



Use Physical Ocean Reanalyses to Monitor Ocean Changes

5th June, 2025



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How to monitor the Ocean?



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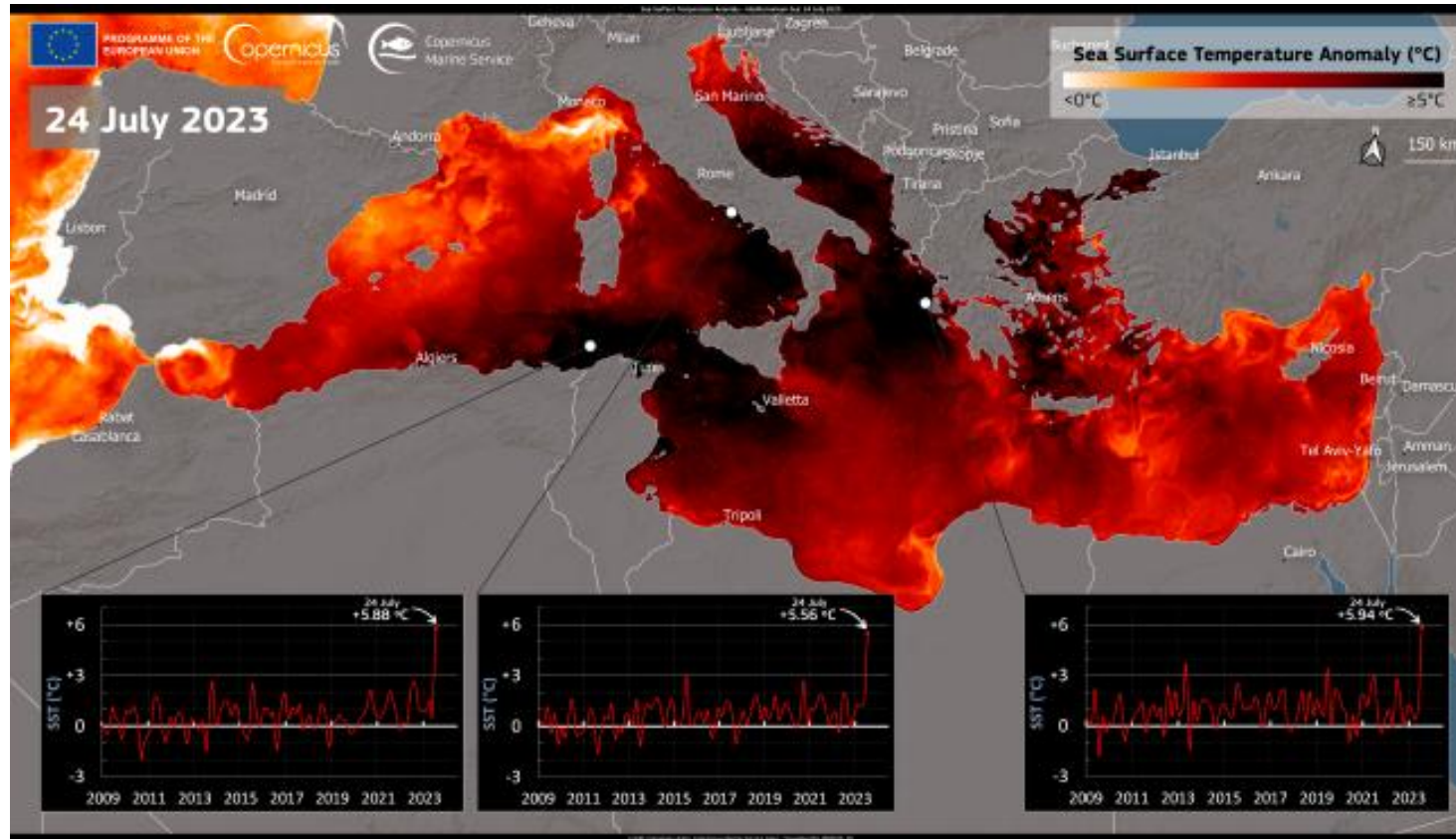


