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Ocean Science
Discussions
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Interactive comment on "Mesoscale processes regulating the upper layer dynamics of Andaman waters during winter monsoon" *by* Salini Thaliyakkattil Chandran et al.

Salini Thaliyakkattil Chandran et al.

salinitc@gmail.com

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Reviewer 2 1. Observation-based analysis (Figs 2 and 3): I'm not convinced you sampled an eddy in the stations you show. Yes, there is some northward flow to the west and some southward flow to the east, but it is hard to confirm it is an eddy on not only a current interacting with the continental shelf. The SSH map cannot confirm this is an eddy - it does not resolve this scale (only features that are larger than 110 km in radius) We changed the SSHA-geostrophic current figure and adopted Okubo-Weiss method to track the eddy. From this we confirmed the presence of cyclonic eddy.

2. Even if you still think that the ADCP data and the SSH maps indicate the presence

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of a sub-mesoscale eddy, this eddy is anticyclonic (clockwise rotation in the northern hemisphere). Therefore, all the discussion and data interpretation that points this eddy as being cyclonic is erroneous (e.g., lines 144, 152). Please, re-interpret your data keeping this in mind.

SSHA and geostrophic current plot confirmed the presence of cyclonic eddy in the region

3. I could not understand why the authors show the vertical sections of T, S, and density only down to 200 m in Figure 2. If these variables where sampled by the CTD, I would expect deeper measurements. If you look at values below 200 m, you might get more insight about the structure you sampled.

Included the same in the revised manuscript

4. Still about Figure 2: the max and min values in the colour axes in (b), (c), and (d) are not appropriate. This choice might be hindering some isolines above 40 m. Please review this figure. Reviewed the figure as per the suggestion of the reviewer

5.I could not understand the advances this manuscript brings to the Rossby Wave propagation and eddy triggering to the literature. Please state it in the manuscript. 6. I was not convinced that the Rossby Waves indeed triggered the eddy. You need more results to support this claim. The whole section on "Generation Eddy Mechanism" needs through review and more results to confirm your claims. The statement in lines 218-220 needs proof to be accepted.

Answer to 5 and 6: The hovmuller diagram on SSHA zonally along 8ïĆřN indicate the westward propagation of Rossby crossing the eddy area which modify the regional dynamics. Forcing mechanism of the eddy is identified as due to the baroclinic instability due to vertical shear in the horizontal flow; one of the reason for which is the westward propagating Rossby wave (Nuncio and Prasannakumar, 2012)

7. Figure 6 shows higher [chla] close to the islands. You claim this is because of eddy

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effect. It just looks like it is a natural coastal increase in nutrients (river runoff, upwelling, current-bottom friction). Is this region of the world different, and these processes would not be in place?

This high chla near island chain is due to the island effect and extened high patch towards offshore is due to the strong cyclonic eddy as indicated by the high Okubo-Weiss parameter.

8. Figure 8 actually suggests an increase in [chla] caused by the presence of an eddy. See the spiralling green patch between 11-14N and 85-88E. This might relate to a cyclonic eddy.

This is a cyclonic eddy present in BoB during winter which already discussed in detail by Vinayachandran and Simi (2003)

9. The part of the manuscript that requires a specially careful analysis and interpretation is the SSHA analysis (Figure 7). The SSH product used does not resolve the features you are trying to investigate. You need to zoom out to look at the mesoscale eddies. In addition, an eddy is defined by a closed SSH contour. You cannot see this in any of the features you indicate as “eddies". All the paragraphs in the manuscript related to this figure must be intensively corrected.

Modified the plot on SSHA and geostrophic current and included in the revised manuscript

10. I could not comment on the biogeochemical results (Table 1) and in the wind stress results because they are not presented in a suitable manner. Please make a figure with the values in Table 1 and a figure with the wind results if included in the next manuscript.

11. The domains you look at in Figures 1, 2, 6, 7, and 8 are all different in space - and probably in time (but I can’t tell because this information is not given). You cannot discuss the “eddies" from these different datasets as you do here because they are

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not the same ones! In order to explain the basin scale processes and link this into the insitu observations.

Minor comments

7. Lines 50-52: does this relate to Andaman eddies or eddies in general? Explained in the context of BoB but the case is general

8. Lines 61-63: does this relate to Burnaprathepart 2010 eddy or to the eddy you describe in this manuscript?

It is the eddy described by Burnaprathepart 2010

9.In the Data and Methods section, you should only include what you used in your manuscript. For example, you did not analyse AVISO data between 2003 to 2013.

