

Global Ocean Data Assimilation and Prediction System2–ReAnalysis (GODAPS2-RA) Project : Preliminary results

Seung-On Hwang, Yu-Kyung Hyun, and Johan Lee
Climate Research Department NIMS/KMA, South Korea

Purpose

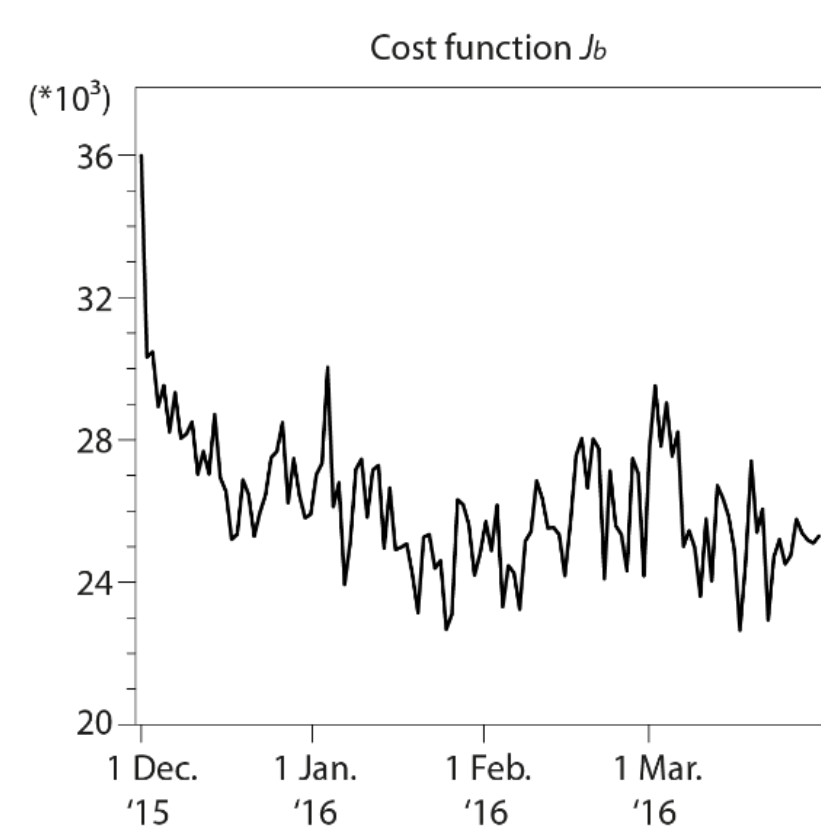
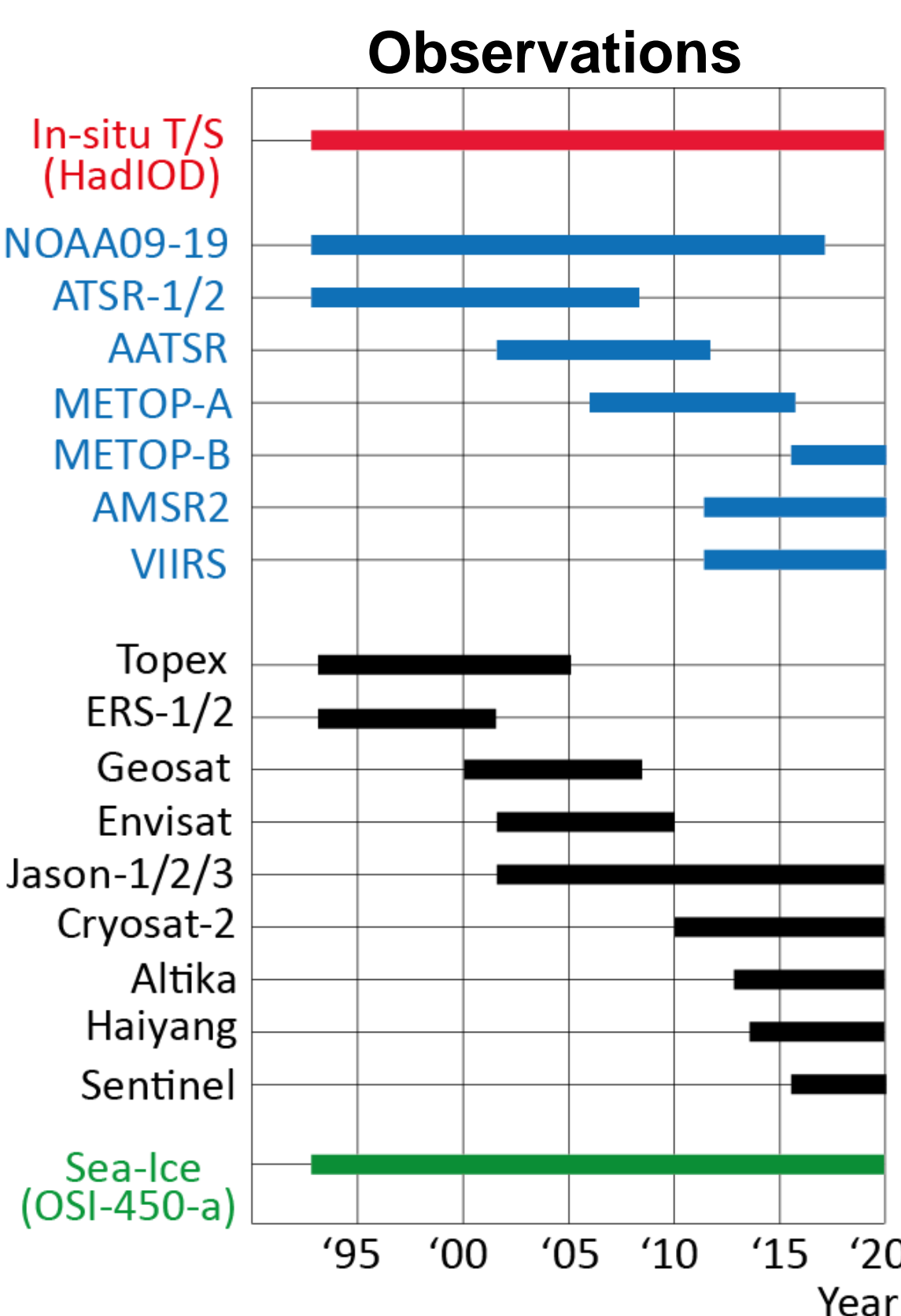
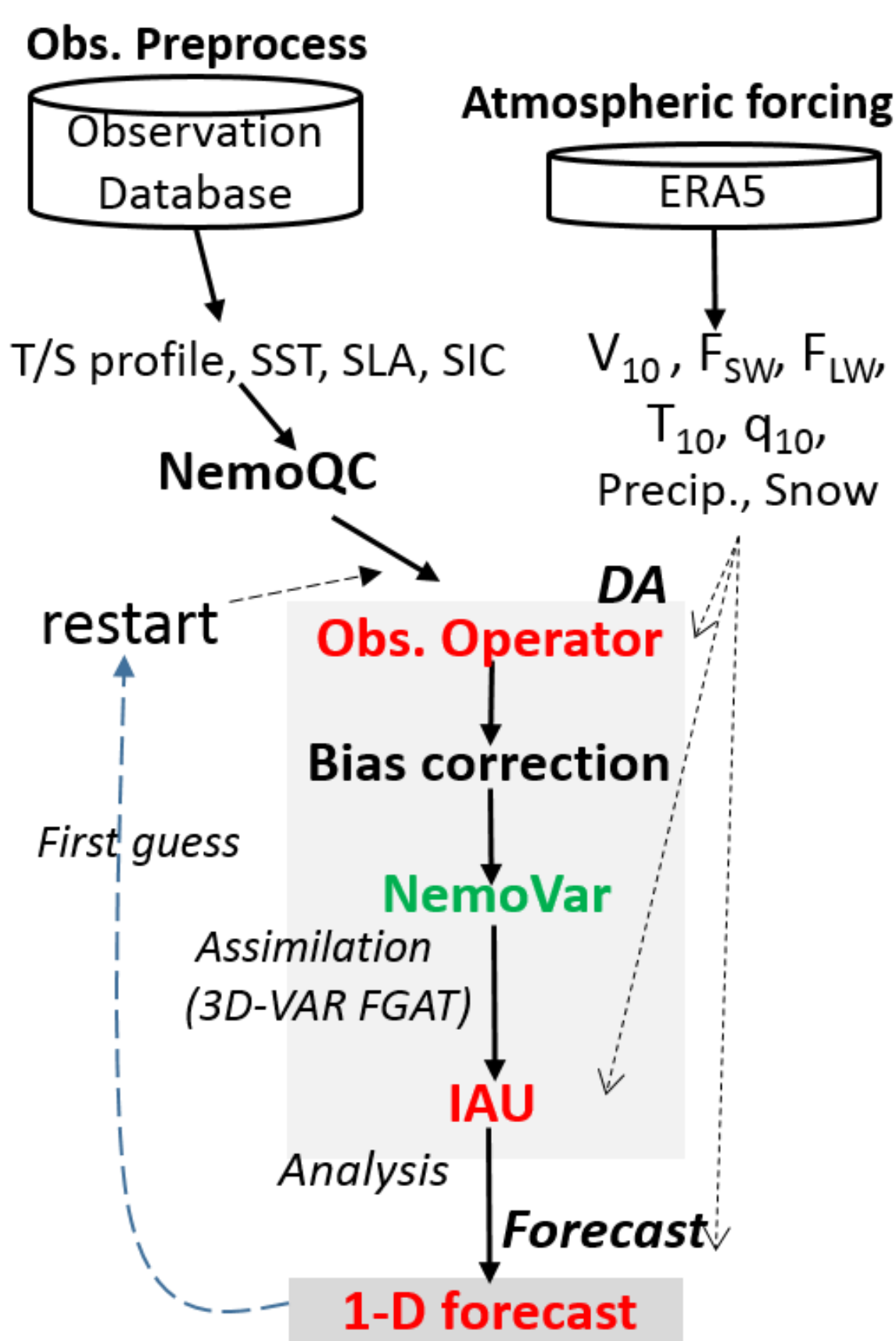
Let's produce KMA **global Ocean Reanalysis (ORA)** datasets for **1993~2020** even though there are already many ORAs in the world.

