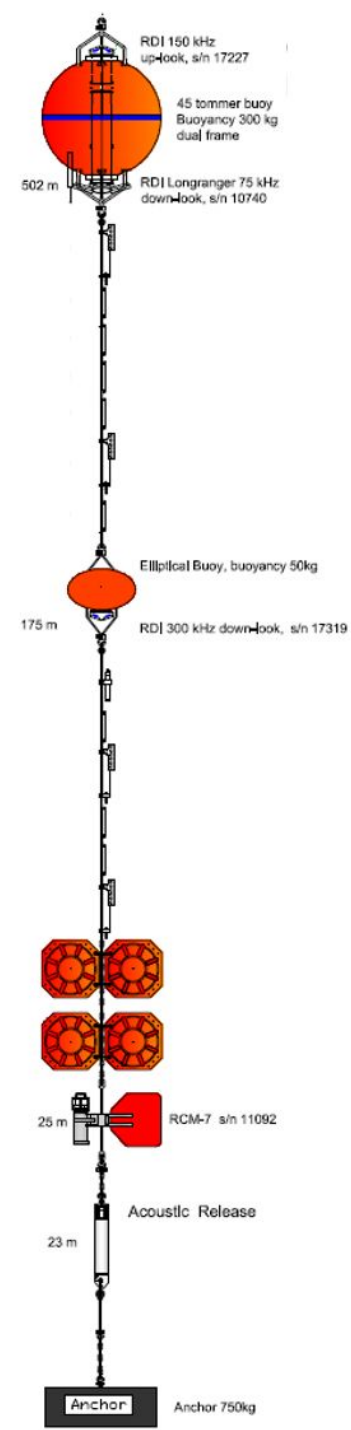
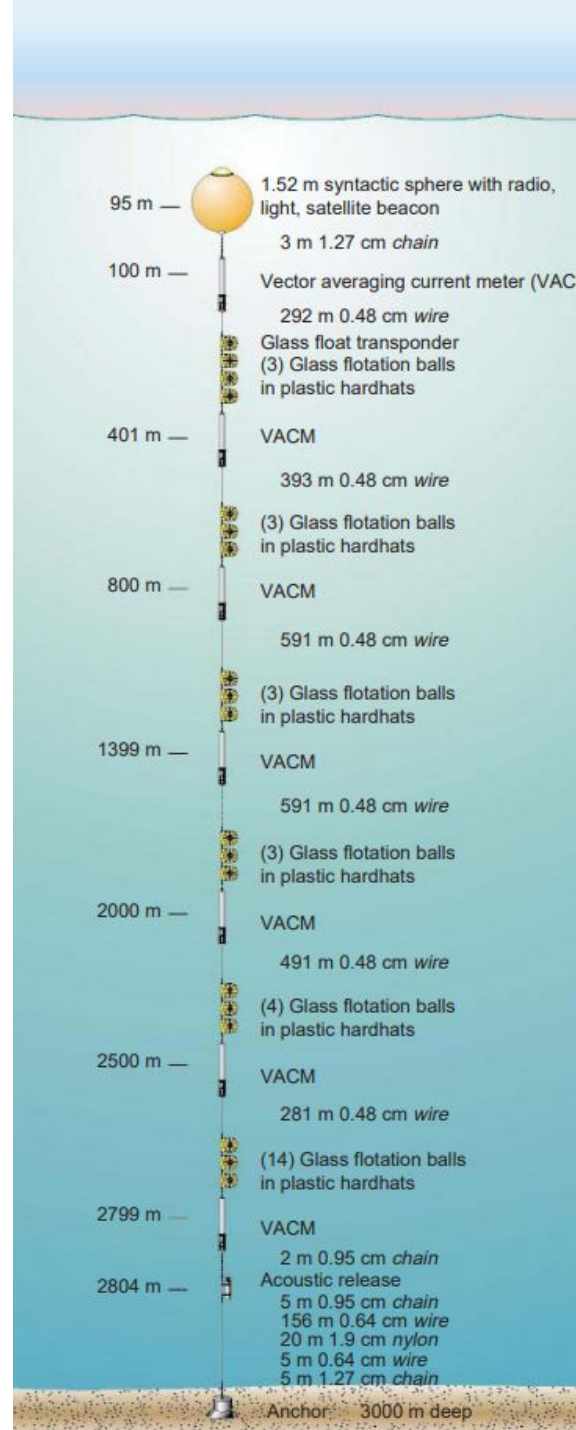


