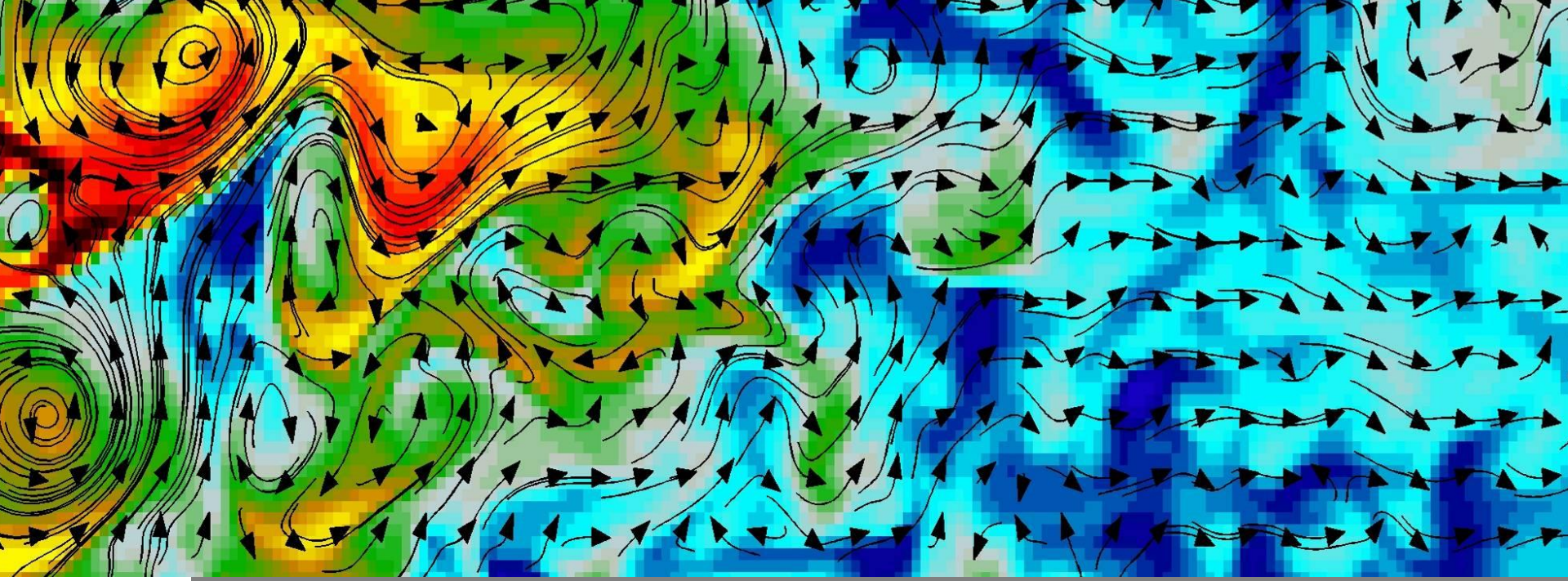


Using Argo data for ocean reanalysis: some pitfalls to avoid

Peter Oke, CSIRO

Outline

- Some subtleties of Argo data
- Argo at high latitudes
- Update on BRAN2020
- Demonstration of how RT data can degrade a reanalysis

