



# Ocean Heat Content

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Importance of ocean heat content

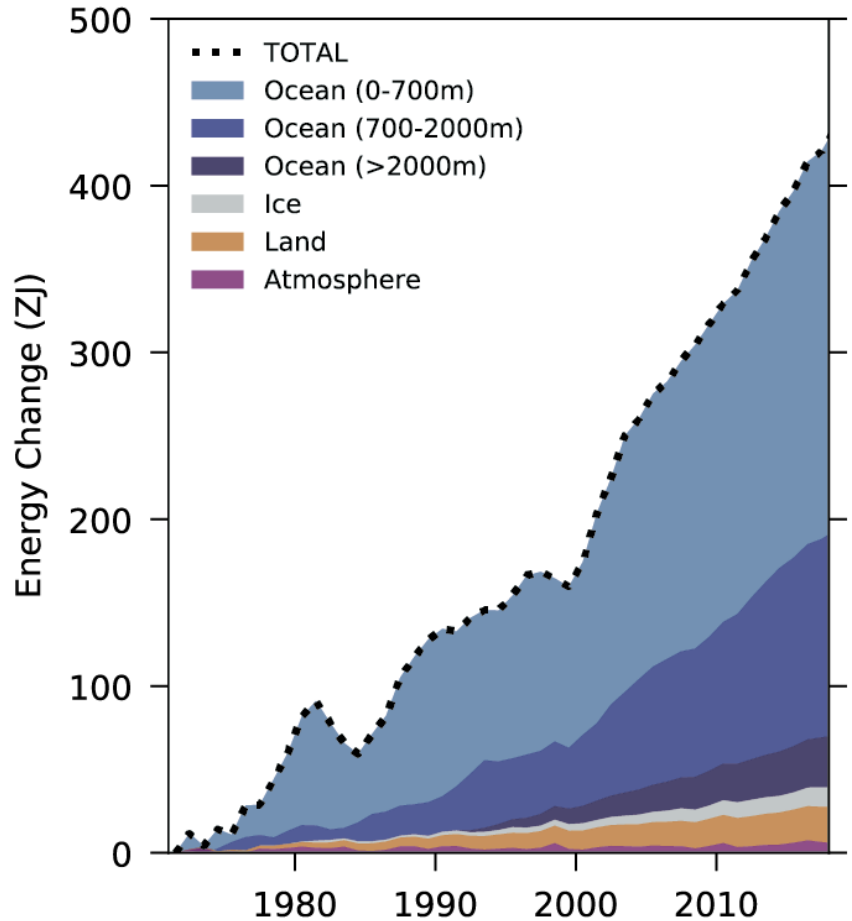
Improvements in measurement

New developments

Future challenges

