Interactive comment on "A mechanistic model of an upper bound on oceanic carbon export as a function of mixed layer depth and temperature" *by* Zuchuan Li and Nicolas Cassar

Anonymous Referee #1

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The manuscript "A mechanistic model of an upper bound on oceanic carbon export as a function of mixed layer depth and temperature" by Li and Cassar applies the Sverdrup hypothesis to derive a simple maximum potential steady state primary production and carbon export estimate consistent with temperature and light limitation and mixed layer depth, and show that this maximum constraint is consistent with past estimates of carbon export. As such, the analysis seems incomplete in failing to describe what new insight the current theoretical constraint provides. Further, as the mathematical posing an equation for maximum possible export includes extremely simplified assumptions such as first-order herbivory that is constant with depth, the robustness of this constraint is impossible to quantify. Without demonstration that the existence of this

equation assists in the characterization of ocean ecosystems beyond what was available previously such as the ability to falsify otherwise seemingly reasonable hypotheses relating to primary production and carbon export, the contribution of the present manuscript to the scientific literature on these topics is unclear. I therefore recommend rejection of the present manuscript to encourage the authors to more fully develop the applications of their approach to demonstrate its usefulness.

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