Chunxue Yang

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



Extreme Ocean Warming

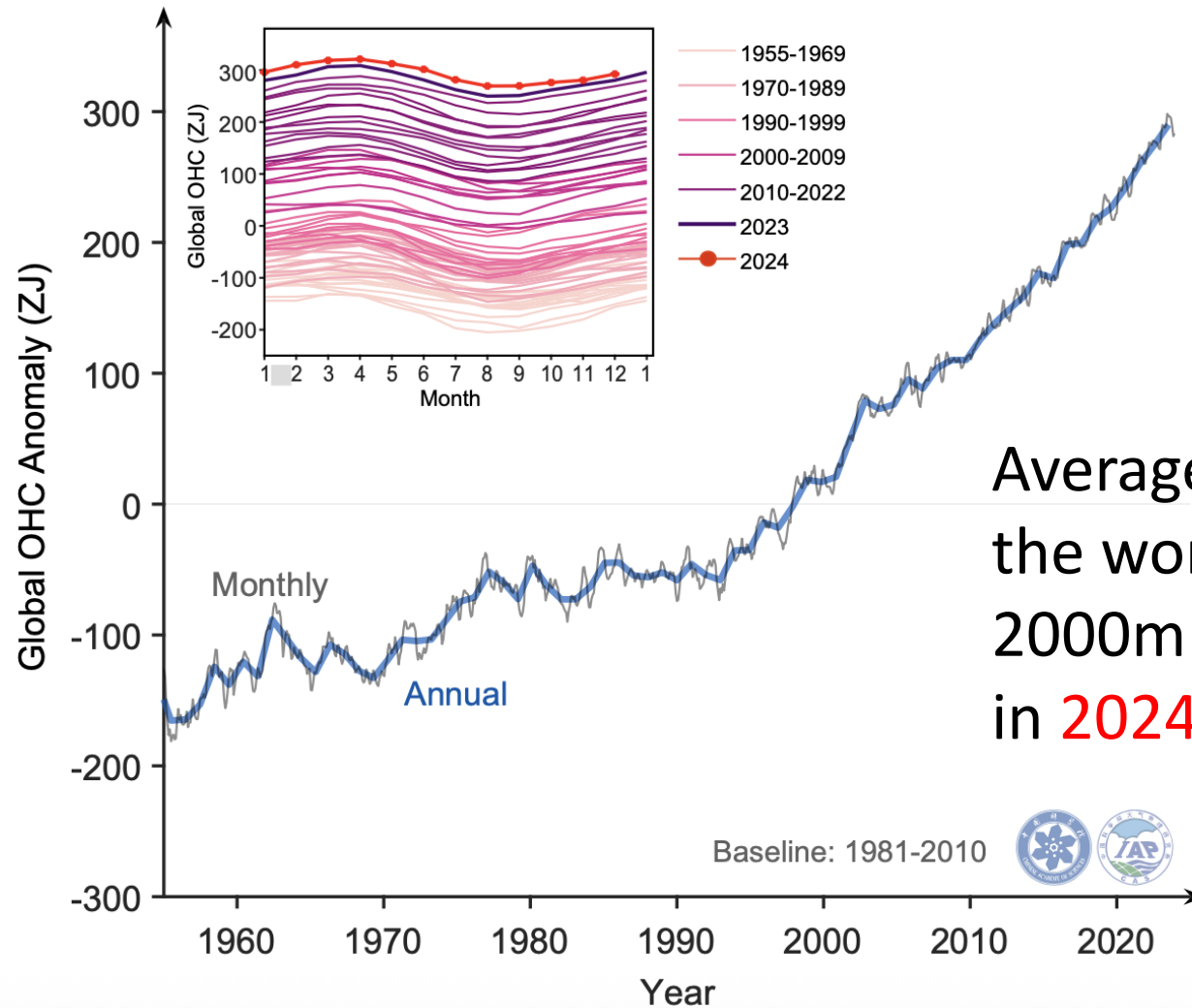


- In **2023**, the marine heat wave last Over a month in Alboran Sea
- **+5.5 °C** increase of sea surface temperature along the coastlines of Italy, Greece, and North Africa



Extreme Ocean Warming

Global ocean heat content (OHC) change (IAP/CAS)



