



Nice | France
2 - 13 JUNE 2025

Use Physical Ocean Reanalyses to Monitor Ocean Changes

5th June, 2025

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How to monitor the Ocean?





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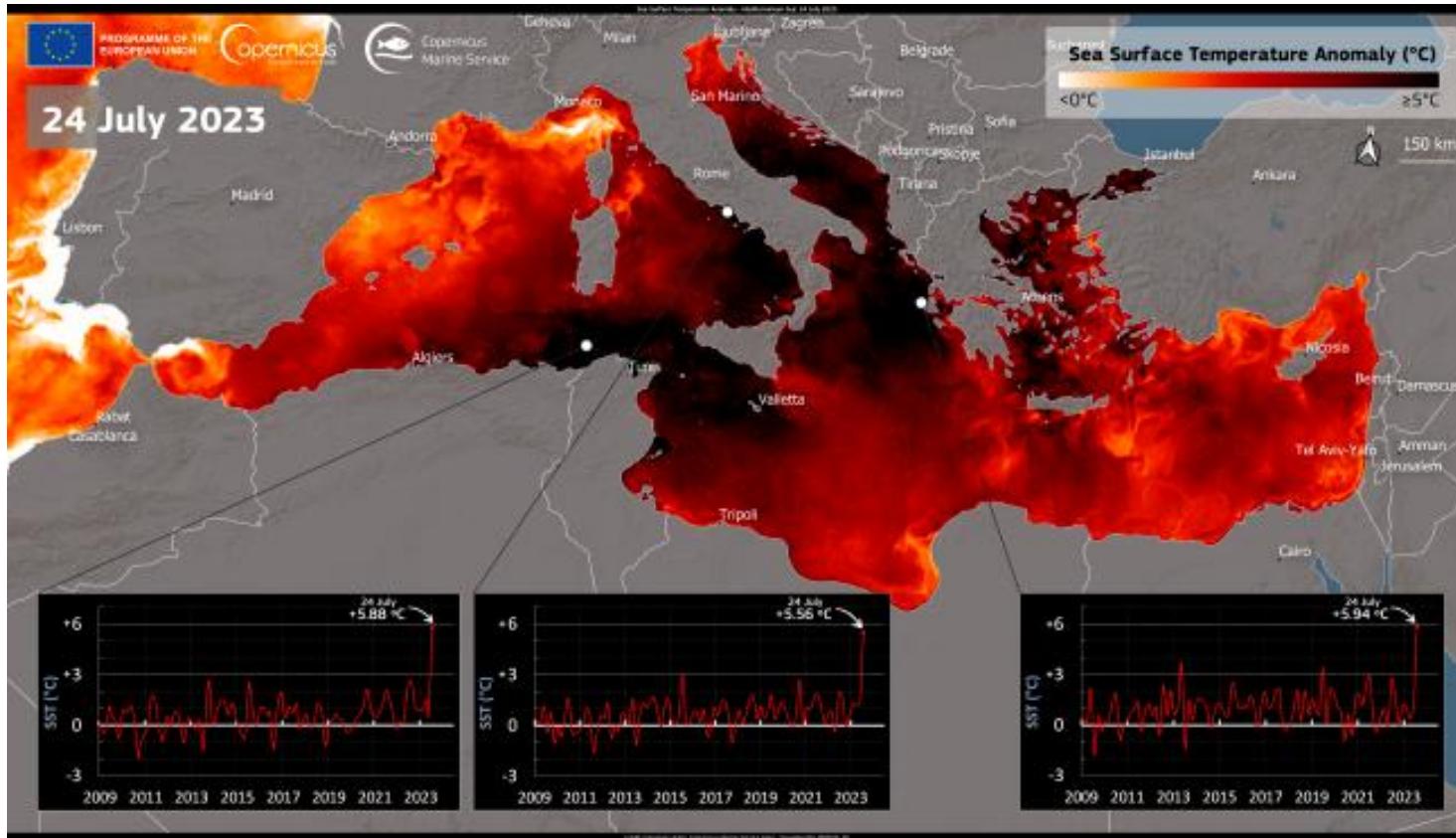