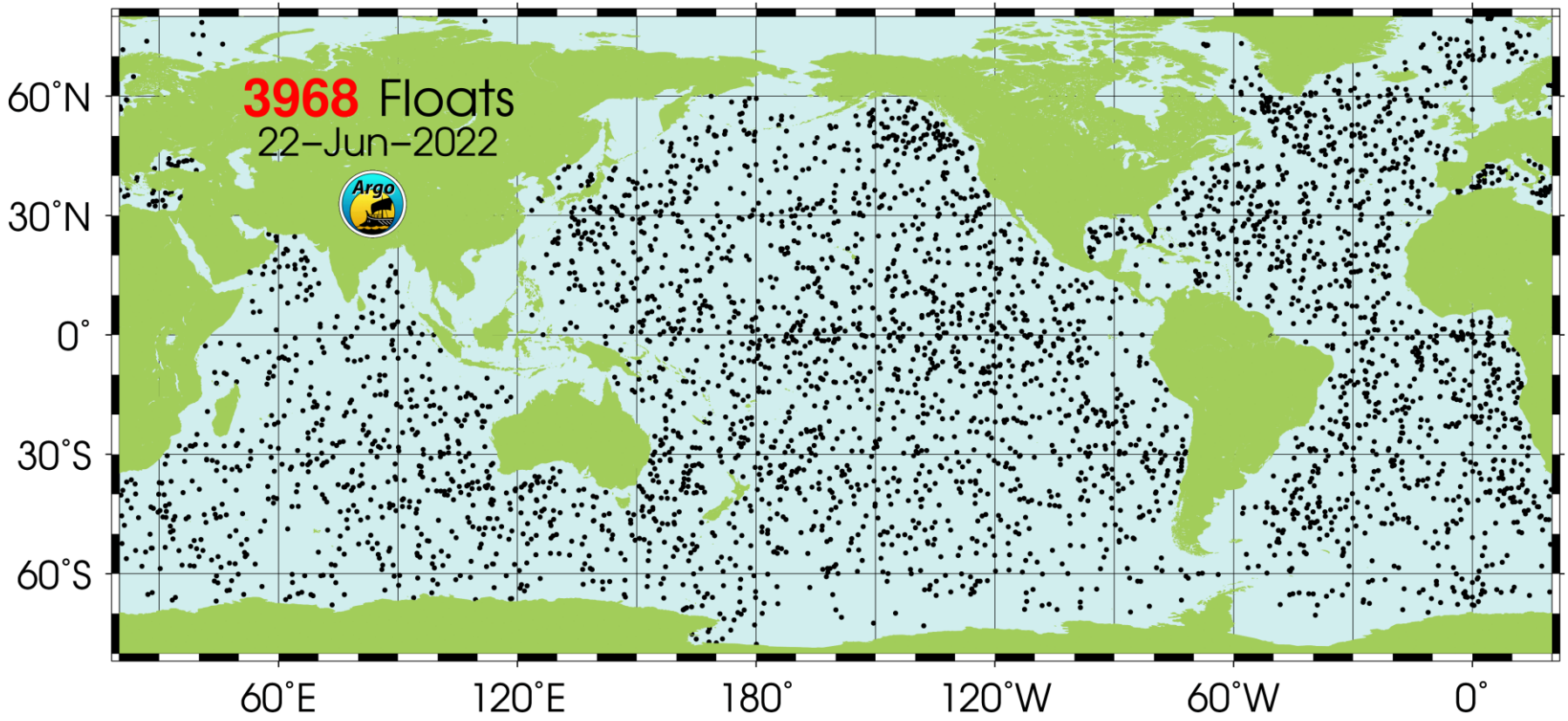
www.cmar.csiro.au/staff/oke/

Argo data is important for us

- Argo data is our main source of sub-surface ocean observations
- Argo floats operate for about 5 years

  … we're always 5 years away from extinction
- The current Argo array is degrading in some places (eg Indian Ocean)

  … keep an eye on it, and consider the implications



Argo data sources

- The Argo community maintains two Global Data Acquisition Centres (GDACs) – US GODAE and CORIOLIS.

Argo GDACs should really be your source of Argo data!

- There are community datasets that make it easier to access Argo data, but they don't update Argo data as frequently as the Argo GDACs.

CORA – appears to be updated once per year

CORA 4.0 – April 2014

CORA 4.1 – April 2015

CORA 4.2 – April 2016

CORA 5.0 – April 2017

CORA 5.1 - ?

CORA 5.2 - ?

EN4 – appears to be u pdated on 10th and 20th of each month

- **ARGOA**
- **ARGOR**
- **ARGOD**

… just use "ARGOD" for reanalysis

Types of Argo data

- There are two types of Argo data files:
  - R-files … real-time data, with automatic quality control
  - D-files … delayed-model data, with manual quality control

- R-files are updated as data is received and automatically processed (including data for today)

- D-files are updated as historical data is reprocessed

  … new old data is reprocessed every day

  QC1 – data is good

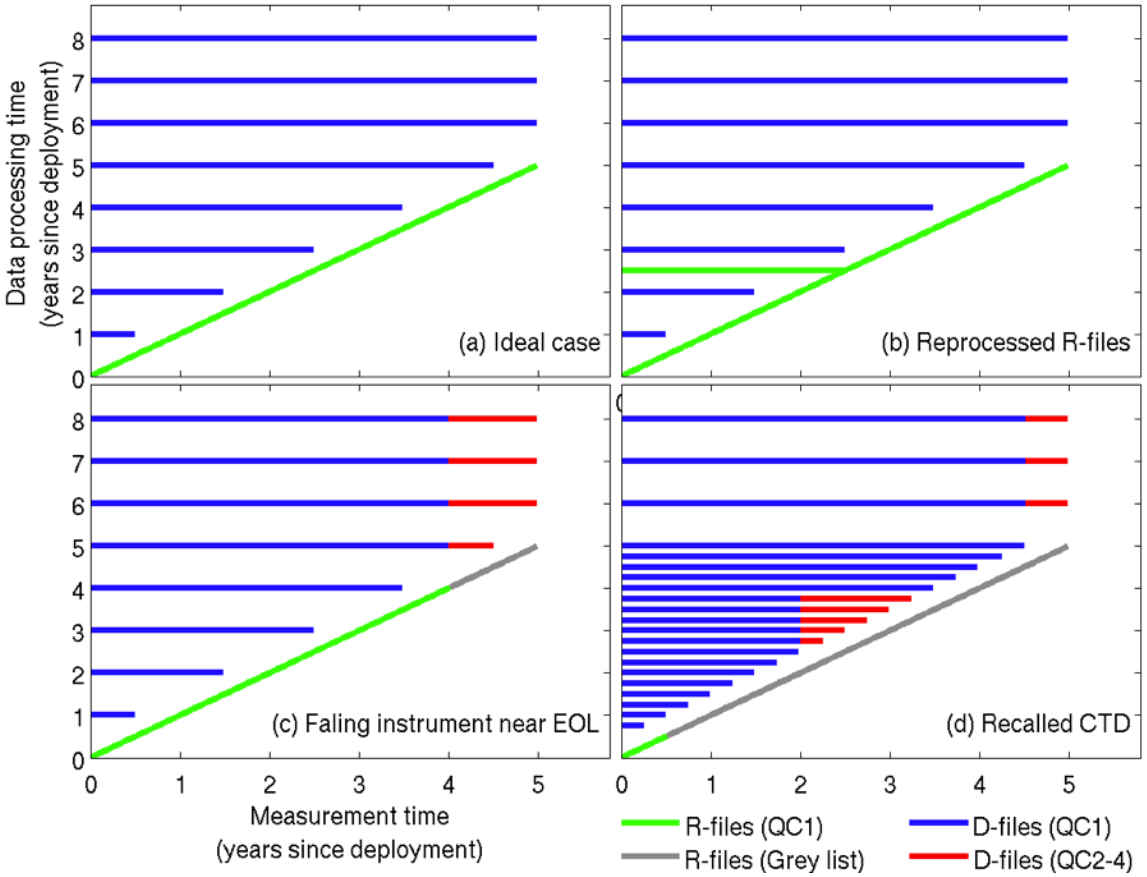
  QC2 – data is probably good

  QC3 – data is probably bad (but may be recoverable)

  QC4 – data is bad (unrecoverable)

