

Impact of Argo salinity drift on the ECMWF Ocean Reanalysis

Hao Zuo et al.

Argo sensor drift background

Credit to Megan Scanderbeg, UCSD

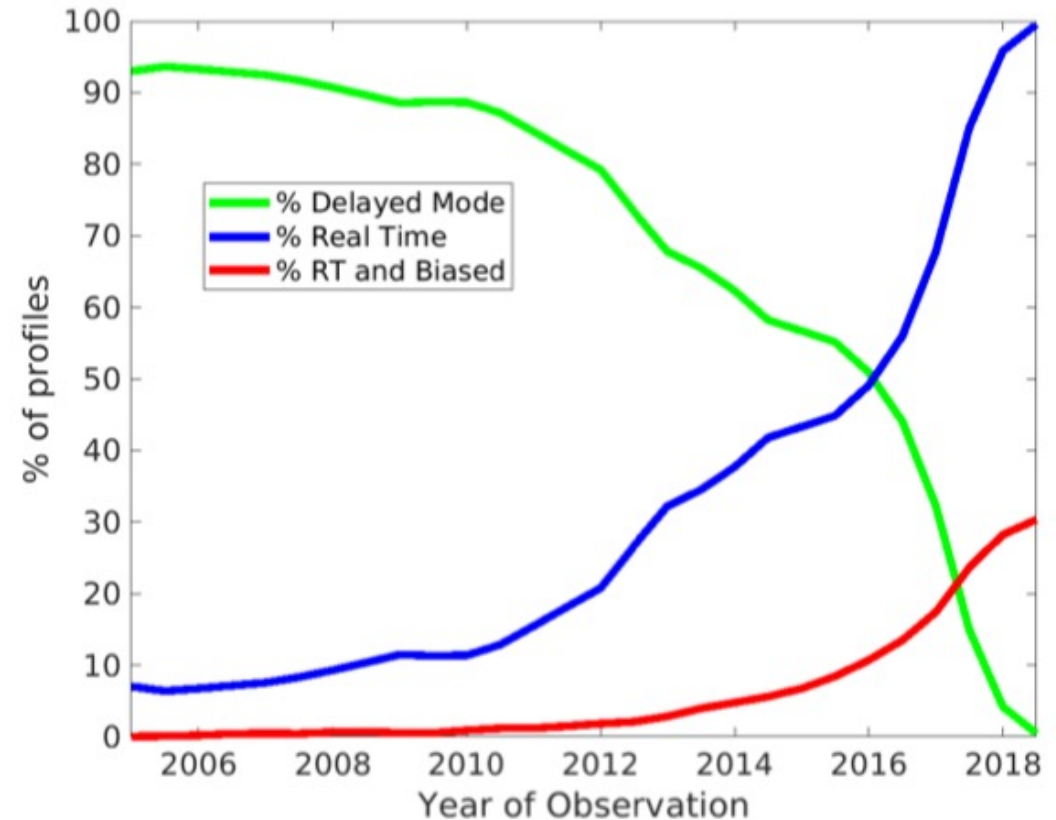
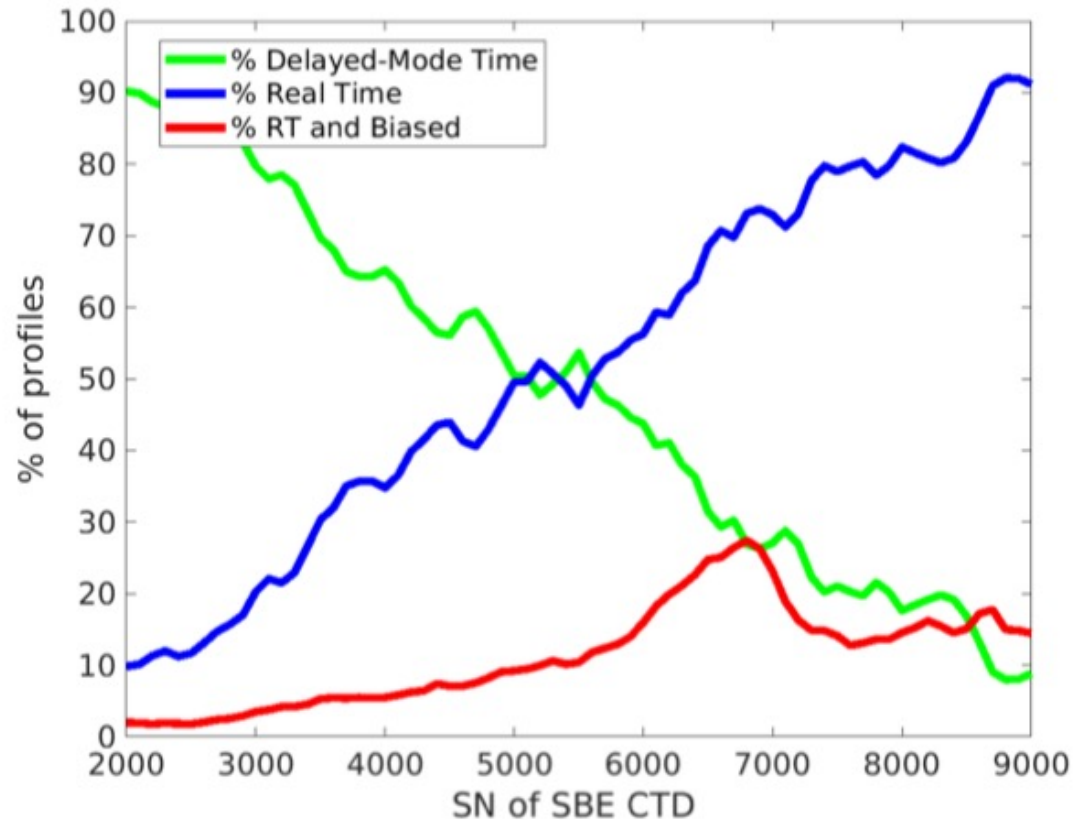