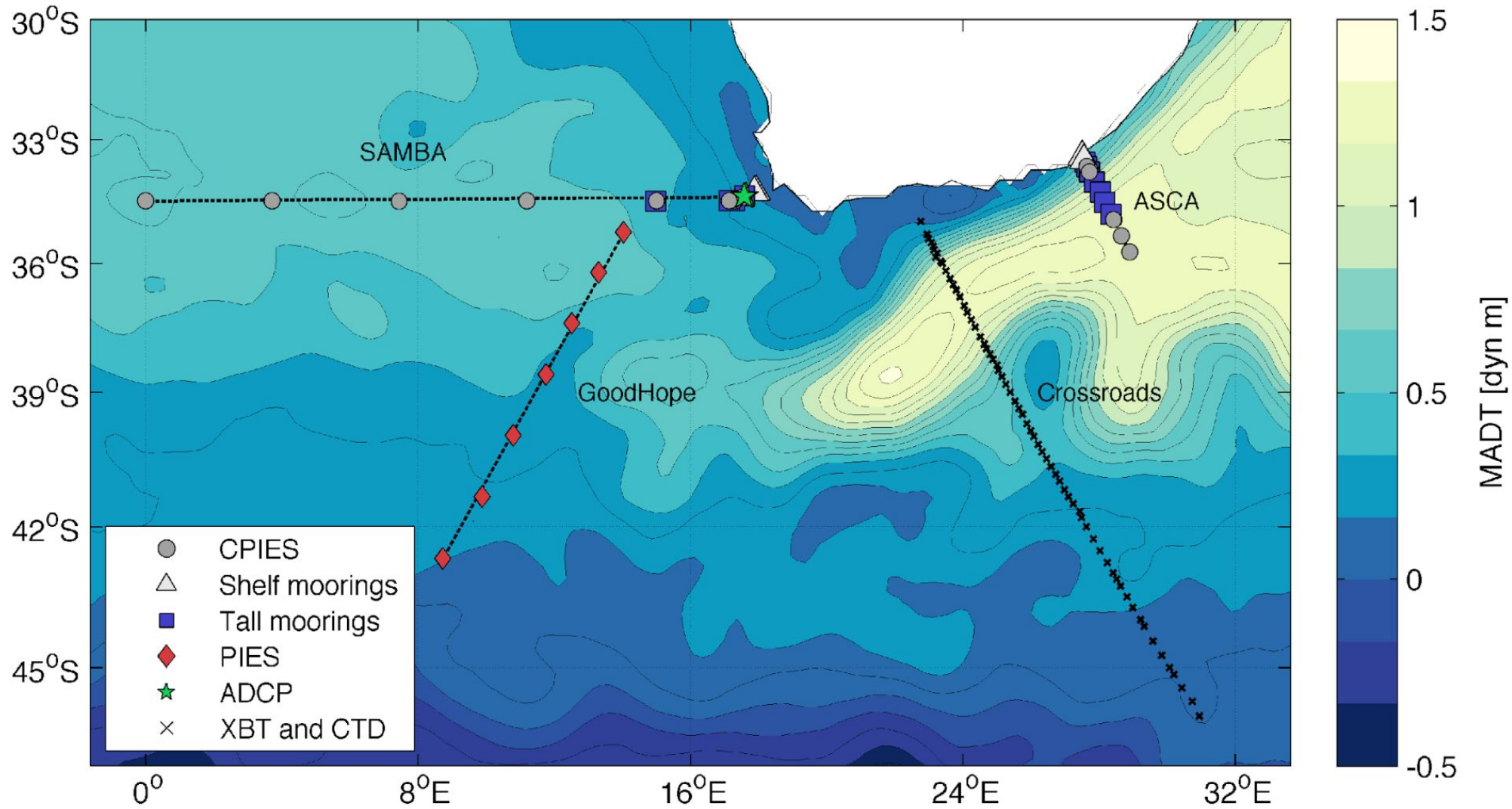
<https://socco.org.za/news/ocean-gliders-battle-southern-ocean-in-order-to-capture-the-seasonal-cycle/>



