KORESPONDENSI PAPER

Judul : Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool

Jurnal : Ocean Dynamic / Springer (Q2)

No	Aktivitas	Tanggal	Keterangan	Lamp.
1	Submission	01/10/2019	ODYN-D-19-00140 - Ocean Dynamics: Submission Confirmation for Thermal Structure of Hot Events and Their Possible Role in...	1
2	Hasil review ronde 1	20/12/2019	Your Submission Major revision dengan 2 reviewer	2
3	Revision round 1 submitted	12/01/2020	Submission Confirmation for ODYN-D-19-00140R1 Balasan komentar reviewer terlampir	3
4	Hasil review ronde 2	28/02/2020	Your Submission Minor revision	4
5	Revision round 2 submitted	15/03/2020	Submission Confirmation for ODYN-D-19-00140R2 Balasan komentar reviewer terlampir	5
4	Accepted	17/03/2020	Your Submission	6
7	Published	23/05/2020	Your article in Ocean Dynamics has been published in the completed journal issue	7

Note : semua proses submission sampai published dilakukan melalui system. Email terlampir hanya report dari system.

Lampiran 1

ODYN-D-19-00140 - Ocean Dynamics: Submission Confirmation for Thermal Structure of Hot Events and Their Possible Role in...

From: ODYN Editorial Office (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Tuesday, October 1, 2019, 09:13 AM GMT+7

Dear Dr Wirasatriya,

Your submission entitled "Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool" has been received by journal Ocean Dynamics

The submission id is: ODYN-D-19-00140
Please refer to this number in any future correspondence.

You will be able to check on the progress of your paper by logging on to Editorial Manager as an author. The URL is https://www.editorialmanager.com/odyn/.

Thank you for submitting your work to this journal.

Kind regards,

Editorial Office
Ocean Dynamics

PS: If there would be any concern regarding authorship, please contact the Editorial Office.

Now that your article will undergo the editorial and peer review process, it is the right time to think about publishing your article as open access. With open access your article will become freely available to anyone worldwide and you will easily comply with open access mandates. Springer's open access offering for this journal is called Open Choice (find more information on www.springer.com/openchoice). Once your article is accepted, you will be offered the option to publish through open access. So you might want to talk to your institution and funder now to see how payment could be organized; for an overview of available open access funding please go to www.springer.com/oafunding.
Although for now you don't have to do anything, we would like to let you know about your upcoming options.

Lampiran 2

Your Submission

From: Alejandro Orfila (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Friday, December 20, 2019, 10:29 PM GMT+7

CC: a.orfila@uib.es

Ref.: Ms. No. ODYN-D-19-00140
Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool
Ocean Dynamics

Dear Dr Wirasatriya,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

Your revision is due by 19 Jan 2020.

To submit a revision, go to https://www.editorialmanager.com/odyn/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Please make sure to submit your editable source files (i. e. Word, TeX).

Yours sincerely

Alejandro Orfila, Ph.D.
Associate Editor
Ocean Dynamics

Reviewers' comments:

There is additional documentation related to this decision letter. To access the file(s), please click the link below. You may also login to the system and click the 'View Attachments' link in the Action column.
https://www.editorialmanager.com/odyn/l.asp?i=88884&l=KVO6XL8X

Reviewer #2: This paper uses the observational data in the ocean to examine the subsurface ocean features of the heat events (HEs) in the tropical western Pacific and its relation to atmosphere features.
They show that the stratification in the ocean in the development stage and decaying stage are different. They also show the HEs tends to happen in the warm pool while at the same time, the frequent HEs could help the formation of the warm pool.

I think the paper is well written and provides interesting features in the ocean to support the previous studies for the mechanism of HEs. I suggest minor revision with some extra analyses.

Major points:
1. It is interesting to show the different stratification of the subsurface ocean in the development and decay stage. However, I think it would be nice to also show the density profile which control the real stratification of the ocean in different stages. This could also show how the precipitation and surface flux influences the stratification respectively.

2. The relation of the wind, solar radiation, and precipitation with the phase of the HE is nice. However, could you explain why these atmospheric features would shift to another phase during the whole HE? Also, it is not clear to me why the stronger wind anomalies in the decay stage would be westerlies, which corresponds to ocean convergence. Are these anomalies or the total features?

