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Thomas B. Kelly, Ralf Goericke, Mati Kahru, Hajoon Song, Michael R. Stukel

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Thomas B. Kelly[1,2,*], Ralf Goericke[3], Mati Kahru[3], Hajoon Song[4], Michael R. Stukel[1,2]

[1]Earth, Ocean & Atmospheric Studies, Florida State University, Tallahassee, FL

[2]Center for Ocean-Atmospheric Prediction Studies, Florida State University, Tallahassee, FL

[3]Integrative Oceanography Division, Scripps Institution of Oceanography, La Jolla, CA

[4]Department of Atmospheric Sciences, Yonsei University, Seoul, South Korea

tbk14@fsu.edu

[*] Corresponding author

1. Introduction

The biological carbon pump (BCP), a mechanism whereby atmospheric CO_2 is fixed into organic matter by marine phytoplankton and transported into the deep ocean, is responsible for the removal of 5 – 13 Pg C yr^{-1} from the atmosphere (Henson et al., 2011; Laws et al., 2011, 2000). Future changes in the BCP could thus cause a substantial perturbation to the global carbon cycle. Unfortunately, our ability to predict such changes is hampered by the large uncertainty in the current magnitude of the BCP and by the dearth of studies that have assessed interannual variability in particle flux out of the euphotic zone. While important contributions have been made by time series studies in the oligotrophic North Pacific and Sargasso Sea (Church et al., 2013; Lomas et al., 2013), there remains a critical need for research focusing on process-oriented quantification of interannual variability in the BCP, especially in dynamic coastal regions.

The BCP consists of several distinct processes including sinking, vertical mixing and subduction of organic matter, and active transport by vertically-migrating organisms (Ducklow et al., 2001; Steinberg and Landry, 2017). For this study, only gravitationally mediated flux of particulate organic carbon (POC) is considered (hereafter termed "export"). Globally, both net primary production (NPP) and export are contingent on a variety of chemical, physical and biological processes (Ducklow et al., 2001; Turner, 2015) such as nutrient availability (Cermeño et al., 2008), heterotrophic bacterial abundance (del Giorgio and Duarte, 2002), and water column stability (Sarmiento et al., 1998). Uncertainties in the global budget thus stem from