Figure 1: Percentage of Argo profiles by sensor serial number (SN) in different QC mode (red is biased).

Figure 2: Percentage of Argo profiles by year of observation with different QC mode (red is biased)

OCEAN5 system

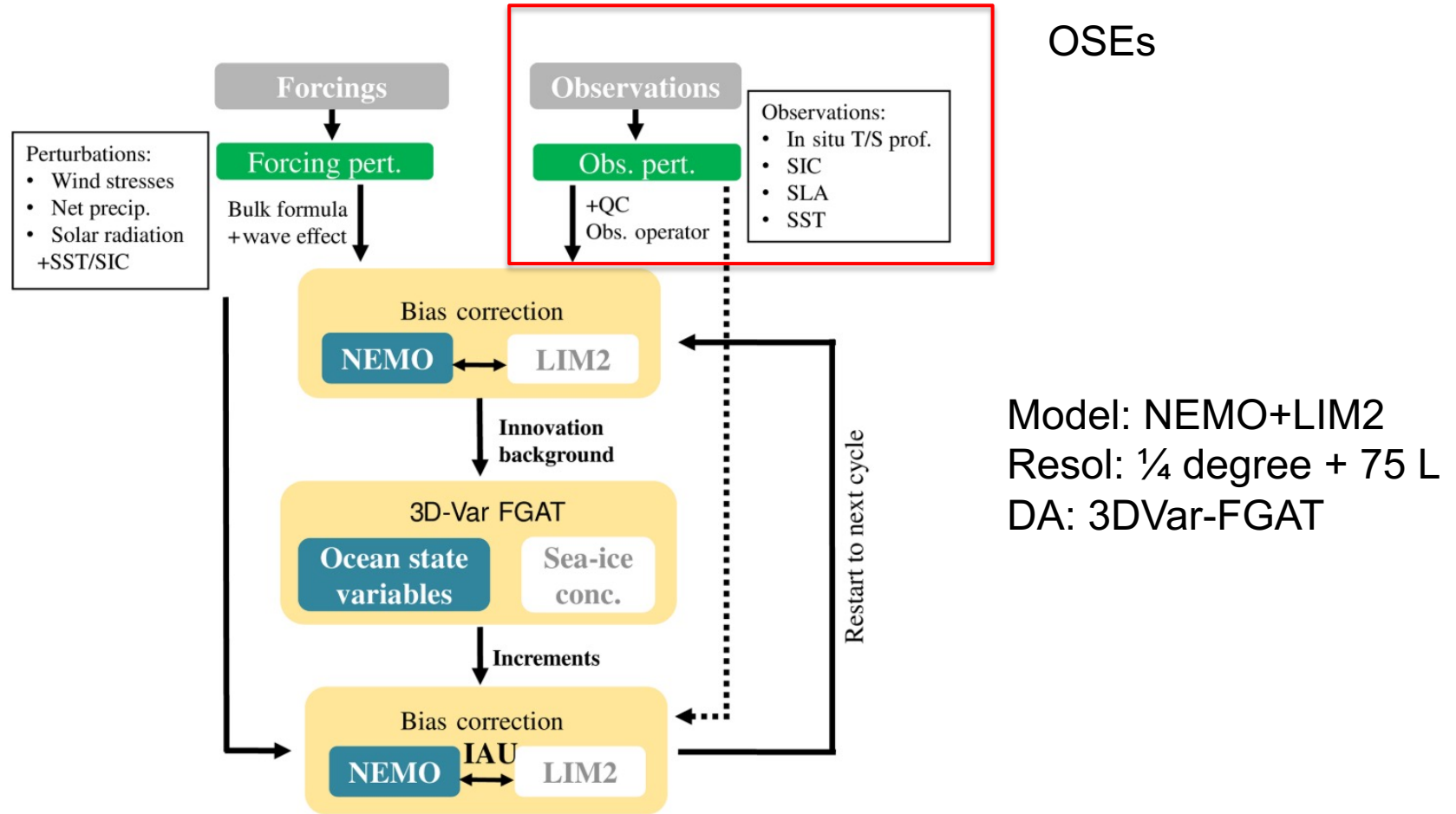


Figure 1. Schematic diagram of the ORAS5 system.

Zuo et al., 2019, OS

OSE setups

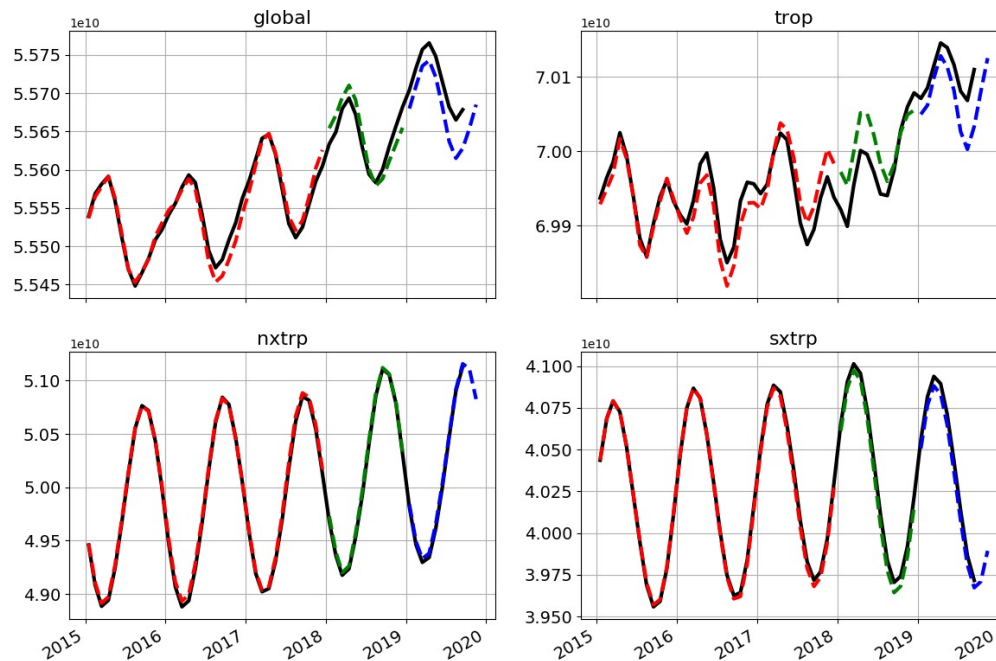
Experiments	Forcing	Observations	Argo Grey list	Period
ORAS5-RT (0001)	NWP forcing (2015-RT)	GTS-NRT	GreyList 20181126	1979-RT
ORAS5-PR (h2or-haog-hidk)	ERA-int (2015-2017) - ERA5 (2018-2020)	Reprocessed	GreyList 20181126	2015-2020
ORAS5-PR-NewQC (haeo)	ERA-int	Reprocessed	GreyList 201910	2015-2018
ORAS5-PR-NoSLA (haou)	ERA-int	Reprocessed No SLA	GreyList 20181126	2015-2018
ORAS5-PR-NoSLA- NoArgo (hb32)	ERA-int	Reprocessed No SLA, No Argo	GreyList 20181126	2015-2018