Minor points:
1. Page 6 line 6, there is no current results in Fig 2
2. Page 6 last line, missing comma
3. Page 7 ling 4 of 3.1, I think it would be helpful to draw the box you select in the fig.1
4. Page 9 line 17 of the second paragraph, I think the white and grey solid line are not coincide with each other.
5. Page 10 line 3 of second paragraph, parenthesis becomes superscripts. Here, I suggest changing the i.e. (e.g., "i.e. about 7m/s") into parenthesis (e.g., "(about 7m/s)"), which might be clearer. Also, in general, adding parenthesis to all the i.e., would be better.
6. Page 11: here, you mention the temperature threshold bulges to the surface due to high wind (in the developing stage). Could you explain why this is the case and how it is different from the decaying phase.
7. page 14 line 8, should this be figure 8b?
8. page 16 in the end of the second paragraph, for background state of Pacific, why is the solar radiation higher in the warm pool? It should have more convection in the warm pool?
9. You emphasize the relation of HE and warm pool are mutually helping each other, causing the positive feedback in the discussion. However, for the beginning of the paper, it sounds more like the HE causes the warm pool formation. Is there a reason that you phrase like this?
10. The role of the diurnal cycle is mentioned a few times but is not explained in the paper. It would be nice to shortly explain a little on the role of diurnal cycle although it is not the focus of this paper.
11. Fig. 1 : missing period for the second sentence. The color of the dots mention in the caption might be wrong. Purple shows up twice. Also, the color purple in the plot is a little not obvious.
12. Fig 2 : could also circle the (a) plot with red box
13. Fig 3: do no indicate (a), (b)
14. Fig 4: net heat, not netheat
15. Fig 9: it is better to indicate the heat content as shading, for example, adding "(shading)" after "heat content". The discussion about the solar radiation and the zonal wind in the developing and decaying phase is not clear to me (in the end of page 14). I think it would be helpful to indicate the developing and decaying phase with the bar in this plot for each event (as in figure 5, 6, 7). The axis of (a) should be adjusted. The font is too large so there is no space between each number.
16. Fig 10: it would be nice to indicate these are all anomalies. Also, it is a little hard to understand some difference in the plot. The circulation is one thing that is not clearly discussed. The anomalous vertical motion forms two circulations in the meridional direction in the developing phase but not in the decaying phase. Is there any explanation? Also, there are both deep and shallow clouds in this plot. What are their relative roles in these two phases? Another thing is why would the thermocline in the developing phase not shoal to the bottom of the surface warm water?

Lampiran 3

Submission Confirmation for ODYN-D-19-00140R1

From: ODYN Editorial Office (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Sunday, January 12, 2020, 03:28 AM GMT+7

Ref.: Ms. No. ODYN-D-19-00140R1
Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool

Dear Dr Wirasatriya,

Ocean Dynamics has received your revised submission.

You may check the status of your manuscript by logging onto Editorial Manager at (https://www.editorialmanager.com/odyn/).

Kind regards,

General Responses : We would like to thank for the reviewers for the comments, suggestions and questions that can improve the quality of this manuscript. We realize that some parts, especially related to the role of HE for the formation of western Pacific warm pool are still not convincing. At first, this paper was actually made to investigate the variability of oceanic thermal structure of HE to complete the analysis of atmospheric aspects that has been conducted by Wirasatriya et al. (2016). This paper can show clearly how heat is accumulated in the surface layer during development stage and then the accumulated heat is transported to the deeper layer during decay stage. Then luckily we saw that the isothermal layer with frequent HE occurrence is warmer than the isothermal layer without HE occurrence. The transported heat during decay stage may play role to maintain warm isothermal layer in the western Pacific warm pool. However, what we found here is still just indication since we still omit the other oceanic factors such as equatorial waves, entrainment, lateral mixing, ocean circulation, and oceanic heat budget. Although these oceanic factors are discussed in the discussion section, further investigations involving all possible oceanic factors may lead to a better understanding of the HE contribution to the formation of warm isothermal layer in the Pacific warm pool. This is left for future studies. Therefore, we still put the word "possible" in our manuscript title since further analysis is still needed to conclude the role of HE in maintaining the warm isothermal layer in the Western Pacific Warm Pool.

Reviewer #1:

This paper investigate the vertical thermal structure during the occurring of HE events and its influence on the warm pool structure using TAO/TRITON observations and satellite measurements. The authors conclude that surface winds control the heat accumulation and heat transport and is the key factor for the HE occurrence. It is an interesting paper and might be published after minor revisions.

R: Thank you very much for the positive comment. We do appreciate it.

Major concerns:

(1) The role of ocean dynamics. The authors noted that the oceanic current (water flow) may play a role in the temperature variability. But Figs. 5-9 lack investigation of the oceanic current during the HE events. TAO/TRITON observes ocean currents in the upper layer ocean as well. The authors may present the observed oceanic currents and to see how does the ocean current influence the temperature. Vertical stratification is not only influence the temperature variation, but also a result of ocean dynamics (e.g., Hu et al., 2017, CD, doi: 10.1007/s00382-016-3459-y).

R: Thank you very much for your suggestion. Fig. A below show the variation of surface current for HE030528.