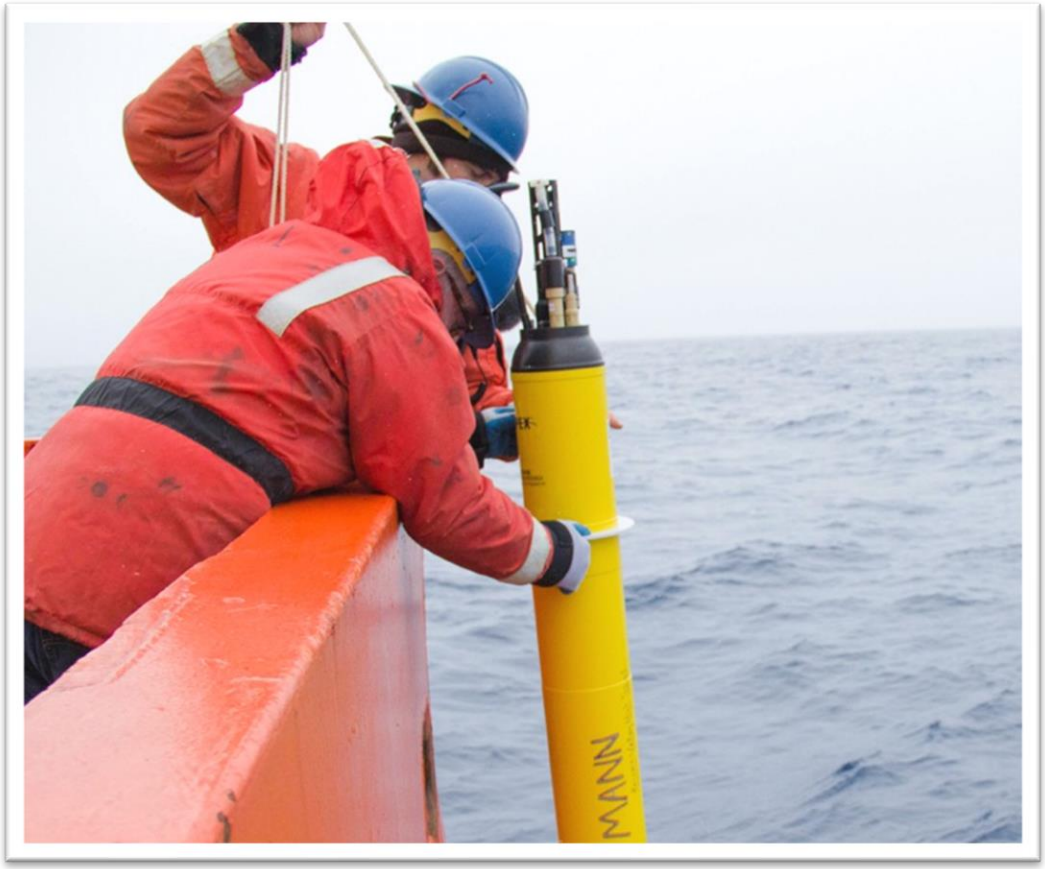
Argo Delayed-Model quality control

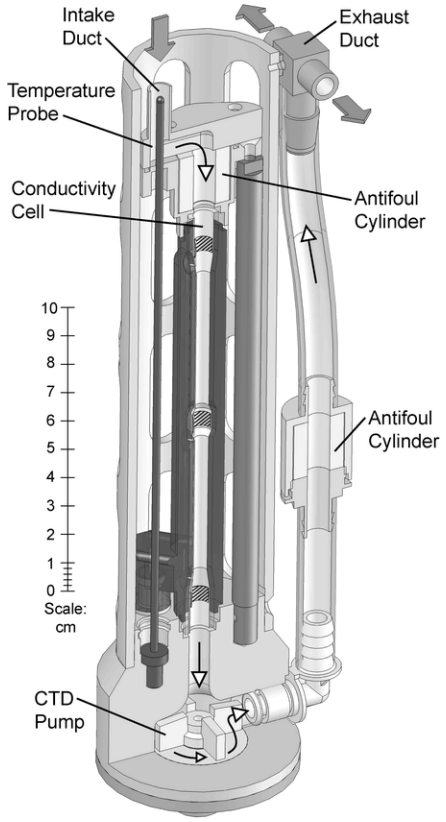
- If data is good, D-files are reprocessed every 12 months
- If data are suspect, D-files are reprocessed more often
- If you updated your data archive for reanalysis a year ago, you will miss the most recent manual check and correction