# Importance

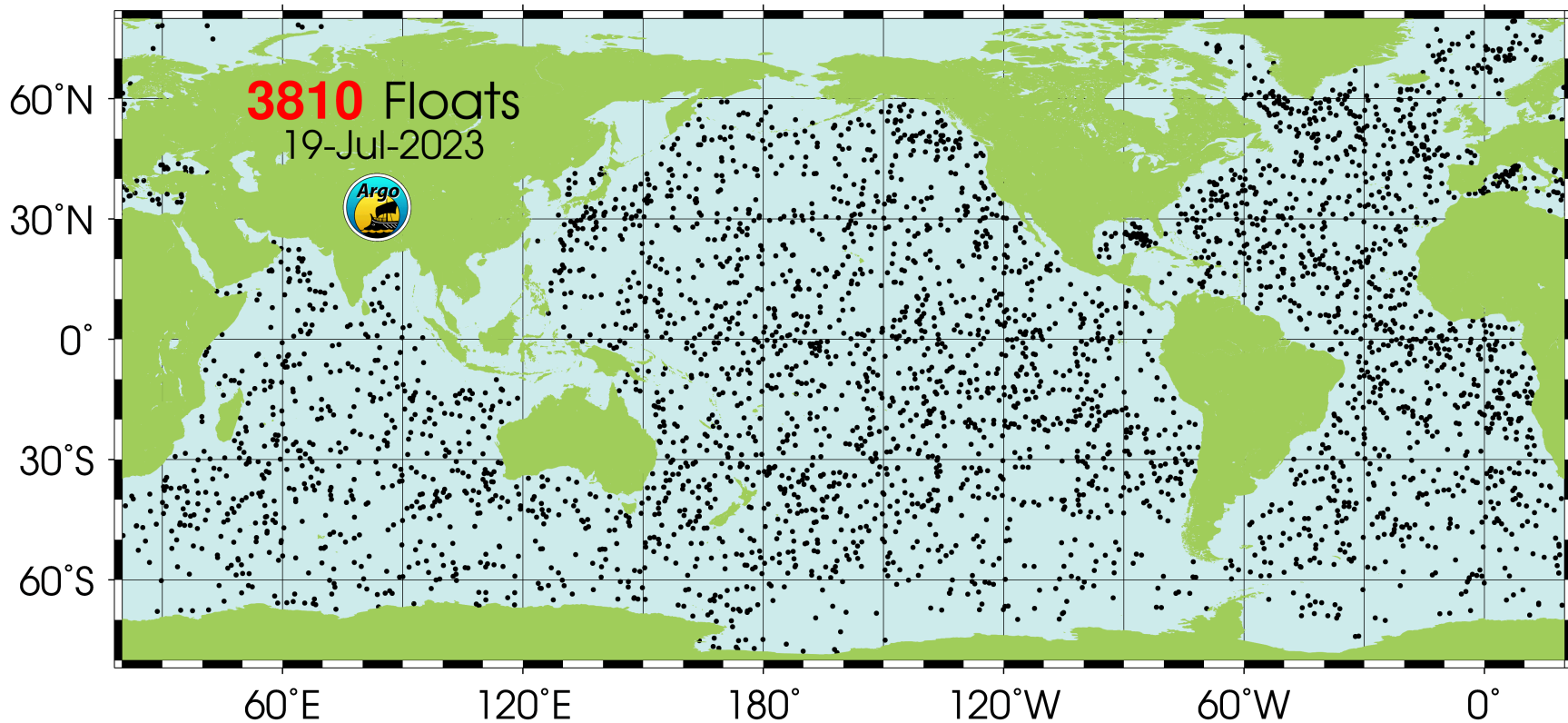
- ~90% of global warming
- ~40% of sea level rise
- Melts ice sheets
- Feeds marine heatwaves
- Increases stratification
- Energizes the atmosphere