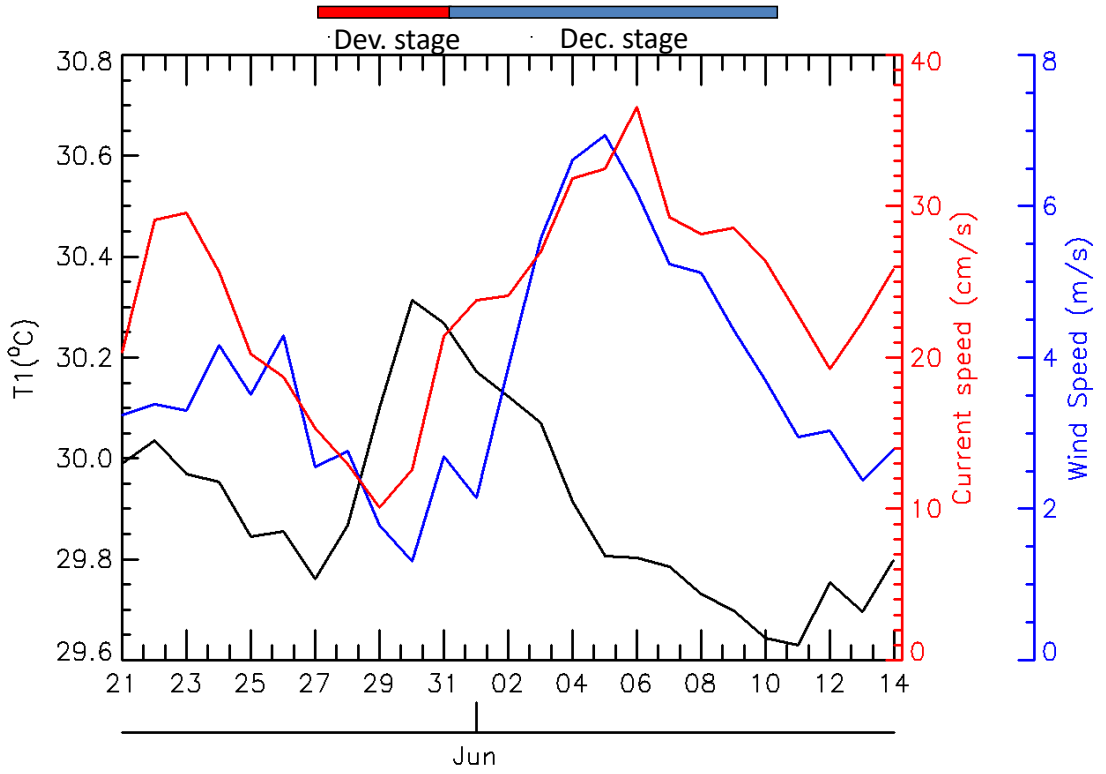

Fig. A. The time series of SST, surface current speed and wind speed for HE030528 at 152°E-157°E and 3°S-3°N

It clearly shows that the variation of surface current speed follows the variation of wind speed. However, we do not think that the variation of surface current speed determines the SST variation during the short occurrence of HE. The heat lateral displacement controlled by the current speed which is maximum only 30 cm/s might not comparable with the areal size of HE (>2 x10^6 km^2) and the short period of HE (7-30 days). Therefore, in the previous HE studies (i.e., Kawamura et al. 2008; Qin et al. 2007, 2008; Qin & Kawamura, 2009ab, 2010; Wirasatriya et al. 2015, 2016), the occurrence of HEs is influenced by the heat exchange of air-sea interaction mainly controlled by solar radiation and wind speed. Thus, we exclude the analysis of surface current speed. In this paper we focus only on the vertical transport of the accumulated heat in the surface layer to the deeper isothermal layer during the occurrence of HE. We found that during decay stage, the heat is not only released to the atmosphere through latent heat release but also transported to the deeper layer. Moreover, the frequent HE occurrence may contribute to maintain the warm isothermal layer through this mechanism.

Hu et al. (2017) indeed demonstrated how the ocean current distributes heat budget laterally inducing the split of western Pacific warm pool during El Nino. Thus, it will be interesting to investigate how the transported heat in the isothermal layer caused by HEs is distributed laterally by the ocean current. This aspect is discussed in the discussion section (P17L31-56) and we keep this work for the future study.

(2) A more quantitative analysis is needed. Comparison analysis is used in this paper, but some of the conclusions from these analysis is not convincing. A heat budget is needed to investigate the mechanism of the HE events and make a solid conclusion.

R: Thank you very much for your suggestion. The surface heat budget analysis is provided in Fig. 4c which shows that wind speed and solar radiation is the main heat flux component that influences the occurrence of HEs. As mentioned above, we keep the analysis of oceanic heat budget for future study.

Minor Comments:

Abstracts: The role of solar radiation, which is investigated in the main text, is not

underlined in the abstract.

R: Thank you very much for your correction. Now the role of solar radiation is added in the abstract (P1L43)

Page 6 Lines 15-20: "The HE is defined as a connected region with a SST higher than the space-time dependent threshold (~30°C), with an areal size larger than $2x10^6$ km, and lasting for a period longer than 6 days.": The definition of the HEs is not clear. Is the unit of the areal size criterion not correct? What the physics basis of these criterions (temperature threshold, areal size and duration) is? Why do you plus a 1.4C?

R: The brief explanation about HE definition can be found at Wirasatriya et al. (2015). To produce the threshold involving the variation of interannual and seasonal scale, the daily mean SST inside the daily contour of 27°C was low-pass filtered with a 101-day cutoff. The threshold is defined as the filtered background SST plus 1.4°C so that the mean of the HE threshold is 30°C. Since previous HE studies (Kawamura et al. 2008; Qin et al. 2007, 2008; Qin & Kawamura, 2009ab, 2010) found that ~30°C is a typical value for HE threshold. The area threshold was determined by the mean areal size of the SST $\geq$ 30°C in the study area during 2003–2011. The value is about 2×10^6 km^2. For the duration threshold, Webster et al. (1996) reported that, due to changes in ocean surface evaporation caused by SST variation, 3–6 day timescales are required for changes in cloud properties to feed back to the SST through their effects on the surface heat flux in unstable tropical atmospheres. The time threshold was determined by considering this timescale. Because HEs occurring under the clear sky condition may maintain the high SSTs last longer than 6 days, we set our time threshold to 6 days.

