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Interactive comment on "Eddy-induced Track Reversal and Upper Ocean Physical-Biogeochemical Response of Tropical Cyclone Madi in the Bay of Bengal" *by* Riyanka Roy Chowdhury et al.

Anonymous Referee #2

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General Comments:

Based a suite of atmospheric and oceanic datasets during the passage of TC Madi, Chowdhury et al. examined the upper ocean physical-biogeochemical response to the TC, mostly emphasized the effect of pre-existing cold core eddies underneath the TC. The topic of TC-ocean interaction in the BoB is interesting and important for TC forecasting. Generally, the effect of mesoscale eddy on TC-ocean interaction is well known at the present stage. Due the lack of in situ observations, studies on the Biogeochemical response to a TC is relatively less and this study may enrich our knowledge on the

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biogeochemical change induced by TC passage.

In the manuscript, I find some conclusions are inaccurate or unclear with not sufficient evidences, especially on the effect of mesoscale eddies. Therefore, I suggest a major revision prior publication. I hope the following comments are useful when the authors revise their manuscript.

(1) How does cyclonic eddy (also OHC in line 143) affect TC translation speed? The authors only described the time series of translation speed and position of eddy, but did not clearly demonstrate the related mechanisms. The authors should supply more evidence to demonstrate how the eddy modulates steering flow and then affect TC translation speed.

(2) On the effect of mesoscale eddy on TC intensity change. The authors just described the movement of TC Madi and relative position with respect to the eddies and then concluded the intensity change of Madi was dominated by the eddies. I do know the authors show OHC change during the TC passage, but acctually the key (oceanic) factor controlling TC intensity change is SST. At least, the time series of SST like figures 2-4 should be given to substantiate the eddy effect. Furthermore, the slow TC translation speed may induce large SST cooling and contribute to the weakening of Madi.

(3) On the mechanism of SST and biogeochemical response. The authors concluded that the SST cooling and Cha increase was due to eddy-pumping of subsurface waters. However, there were clear sursurface temperature increase and Cha decrease in the thermocline in Fig. 11, indicating a non-negligible role of diapycnal mixing. This was also consistent with results from many previous studies, i.e., the SST change was mainly due to diapycnal mixing (Price 1981).

Specific comments

(1) line 67: the Unisys Weather does not give TC track information right now. Actu-

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ally, the TC track information of Unisys Weather is originated from the Joint Typhoon Warning Center.

(2) line 80: The temperature profiles should be indicated to calculate OHC.

(3) line 123-124: Most people may be not familiar with the classification of intensity of IMD. Please give the range of wind speed of different IMD categories or use the more popular Saffir-Simpson scale.

(4) line 149 & 150: Compared with the huge OHC of the ocean, the heat uptake by a TC was very small. The decrease of local OHC may be subject to the advection of TC induced strong currents.

(5) line 189 & 200: To examine the effect of vertical wind shear on TC, people mostly average the vertical wind shear azimuthally around the TC center, not the spatial map as in Fig. 5. Relatively, vertical wind shear of 10-15 m/s is not small and may compromise TC intensification.

Technical corrections

(1) line 25: “occurred” should be “ever reported”

(2) line 153: delete the first “it”

(3) line 339: delete the second “and”

(4) Line 875-883: The line number overlaying the figure legend is confusing.

Reference: Price J F. Upper ocean response to a hurricane[J]. Journal of Physical Oceanography, 1981, 11(2): 153-175.

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