



EGUsphere, author comment AC1
<https://doi.org/10.5194/egusphere-2022-495-AC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on RC1

Arachaporn Anutaliya

Author comment on "Surface circulation in the Gulf of Thailand from remotely sensed observations: seasonal and interannual timescales" by Arachaporn Anutaliya, EGU Sphere, <https://doi.org/10.5194/egusphere-2022-495-AC1>, 2022

Major comments:

- Line 16: author defined the GoT domain (6-14 N and 98-106 E), but when author begins to analyze the data, why author defined the analyzed area as 8-14 N (Line 73) not 6-14 N. During SW monsoon, northward flow from East Malaysian Peninsula could also play significant role for the circulation in the GoT as is showed the inflow from South China Sea (SCS) during NE monsoon. Please clarify this.
 - Thank the reviewer for pointing it out. The GoT domain is redefined to be between 8-14° N (L15).
 - Discussion relating to the influence of the South China Sea and that along the East Malaysian Peninsular is added.

- Line 78-80: when author mentioned that the largest difference between OSCAR and HF Radar is found at UGoT where there are only 6 OSCAR data points. Does author try to conclude that largest difference found at UGoT is because of there are only 6 OSCAR data points? What about other areas in the GoT?
 - The large difference between the OSCAR data and the coastal-radar found at the uGoT is essentially due to the spatial resolution of the OSCAR data that is too coarse. As a result, there are only a few measurements in the uGoT regions (only 6). The author understands that the original text is quite misleading and has revised to better explain the point. The available OSCAR data in each defined region is presented in Figure 3; there are 14 data points in the western boundary box and 72 data points in the interior box.

- Line 83-87: Please clarify sea surface level (is it monthly data? And what is the source of ADT data?). Do you think 3 stations situated in the UGoT and western GoT are enough to validate satellite-derived ADT? What about the stations in the eastern GoT? I think there are available data from local authorities that you can request. When author mentioned western boundary, does it include the western side of UGoT (no data for OSCAR).
 - The ADT is the gridded all-satellite merged product provided at daily resolution. See Line 97.
 - Thanks to the reviewer for the suggestion to also compare the ADT data to the available tide gauge along the eastern boundary. Further ADT validation against four

additional tide gauge stations is carried out with the two out of four stations located along the eastern side of the GoT (Laem Sing and Ko Sichang). The calculated correlation coefficients between the ADT and tide gauge data are presented in Figure 1.

- Line 99: How to estimate A?
 - The estimation of A is added.

- Line 111-113: Why high variance of ADT indicating the influence of geostatic flow and low variance indicating ageostrophic flow? Could you give a reference for that statement?
 - The geostrophic current can be directly estimated from the satellite-derived ADT. The relationship is added to the datasets section and the reference to these equations is inserted in the text. Therefore, the change (hence variance) of ADT directly associates with the geostrophic current. On the contrary, geostrophic current is suggest to not be important when the ADT barely fluctuates (low variance), and thus the ageostrophic component dominates.

- Line 116: Any references for reader to follow, regarding to CEOF that the author used?
 - The author thanks the reviewer for the suggestion. A methodology section describing the complex empirical orthogonal function (CEOF) as well as providing the associated literature is added to the manuscript.