ORAs performance

— ORAS5-RT
 - - - ORAS5-PR

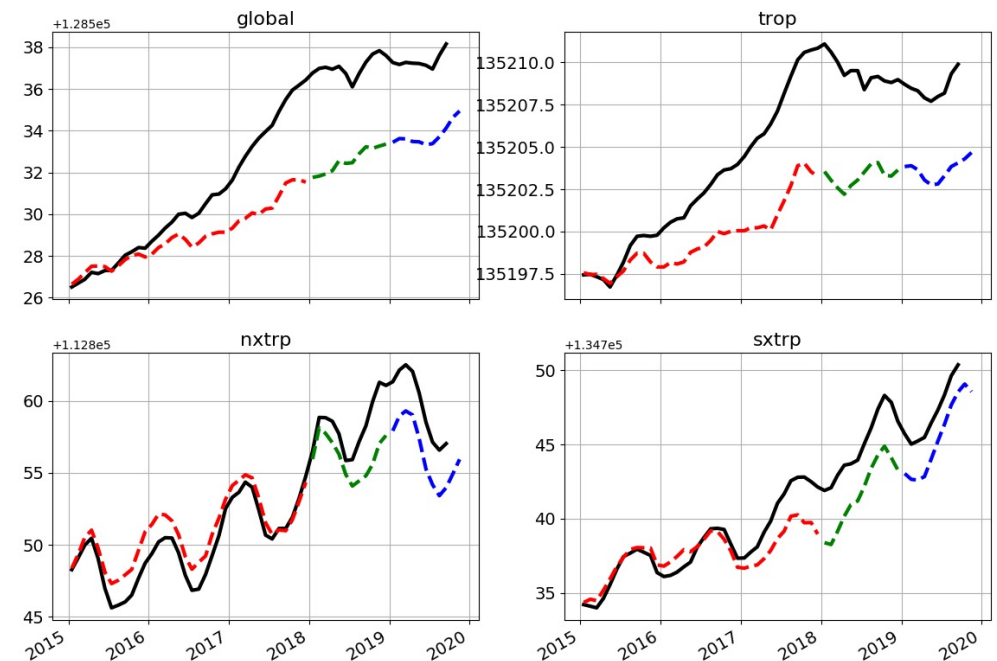
Ocean Heat content (0-bottom)

hdr8 hcbtm 0m



Total salt content (0-bottom)

hdr8 salbtm 0m



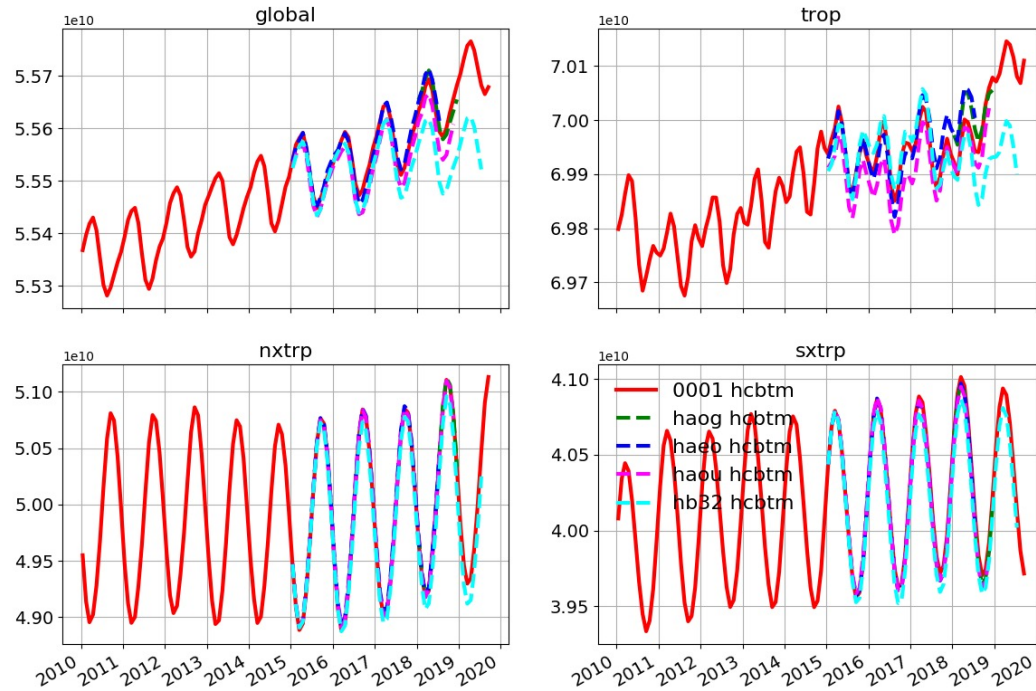
global=Global; trop=Tropics, nxtrp=North extra-tropics; sxtrp=south extra-tropics).