The data used for wavelet analysis 11. Please describe in the manuscript the reason for working with the weekly AVISO dataset, instead of the daily product. We have taken weekly product to avoid small scale variation 12. Line 107: Before describing the wavelet analysis, it helps the reader if you write a brief line saying what you use it for later on the manuscript. In the present study the wavelet is applied to explain the temporal variation of SSHA in the eddy region to explore the life span and frequency of the processes during the 10 years. 15. Line 151: The figure does not show this is a sub-surface cyclonic eddy. You are not resolving this feature neither in the horizontal direction or in the vertical direction. The temperature profile indicates the core of the eddy in the subsurface (40-60 m) along the transect. The ADCP derived current gives the measurements from 16-88 m only. However the SSHA derived geostrophic current indicate the presence of eddy in the surface water also. These gives the indication that the core lies in the sub-surface with its influence extending tto surface.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-23/os-2018-23-AC2-supplement.pdf

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Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2018-23, 2018.

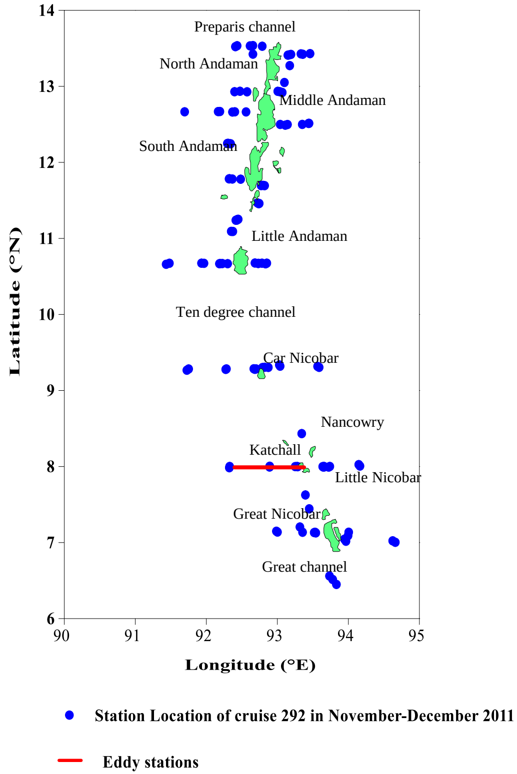

Fig. 1 Station Location

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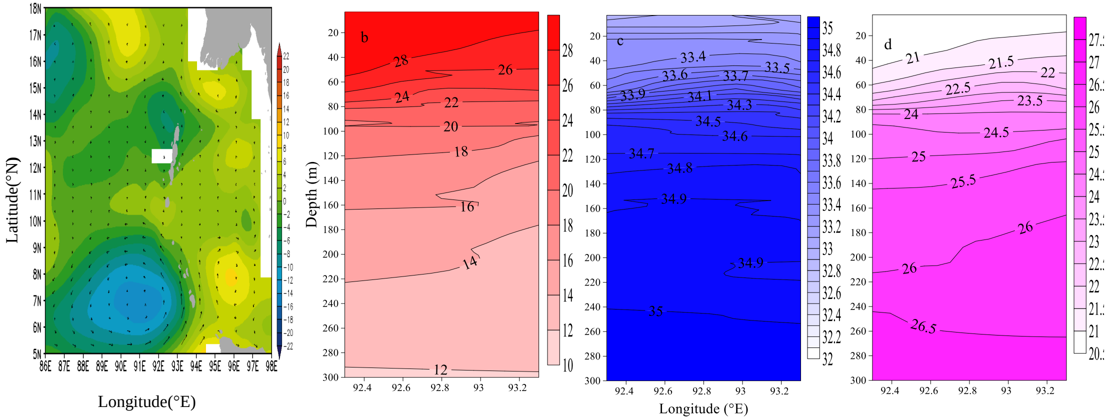

Fig. 2 a) Sea Surface Height (cm- Aviso weekly) and geostrophic current (cm/s) and the eddy location b) Vertical temperature (°C), c) salinity and d) density (kg/m^3) distribution at the eddy location