<http://archive.saeon.ac.za/enewsletter-archives/2015/august2015/doc07>



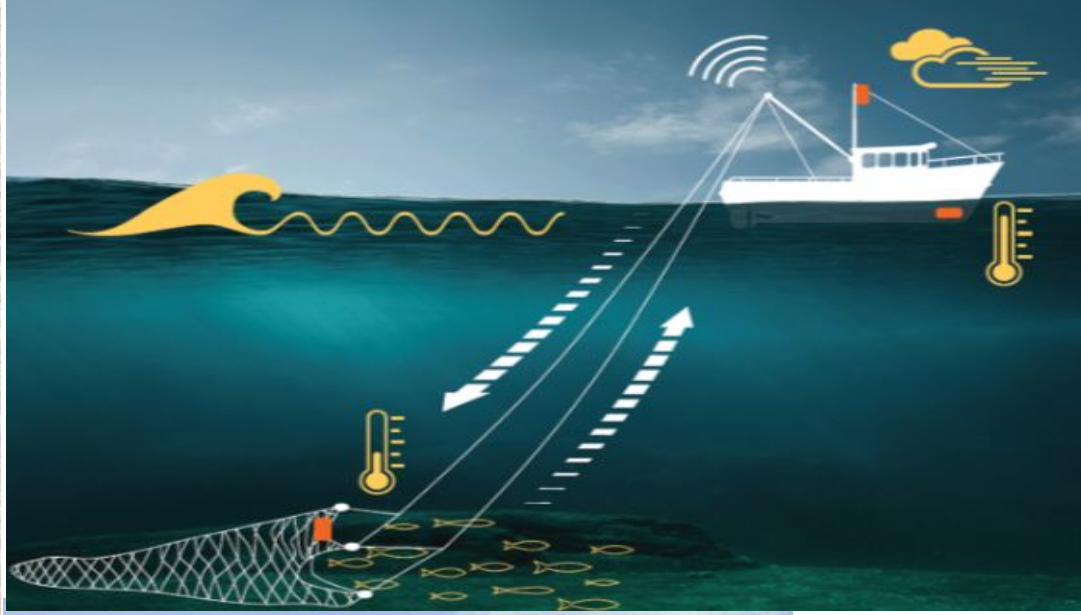
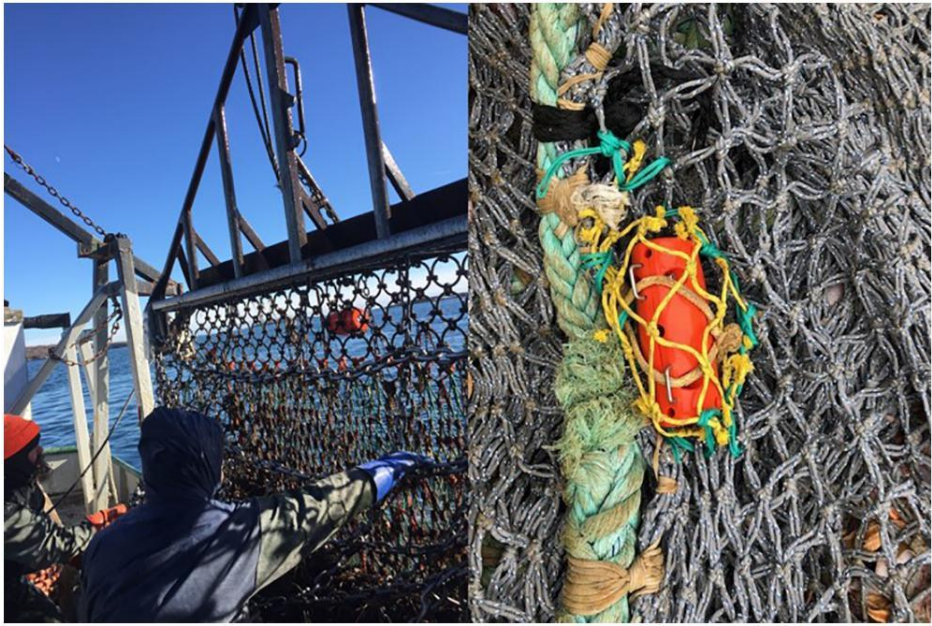