Before this task, we test-run the GODAPS2-RA for recent five years (**2016~2020**). Why? the current hindcast year of GloSea6 ends in 2016, highlighting the necessity to extend to more recent years.

named **GODAPS2-RA**

KMA is now officially operating GODAPS2 that Originated from **FOAM** of the **UK Met Office**

Model	FOAM vn14.1 based NEMO vn3.6 – CICE vn5.1.2 4-ice layer
Resolution	eORCAO25 (~1/4°) 75 vertical levels Daily cycle
Domain	Global 90°N ~ 85°S
Assimilation	NEMOVAR vn5 3D-Var FGAT algorithm 1 day assimilation window 1 day IAU
Bias correction	SST, SLA
Forcing	ERA5
Record period	2016~2020 here 1993~2020 in the future
Archive period	daily



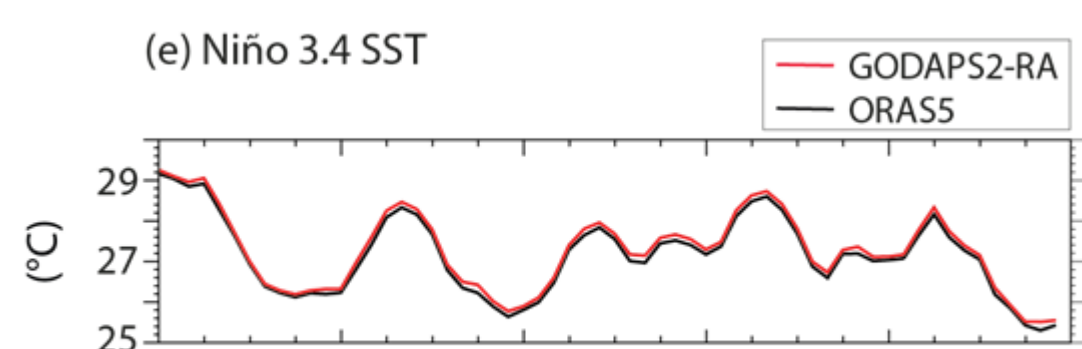
To decide the starting date of run, the time-series of the cost function of background (J_b) is investigated. It looks that J_b stabilizes around three weeks later. Therefore, we initiate GODAPS2-RA one month ahead (the 1st Dec. 2015).