ORAs performance

- ORAS5-RT
- - - ORAS5-PR
- - - ORAS5-PR-NewQC
- - - ORAS5-PR-NoSLA
- - - ORAS5-PR-NoSLA-NoArgo

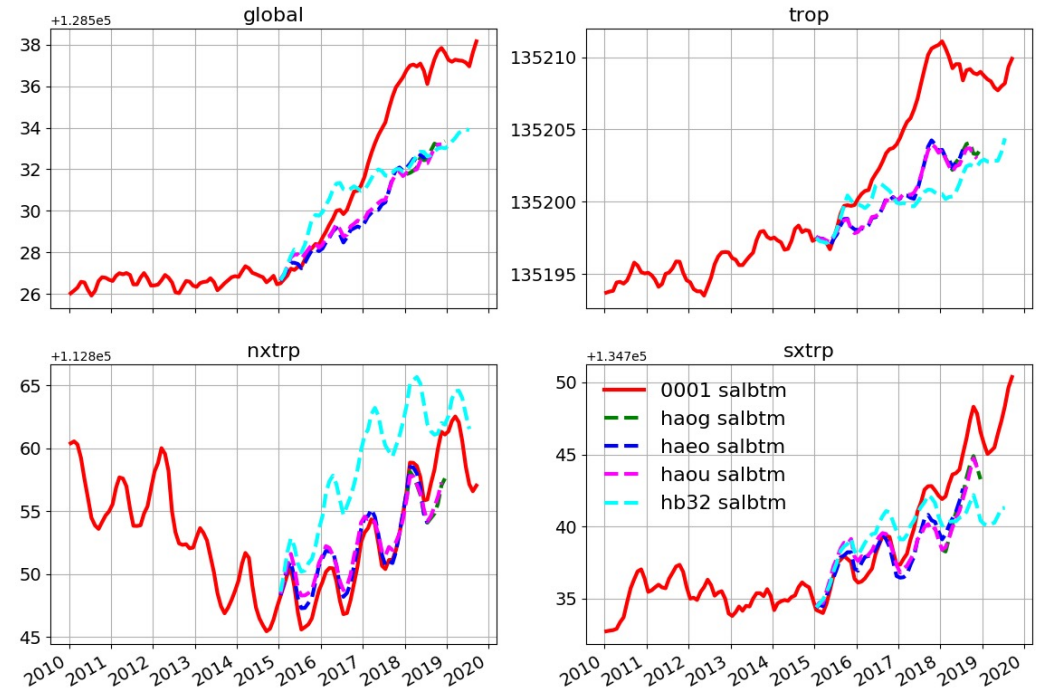
Ocean Heat content (0-bottom)

