

# A demonstration of why only delayed-mode Argo data should be used for ocean reanalysis

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Hey Argo Community, did you know ...

- Assumed observation errors for Argo data are often 50-500 times larger than the instrument error?
- But match instrument error for satellite SST & altimetry?
- Analysis mis-fits are often 100 times greater than instrument error?
- But are smaller than instrument error for satellite SST & altimetry?

Argo DMQC never stops – it's like the mail - it just keeps coming and coming and coming?

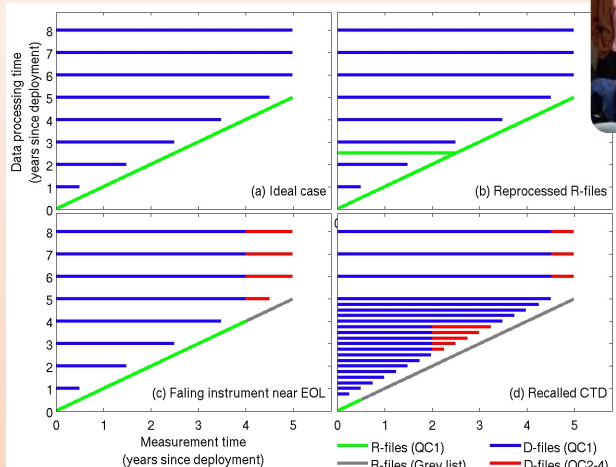


Figure 1: Schematic showing scenarios for Argo data processing, including (a) an ideal case; (b) R-profiles need reprocessing; (c) instrument fails near EOL; (d) CTD has been recalled by the manufacturer.

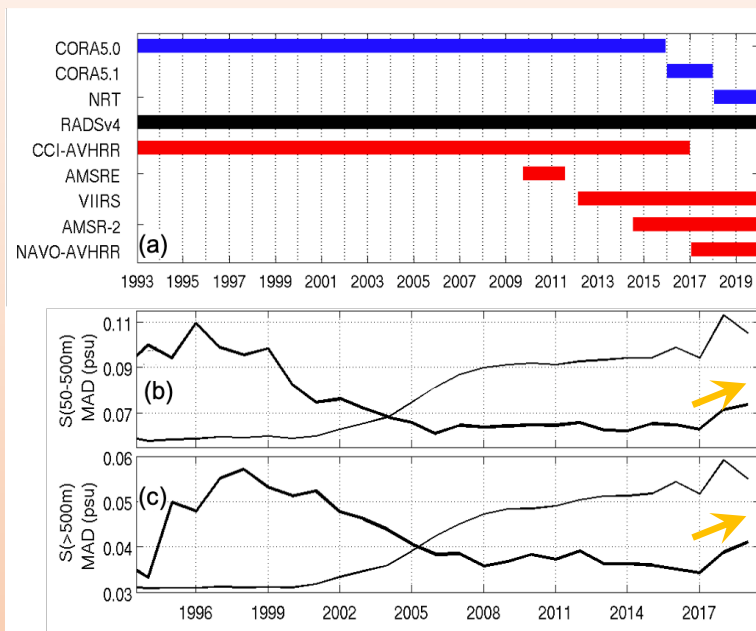


Figure 2: (left): Gantt chart showing what data is assimilated, from what source, and when.

Figure 3 (lower left): Globally-averaged profiles of the (a) the MAD for S; (b) change in MAD for different time-periods; and (c) % improvement, relative to pre-Argo. *manufacturer.*



Using archived data from the GTS could degrade your reanalysis by 1/3<sup>rd</sup> of the improvement gained by assimilating Argo

## BRAN2020

- BRAN2020 uses EnOI, updates every 3 days, assimilates altimetry, SST, and in situ TS (from CORA + GTS).
- Uses multi-scale assimilation to eliminate bias.
- Significant improvement over previous versions

	BRAN2020			BRAN2016		
	1990s	2000s	2010s	1990s	2000s	2010s
SST (°C)	0.19	0.17	0.13	0.23	0.22	0.16
SLA (cm)	3.0	3.2	2.9	3.3	3.4	3.1
Subsurface temperature (°C)						
(All depths)	0.44	0.35	0.28	0.50	0.46	0.39
(0-50 m)	0.50	0.39	0.29	0.47	0.35	0.29
(50-500 m)	0.43	0.37	0.32	0.52	0.53	0.45
(500+ m)	0.26	0.25	0.19	0.40	0.37	0.33
Subsurface salinity (psu)						
(All depths)	0.085	0.060	0.046	0.161	0.090	0.071
(0-50 m)	0.122	0.086	0.059	0.198	0.103	0.072
(50-500 m)	0.069	0.053	0.047	0.132	0.092	0.075
(500+ m)	0.044	0.041	0.035	0.074	0.063	0.061

## Community databases

- Include observations from many different sources.
- Make life much easier for the data assimilation community
- But do they include the most up-to-date data?

CORA ... appears to be updated once per year

EN4 ... appears to be updated on 10<sup>th</sup> and 20<sup>th</sup> of each month

CORA 4.0 – April 2014

CORA 4.1 – April 2015

CORA 4.2 – April 2016

CORA 5.0 – April 2017

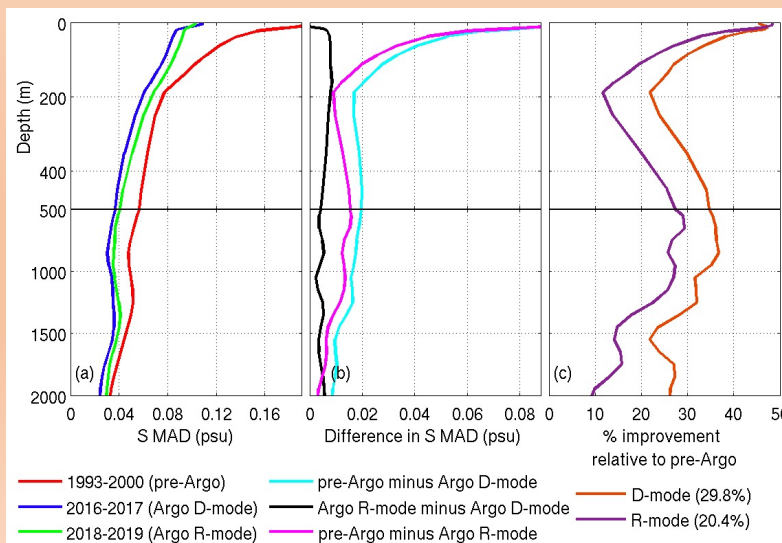
CORA 5.1 - ?

CORA 5.2 - ?

... just use "ARGOD" for reanalysis

What do you need to do to make sure you have the latest and greatest version of Argo data?

- Accessing data from the Argo GDACs
- Refresh your dataset continually, even for old data - it's constantly revisited and updated.



(a) 1993-2000 (pre-Argo) (b) pre-Argo minus Argo D-mode (c) D-mode (29.8%)

(d) 2016-2017 (Argo D-mode) (e) Argo R-mode minus Argo D-mode (f) R-mode (20.4%)

(g) 2018-2019 (Argo R-mode) (h) pre-Argo minus Argo R-mode