

Interactive comment on “Physical-biological interactions to the west of Hawaiian Islands: impact of submesoscale dynamics on biological productivity” by P. Xiu and F. Chai

Anonymous Referee #2

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The authors use a variety of available datasets (CBPM, VGPM primary production; Mixed Layer Depth from SODA and TOPS and MSLA from AVISO, to calculate the FSLE's) to propose a mechanism by which submesoscale motions would affect phytoplankton dynamics. Namely, by changing their physiological conditions, as submesoscale-induced restratification would decrease MLD and increase the mean light exposure of phytoplankton. This could be an interesting study if the authors had sought to observe or model these processes explicitly and show that they are in fact operating in the region of interest, as none of the datasets on which the authors base their conclusions resolve submesoscale process. Moreover, although the authors find the comparison between the VGPM/CBPM estimates and the in-situ measurements at

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Station ALOHA “reasonable”, the former clearly fail to reproduce the variability of the observations. This adds another layer of doubt to the conclusions of the manuscript. The explicit resolution of submesoscale processes is necessary, for example, in order to separate which instability mechanisms are responsible for the high EKE along the HLCC. Kobashi and Kawamura 2002, which the authors cite, show that baroclinic instability is the mechanism responsible. It would be interesting if the authors showed that submesoscale, mixed-layer instabilities are also at play in this region. This is not possible, however, with the datasets used in this study. Therefore, given that the main assumptions of the manuscript rest on poor evidence, I recommend rejection of the manuscript.

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