Biogeosciences Discuss., 10, C5193–C5194, 2013
www.biogeosciences-discuss.net/10/C5193/2013/

Biogeosciences Discussions
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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

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Received and published: 19 September 2013

We would like to make two comments concerning the manuscript in review of Xiu and Chai (2013). The first is the authors make claim that the relatively shallow mixed layer depths (MLDs) found in the SODA product point to restratification caused by submesoscale activity. Few details are given, but we assume the authors are using the most current version of SODA which has a horizontal resolution of about 0.25°x0.4°. This is far too coarse to resolve submesoscale features (which require O(1km) resolution). Further, SODA nudges SST which can introduce spurious heat fluxes which will have an impact on the model's MLD.

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The second comment concerns the effect of submesoscale activity on the supply of nitrate to the euphotic zone around Hawaii. We have reported in a recent paper (Ascani et al. 2013) an analysis of the nutrient field around Hawaii from profiling floats and, in combination with a high-resolution (0.04° in the horizontal) numerical model and other observations, we have concluded that the large vertical velocities associated with submesoscale features are confined to the surface mixed layer (SML) – which sits above the top of the nutricline most of the year – and do not contribute to the input of nutrient into the SML. The only exception is in late winter and early spring when the bottom of the SML reaches the top of the nutricline. The Ascani et al.'s study is to the north of the islands, although we expect the same to occur elsewhere in the center of the subtropical gyre. The Xiu and Chai manuscript does not provide evidence to suggest otherwise.

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Reference:

Ascani, F., K.J. Richards, E. Firing, S. Grant, K.S. Johnson, Y. Jia, R. Lukas and D.M. Karl, 2013: Physical and biological controls of nitrate concentration in the upper subtropical North Pacific Ocean. Deep-Sea Research II, 93, 119–134.

Interactive comment on Biogeosciences Discuss., 10, 12529, 2013.