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

Cheng et al., 2025



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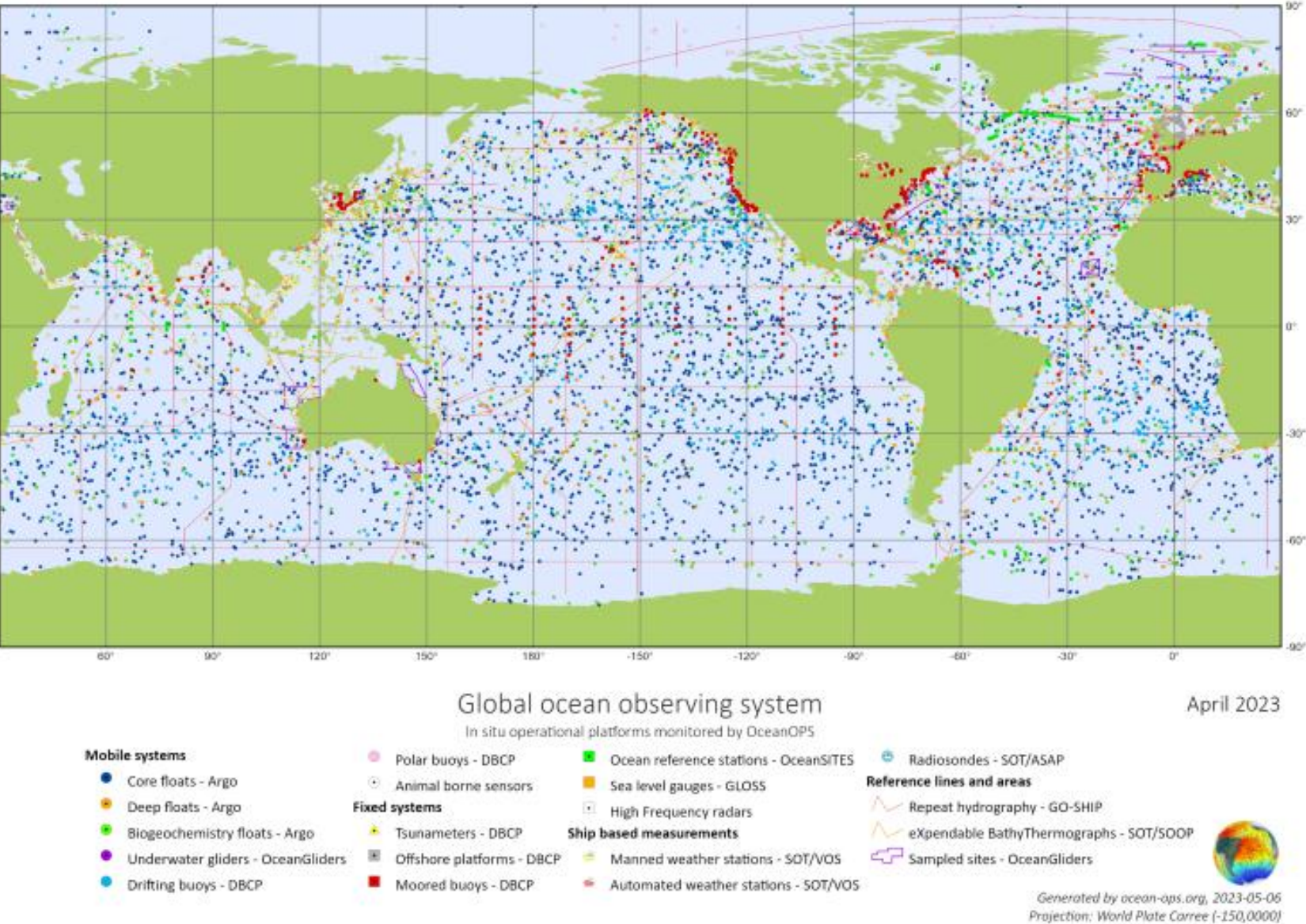
Observations