Chunxue Yang

Institute of Marine Sciences,
National Research Council of Italy
(CNR-ISMAR), Roma, Italy



Extreme Ocean Warming



- In **2023**, the marine heat wave last Over a month in Alboran Sea
- **+5.5 °C** increase of sea surface temperature along the coastlines of Italy, Greece, and North Africa

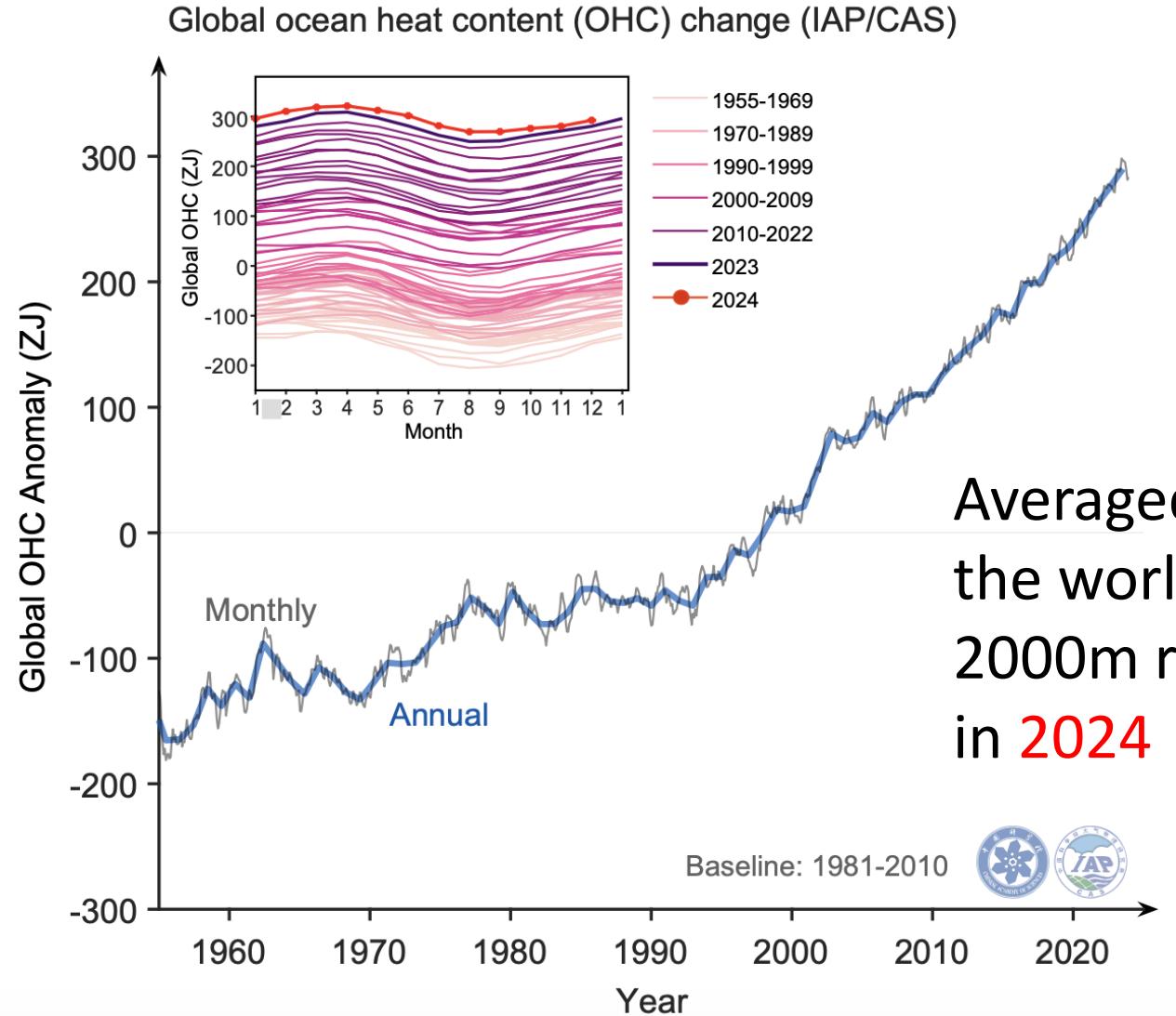


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Extreme Ocean Warming



Averaged temperatures across the world's oceans above 2000m reached an all-time high in **2024**

