Reconstruction of Deglacial Surface Ocean pH in the South China Sea using Boron Isotopes in Foraminifera

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Deciphering ocean carbon system and hydrological variability in the past provide clues to understand the mechanisms of the global carbon cycle. During the last deglaciation, outgassed oceanic CO_2 from open ocean upwelling regions has been considered as the major contributor to atmospheric CO_2 raising [1]. Despite the possible role as CO_2 sources based on modern observations, marginal seas, however, has not received much attention due to its dynamic feature [2].

In this study, we present the first deglacial variability in surface ocean pH using the boron isotope composition ($\delta^{11}B$) of planktonic foraminifera (*T. sacculifer*) from the South China Sea (SCS) and utilize trace element ratios as indicators of deglacial hydrological changes. The results from two sediment cores in the eastern (MD97-2142, water depth 1557m) and the western SCS (MD05-2901, water depth 1454m) suggest that the SCS was an atmospheric CO_2 source throughout the last deglaciation, with stronger CO_2 source during Heinrich stadial 1 and Younger Dryas, while weaker CO_2 sources during Bølling–Allerød and the Holocene. The deglacial seawater pH variability in the SCS was most likely controlled by surface ocean conditions, which is mainly driven by East Asian Winter Monsoon. This implies that the monsoon-driven oceanic CO_2 outgassing from marginal seas may also contribute to the increases in atmospheric CO_2 during the last deglaciation. More paleo-CO_2 reconstructions in the marginal seas are clearly required to better understand their roles in regulating atmospheric CO_2 in the past.

[1] Martínez-Botí *et al*. (2015) *Science* **518**, 219-222. [2] Dai *et al*. (2013) *Geophys. Res. Lett* **40**, 2154–2158.