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



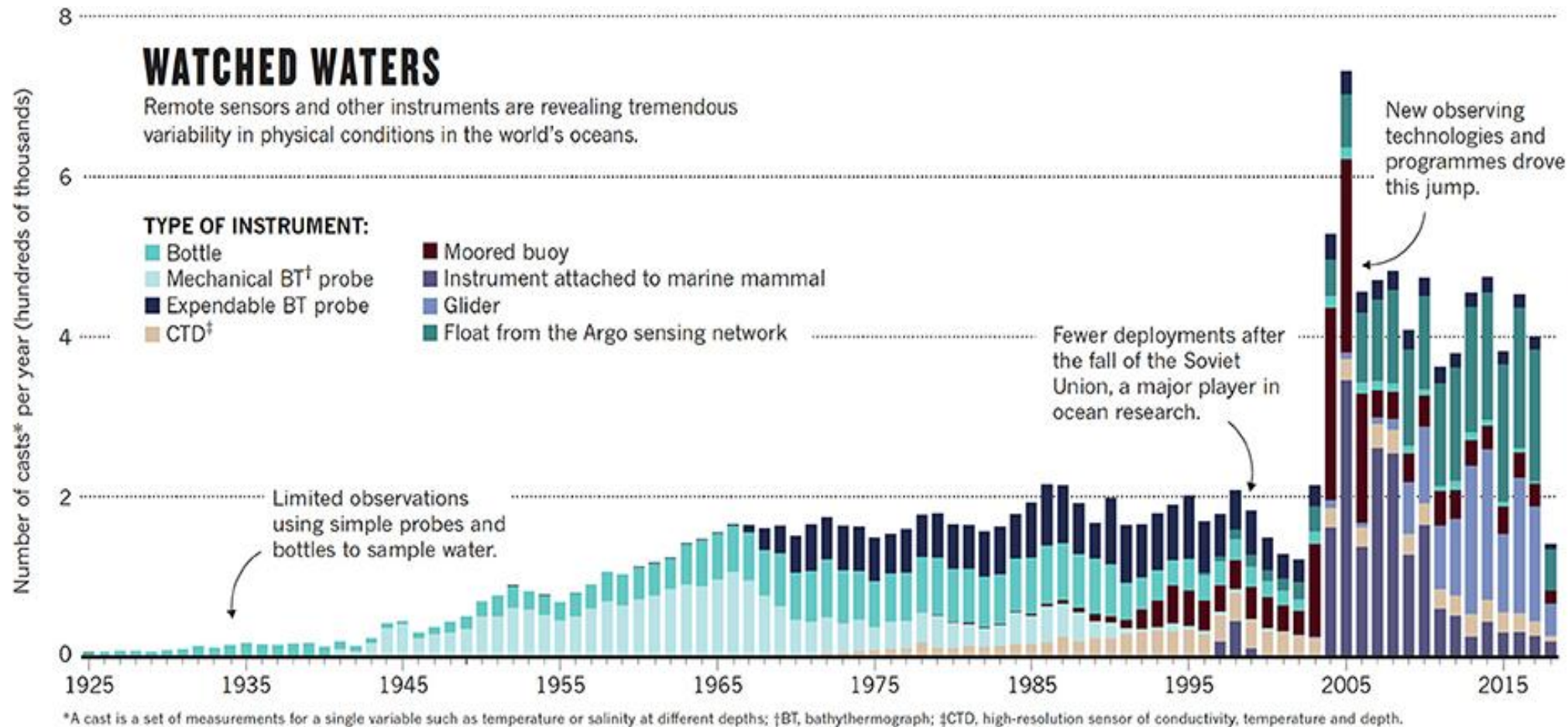
Observations



<https://gcos.wmo.int/site/global-climate-observing-system-gcos/networks/oopc-situ>