- Line 117: The first 2 modes represent just only 48%. What about other 52%?
 - The CEOF technique decomposes the velocity vector fields into 173 orthogonal modes (i.e. 173 independent CEOF maps). By the mathematical setup, the first mode explains the biggest portion of the variance while the subsequent modes explain subsequently smaller portion. Therefore, the rest of the variance (58%) is distributed over 171 modes not being considered in the manuscript.
- Line 117-119: Without the knowledge background about the GoT dynamics, from fig.3a-c, how do you know that during southwest monsoon, anticyclonic circulation exists at the center of the GoT? Please clarify or give any references.
 - As shown in Figure 3a, there is an anticyclonic circulation in the middle of the GoT basin. To understand when this pattern occurs, the PC has to be considered. Magnitude of the PC indicates the intensity of the pattern and the phase of the PC indicates the rotation that CEOF1 has to rotate. During the southwest monsoon and fall monsoon transition, the phase of PC is 0 indicating no rotation needed. During the northeast monsoon and spring monsoon transition, the phase of PC is $\pm \pi$ indicating that the pattern shown in Figure 3a has to be reversed; this yields a cyclonic circulation in the middle of the GoT. The author has added a methodology section to describe the CEOF technique as well as how to interpret the results.
- Line 125-129: For CEOF2 "Negative phase means southward flow along the western boundary and vice versa for positive phase" How do you know that? What figures tell you that?
 - The original text is unclear regarding how to interpret results from the CEOF analysis, the author thanks the reviewer for the suggestion. The author has included text describing how the CEOF and PC are interpreted in the methodology section.
- Line 164: Why strong mismatch occurs at UGoT and western boundary?
 - The difference between the total and geostrophic flow is simply the ageostrophic flow, i.e., flow driven by wind or affected by friction, etc. In this case, the author

speculates that the large difference is likely due to strong total and geostrophic currents at these locations. Therefore, the author has rephrased the sentences to clarify this point.

- Line 239: What is the source of SST? The author didn't mention it in Datasets Section.
 - The ENSO and IOD indices are added in the dataset section. The data sources are provided in the data availability section.
- Line 240: Please give the reference of complex correlation that the author mentioned.
 - Complex correlation is introduced, and reference for the calculation is provided.

Minor comments:

- Line 21 and others: "Buranatheprat" -> "Buranapratheprat"
 - The author apologizes for the wrong information provided. The text has been updated.
- Line 26 and others: I'm not sure how to order the citation, first name or year
 - The citation style in this manuscript follows the Copernicus Publications LaTeX Package, version 6.8, 28 March 2022.
- Line 160: Better to start new paragraph after (Kubryakov)
 - The text has been updated accordingly.
- Lines 299 & 304: "farther"
 - The text has been updated.
- Line 357: "Copernicus Marine Service Information"
 - The text has been updated.
- For the Reference, the journal name is full or short name? I found both full and short name (Be consistency).
 - The reference has been updated to be consistent.
- Figure 2: unit of Fig.2a is m or m/s?
 - The author thanks the reviewer for pointing out the mistake. The unit has to be m for (a) and m² for (b) and the correction has been made.
- Figure 3: Could not see Marron boxes in (a) and (d).
 - The maroon boxes are missing from the figure and have now been inserted.
- Figure 4: better to have a title for colorbar in the figure and have colorbar for every row.
 - The title has been added to the figure. Since all subplots share the same colorbar, only one colorbar is provided on the lower right corner of the figure. The figure caption has been updated to emphasize this point.
- Figure 7: intext, author use r instead of R as shown in the figure. Just curios! When the author shows the comparison between sea surface height at different areas and negative wind stress curl, which clearly show perfect match but why r in the figure is negative not positive?
 - The author has updated the text to use R to represent the correlation coefficient.
 - The author thanks the reviewer for pointing the inconsistency. The correlation coefficient shown on the figure is from the correlation between wind stress curl and ADT; therefore, the number is negative. However, the reviewer is correct that presenting the figure and correlation coefficient this way is inconsistent so the figure

has been updated.

- Figure 8: Since color scale in the first row and second row are different, how color contour in (a) & (b) differ from the rest? Are they correlation coefficient? Better to have the title for the colorbar and have colorbar for all rows.
 - All subplots show correlation maps; therefore, the color contours are all showing correlation coefficients but between different variables. Since the top row ((a) and (b)) is showing correlation with the velocity, complex correlation is applied here. The author understands that the figure caption might not be clear, so the text has been updated to emphasize this point.
 - The title is added at the top of the colorbar (upper right corner of the figure).
 - Colorbars are added for all the rows.

- Figure 9: Better to have no. of data legend equal to the no. of variables. For example, 9(a) has 3 lines, so it should have 3 data legend, velocity, Nino3.4 and DMI.

The accordant change has been made.