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Interactive comment on "Estimation of geostrophic current in the Red Sea based on Sea level anomalies derived from extended satellite altimetry data" *by* Ahmed Mohammed Taqi et al.

Anonymous Referee #1

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The paper "Estimation of geostrophic current in the Red Sea based on Sea level anomalies derived from extended satellite altimetry data" by Taqi et al. focuses on describing the geostrophic currents and eddy field in the Red Sea based on altimetry data, extended to the coast using a method proposed by same authors (Taqi et al., 2017). The first part consists of a continuation of the validation of the method (adding hydrographic data for estimating the geostrophic velocity) and the second part provides an analysis of the monthly climatology of the sea level anomaly (SLA) and the corresponding surface currents (averaging 6 years satellite data).

The validation part provides very little additional analysis compared to the Taqi et al.,

2017, while there is no information and/or reference related to the cruises that were used for estimating the geostrophic currents (lines 107-110). Actually, after checking the reference provided later in the text (e.g. Bower and Farrar, 2015) the cruise(s) covered a much larger area than the one used and shown in this paper. It is not understood why the authors selected the specific regions to perform the validation. The cruises also used an LADCP and thus the adoption of 700 m reference level seems arbitrary (actually most of the stations are shallower than that). The comparison and error estimation is very qualitative (comparing figures) and in figure 4a,b (the largest area covered) it is impossible to visualize the results.

The second part is very weak, merely describing the twelve monthly SLA/geostrophic velocity figures. The methodology of averaging 6 years of SLA data to describe the climatology of the complex Red Sea eddy field is not appropriate. While the basin-scale seasonal variability of the SLA can benefit very little from the new method of extending the data to the coast (this comparison is not shown), the averaging could mask the eddy field and produce artificial features. More advanced methods, including the interannual variability of the SLA/geostrophic currents, could provide more reliable information (see Zhan et al., 2014 and many more). Finally, the schematic circulation, presented in figure 7, based on the annual geostrophic currents is not convincing (at least compared to the black arrows shown in the figure). A seasonal schematic could be more appropriate.

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