Results of the Comparison

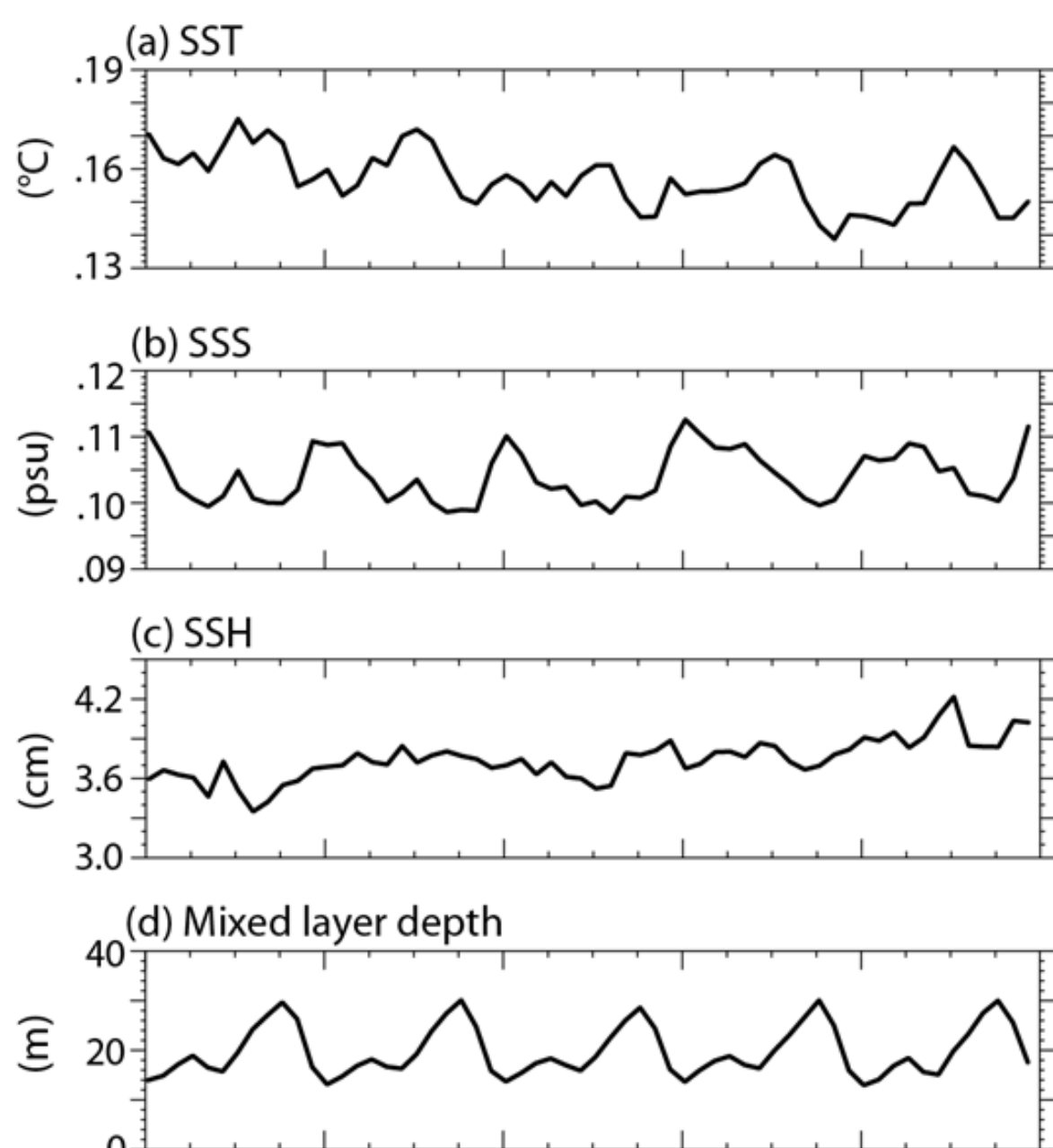
To examine whether GODAPS2-RA is working well, we compared it with the other validation dataset such as KMA operational GODAPS2, the UK Met Office restart files, ORAS5, and GloSea6 hindcasts.

Comparison 1.