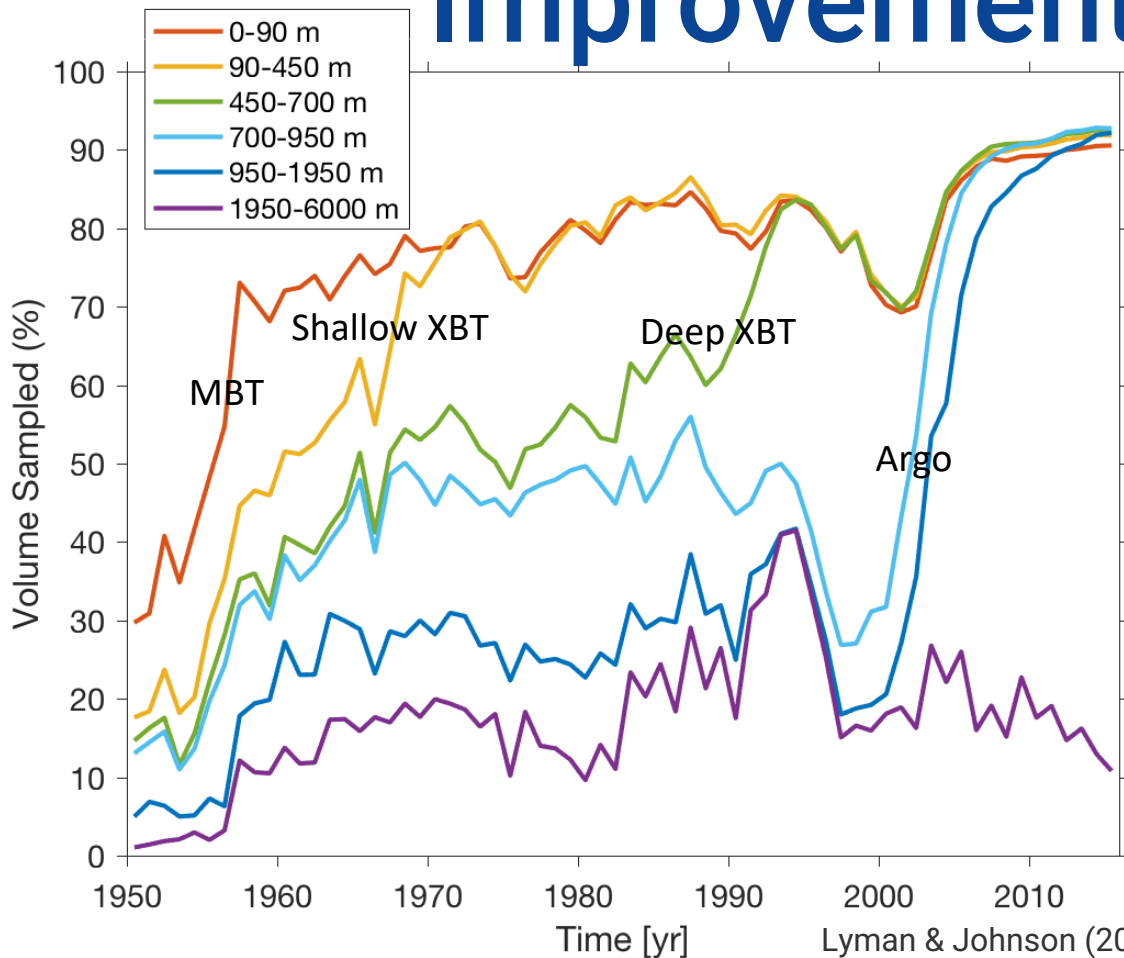
IPCC WG1 AR6



# Improvements



# Improvements

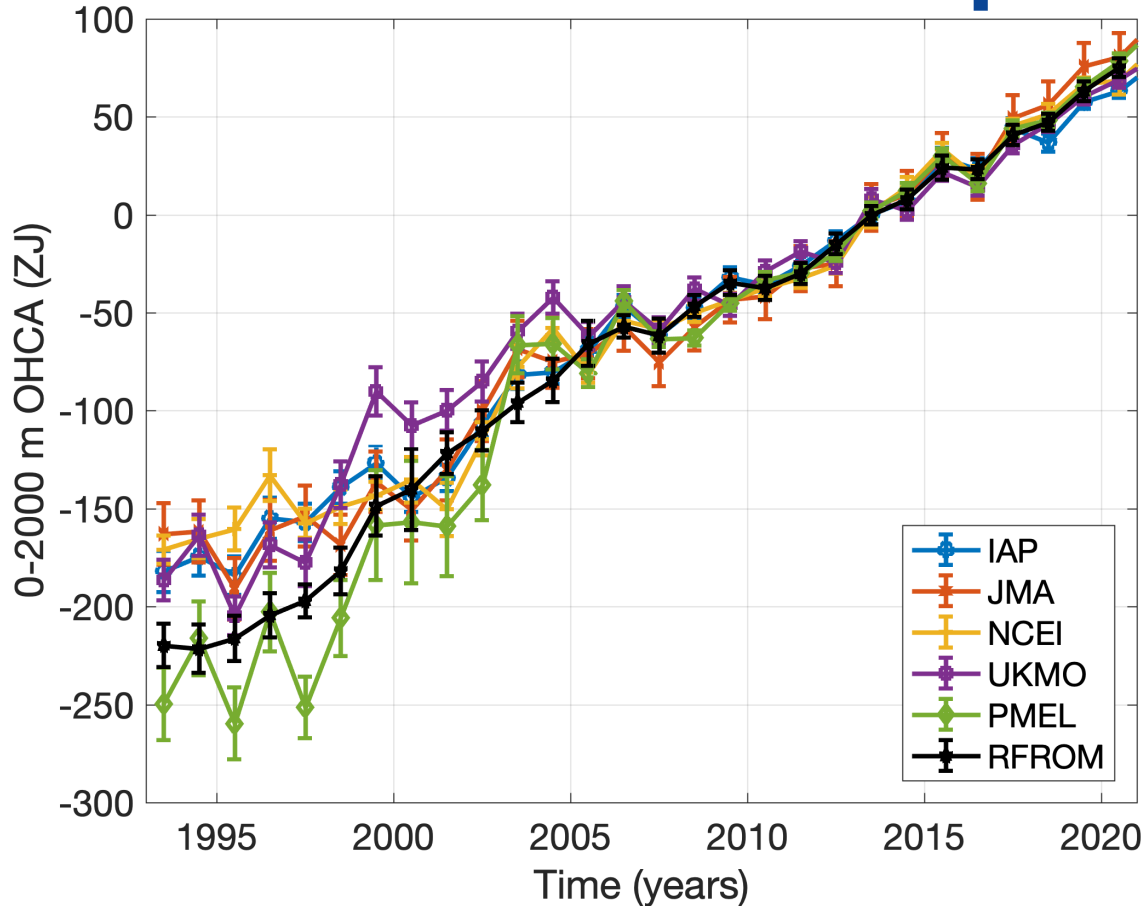


- IGY -> MBT & full depth
- IDOE -> Shallow XBT
- WOCE -> Deep XBT & full depth
- **Argo (< 2 km) & GO-SHIP (full depth)**
- Accuracy as well as coverage
- Deep Argo next?