Observations



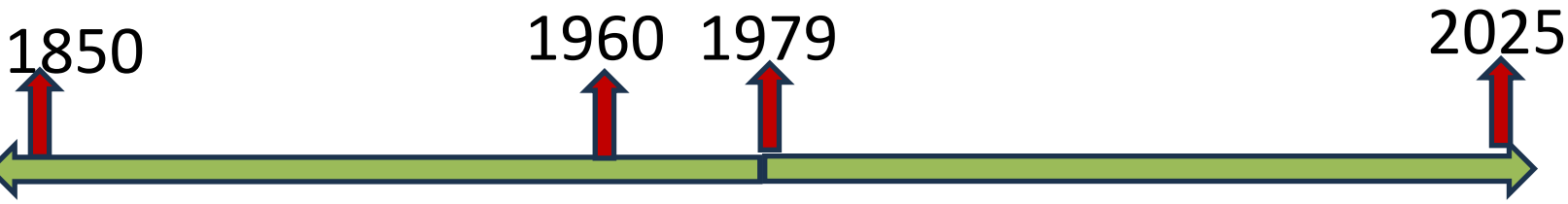
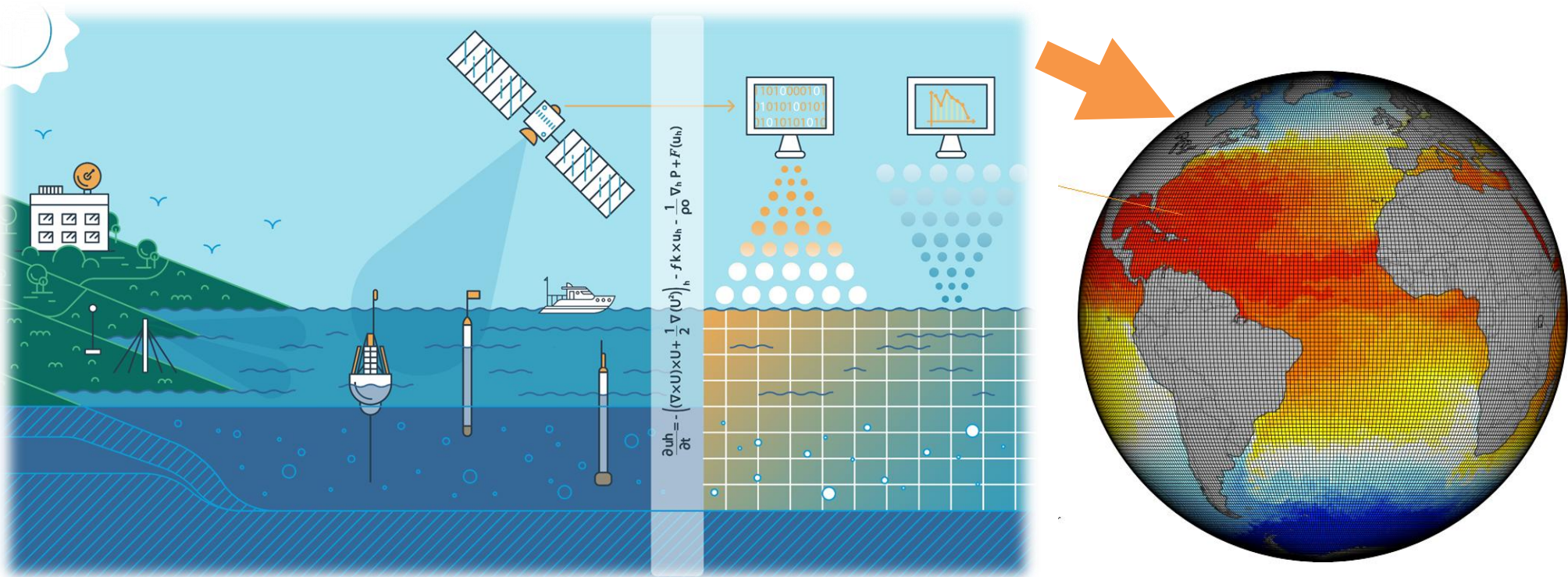
Bates et al., 2018