environmental affairs

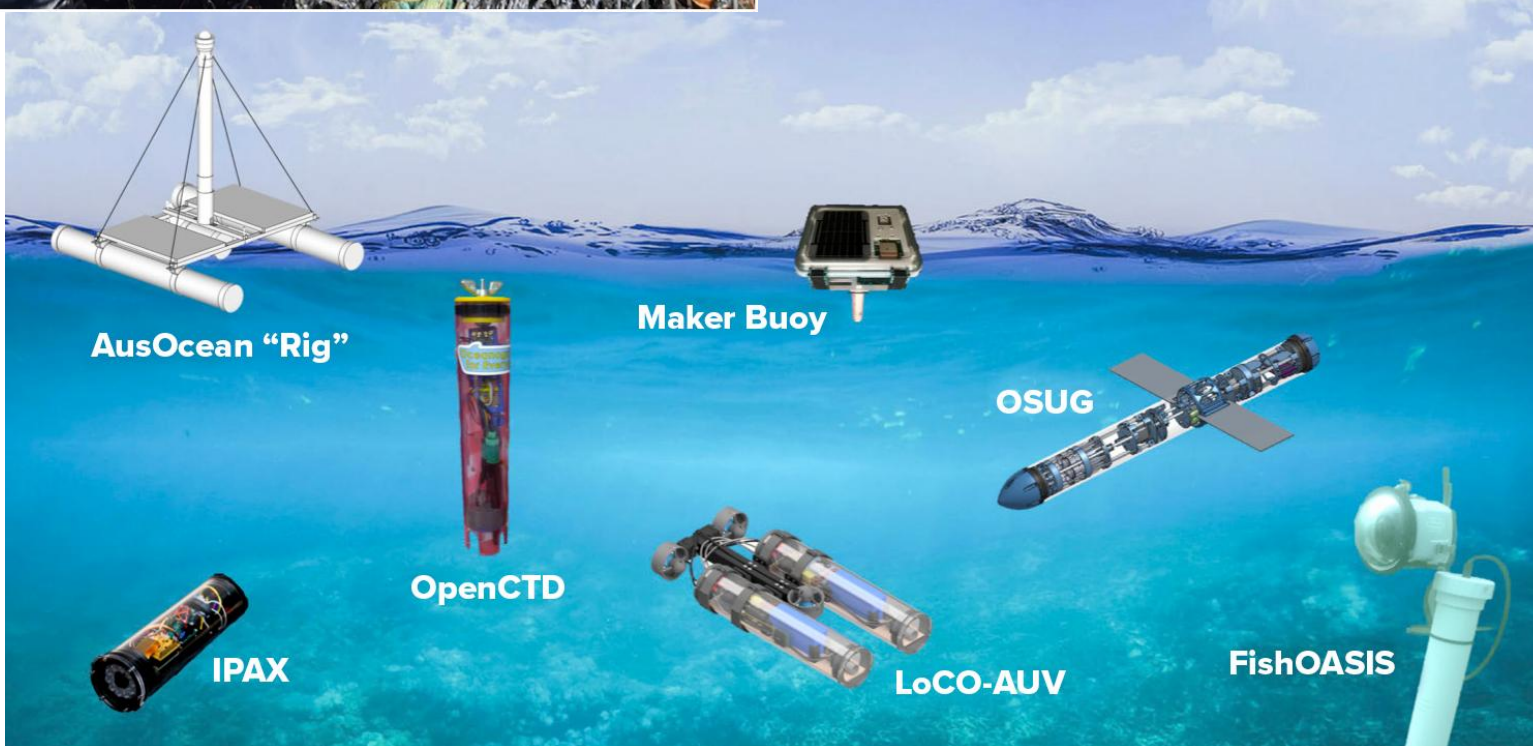
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA





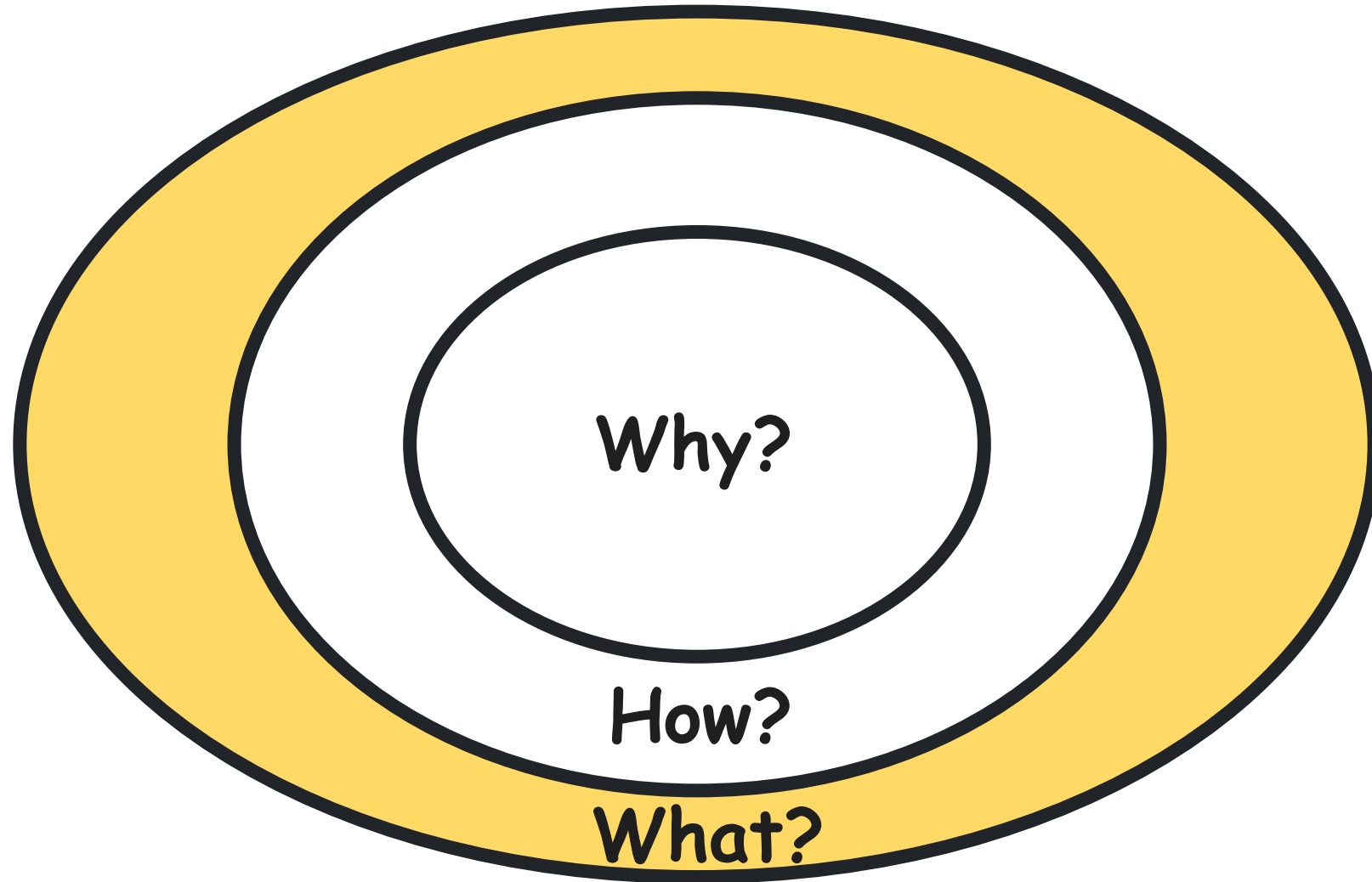
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<https://doi.org/10.3389/fmars.2020.485512>



