

Interactive comment on “Drivers of trophic amplification of ocean productivity trends in a changing climate” by C. A. Stock et al.

Anonymous Referee #2

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Trophic amplification (or attenuation) is a measure of the propagation of a hydro-climatic signal up the food web, causing magnification (or depression) of biomass values between trophic levels. Ocean warming can modify the ecophysiology and distribution of marine organisms, and relationships between species, with nonlinear interactions between ecosystem components potentially resulting in trophic amplification. The paper by Stock et al describes a global numerical modelling study which explores the impact of climate induced change in net primary production on higher trophic levels. It shows how changes in NPP may be amplified (either positivity or negatively) as reflected in the production of mesozooplankton. In this respect is it similar to the recently published work by Chust et al (GBC 2014) but the paper goes beyond the analysis of Chust by considering the role of three key planktonic foodweb properties, zooplankton growth efficiency (ZGE), the trophic level of meso-zooplankton and

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the coupling between zooplankton and phytoplankton (fraction of NPP consumed by zooplankton).

The paper is well constructed and well written and is based on one of the best global model systems around. While one can always argue about ecosystem model foodweb structure and process descriptions (and modellers frequently do) I believe that in this respect COBALT is appropriate for the task at hand.

The key result is that zooplankton growth efficiencies change with NPP amplifying increases and decreases in NPP as illustrated in figure 2. The work is to my mind quite thought provoking as it highlights the importance of zooplankton in mediating the transfer of energy from phytoplankton to both higher trophic levels and to carbon export. It makes the crucial point that it's not always just about the changes in the physical environment. As zooplankton physiology (e.g. assimilation efficiency, respiration) is thought to be sensitively to climate drivers (e.g. T, pH), it is clear that further research effort should be made in this area.

Minor points. The individual maps in figures 3 and 4 would benefit from being larger as in figure 7.

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