Lyman & Johnson (2014) updated

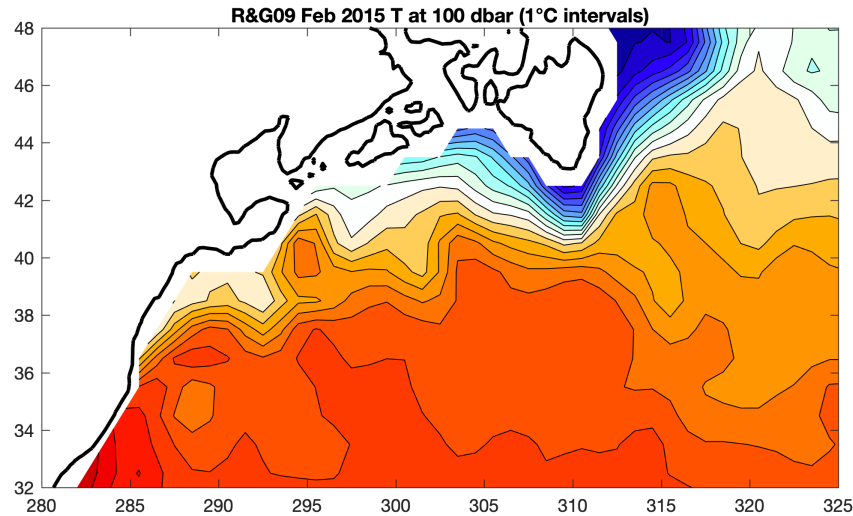


# New Developments

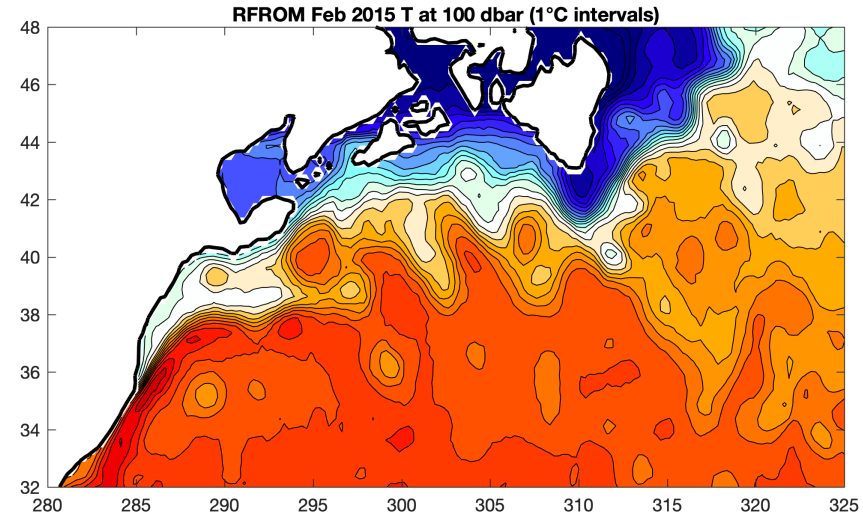


- 5 group estimates of 0-2000 m OHCA from in situ data
- RFROM: Predicts OHCA from satellite SSH and SST trained with situ data by machine learning
- RFROM variance of first differences is 0.09 to 0.40 of in situ only estimates

# New Developments



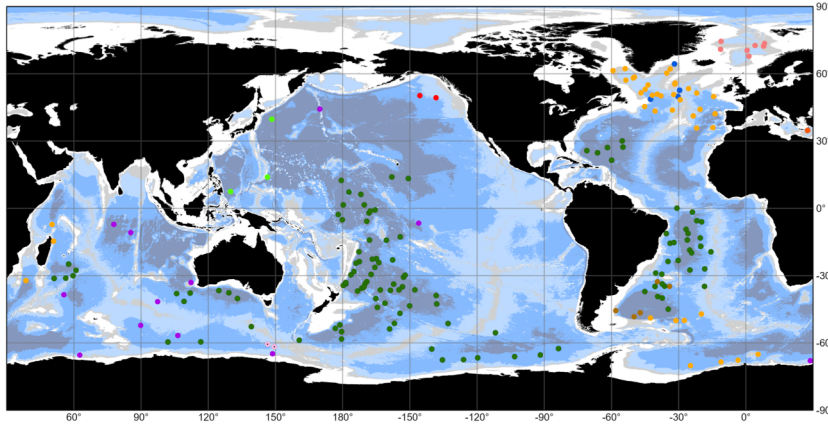
Roemmich & Gilson (2009)



Lyman & Johnson (2023)

- Feb. 2015 T @ 100 dbar: Scripps Argo Clim. (left) and RFROM (right)
- Gulf Stream warm core and cold wall resolved
- Eddies resolved (to the degree done by SSH maps)
- RFROM maps reach the coast

# New Developments



Deep Argo

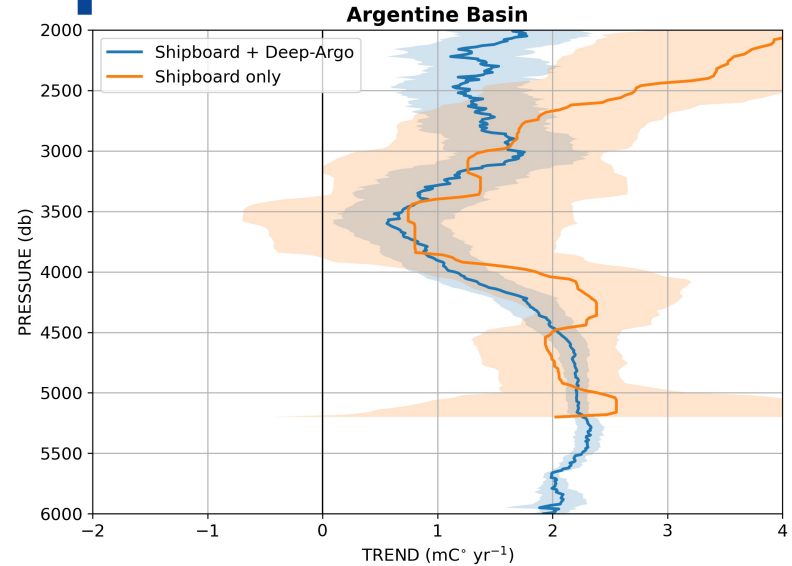
National contributions: 191 Operational Floats