Page 7 Line 33: depth –> depths

R: It is done. (P6L28)

Page 8 Line 5: HE –> a HE event

R: It is done. (P8L13)

Pages 7&8: Fig.3 “compared the thermal structure of the western Pacific warm pool during the period with frequent HE occurrence in 2003 (Fig. 3a) and without HE occurrence in 2010 (Fig. 3b).” But it seems that HE events can be found during May-middle July of 2010. Does this period May-middle July of 2010 have HE events? Or why don’t you choose a period that has no HE occurrence?

R: Based on the HE criteria mentioned above, there is no HE during May to August 2010. From Fig 9b, we also cannot see the surface accumulated heat and then vertically transported heat as a signal of HE occurrence.

Page 9: What is the role of oceanic dynamics?

For example, equatorial Kelvin waves may also lead to short-term cooling and warming in the equatorial regions, including the layer from bottom mixed layer to the upper thermocline layer. The authors may discuss this possibility. Local wind and heat flux is not the only mechanism, especially for the subsurface temperature.

R: Thank you very much for your suggestion. The possibility of other oceanic factors has been added in the discussion (P17L31-26; P18L1-14)

Page 11: “The second investigation is the time series analysis shown in Fig. 5. It suggests that the variation of wind speed and solar radiation corresponds to the variation of SST and subsurface temperature (Figs. 5a,b).” This is not convincing. The time series is too short to make a statistical conclusion, and even for such a short period, the temperature variation is not always corresponds to local wind and heat flux. For example, during June 10-14, the solar radiation is above the mean and wind is week, but the SST is obviously lower than mean.

As I mentioned, the solar radiation and local wind is not the all mechanisms, and oceanic processes in the mixed layer and the upper thermocline layer is also important. A heat budget is needed to investigate the mechanism of the HE events.

R: Thank you very much for your comment. HE is a high frequency phenomena of high SSTs (i.e. gt ~30C). Their occurrence is mainly a result of air-sea heat exchange which controlled by solar radiation and wind speed (i.e., Kawamura et al. 2008; Qin et al. 2007, 2008; Qin & Kawamura, 2009ab, 2010; Wirasatriya et al. 2015, 2016). During June 10-14, solar radiation has increased to more than 200 W/m2. However, wind speed is still low (< 3 m/s). Thus HE cannot be generated. Fig 6ab, which describes the different HE also shows the same tendency. All 71 HEs that we found during 2003-2011 also show the same tendency as depicted in the statistical analysis provided in Wirasatriya et al. (2015).

Reviewer #2:

This paper uses the observational data in the ocean to examine the subsurface ocean features of the heat events (HEs) in the tropical western Pacific and its relation to atmosphere features.

They show that the stratification in the ocean in the development stage and decaying stage are different. They also show the HEs tends to happen in the warm pool while at the same time, the frequent HEs could help the formation of the warm pool.

I think the paper is well written and provides interesting features in the ocean to support the previous studies for the mechanism of HEs. I suggest minor revision with some extra analyses.

R: Thank you very much for the positive comments, We do appreciate it.

Major points:

1. It is interesting to show the different stratification of the subsurface ocean in the development and decay stage. However, I think it would be nice to also show the density profile which control the real stratification of the ocean in different stages. This could also show how the precipitation and surface flux influences the stratification respectively.

R: Thank you very much for your suggestion. We add the analysis of density and precipitation in Fig. 10. It is clearly shown that the occurrence of high precipitation prior to the development stage causes the formation of barrier layer denoted by the thin low density layer from the surface layer to about 20 m depth during the development stage (Fig. 10). This barrier layer may keep the solar heating only in the surface layer leading to the increasing SSTs during development stage. During decay stage, the density increases as the convergence brings fresher water in the surface to the deeper layer. (P18L24-46)

2. The relation of the wind, solar radiation, and precipitation with the phase of the HE is nice. However, could you explain why these atmospheric features would shift to another phase during the whole HE? Also, it is not clear to me why the stronger wind anomalies in the decay stage would be westerlies, which corresponds to ocean convergence. Are these anomalies or the total features?

R: Thank you very much for your questions. The climatological analysis of the difference of solar radiation and surface wind between the development and decay stage has been provided by Wirasatriya et al. (2016). It is found that solar radiation (wind speed) during development stage is higher (lower) than the decay stage. The strong wind speed during decay stage is dominated by westerly wind. About 68% of HE cases found during 2003-2011 has strong westerly wind during the decay stage. Lukas & Lindstrom (1991) reported that westerly winds

straddling the equator cause an Ekman convergence at the equator, resulting in a downwelling response in that area due to Coriolis effect (P13L26-34).

Minor points:

1. Page 6 line 6, there is no current results in Fig 2

R: It is deleted.

