

Interactive comment on “Winter mixing, mesoscale eddies and eastern boundary current: Engines for biogeochemical variability of the central Red Sea during winter/early spring period” by Nikolaos D. Zarokanellos and Burton H. Jones

Anonymous Referee #1

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Numerous studies during recent years have focused on the central Red Sea, including on the relationship between physical processes and biological activity (e.g. Chen et al., 2014; Zarokanellos et al., 2017ab; Triantafyllou et al., 2014; Dreano et al., 2016; Wafar et al., 2016). The present study presents new data, mainly collected by ocean gliders, to investigate the effects of winter mixing, lateral advection and eddies on biological activity. The data is new, but parts of the results are either known or expected (e.g. Zarokanellos et al., 2017ab; Triantafyllou et al., 2014; Dreano et al., 2016; Wafar et al., 2016). As the data is limited to a short period, many of the statements on the

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relationship between different variables do not seem robust. In addition, there are no sensitivity tests to some of the arbitrary divisions into wind speed and glider sections.

I would suggest the author to try synthesizing the data and results from the above-mentioned references (and few others) instead of focusing on a limited data set that cannot provide conclusive statements (examples below). Altogether, there is now a bulk of data from different sources and different seasons, that can be used to study physical-biological coupling in the Red Sea.

Additional comments: The authors divided the period into three sections: winter mixing, intensified eddy, and strong eastern boundary current. However, no support to this division is provided. Can you demonstrate using satellite data, field observations, or operational numerical simulation the existence of strong eddy and EBC during the corresponding periods? Fig. 8, which is shown only toward the end of the manuscript, provides very limited evidence.

Page 9, line 228: are the results sensitive to the specific division?

Section 3.1: a. Show the lag correlation between air and sea temperature. b. MLD is maximal when Daily mean air temperature is minimal on Jan 11, but similar air temperature appears on Feb 20, and MLD then is rather shallow. . . c. Overall, weak correlation between wind stress and MLD. How sensitive are the correlations to the division into wind speed categories?

Page 10. Line 273: MLD mixing is not monotonic, and there are cases with strong wind and no mixing.

Page 10, line 276: Where do we see the existence of CE and AE? (the sections shown in Figure 3 are not enough to demonstrate that there are both CE and AE). Also, we expect the MLD to respond differently in CE and in AE.

Section 3.4: can you distinguish between the contribution of the introduction of a new watermass from the Gulf of Aden and uplift of isopycnal by the CE?

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Minor comments (partial list) Cetinic' et al. (2009) Is missing Figure 1: the blue is hardly seen Line 127: extra space Line 142: significantly? Line 207: "study region"? Line 548: there-> that

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