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Ocean Reanalyses

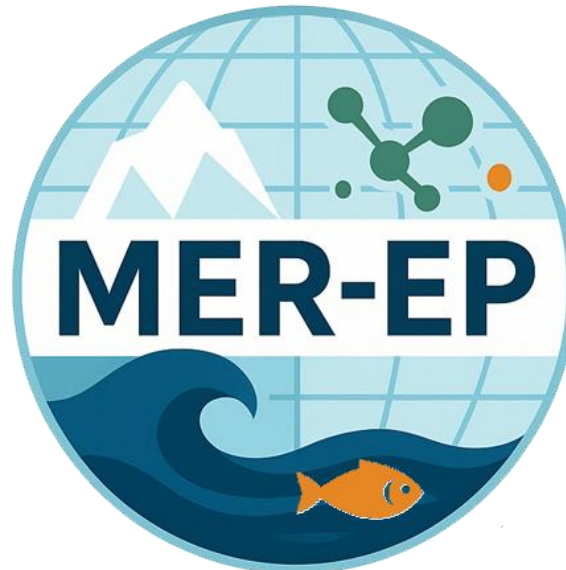


Quality of ocean reanalyses

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



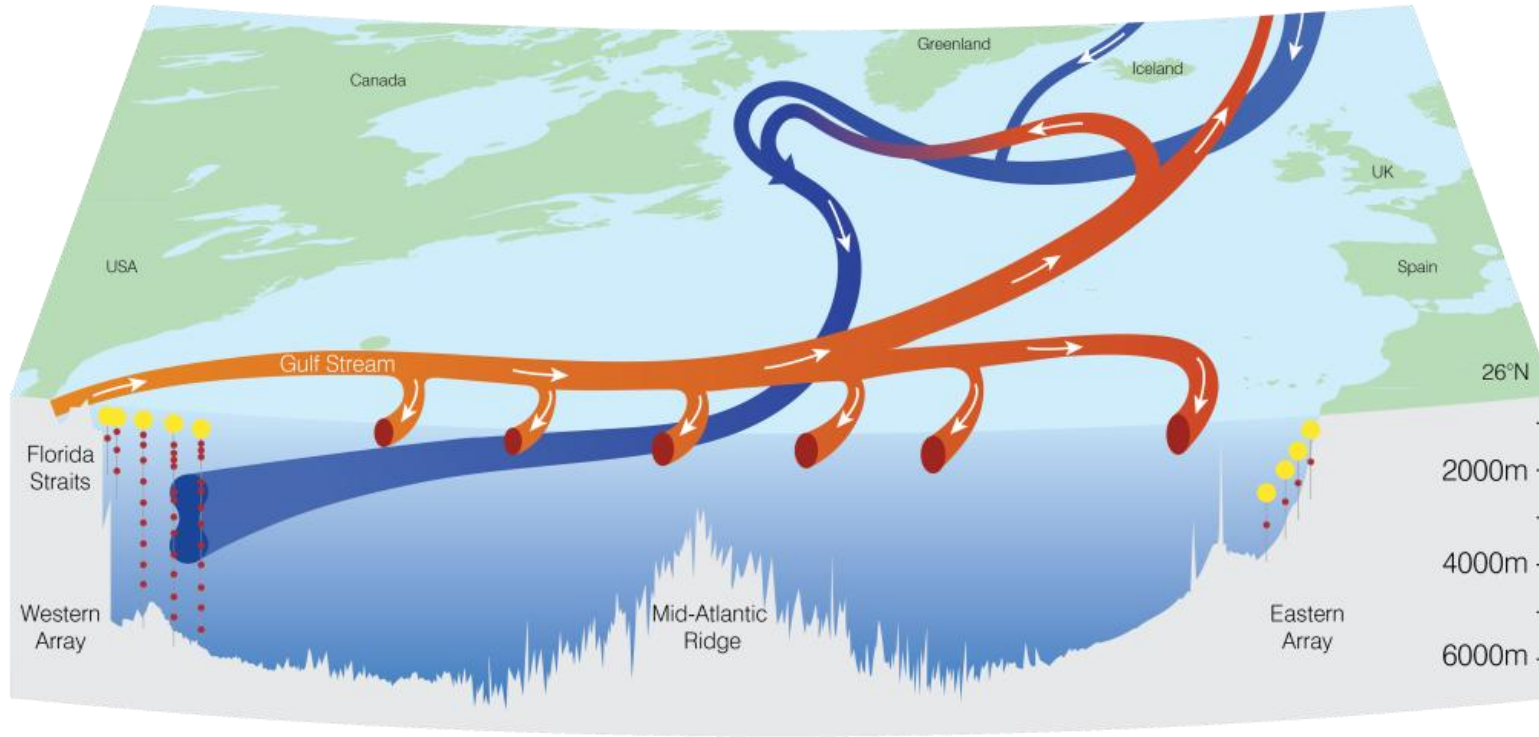
Evaluation of ocean reanalyses



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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!