2. Page 6 last line, missing comma

R: Comma is added. (P6L53)

3. Page 7 ling 4 of 3.1, I think it would be helpful to draw the box you select in the fig.1

R: It is done

4. Page 9 line 17 of the second paragraph, I think the white and grey solid line are not coincide with each other.

R: It is changed into “the SST threshold contour at 40 m is much closer to the SST threshold contour at 80 m”. (P9L43)

5. Page 10 line 3 of second paragraph, parenthesis becomes superscripts. Here, I suggest changing the i.e. (e.g., "i.e. about 7m/s") into parenthesis (e.g., "(about 7m/s)"), which might be clearer. Also, in general, adding parenthesis to all the i.e., would be better.

R: It is done.

6. Page 11: here, you mention the temperature threshold bulges to the surface due to high wind (in the developing stage). Could you explain why this is the case and how it is different from the decaying phase.

R: The explanation of P11L1-5 is to emphasize the role of solar radiation and surface wind speed to the SST variation during HE. Even though during the development stage, in the area around 155°E (*red triangle* in Fig 4c) the contour of temperature threshold extend to the surface due to the higher surface wind speed and lower solar radiation than its surroundings. During decay stage, when the wind speed (solar radiation) becomes higher (lower), temperature in the area around 155°E is lower than its surroundings.

7. page 14 line 8, should this be figure 8b?

R: Thank you very much for your correction. Yes, it is Fig. 8b.

8. page 16 in the end of the second paragraph, for background state of Pacific, why is the solar radiation higher in the warm pool? It should have more convection in the warm pool?

R: Thank you very much for your correction. It is changed into "For radiation flux, distribution of solar radiation in the western side is lower than the eastern side of the equatorial Pacific. However, the distribution of the mean solar radiation in the west side is still higher than 200 W/m^2 (Fig. 9 of Wirasatriya et al., 2015)." (P16L41-49).

9. You emphasize the relation of HE and warm pool are mutually helping each other, causing the positive feedback in the discussion. However, for the beginning of the paper, it sounds more like the HE causes the warm pool formation. Is there a reason that you phrase like this?

R: Thank you very much for your question. Actually it does not sound like that. In the introduction, we explain the relationship between the western Pacific warm pool and HE that statistically provided by Wirasatriya et al. (2015). In the warm pool area enclosed by the 29.5°C isotherm of the climatological SST, HEs coincide with SST greater than 30°C with the percentage of 51.5%. (P3L58-61; P4L1-15). Thus in the present study we indicate the possible role of HEs on regulating the warm isothermal layer in the western Pacific warm pool.

10. The role of the diurnal cycle is mentioned a few times but is not explained in the paper. It would be nice to shortly explain a little on the role of diurnal cycle although it is not the focus of this paper.

R: The role of diurnal cycle for HE occurrence has been investigated by Wirasatriya et al. (2015). The HE occurrence corresponds to large amplitude of diurnal SST. (P2L52-60).

11. Fig. 1 : missing period for the second sentence. The color of the dots mention in the caption might be wrong. Purple shows up twice. Also, the color purple in the plot is a little not obvious.

R: thank you very much for your corrections. Fig. 1 is revised.

12. Fig 2 : could also circle the (a) plot with red box

R: It is done.

13. Fig 3: do no indicate (a), (b)

R: it is done.

14. Fig 4: net heat, not netheat

R: it is done.

15. Fig 9: it is better to indicate the heat content as shading, for example, adding "(shading)" after "heat content". The discussion about the solar radiation and the zonal wind in the developing and decaying phase is not clear to me (in the end of page 14). I think it would be helpful to indicate the developing and decaying phase with the bar in this plot for each event (as in figure 5, 6, 7). The axis of (a) should be adjusted. The font is too large so there is no space between each number.

R: Thank you very much for your correction. We do hope that now Fig. 9 is more understandable after correction. The point of Fig. 9a is to show that except for HE030413, the development and decay stages of HEs are controlled by the zonal wind variation as explained in Wirasatriya et al. (2016); weak wind during the development stage and westerly wind during the decay stage.

16. Fig 10: it would be nice to indicate these are all anomalies. Also, it is a little hard to understand some difference in the plot. The circulation is one thing that is not clearly discussed. The anomalous vertical motion forms two circulations in the meridional direction in the developing phase but not in the decaying phase. Is there any explanation? Also, there are both deep and shallow clouds in this plot. What are their relative roles in these two phases? Another thing is why would the thermocline in the developing phase not shoal to the bottom of the surface warm water?

R: Thank you very much for your questions. Actually this figure compiles the mechanisms of HE030528 for atmospheric aspects as shown in Wirasatriya et al. (2016) and oceanic aspects as shown in the present study. Thus, the brief explanation of the atmospheric aspects can be found in Wirasatriya et al. (2016). The anomalous vertical motion forms two circulations in the meridional direction in the developing phase that suppress convection above the HE030528. The suppressed convection then created low cloud cover band along the HE area increasing solar radiation during the development stage. During the decay stage, surface wind speed increased, surface convergence became stronger and convection process began to reduce solar radiation. Yes, there 2 cloud bands at around 900 hPa and 200 hPa. During development stage, the cloud band at the upper layer is disappear due to the air subsidence as a result of the double

meredional circulation. In the lower layer, the cloud band reduce but not totally diminishes since weak convection still occurs near the sea surface. During decay stage, both cloud bands are intensified due to the intensified convection. In the present study, we do not investigate the variation of thermocline. The variation of thermocline may involve more complex oceanograpic factors such as kelvin wave, entrainment, lateral mixing which are left for future study.