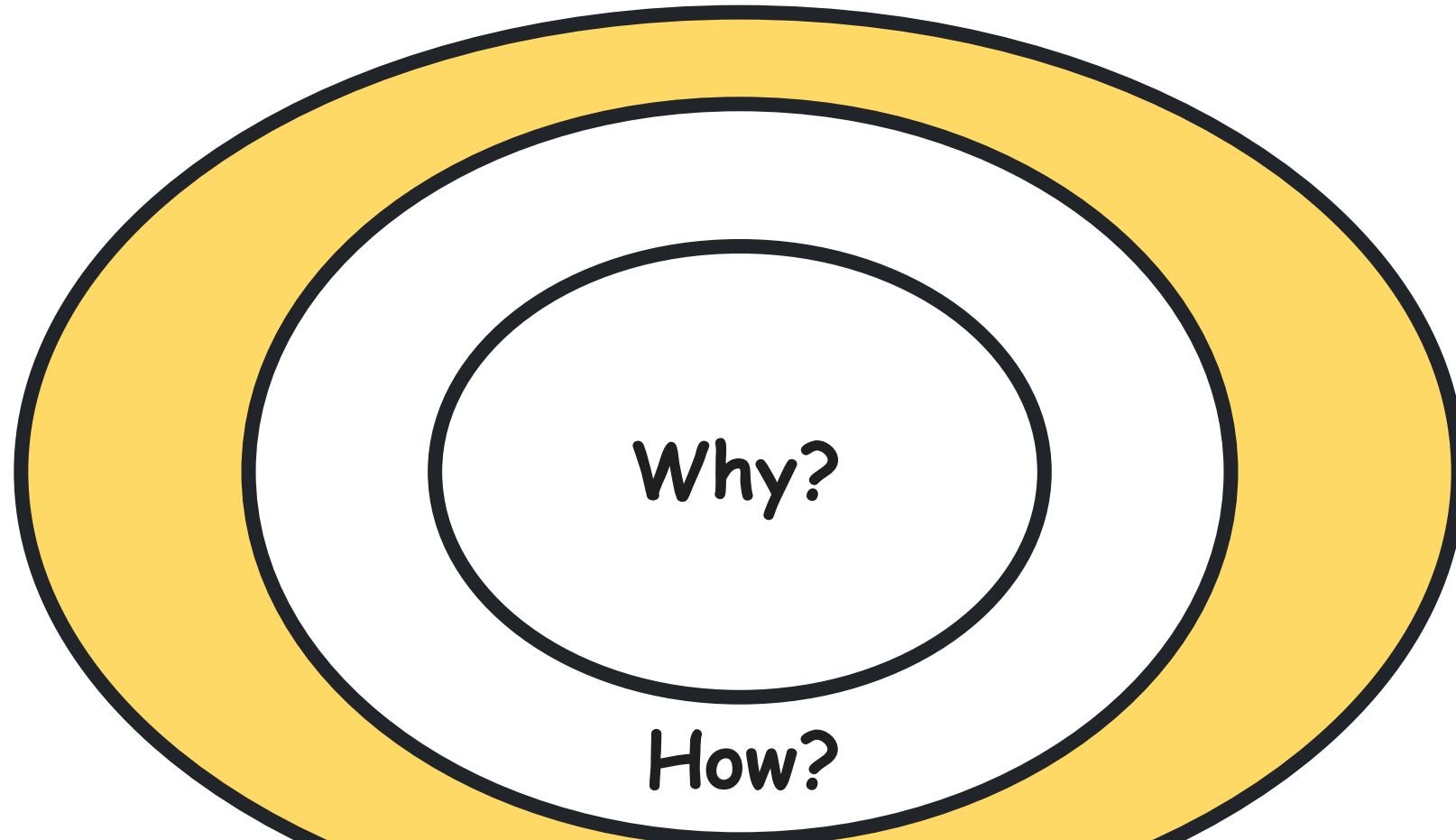
<https://doi.org/10.5670/oceanog.2021.supplement.02-35>