Argo Delayed-Model quality control

- Point-wise QC flagging
- Correction of salinity bias, if possible





Argo Delayed-Model quality control

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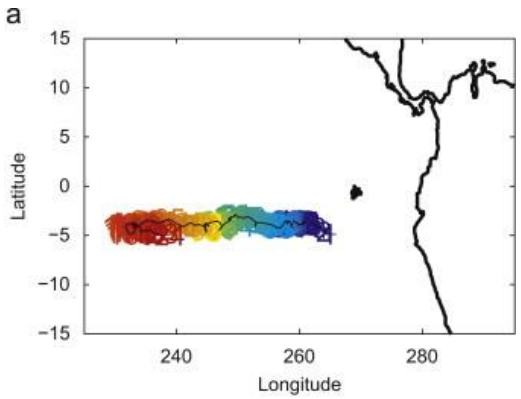
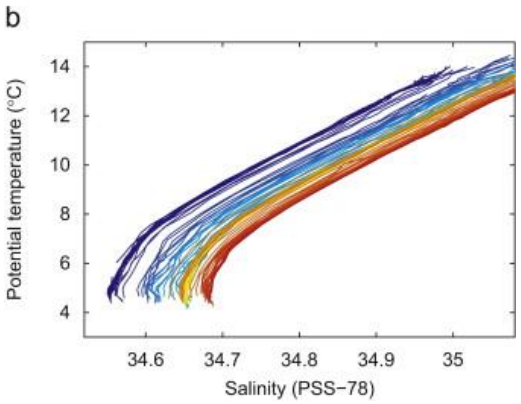
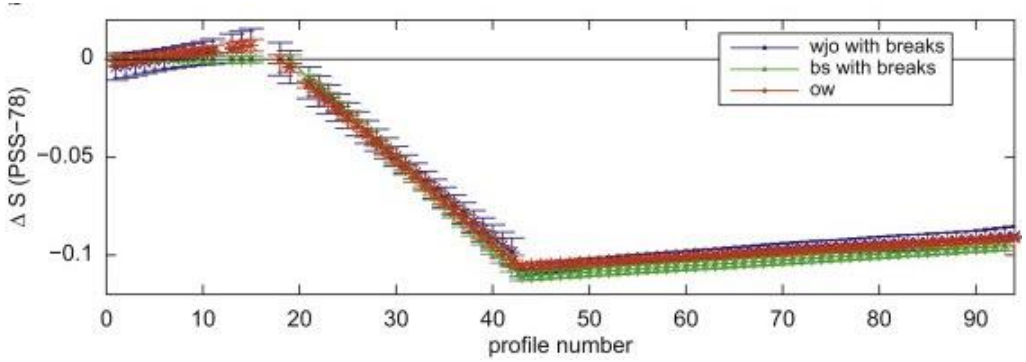
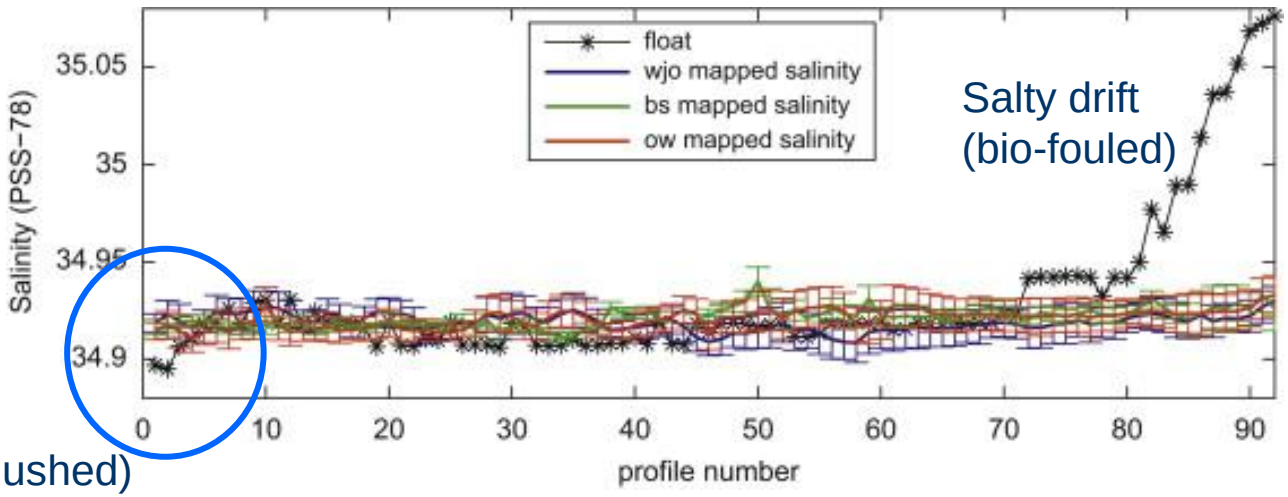


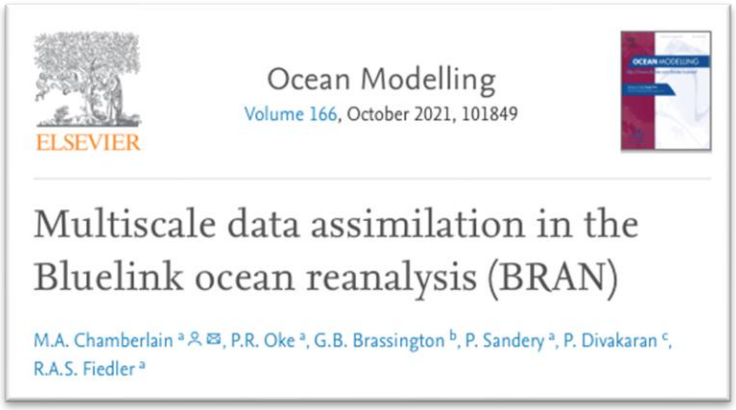






TBTO (CTD not flushed)

