

## ***Interactive comment on “Tidal impacts on primary production in the North Sea” by Changjin Zhao et al.***

### **Anonymous Referee #2**

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This paper attempts to describe the relation of tidal dynamics with NPP on the distribution of phytoplankton and other factors related to NPP growth rate over the North Sea through numerical simulations. For this purpose, three scenarios were applied through the physical-biogeochemical coupled model ECOSMO, which is non-tidal, tidal (M2 + S2), and M2 tidal scenario, respectively, from 1990 to 2015. Overall speaking, this paper is cautiously studied and is well described concisely on the impacts of the tide dynamics. As described, however, tides influence the biogeochemical cycle in two different ways. One of them is enhancing the vertical biomass mixing into the euphotic zone so that sustains the primary production. Another way is by vertical mixing diluting the biomass so that reducing the productivity. The latter process seems to not be well discussed in the current version of the manuscript. Other than this, the current

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manuscript only has few remarks I want to address below:

1. A point of view as a modeler, I am somehow confused with the meaning of the spatial resolution 6' x 10' (line 91) because a) no unit associated with, and b) it is not the comment way we are using.
2. Line 138, "southern coast" is not clear to understand
3. Between line 197-204, authors divided the North Sea into three subdomains by tidal forcing, and then further separate it with positive net primary production and negative one. After, authors separate the southern North Sea into EC and outside of EC, separate the northern North Sea into NT and the deeper area. Those of sentences are not clear until figure 4 is mentioned. Please make it clear.
4. Line 219 – 226 also makes confuse to me. It looks like the authors want to further discuss the described impact on/before line 218. The descriptions, however, didn't well expound. For example, the definition of stratification is defined by the vertical seawater temperature difference reaching to 0.5 deg-C; however, why 0.5 deg-C is using here didn't explain. Also, how the averaged MLD can be used to measure the depth of stratification needs to be stated.
5. Line 229 – 237 and line 280 needs to well describe.

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