The Golden Circle



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Where do monitor our oceans?

~Simon Sinek, Start with Why



Transects + moorings

- ASCA Line —
- Good Hope Line —
- Marion Island Line —
- SAMBA Line —

Glider sites

- SAZ – sub-Antarctic
- PUZ - upwelling
- MIZ – seasonal ice

Research bases

- MARION (multiple sites)
- SANAE IV (multiple sites)
- GOUGH (multiple sites)

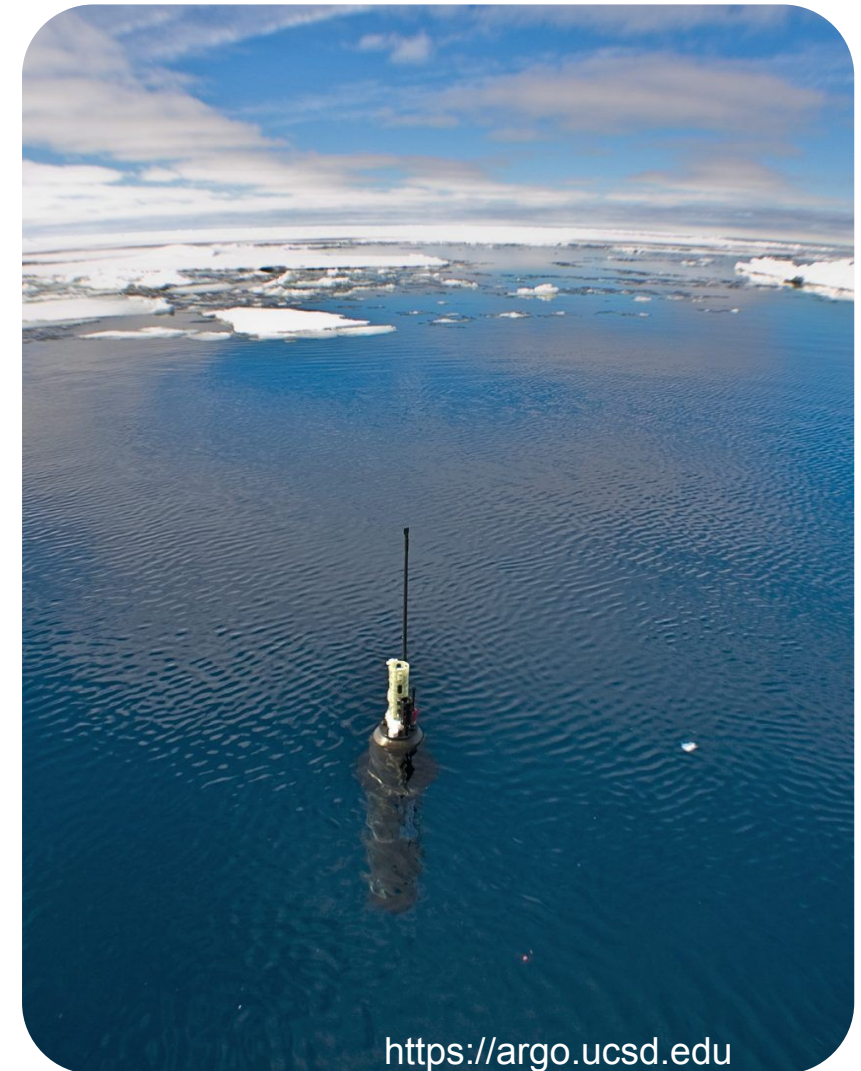
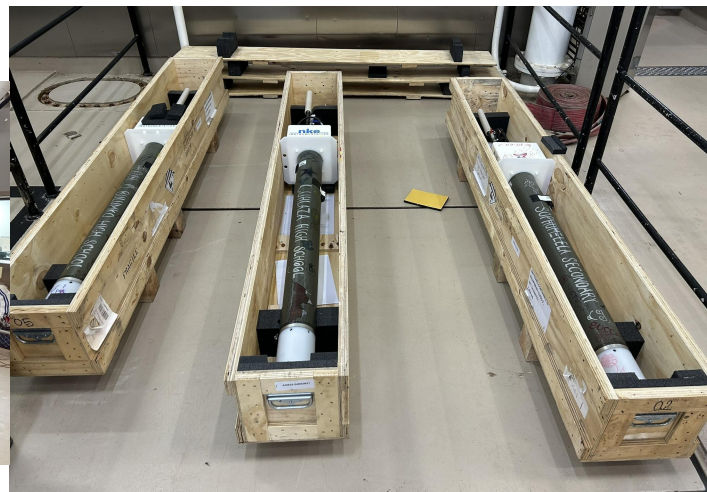
Moorings