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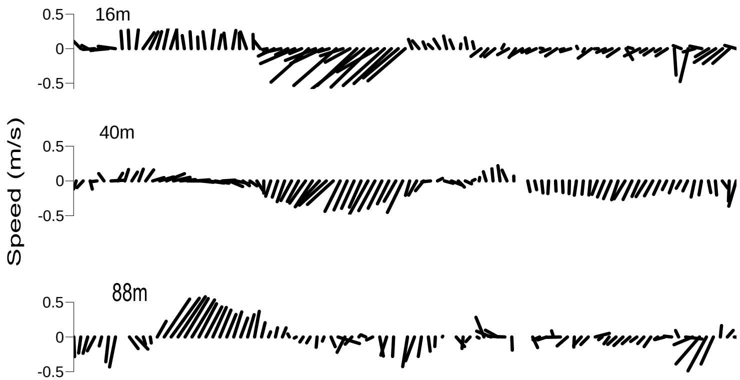

Fig. 3 Horizontal current (m/s) structure at different depth at 8°N

Fig. 3. Fig. 3 Horizontal current (m/s) structure at different depths along 8°N

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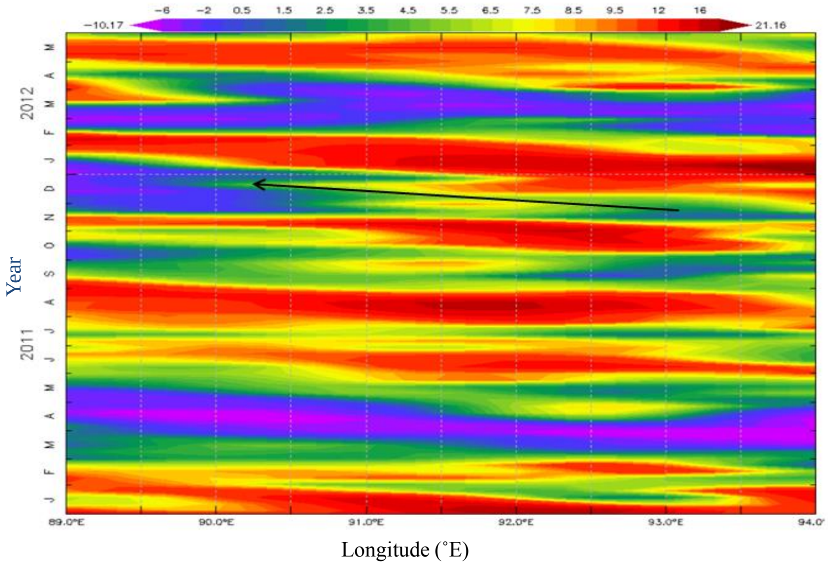

Fig. 4 Hovmuller diagram of SSHA(m) (Aviso monthly) along 8°N

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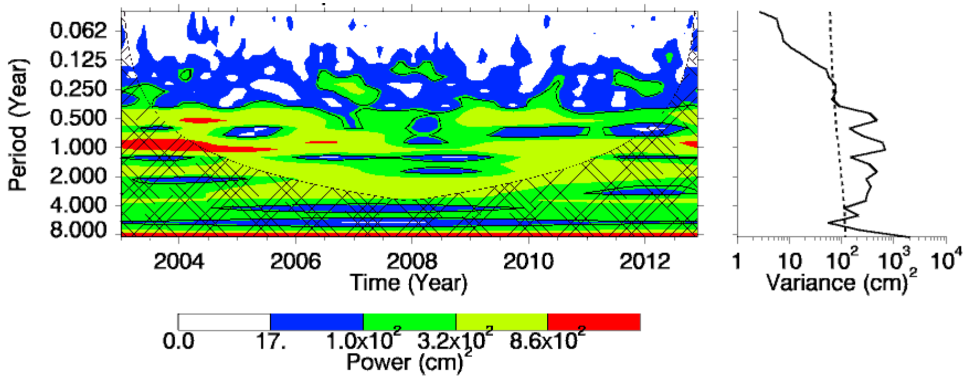