- w/ ECMWF **ORAS5**
- Monthly mean for 2016~2020



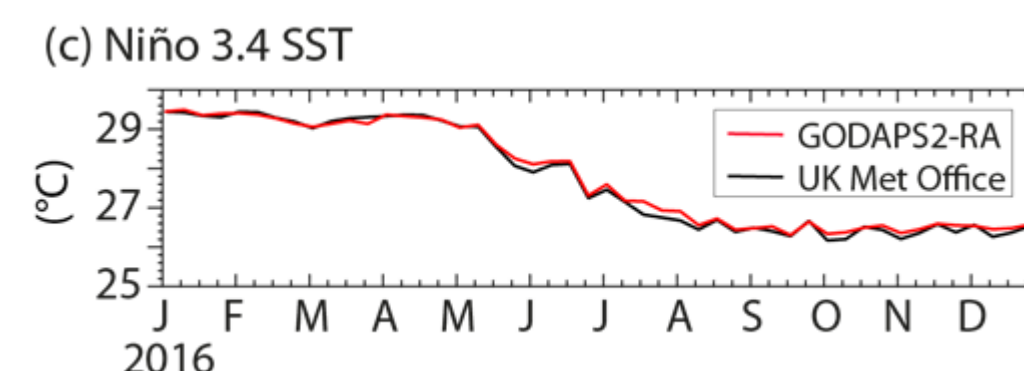
SSTs over Niño 3.4 region



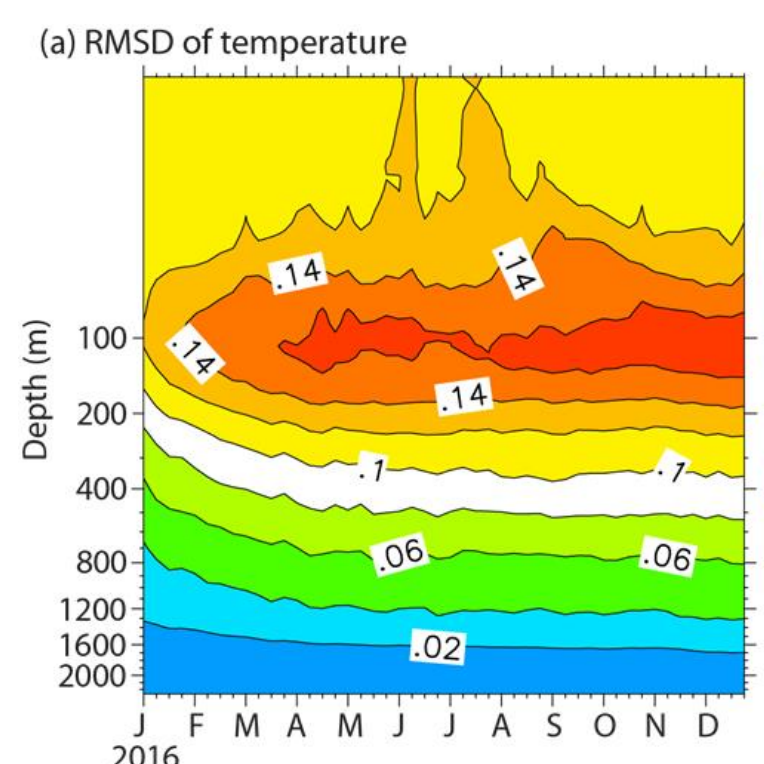
Monthly mean RMSD against ECMWF ORAS5

Comparison 2.

- w/ the **UK Met Office** restart files used in the GloSea6 hindcasts
- 1st, 9th, 17th, and 25th each month in 2016