Lampiran 4

Your Submission

From: Alejandro Orfila (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Friday, February 28, 2020, 09:10 AM GMT+7

CC: a.orfila@uib.es

Ref.: Ms. No. ODYN-D-19-00140R1
Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool
Ocean Dynamics

Dear Dr Wirasatriya,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

Your revision is due by 28 Mar 2020.

To submit a revision, go to https://www.editorialmanager.com/odyn/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Please make sure to submit your editable source files (i. e. Word, TeX).

Yours sincerely

Alejandro Orfila, Ph.D.
Associate Editor
Ocean Dynamics

Reviewers' comments:

Reviewer #1: The authors have satisfactorily addressed my concerns.

Reviewer #2: The authors address most of the points I proposed before. However, I feel the flow of some paragraph is a little hard to follow and some words are missing. I think it would be better to refine the wording before it can be published.

abstract:
I am a little confused on the sentence "We found …". Are you missing the part you describe how the thermal structure plays a role?

Page 2:

30degC, no space

end of the second paragraph of the Introduction:
I feel the last sentence is a little isolated from the sentence before it.
- Maybe you should put it before you start to describe the conclusion (e.g., several studies (…) were able to identify high SST events in specific areas and at certain time periods and define them as Hot Event (HE). These studies focused on the atmospheric structure and SST in HE regions and their general conclusion was that the generation of a HE is characterized by significant daily heat gains under the condition of high solar radiation and low wind speed.)
- Or, you could put it at the beginning of the next paragraph so it is directly linked to the ocean roles you want to explore.

Page 5

Is the mean of the HR threshold 30C or around 30C?

I think you also use the data from 2003-2011. It is not specified in the Data and Methods session.

The detail"ed" definition of development and decay stage can be found in Wirsatriya et al. 2016.

Page 6

Some words are missing?
The data with the highest "quality" satisfy pre/post-deployment "calibrations"

Page 8
Beginning of 3.2, detail=> detailed

Page 9
Using the comparison between 1m vs 40m of the SST threshold and 40m vs 80m seems not very convincing. It is not clear in the Fig 4b that the 1-40m is more stratified than the 40-80m. Looks like it depends on different locations. For example, it is more stratified at 40-80m near 156-160E.
This is especially confusing because there is almost no contour for 80m of the SST threshold (based on my understanding, white solid contour only shows up at one very small area). I feel it is hard to say it is closer to the 40m contour.
Later in the paragraph, you also emphasize the difference in the stratification is confined in the levels <20m. In this case, it seems not very relavant to use the comparison between 40m and 80m to show the difference in stratification during different stages?

Page 10
"For the heat flux component driven by wind speed, latent heat flux has much larger (more than 100 W/m2), than sensible heat flux." => Do you miss a "magnitude" after "larger" and having an extra "," after the parenthesis?

Maybe it is better to say: disequilibrium in humidity plays a more substantial role than the disequilibrium in temperature between air and sea surface.

Isn't surface wind speed 2 m/s vs 4m/s for development and decay stage at the red triangle (instead of 4 m/s vs 7 m/s)?

Wind speed and solar radiation "are"; Results of all heat flux aspects "are"

Page 11

The contour of temperature threshold extend"s"

In fig 5, it seems that the solar radiation decreases to 100 W/m^2, not 50 W/m^2

Page 12

What is the causality relation between "Surface stratification during development stage of HE corresponds to the high amplitude of diurnal SST" and "the development stage corresponds to warmer and more stratified water"? I am not following why you use "Thus" here.

Page 14
For 030413, it seems that the heat content structure is not consistent to other events (you said "The results are consistent with those during HE030413,") It seems that this exception is only emphasize when you talk about wind

Page 16
"the western part of the western Pacific warm pool quite different from that in the eastern part." Are you talking about the western and eastern part inside the western Pacific warm pool or you are talking about the western and eastern part of the whole Pacific? It is a little unclear to me.

I think for this paragraph, it is a little unclear what are the buoyancy forcing and other things? It sounds like you only specify the buoyancy forcing from P-E but are other things (e.g., the radiation flux) also buoyancy forcing?
I am a little confused because you talk about radiation flux first and then mention the relation of buoyancy flux and thermal stratification were discussed in Lukas & Lindstrom 1991. After that you immediately mention the buoyancy forcing associated with P-E plays a role.
In summary, if possible, I think the organization of this paragraph (or the wording) could be improved to make it a little clearer.

End of the page: Is the upwelling induced by strong wind or evaporation excess? I think it is the former? But it is not clear from your sentence.