Multi-scale EnOI



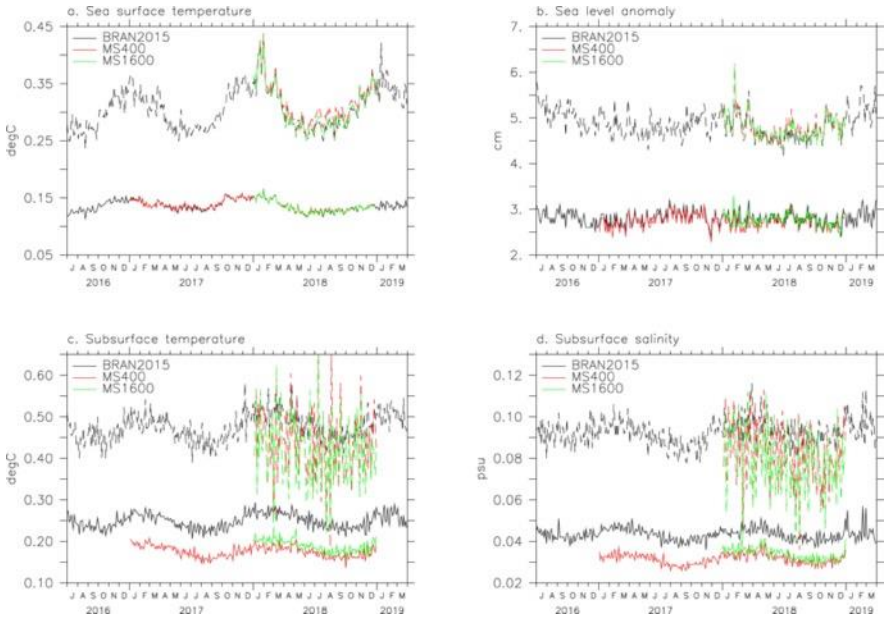
Multi-scale EnOI, with 2 ensembles

Broad-scale, 1^{o} model, 480 members, 1m-40y anoms

Mesoscale: 1/10^{o} model, 144 members, 3d-3m anoms

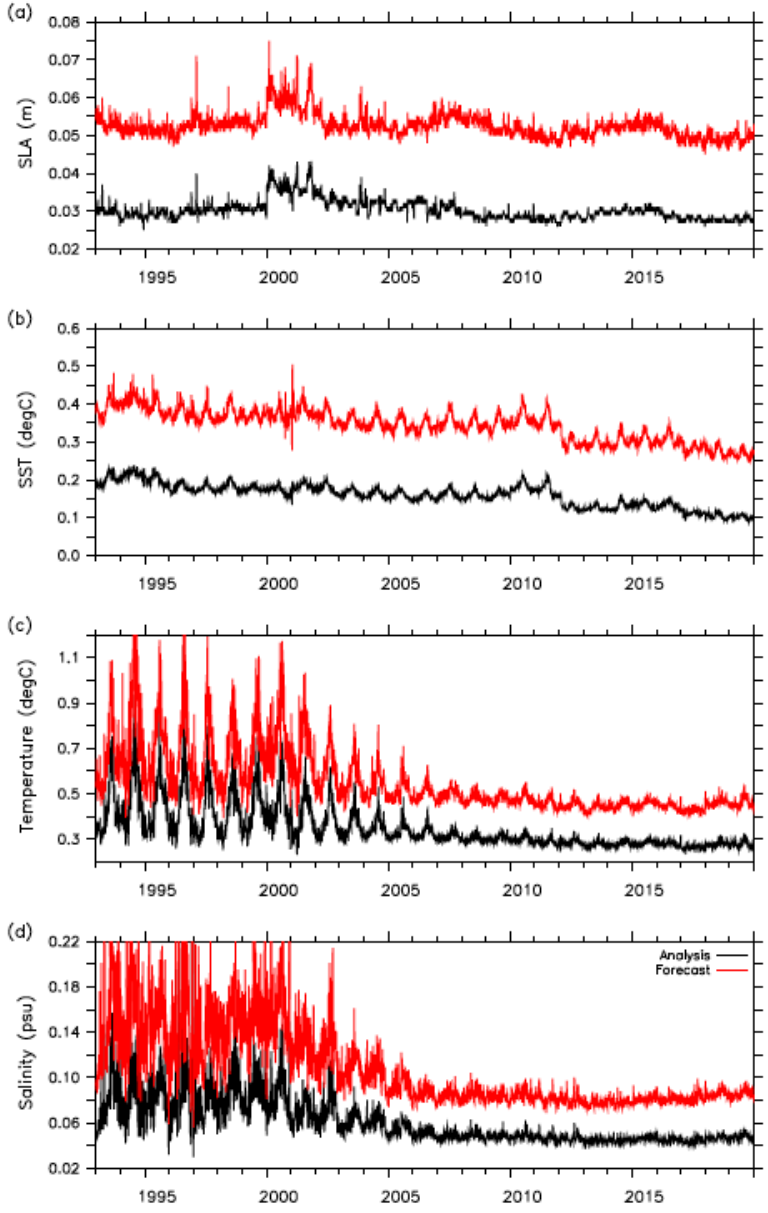
Two steps:

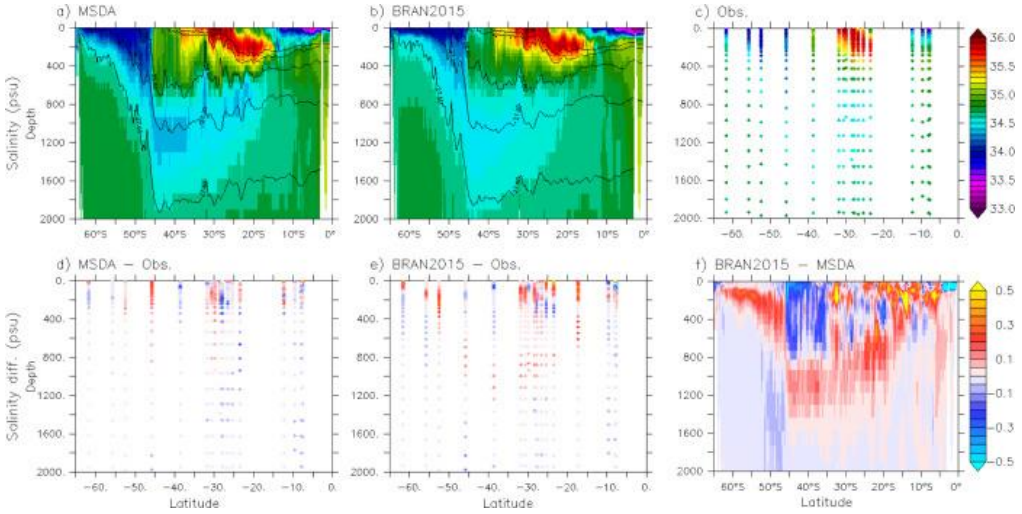
1. adjust broad-scales
2. Adjust mesoscales



	BRAN2015	MS400
Subsurface temp. (˚C)		
all	0.2512	**0.1744** (–30.6%)
<50 m	0.1821	**0.1597** (–12.3%)
50–500 m	0.2733	**0.1954** (–28.5%)
>500 m	0.2549	**0.1405** (–44.9%)
Subsurface sal. (psu)		
all	0.04324	**0.03185** (–26.3%)
<50 m	0.04259	**0.02898** (–32.0%)
50–500 m	0.04533	**0.03208** (–29.2%)
>500 m	0.03946	**0.03332** (–15.6%)