hb32 hcbtm 0m



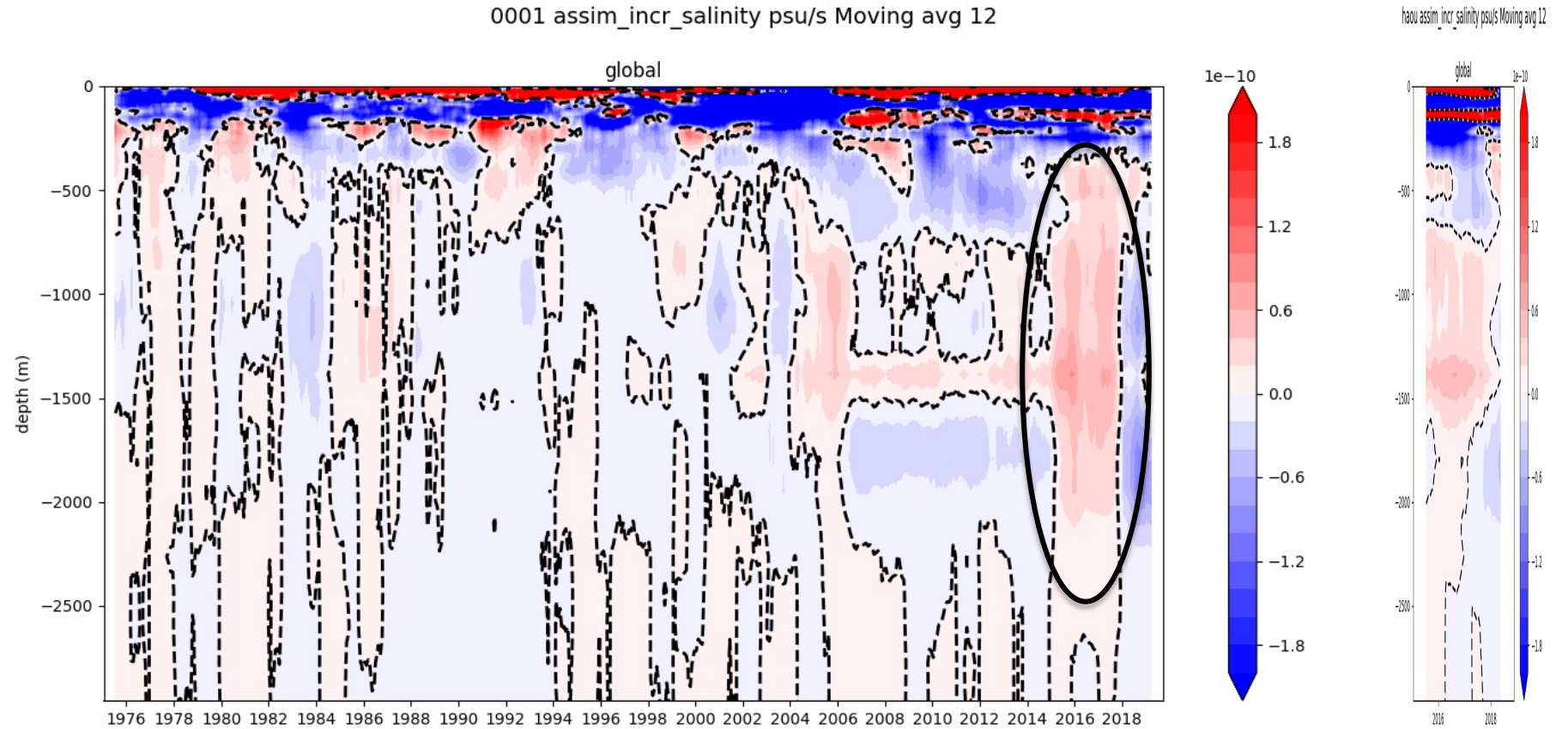
Total salt content (0-bottom)

hb32 salbtm 0m



Assimilation contributions to salt content changes

ORAS5 global zonally averaged salinity increments



Summary

1. My experiments show a strong positive trend in the salinity content since 2015, especially in our real time analysis with RT Argo data
2. Reanalyses using re-processed EN4 Argo also have a positive trend but weaker
3. Not much difference between ORAS5-PR and ORAS5-PR-NewQC in the sense of salt content trend, despite that an updated Argo grey list (Oct 2019) has been used in ORAS5-PR-NewQC.
4. Removal of Argo data leads to even larger positive trend in the salt content since 2015, with the signal mostly comes from the Tropics.

More OSEs are on-going including testing different forcings and bulk formulas in the sense of salt content changes.