

Comment on gmd-2021-235

Anonymous Referee #2

The authors describe the evolution of the South China Sea operational oceanography forecasting system (SCSOFS), which significantly improve the quality of the system. The manuscript provides a detailed description of different versions of the ROMS model which were used for SCSOFSv1 and SCSOFSv2 and compare the 11-year long free run of both models. The results show various improvements for the changes that have been made to the operational system. It provides useful suggestions for the community. My opinion is that the paper is worthy of publication in GMD after minor modifications. But several specific aspects of the paper detail and analysis should be considered first.

Thanks for your confirmation to our manuscript.

2 Specific comments

The grammar and quality of the writing needs to be improved before publication: many sentences are over-complicated or confusing (Example lines: 113-114, 170-174, 341-343....). It would benefit from a thorough revision by someone with proficient written English skills.

We have invited a professional of similar academic background with proficient English written skills to proofread and revise our manuscript thoroughly according to the reviewer's comments.

Line116: "sea areas" change to "areas"

Line341-343: "The results of SCSOFSv2 show much more areas with lower SST than OSTIA in the central Pacific Ocean, comparing to the results of SCSOFSv1 and BulkFormula, which can be attributed to the new scheme combination." change to "Comparing with the results of SCSOFSv1 and BulkFormula, smaller SST hot bias versus OSTIA is found in the central Pacific Ocean for the results of SCSOFSv1.3, which can be attributed to the new scheme combination."

Line 99: the section title is not clear, which datasets? Not all datasets used in the article are described here.

Thanks. We have changed to "input datasets" in Line102.

Line 142: For what reasons are the initial conditions not deduced from soda 3.3 in correspondence with the boundary conditions?

Thanks. One reason is that the resolution of GDEMv3 ($0.25^\circ \times 0.25^\circ$) is finer than SODA3.3 ($0.5^\circ \times 0.5^\circ$), and GDEMv3 is derived from plenty of observations with good accuracy. The other reason is that our model was started from climatological run with climatological initial, boundary, and surface forcing conditions. We just selected climatological initial conditions with finer resolution.

Lines 180-184: Why does the inclusion of Guam at the open boundary have such a

significant influence on the latitude of the NEC in the model? This need be explored or explained.

Thanks. It is because that the Guam Island changes the bathymetry from over 3500m to below 500m suddenly, and as a big block to the NEC once flowing into the model domain from eastern lateral boundary. We have explained it in Line 179.

Lines 189-193: Why these choices as opposed to the ones used in v1? What is special about 3rd order and biharmonic?

Thanks for pointing out this. I have clarified it between Line194 and Line199, and added one more table1. Actually, the third-order upstream and fourth-order centered schemes are used for momentum in SCSOFSv1, which are default and recommended settings in ROMS. We do not use biharmonic mixing scheme, just harmonic mixing for both SCSOFSv1 and SCSOFSv2.

Line 227: Any reference for OSTIA first appeared in the text? Is it provided to SCSOFS directly by the Metoffice or by other means?

In our manuscript, we have already cited the paper of Donlon et al.,2012 in the end of this sentence. OSTIA data is open access to public. We have already change ‘provide’ to ‘produced’ in Line 242 to avoid possible misunderstanding.

Line 326: the sentence on the conclusion may come after the lines 327-337.

Thanks, we have deleted the conclusion in Line339

Line 355: Where do you get the data from in SCSOFSv2, is it still the same servers? Where do the ARGO observations come from?

Thanks. Yes, we have got all SLA, OSTIA, ARGO observation data from the website <https://marine.copernicus.eu> of CMEMS in SCSOFSv2, it is the same with SCSOFSv1.

Line 373: “around” is not an exact annotation, need to point out exactly.

Thanks. We have changed it to “, with 30 days before and after” in Line 399.

Line 383: “for the calculation of innovations” change to “when calculating innovations”

Thanks. We have done it in Line 409.

Line 385: Lee et al., 22-25 Jun, format error!

Thanks. We have removed “22-25 June” in Line 414.

Line 619: What are the known biases of the system? Some are described in the article; can you summarize them in the conclusion? Can you elaborate the summary in terms of what is the added value of this regional system compared to existing global systems?

Thanks for your good suggestions. We have added it in conclusions section. For the comparison to existing global system, it is not done in this article, so we can not give more information. We will try to do that with many existing global systems in later.

Section 2: A table summarizing the v2 and v1 features would be useful.

Thanks for your good suggestions. We have added a new table1.

Fig. 8: Why 7-day FGAT? Why not 3-days or 10-days? Can you explain more on this?

The length of First Guess at Appropriate Time (FGAT) is associated with the data assimilation window, which is taken as 7 days in our data assimilation system. The length of assimilation window is decided by several factors. 1) The observations of Sea Level Anomaly (SLA) and temperature/salinity profiles are relatively sparse, therefore,

the window is enlarged enough to include more observations. 2) the true state evolves with time, therefore, the window is shortened, as the difference between observation and background increases with time. 3) The data assimilation system runs every 7 days, and forecasting system provides the forecast of 7 days in future, therefore, 7 days of window is adopted to collect the more observations, and also to avoid reusing some observations. The window of 7 days is also used by other operational oceanography system, such as the PSY4 in Mercator. Therefore, the length of 7 days is appropriate for the assimilation window, and also for the FGAT.