Carbonate compensation in the eastern Equatorial Pacific over the last glacial-interglacial transition

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The last glacial-interglacial transition was marked by two rapid increases in atmospheric CO_2, both of which were accompanied by rapid warming. The deep ocean is the most likely source for the release of this CO_2 to the atmosphere during the last deglaciation, with sequestration of respired organic carbon in glacial deep-waters being the primary mechanism of carbon storage [1]. A counter balance to the organic carbon driven drawdown of CO_2 is the removal of alkalinity and increase in surface ocean pCO_2 through calcification by marine organisms (the carbonate counter-pump). The role of the carbonate counter-pump during this period is poorly constrained, however a better understanding of deep-water carbonate saturation state could clarify the relative importance of dissolution and calcification of carbonate during deglaciation. Benthic foraminiferal B/Ca ratios have been shown to vary linearly with $\Delta[CO_3^{2-}]$ providing a proxy for deep-water carbonate ion concentration [2]. This study examines the carbonate counter pump over the last 25,000yrs using *Cibicidoides wuellerstorfi* B/Ca records developed from 7 cores (1620-3200m water-depth) in the Eastern Equatorial Pacific (EEP). From these cores we estimate changes in the depth of the lysocline over the last glacial-interglacial period with core TR163-23 (2730m; 0.41ºN, 92.16ºW) selected for high-resolution study of deglacial deep-water $[CO_3^{2-}]$. While focus has previously been on changes in the Southern Ocean biological pump [3,4], the EEP is a large source of CO_2 to the atmosphere and responsible for ~10% of global ocean productivity. An understanding of the carbonate counter-pump in the EEP is essential to understanding the role of the biological pump in the transfer of carbon between the deep and surface ocean during the last glacial-interglacial cycle.

[1] Sigman and Boyle (2000) *Nature* **407**, 859-869. [2] Yu and Elderfield (2007) *EPSL* **258**, 73-86. [3] Matsumoto *et al.* (2014) *Paleoceanography* **29**, 238-254. [4] Ziegler *et al.* (2013) *Nature Geoscience* **6**, 457-461.