Cheng et al., 2025



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Observations



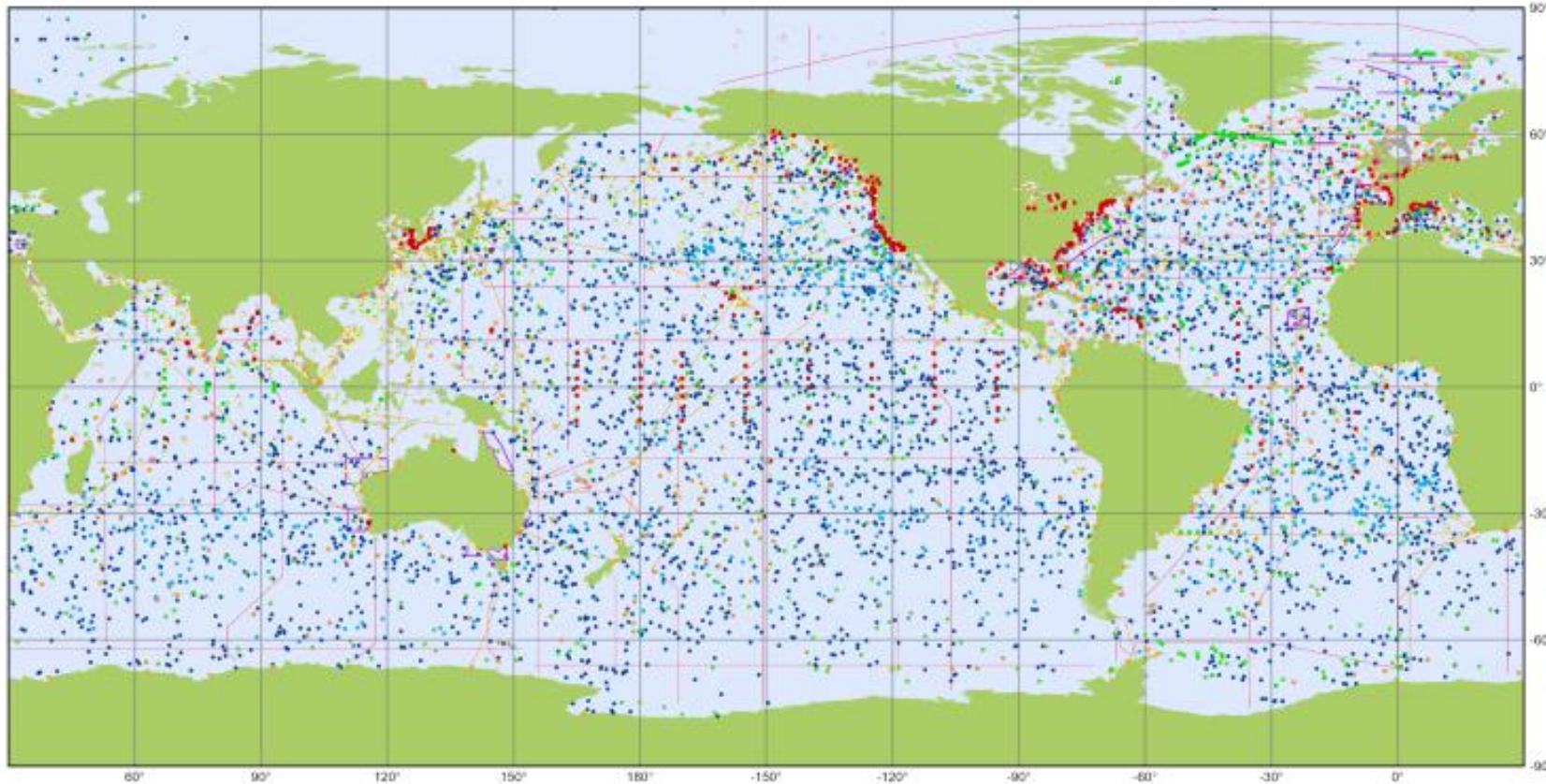
https://www.esa.int/ESA_Multimedia/Images/2019/05/ESA-developed_Earth_observation_missions



