

Interactive comment on “Can we use sea surface temperature and productivity proxy records to reconstruct Ekman Upwelling?” by Anson Cheung et al.

Anonymous Referee #1

Received and published: 13 August 2019

The paper by Cheung et al. uses satellite data to test whether Ekman pumping is likely to be detectable in marine sediment records from the Southern Californian margin through proxy records, especially those relating to SST and productivity. They conclude that important processes, such as Ekman pumping, do not occur across all timescales, and that an integrated proxy record is unlikely to accurately reflect the spatial variability associated with Ekman pumping. They further show that inclusion of multiple sites may increase the reliability of proxy records. Overall, this is an interesting study and the conclusions seem sound and well supported. I do have a few comments, which I hope can serve to improve the manuscript.

C1

First, I am surprised the authors have not included much of a temporal element in applying their modern observations to sediment core reconstructions. The authors are quite convincing in showing that annually averaged (or seasonally weighted) models do not represent the true spatial extent of Ekman upwelling. However, what they don't seem to test is whether time averaged variability in these phenomena would be captured in the sediment. After all, this is what the vast majority of marine sediment studies record – temporal variability (even relative) at a site, rather than comparison between sites in a world with perfect age models. I think including a test of how integrated variables compare across different intervals would be relevant to addressing this point.

Second, even after extremely close reading, I am struggling to understand how exactly the pseudo-proxy time-series presented in Figures 8-10 were generated. I'm under the impression that each of these is an integration of satellite data at a specific point. Is this correct? If so, this could be made more explicit, and an explanation of how and why particular sites were chosen would be helpful.

Minor comments: Page 2, Line 3 – Missing the end of this sentence.

Figure 8 – Something is going on here with the labeling of “best”, “median”, and “worst.” I don't think this is correct.

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2019-73>, 2019.

C2