Page 17
"The influences of equatorial wave such as Kelvin and Ros"s"by waves that generates downwelling and upwelling actions, then subduction, entrainment, and also lateral mixing"," which regulate oceanic heat budget in the warm pool "," were neglected in the present study"

Is there an "over" or "in" in this sentence?
"the low SST band "over?" western Pacific warm pool"

page 18
how many HE events are detected during the time they identify 29 HE cases related to MJO? It is hard to know whether it is "only" 29 cases if we don't know the total number.

Page 19
"The whole HE processes creates typical vertical thermal structure of the HE as explained in the previous section.", are you talking about the HE0611-west here??

Lampiran 5

Submission Confirmation for ODYN-D-19-00140R2

From: ODYN Editorial Office (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Sunday, March 15, 2020, 11:04 AM GMT+7

Ref.: Ms. No. ODYN-D-19-00140R2
Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool

Dear Dr Wirasatriya,

Ocean Dynamics has received your revised submission.

You may check the status of your manuscript by logging onto Editorial Manager at (https://www.editorialmanager.com/odyn/).

Kind regards,

Reviewer #1: The authors have satisfactorily addressed my concerns.

R: Thank you very much.

Reviewer #2: The authors address most of the points I proposed before. However, I feel the flow of some paragraph is a little hard to follow and some words are missing. I think it would be better to refine the wording before it can be published.

R: Thank you very much for comment. We have revised the manuscript following your suggestions. Hopefully this revised version is better.

abstract:

I am a little confused on the sentence "We found …". Are you missing the part you describe how the thermal structure plays a role?

R: We have modified the sentence to become more understandable “We found that the occurrence of HEs can be identified by the typical vertical thermal structure within the isothermal layer.” (P1L34-35)

Page 2:

30degC, no space

R: It is done. (P2L13)

end of the second paragraph of the Introduction:

I feel the last sentence is a little isolated from the sentence before it.

- Maybe you should put it before you start to describe the conclusion (e.g., several studies (…) were able to identify high SST events in specific areas and at certain time periods and define them as Hot Event (HE). These studies focused on the atmospheric structure and SST in HE regions and their general conclusion was that the generation of a HE is characterized by significant daily heat gains under the condition of high solar radiation and low wind speed.)

- Or, you could put it at the beginning of the next paragraph so it is directly linked to the ocean roles you want to explore.

R: We have restructured the sentence in paragraph 2 to deliver better flow of the story. (P2L27-52)

Page 5

Is the mean of the HR threshold 30C or around 30C?

R: Around 30C. (P5L17)

I think you also use the data from 2003-2011. It is not specified in the Data and Methods session.

R: Thank you very much for your correction. We have added it. (P4L54)

The detail"ed" definition of development and decay stage can be found in Wirsatriya et al. 2016.

R: It is done. (P5L50)

Page 6

Some words are missing?

The data with the highest "quality" satisfy pre/post-deployment "calibrations"

R: Thank you very much for your correction. We have added it. (P6L5-7)

Page 8

Beginning of 3.2, detail=> detailed

R: It is done. (P8L43)

Page 9

Using the comparison between 1m vs 40m of the SST threshold and 40m vs 80m seems not very convincing. It is not clear in the Fig 4b that the 1-40m is more stratified than the 40-80m. Looks like it depends on different locations. For example, it is more stratified at 40-80m near 156-160E.

This is especially confusing because there is almost no contour for 80m of the SST threshold (based on my understanding, white solid contour only shows up at one very small area). I feel it is hard to say it is closer to the 40m contour.

Later in the paragraph, you also emphasize the difference in the stratification is confined in the levels <20m. In this case, it seems not very relavant to use the comparison between 40m and 80m to show the difference in stratification during different stages?

R: Thank you very much for your suggestion. We have deleted the analysis 40m vs 80m to describe the stratification. The different thermal stratifications between the stages are analyzed by using only Fig. 4b. (P9L34-59)

Page 10

"For the heat flux component driven by wind speed, latent heat flux has much larger (more than 100 W/m2), than sensible heat flux." => Do you miss a "magnitude" after "larger" and having an extra "," after the parenthesis?

R: Thank you very much for your correction. We have added it. (P10L5-6)

Maybe it is better to say: disequilibrium in humidity plays a more substantial role than the disequilibrium in temperature between air and sea surface.

R: Thank you very much. It is done. (P10L7-13)

Isn't surface wind speed 2 m/s vs 4m/s for development and decay stage at the red triangle (instead of 4 m/s vs 7 m/s)?

R: Thank you very much for your correction. It is revised into 2 m/s and 4 m/s. (P10L25)

Wind speed and solar radiation "are"; Results of all heat flux aspects "are"

R: It is done. (P10L39)

Page 11

The contour of temperature threshold extend"s"

R: It is done. (P10L59)

In fig 5, it seems that the solar radiation decreases to 100 W/m^2, not 50 W/m^2

R: Thank you very much for your correction. Yes it is 100 W/m2. (P11L45)

Page 12

What is the causality relation between "Surface stratification during development stage of HE corresponds to the high amplitude of diurnal SST" and "the development stage corresponds to warmer and more stratified water"? I am not following why you use "Thus" here.