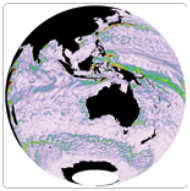
BRAN2020





Data description paper

07 Dec 2021



Next generation of Bluelink ocean reanalysis with multiscale data assimilation: BRAN2020

Matthew A. Chamberlain[1], Peter R. Oke[1], Russell A. S. Fiedler[1], Helen M. Beggs[2], Gary B. Brassington[3], and Prasanth Divakaran[2]

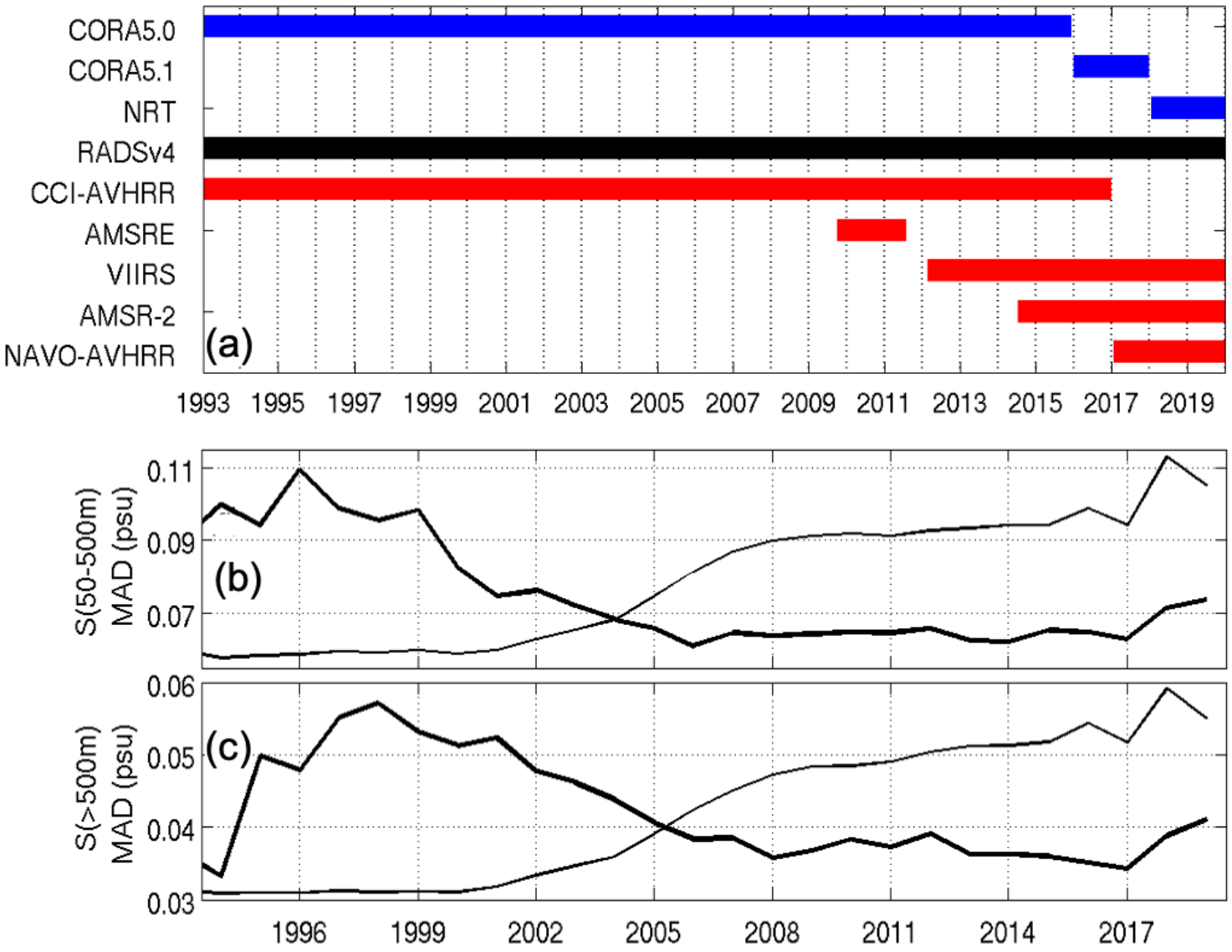
[1]CSIRO Oceans and Atmosphere, Hobart, TAS, Australia

[2]Bureau of Meteorology, Melbourne, VIC, Australia

[3]Bureau of Meteorology, Sydney, NSW, Australia

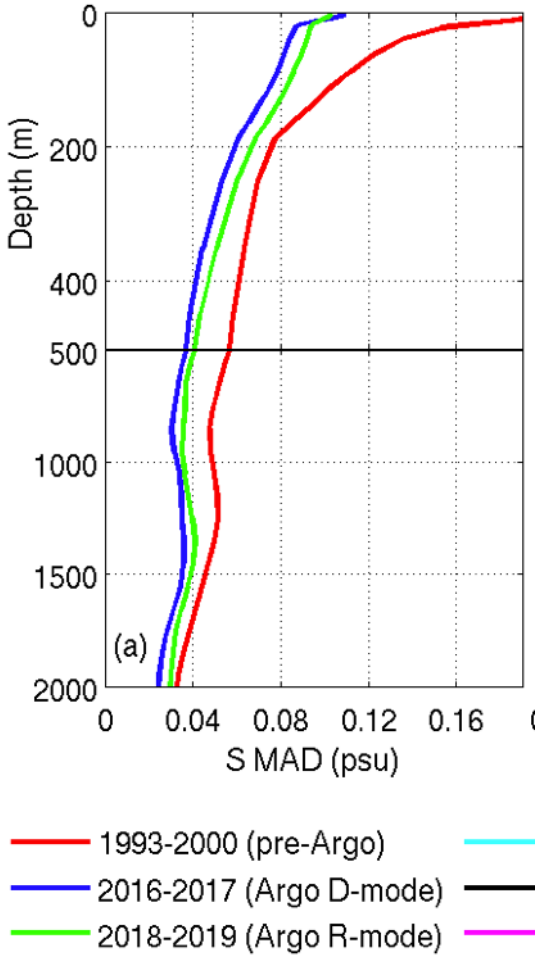
Correspondence: Matthew A. Chamberlain (matthew.chamberlain@csiro.au)