Fig. 5. Wavelet spectra of SSHA (m- Aviso monthly from 2003-2013) along 8°N

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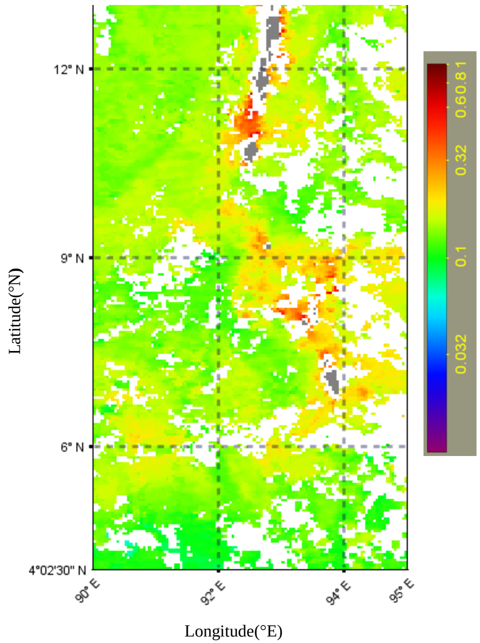

Fig. 6 chl a (mg/m^3- weekly MODIS Aqua) pattern during the insitu observation

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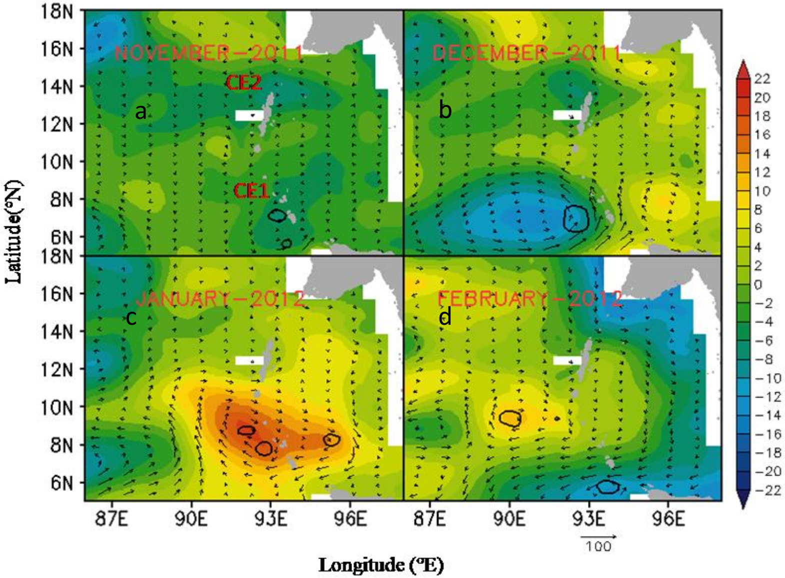

Fig. 7 Merged map of SSHA (m), Geostrophic current (cm/s) and Okubo-Weiss paremeter (Black contour of -2x10-11/s2) from Aviso during a) November b) December c) January d) February

Fig. 7. Fig. 7 Merged map of SSHA (m), Geostrophic current (cm/s) and Okubo-Weiss paremeter (Black contour of -2x10-11/s2) from Aviso during a) November b) December c) January d) February

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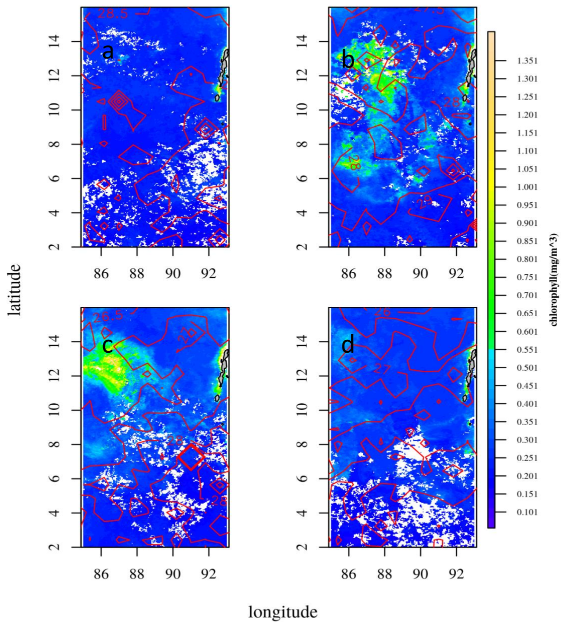

Fig.8 Overlap map of SST (°C-monthly MODIS Aqua) and Chl a (mg/m^3- monthly MODIS Aqua) during a) November, b) December, c) January, d) February

Fig. 8. Fig.8 Overlap map of SST (ïĆřC-monthly MODIS Aqua) and Chl a (mg/m3- monthly MODIS Aqua) during a) November, b) December, c) January, d) February

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