R: Thank you very much for your notice. We have reorganized by putting this part after the analysis of HE041216 since this part is discuss about HE041216. We hope that the flow of the story becomes better now. (P12L21-61)

Page 14

For 030413, it seems that the heat content structure is not consistent to other events (you said "The results are consistent with those during HE030413,") It seems that this exception is only emphasize when you talk about wind

R: Yes. The exception is only about wind. So we separate this part to avoid confusion. (P15L2-12)

Page 16

"the western part of the western Pacific warm pool quite different from that in the eastern part." Are you talking about the western and eastern part inside the western Pacific warm pool or you are talking about the western and eastern part of the whole Pacific? It is a little unclear to me.

R: the eastern part of the western Pacific warm pool. (P16L34)

I think for this paragraph, it is a little unclear what are the buoyancy forcing and other things? It sounds like you only specify the buoyancy forcing from P-E but are other things (e.g., the radiation flux) also buoyancy forcing?

I am a little confused because you talk about radiation flux first and then mention the relation of buoyancy flux and thermal stratification were discussed in Lukas & Lindstrom 1991. After that you immediately mention the buoyancy forcing associated with P-E plays a role.

In summary, if possible, I think the organization of this paragraph (or the wording) could be improved to make it a little clearer.

R: Thank you very much for your comment. We have reorganized the sentences to be more understandable. (P16L17-P17L12)

End of the page: Is the upwelling induced by strong wind or evaporation excess? I think it is the former? But it is not clear from your sentence.

R: Yes, it is strong wind. (P17L10)

Page 17

"The influences of equatorial wave such as Kelvin and Ros"s"by waves that generates downwelling and upwelling actions, then subduction, entrainment, and also lateral mixing"," which regulate oceanic heat budget in the warm pool "," were neglected in the present study"

R: It is done. (P17L44)

Is there an "over" or "in" in this sentence?

"the low SST band "over?" western Pacific warm pool"

R: We add “in”. (P17L54)

page 18

how many HE events are detected during the time they identify 29 HE cases related to MJO? It is hard to know whether it is "only" 29 cases if we don't know the total number.

R: We have add total cases (I.e., 71 cases). (P18L51)

Page 19

"The whole HE processes creates typical vertical thermal structure of the HE as explained in the previous section.", are you talking about the HE0611-west here??

R: Yes. (P19L17)

Lampiran 6

Your Submission

From: Alejandro Orfila (em@editorialmanager.com)

To: aninosi@yahoo.co.id

Date: Tuesday, March 17, 2020, 08:22 PM GMT+7

CC: a.orfila@uib.es

Ref.: Ms. No. ODYN-D-19-00140R2
Thermal Structure of Hot Events and Their Possible Role in Maintaining the Warm Isothermal Layer in the Western Pacific Warm Pool
Ocean Dynamics

Dear Dr Wirasatriya,

I am pleased to tell you that your work has now been accepted for publication in Ocean Dynamics.

Comments from the Editor and Reviewers can be found below.

Thank you for submitting your work to this journal.

With kind regards

Alejandro Orfila, Ph.D.
Associate Editor
Ocean Dynamics

Comments from the Editors and Reviewers:

Lampiran 7

Your article in Ocean Dynamics has been published in the completed journal issue

From: Springer (springeralerts@springeronline.com)

To: aninosi@yahoo.co.id

Date: Saturday, May 23, 2020, 05:40 PM GMT+7

Final publication of your article 2020-05-23

Your article has been published in the completed journal issue

Dear Anindya Wirasatriya,

Good news for you: Your article has now been published in the paginated issue:

Title
Thermal structure of hot events and their possible role in maintaining the warm isothermal layer in the Western Pacific warm pool

Journal
Ocean Dynamics, 70(6), 771-786

DOI
10.1007/s10236-020-01362-8

This information can be used to cite your article. The Digital Object Identifier (DOI) can make it easier for readers to find your article in print and online.

Your paper is available electronically :
http://link.springer.com/article/10.1007/s10236-020-01362-8

We encourage you to forward this email to your co-authors and colleagues or mention your article and its DOI on your website or your social media profiles.

Download Your e-Offprint (PDF file)

http://www.springer.com/home?SGWID=0-0-1003-0-0&aqId=3988517&download=1&checkval=8ea8300c89eb98f5b5fc39365344837a

Please note: Your free e-Offprint will only be available for four weeks!

If you have ordered additional (print) offprints please note that they are currently being prepared and will be delivered to you shortly.

Springer Nature also offers a service to create professional short animated videos – click here to find out more.

Thank you again for publishing with us. We hope that your experience with Springer was a satisfying one and we look forward to your future contributions! For more information, visit our author website at springer.com/authors, or contact our Author Helpdesk.

Best regards,

Your Marketing Team

If you have any questions, please contact our Springer Nature Customer Service
customerservice@springernature.com

Springer Nature, Tiergartenstr. 15-17, 69121 Heidelberg, Germany
Tel: +49 6221 345 0, Fax: +49 6221 345 4229

Springer Nature, 233 Spring Street, New York, NY 10013, USA
Tel: +1-212-460-1500, Fax: +1-212-460-1700
(Weekdays 8.30am - 5.30pm ET)