June 2023

Latest location of operational floats (data distributed within the last 30 days)



Generated by ocean-ops.org, 2023-07-01  
Projection: Plate Carree (-150,0000)



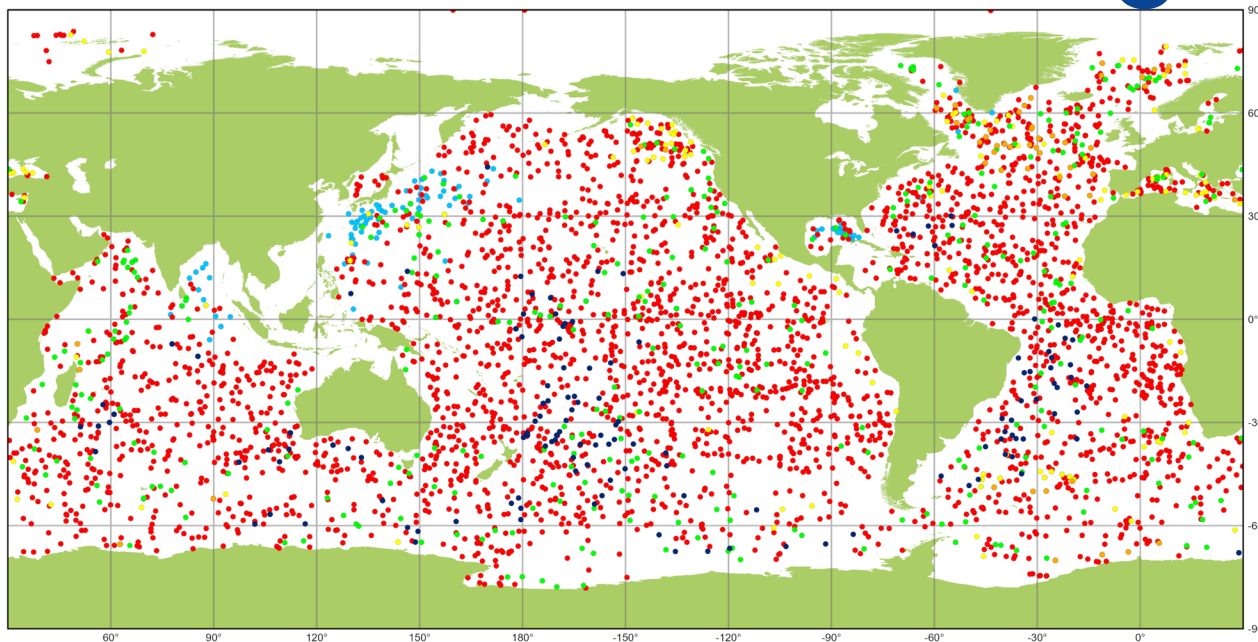
Zilberman et al. (submitted)

- Warming of the ocean for  $z > 2000$  m estimated at 5-15% of total
- Strongest signal in Antarctic Bottom Water
- Deep Argo data reducing uncertainties by an order of magnitude
- Limited to deep basins with regional pilot arrays



# Future Challenges

- Maintain Core Argo
- Build up Deep Argo
- Increase high latitude, marginal sea, and shelf/slope sampling



Argo

Networks  
3849 operational units

June 2023

- Deep (TSO only) (55)
- Deep (190)
- BioGeoChemical (without TSO only) (355)
- Core + 02 (TSO) (137)
- Core (3059)
- Equivalent (156)



Generated by ocean-ops.org, 2023-07-01  
Projection: Plate Carree (-150,0000)