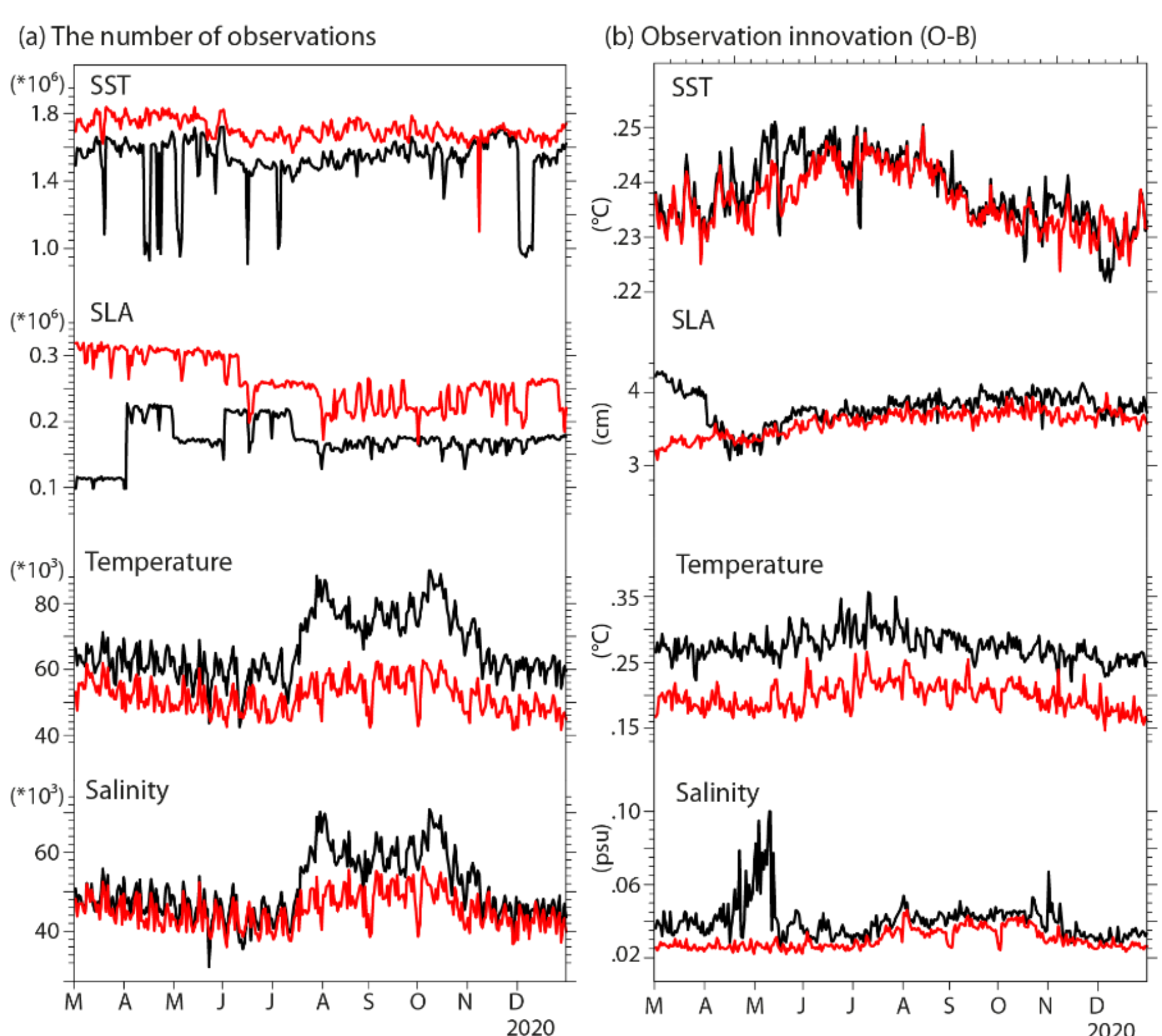
SSTs over Niño 3.4 region



RMSD against the UK Met Office restart files

Comparison 3.

- w/ operational **GODAPS2**
- From Mar. to Oct. 2020

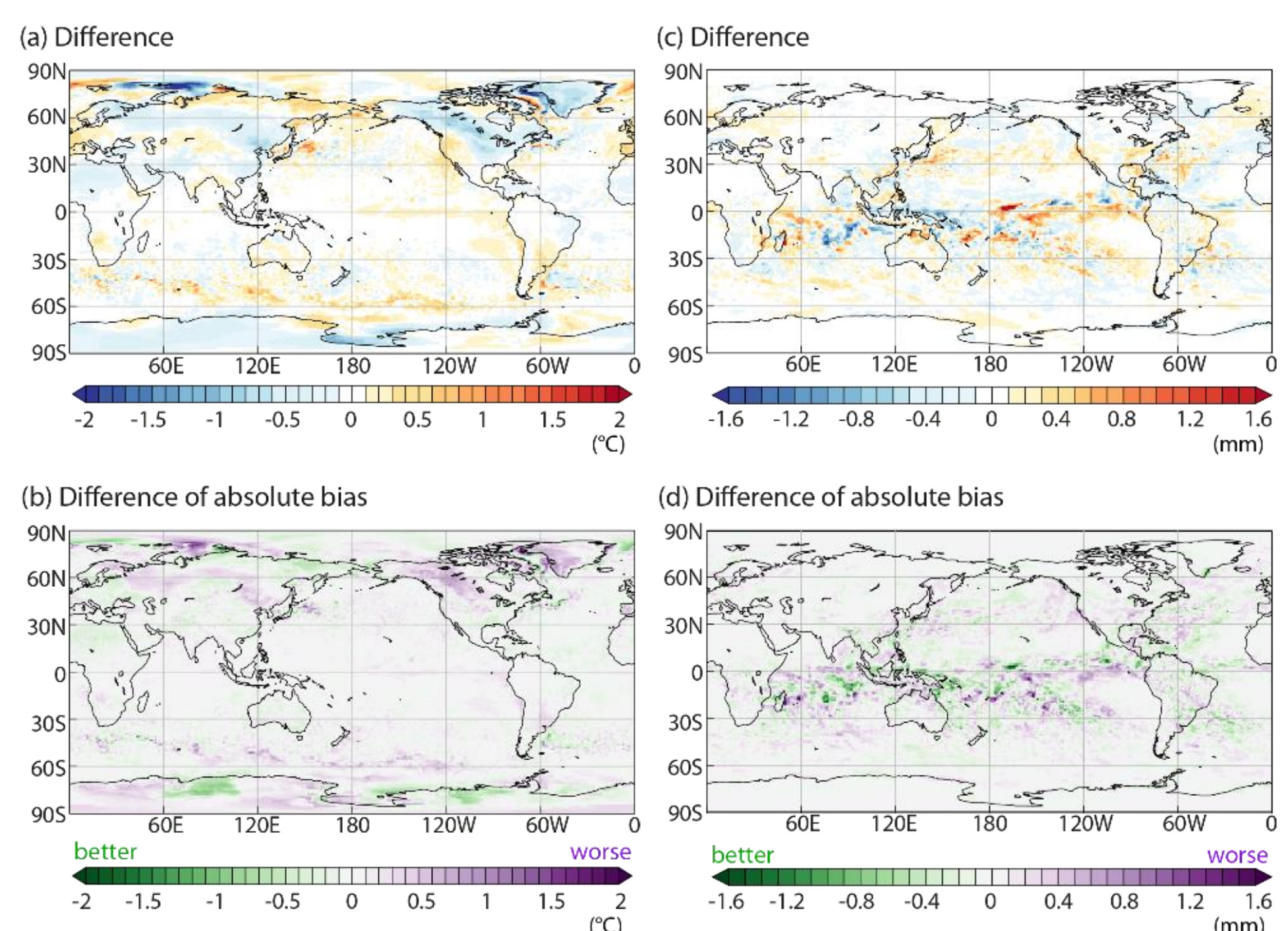


The daily number of observation ingested in NEMOVAR, and their O-B. (smaller # of profile obs. in GODAPS2-RA !)