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Observations



Global ocean observing system

In situ operational platforms monitored by OceanOPS

April 2023

Mobile systems

- Core floats - Argo
- Deep floats - Argo
- Biogeochemistry floats - Argo
- Underwater gliders - OceanGliders
- Drifting buoys - DBCP
- Polar buoys - DBCP
- Animal borne sensors

Fixed systems

- Tsunameters - DBCP
- Offshore platforms - DBCP
- Moored buoys - DBCP

Ship based measurements

- Ocean reference stations - OceansITES
- Sea level gauges - GLOSS
- High Frequency radars
- Manned weather stations - SOT/VOS
- Automated weather stations - SOT/VOS

Reference lines and areas

- Repeat hydrography - GO-SHIP
- eXpendable Bathymeterographs - SOT/SOOP
- Sampled sites - OceanGliders



Generated by ocean-ops.org, 2023-05-06

Projection: World Plate Carrée (-150,0000)

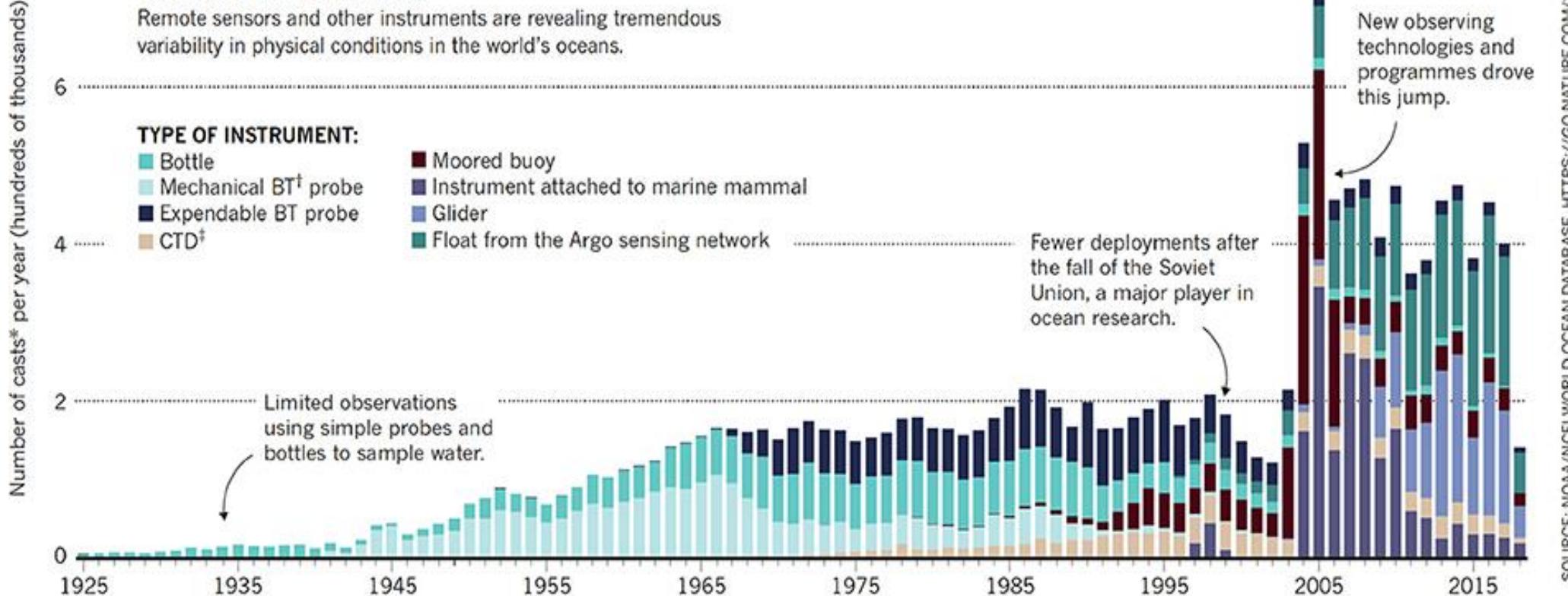


Observations

8

WATCHED WATERS

Remote sensors and other instruments are revealing tremendous variability in physical conditions in the world's oceans.



SOURCE: NOAA/NCEI WORLD OCEAN DATABASE, [HTTPS://DOI.NATURE.COM/20FK8HG](https://doi.nature.com/20fk8hg)

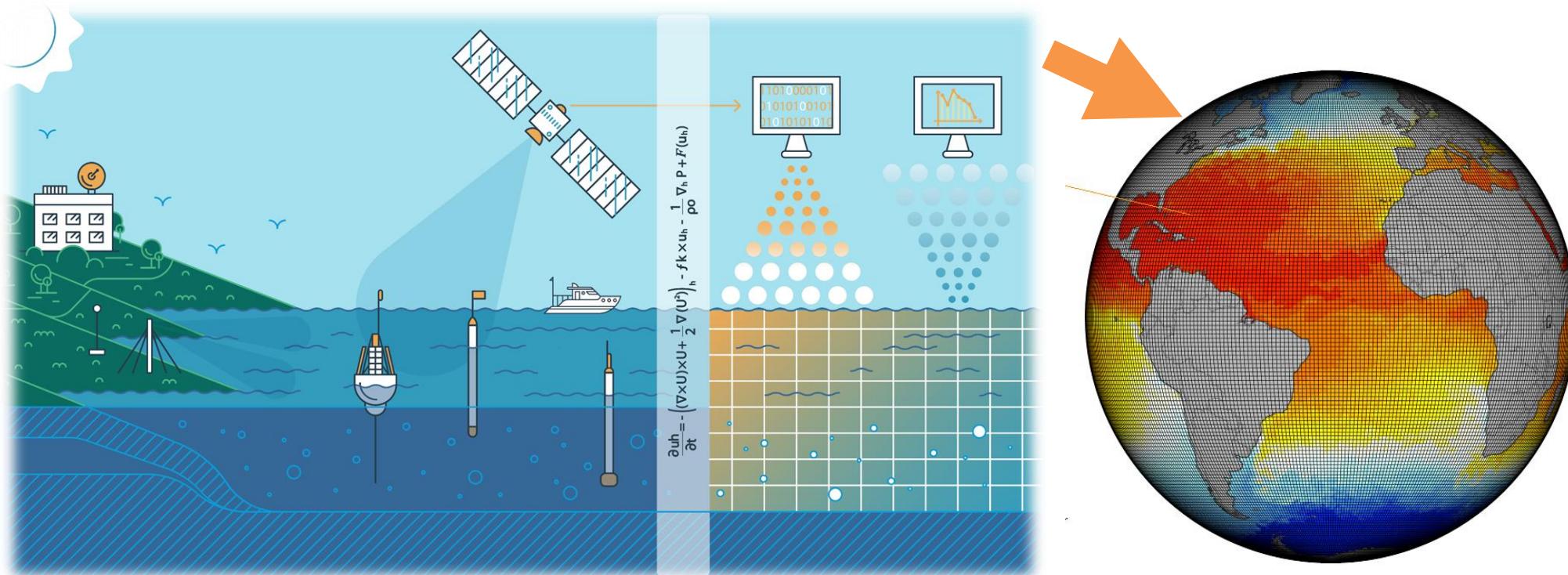
Bates et al., 2018



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Ocean Reanalyses



2025



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Quality of ocean reanalyses

- Uncertainty
- Accuracy
- Reliability
- Fitness for the purpose of usage of ocean reanalyses



