Oceanography Seminar

"Plankton metabolism in the oligotrophic ocean"

Subantarctic mode waters (SAMW) form from deep winter Southern Ocean mixed layers and transport large amounts of carbon, nutrients, and oxygen to lower latitudes where they fuel primary productivity. Thanks to Argo floats, we now have much more information on the biogeochemical properties of these wintertime mixed layers and find substantial variability in nitrate, carbon, and oxygen concentrations in the different formation regions. In the case of carbon, we find increased concentrations in more recent years in the SAMW formation regions, likely due to the uptake of anthropogenic carbon from the atmosphere.

Thursday, April 4, 2024, 3:00p.m., MSB 100

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Aquatic photosynthesis and respiration rates regulate the flux of organic matter into the ocean's interior, a process that influences Earth's climate by effectively sequestering carbon dioxide from the atmosphere. This flux of organic matter also serves as the primary energy source to marine organisms inhabiting the dark depths of the ocean. However, determining and predicting the magnitude of microbial metabolic rates in the ocean presents challenges, and the accuracy of available techniques is difficult to assess given the lack of standards against which to compare measured rates. Methodological limitations and sparse oceanic measurements contribute to our inadequate understanding of the controls on plankton metabolism, hindering our ability to predict changes in the biological carbon pump. In this seminar, I will discuss my efforts to address some of these challenges and to constrain plankton metabolic rates in the North Pacific Subtropical Gyre. I use a variety of approaches, each with its own methodological advantages and limitations, that measure different steps within the spectrum of metabolic processes going from solar energy capture to the breakdown of organic matter. My research has revealed pronounced seasonality in the net production of organic matter within the euphotic zone, despite the chronic oligotrophy year-round. Annual net community production exceeds estimates of carbon export by sinking particles, suggesting that the contribution of other export mechanisms to the biological carbon pump might be important.

Schedule of upcoming seminars: Thursdays, 3:00pm, MSB 100