Impact of RT data



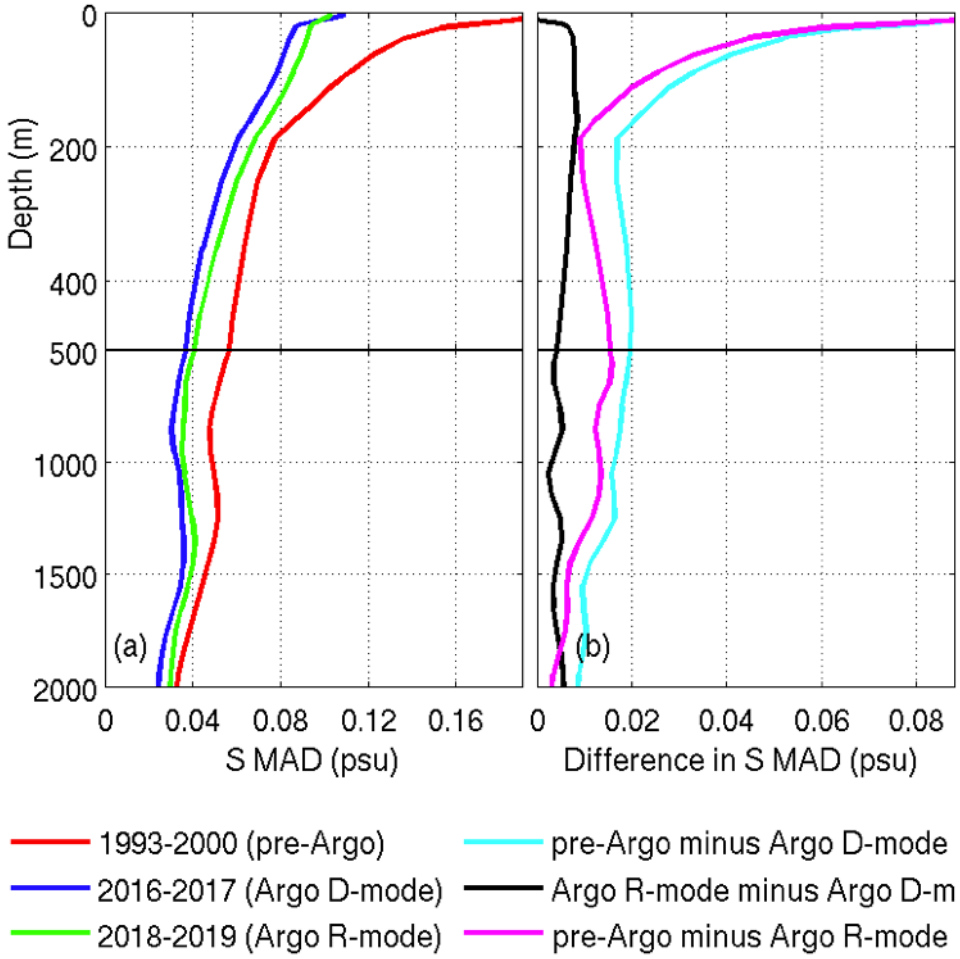
Impact of RT data

- Mean absolute differences (background innovations) for different times



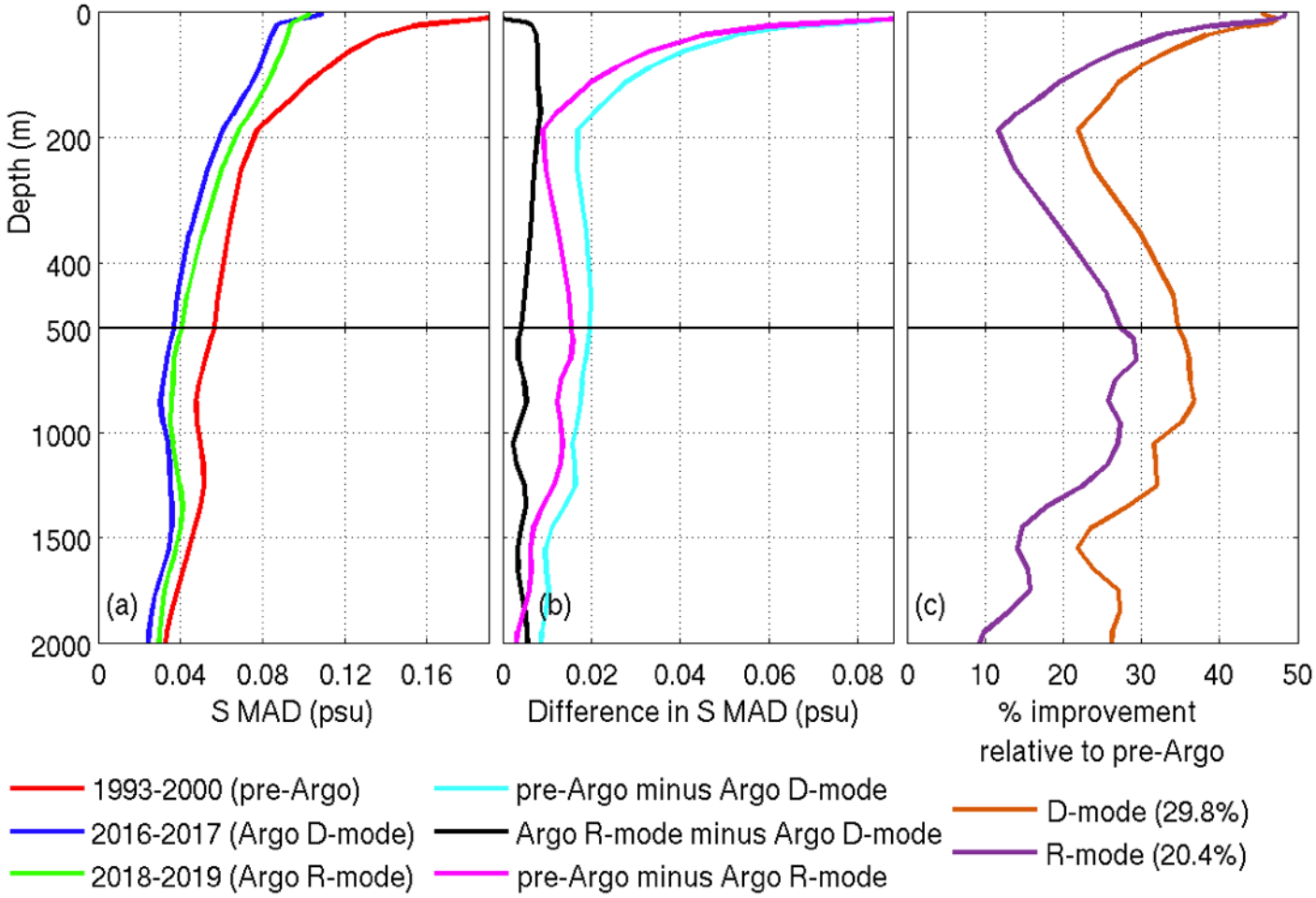
Impact of RT data

- BRAN improved when Argo data was assimilated
- BRAN degraded when we switched to RT data



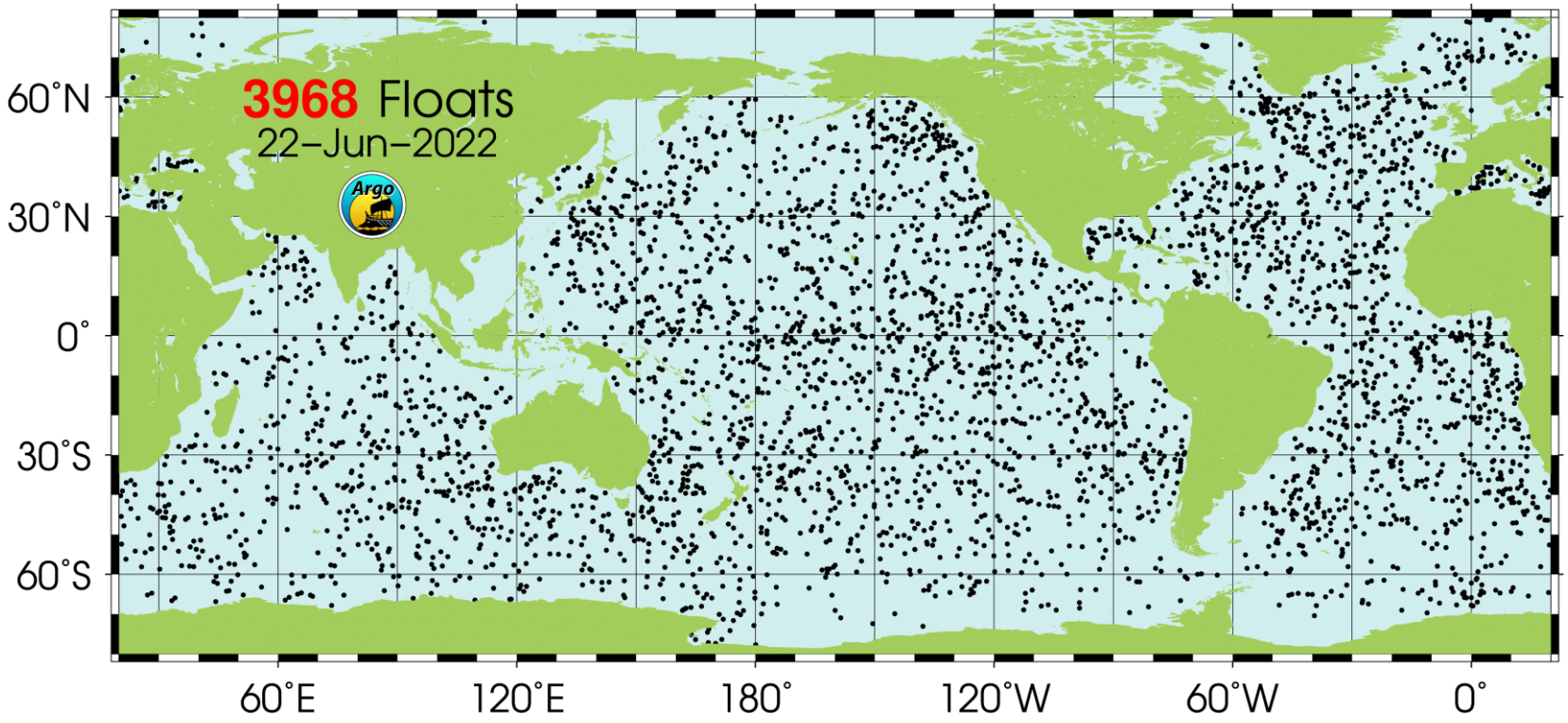
Impact of RT data

- We reduced errors by ~30% when we assimilate Argo data
- We lost one third of that gain by switching back to RT data



Key messages

- Only use delayed-mode data for reanalysis
- Argo D-files are updated every day … even for historical data
  … even for floats that are dead
- Access data from Argo GDACs directly
- Advocate for Argo … we're always 5 years away from extinction



Nice intercomparison study

ORIGINAL RESEARCH article

Front. Mar. Sci., 11 March 2022 | https://doi.org/10.3389/fmars.2022.837906

An Intercomparison of Global Reanalysis Products for Southern Africa's Major Oceanographic Features

Cristina Serena Russo[1*], Jennifer Veitch[1,2], Matthew Carr[1], Giles Fearon[2] and Christo Whittle[2,3]