Comparison 4.

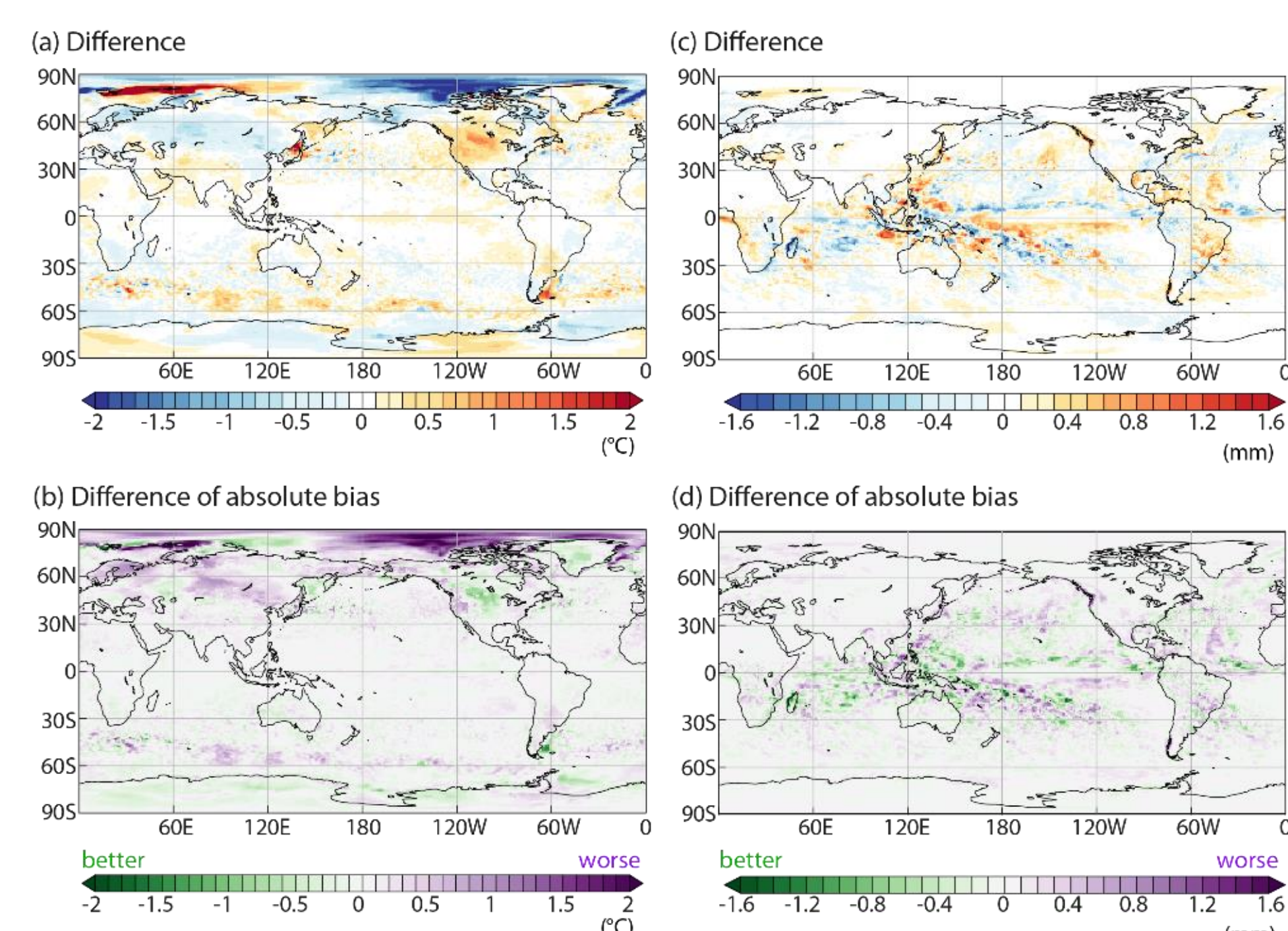
- w/ KMA operational **GloSea6** hindcasts
- Test-run GloSea6 hindcasts with initial conditions produced by GODAPS2-RA