- Marion Island (oceanography)
- Maud Rise (passive acoustic)

- Maximum sea ice* —
- Minimum sea ice* —
- South African EEZ* —



The *S.A. Agulhas II* is managed and administered by the Department of Forestry, Fisheries and the Environment (DFFE)






<https://argo.ucsd.edu>

SMCRI

-  Sentinel Sites
-  Satellite Sentinel Sites

Port Elizabeth = Central Coordinating Unit

-  Coastal Biogeochemistry Platform
-  Dive and Hyperbaric Chamber Platform
-  Data Management Platform



Coastal Craft Platform

- Cape Town
- Port Elizabeth
- Durban

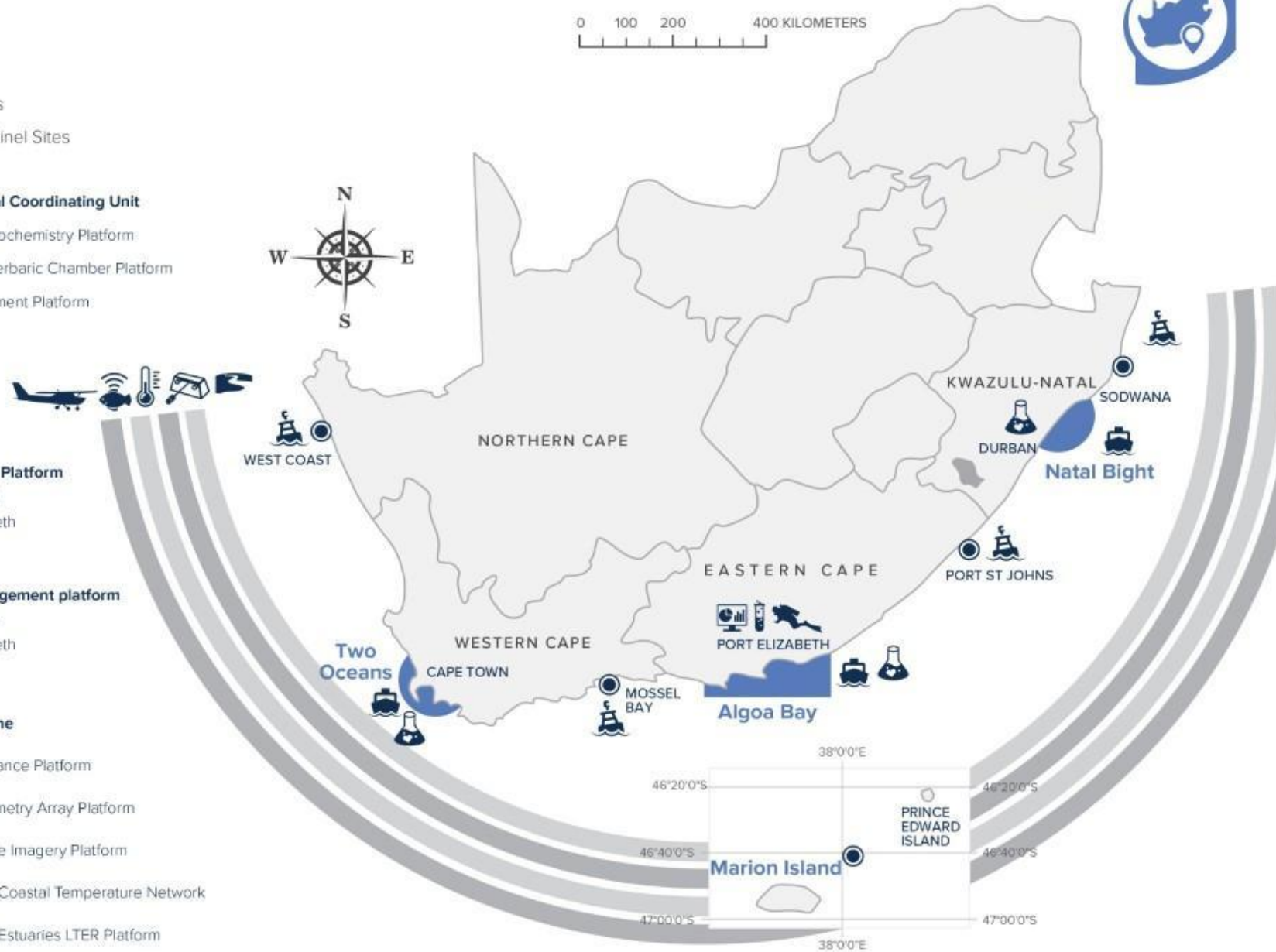
Science engagement platform

- Cape Town
- Port Elizabeth
