Geophysical Research Abstracts
Vol. 21, EGU2019-4538-2, 2019
EGU General Assembly 2019
© Author(s) 2019. CC Attribution 4.0 license.

The Biogeochemical Role of the Ocean's Deep Biomass

Amos Winter (1), Josue G Millan (1), Diana Ruiz-Prado (2), Luc Beaufort (3), and Olivier Aumont (2)

(1) Department of Earth and Environmental Systems, Indiana State University, Terre Haute, IN, USA, (2) L'OCEAN, Sorbonne Université, Paris, France, (3) CEREGE, CNRS-Université ´ Aix Marseille-IRD, Aix en Provence 13545, France

We focus on an unexplored part of primary production (PP), the Deep Biomass (DB), located in the lowest part of the euphotic zone (approx. 80 m to 300 m) primarily in the subtropical gyres. The DB is one of the largest biomes on our planet considering that subtropical regions occupy 60% of the total ocean. Recent observations indicate that the major oceanic gyres expanded by 15%, a phenomenon attributed to global warming. As the gyres expand and warm they become more stratified which should favor coccolithophores but also improve conditions for some large stratified-adapted diatoms. The biological community in the DB, however, is not well known and their contribution to the export production has never been quantized. Productivity estimates for oceanic net primary production show that regions with oligotrophic surface water contribute significantly to global productivity due to its deep phytoplankton community. Some model estimates indicate a recent increase of net oceanic primary production in oligotrophic ocean gyres. If we consider the total area covered by the DB, the expansion of the ocean gyres, that primary production occurs throughout the year, and that the global depth-integrated NPP of the mixed layer in the tropics and subtropical gyres display very small seasonal variability it is reasonable to assume that the DB ecosystem is likely as important for productivity and chemical recycling than seasonally active upwelling areas. The role in PP of this enigmatic biome cannot be simply determined using chlorophyll because organisms in the DPZ, particularly coccolithophores, do not possess much chlorophyll per biomass. It is thus probable that carbon export from the DB is underestimated in models. With the ocean upper euphotic zones already impacted by acidification the DB can be arguably considered the last refuge for marine organisms. Whether the biochemical signature of ocean acidification has reached the depths of the DB is not well known. We need to determine how anthropogenic activity is affecting the phytoplankton comprising the DBM and the ensuing biogeochemical cycling of carbon.