

Rapid changes in Pacific seawater carbonate chemistry during the last glacial termination

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Past variations in seawater carbonate ion concentration ($[\text{CO}_3^{2-}]$) may be derived from B/Ca of benthic foraminiferal calcite, ultimately providing constraints on past amounts and mechanisms of ocean carbon storage. We present results from a depth transect composed of three sediment cores spanning 1.2 – 2.5 km water depth in New Zealand's Bay of Plenty. B/Ca of the benthic foraminifer *Cibicidoides wuellerstorfi* is used to reconstruct $[\text{CO}_3^{2-}]$ at the three core sites for the past ~30 ky. Large shifts in $[\text{CO}_3^{2-}]$ (30-40 $\mu\text{mol/kg}$) occur at the intermediate-water site (1.2 km) between 17-9 cal ky BP, similar in timing and magnitude to previously published results from the 1.6 km core [1]. Both $[\text{CO}_3^{2-}]$ and $\delta^{13}\text{C}$ of the deeper sites (1.6 and 2.5 km) experience a permanent shift towards higher values between 25-10 cal ky BP. Broad covariation of *Cibicidoides* $\delta^{13}\text{C}$ with $[\text{CO}_3^{2-}]$ derived from B/Ca suggests that the amount of isotopically light, respired CO_2 in deep waters is decreasing during the deglaciation. Depth profiles of $[\text{CO}_3^{2-}]$ for 2 ky time slices indicate a steeper intermediate-deep $[\text{CO}_3^{2-}]$ gradient during the glacial than the Holocene. At our Southwest Pacific sites, $[\text{CO}_3^{2-}]$ exhibits more dramatic changes than observed in the equatorial Pacific [2], perhaps indicating a more dynamic response of South Pacific water masses to shifts in Southern Ocean-atmosphere circulation and/or changes in the operation of the biologic pump during the deglaciation.

[1] Allen K.A., Sikes E.L., Hönisch B., Elmore A.C., Guilderson T.P., Rosenthal Y., Anderson R.F. (2015) *Quaternary Science Reviews* **122**, 180-191.

[2] Yu J., Anderson R.F., Jin Z., Rae J.W.B., Opydyke B.N., Eggins, S.M (2013) *Quaternary Science Reviews* **76**, 39-52.