- Durban

Entire coastline

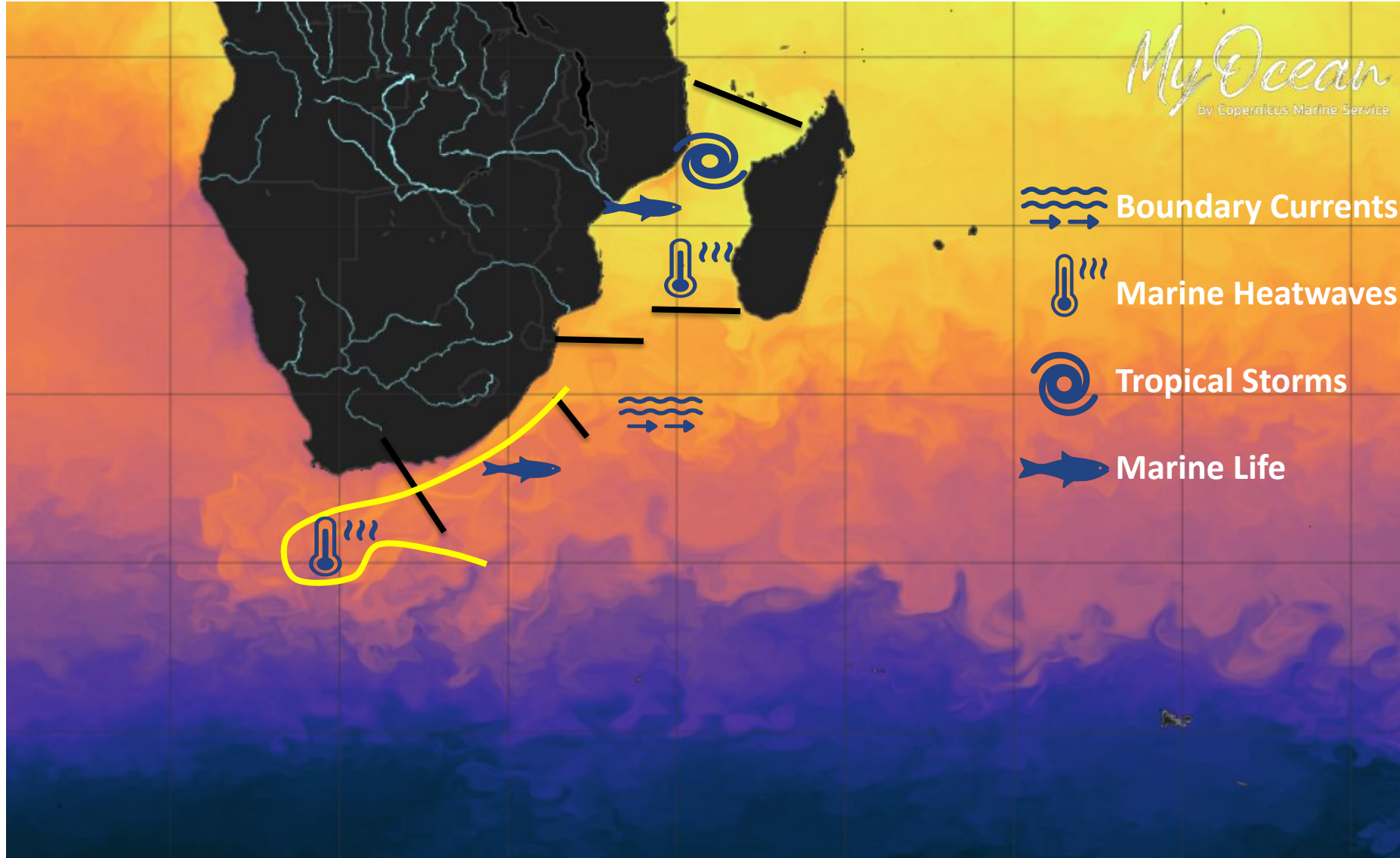
-  Aerial Surveillance Platform
-  Acoustic Telemetry Array Platform
-  Marine Remote Imagery Platform
-  South African Coastal Temperature Network
-  South African Estuaries LTER Platform

0 100 200 400 KILOMETERS





The Greater Agulhas Current Pilot Region





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Thank you

www.sapri.ac.za



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



National Research
Foundation

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forestry, fisheries
& the environment

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