Evaluation of ocean reanalyses

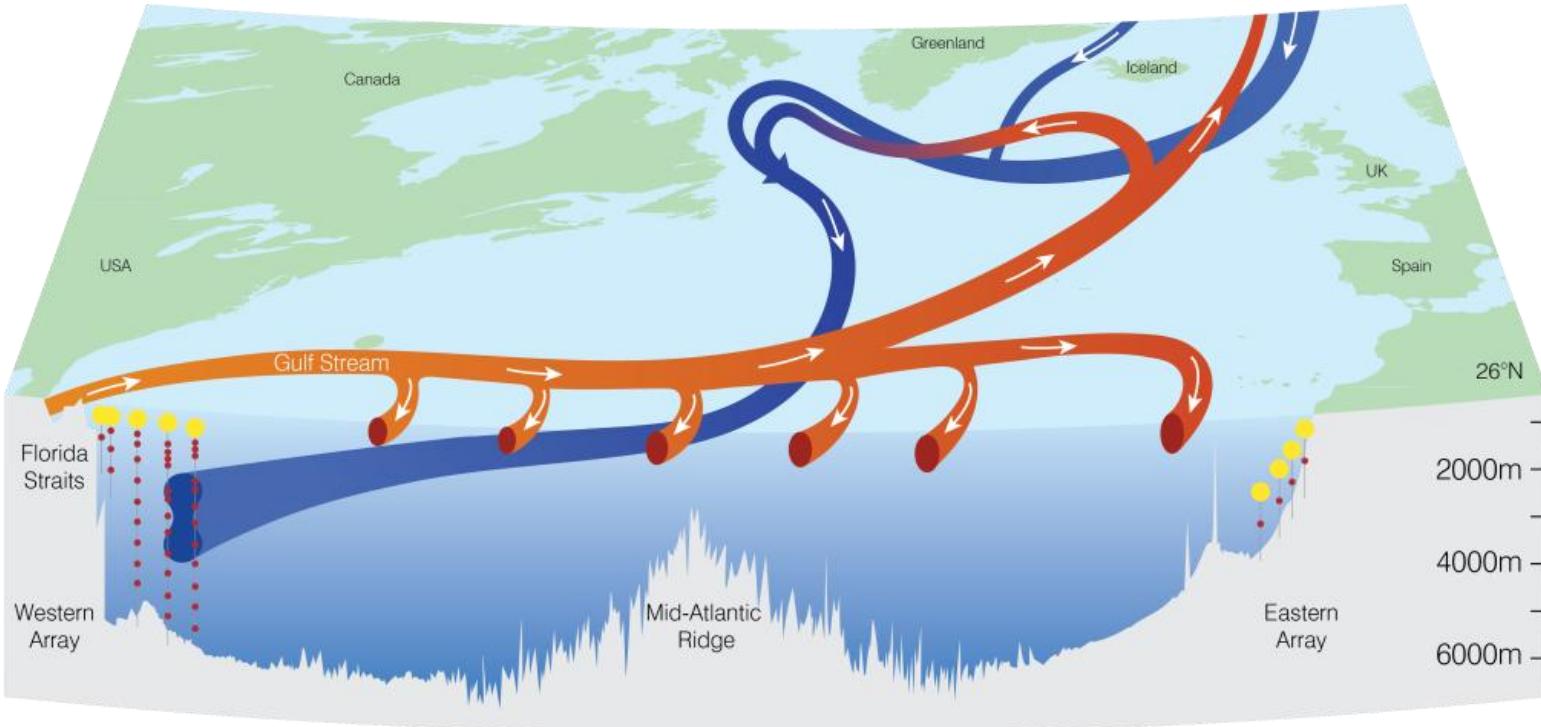


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Use reanalyses to monitor ocean changes



<https://rapid.ac.uk/methodology>

Observation record goes back to 2004



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Thank You!



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