<Hindcast case starting from January 2016>



SST over Niño 3.4 region

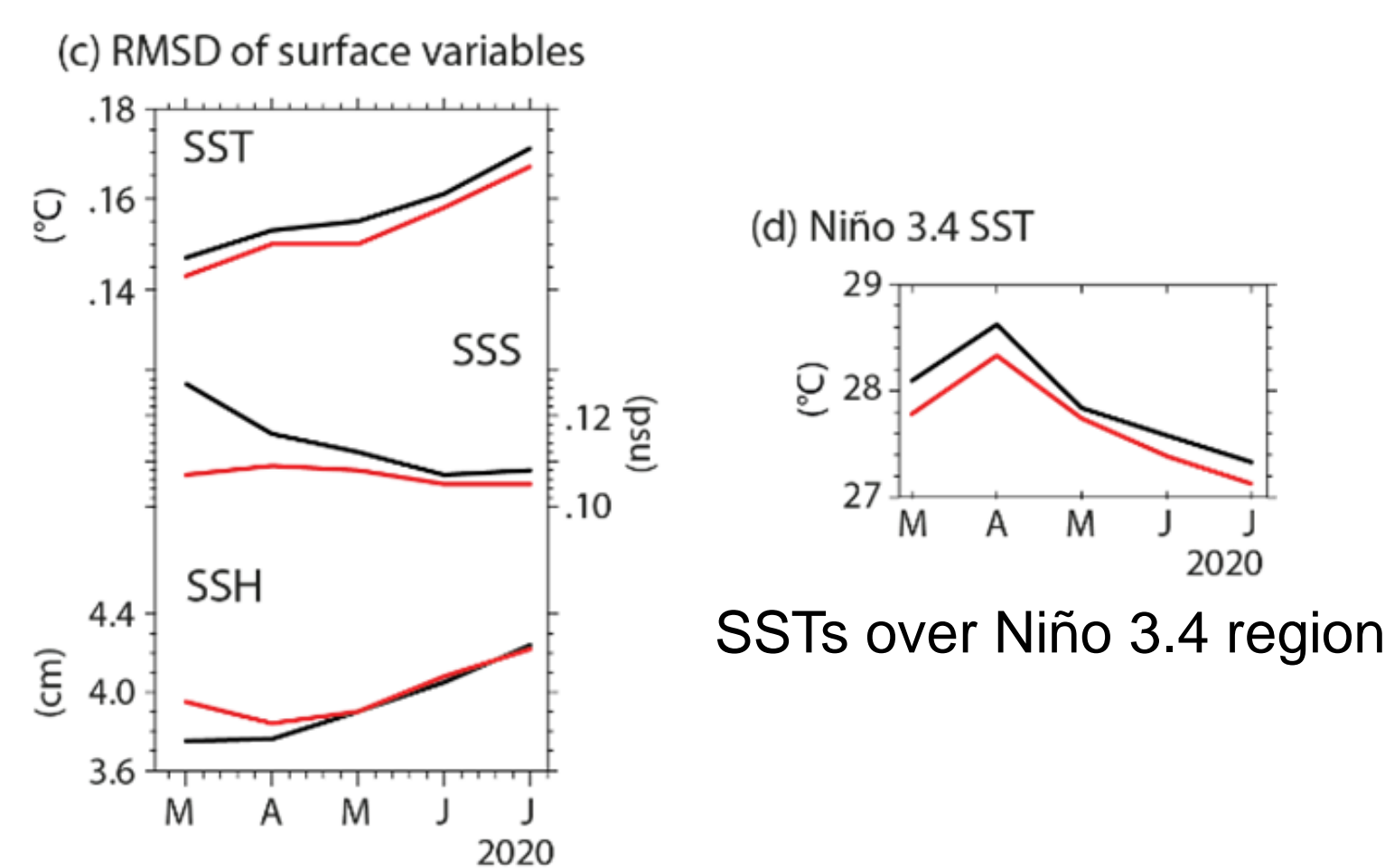
<Hindcast case starting from November 2016>



SST over Niño 3.4 region

*Difference: GloSea6 hindcast with GODAPS2-RA initial condition – the operational GloSea6 hindcast

Averaged monthly RMSD against ORAS5 (weak point of GODAPS2-RA !)



Monthly mean RMSD against ORAS5

Conclusion

- No significant difference from other validation dataset.
- However,
 1. SST satellite observations NOAA-18 and -19 were not collected by mistake.
 2. More ocean profile data such as CORA need to be used.
 3. Need to investigate the quality of profile data.
- By addressing the shortcomings mentioned above, we will improve GODAPS2-RA.
- We will officially begin to reproduce ocean reanalysis dataset spanning 1993~2020, or possibly extended to 2024, for releasing to publics.