

## Sea surface pH over the last 7 kyr reconstructed by boron isotope ratio of sclerosponges

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The atmospheric CO<sub>2</sub> concentration ( $p\text{CO}_2$ ) has changed with glacial/interglacial cycles during the last 800 kyr. From the last glacial maximum to pre-industry age,  $p\text{CO}_2$  rose from 180 to 280 ppmv. Since seawater pH responds to the CO<sub>2</sub> flux between the atmosphere and the ocean, change in  $p\text{CO}_2$  is accompanied by pH shift in the oceans. In this study, sea surface pH in the last 7 kyr is estimated by  $\delta^{11}\text{B}$  of sclerosponge skeletons.

Fossils of sclerosponge (*Astrosclera willeyana*,  $n=24$ ) were collected from the cave sediments (10–30 m water depth) in Okinawa, Japan, which includes the deposit over the last 7 kyr (Yamamoto et al., 2009). After micro-sublimation separation of boron,  $\delta^{11}\text{B}$  were measured by multi-collector ICP-MS housed at University of Ryukyus.

$\delta^{11}\text{B}$  varied in the narrow range (~19 – 20‰). Considering that  $\delta^{11}\text{B}$  of sclerosponges is restricted by surrounding pH, the sea surface pH derived from  $\delta^{11}\text{B}$  ranges between ~8.1 and 8.2. Assuming constant total alkalinity, CO<sub>2</sub> concentration in seawater was calculated to be ~230 – 280  $\mu\text{atm}$ . These results imply that CO<sub>2</sub> concentration in the western Pacific has been stable from 7 ka to the pre-industrial age, being nearly equilibrium to  $p\text{CO}_2$ . Further, we also discuss the vital effect on  $\delta^{11}\text{B}$  of sclerosponges.

### Reference

Yamamoto, N., Kitamura, A., Ohmori, A., Morishima, Y., Toyofuku, T., Ohashi, S., 2009. Long-term changes in sediment type and cavernicolous bivalve assemblages in Daidokutsu submarine cave, Okinawa Islands: evidence from a new core extending over the past 7,000 years. *Coral Reefs* 28, 967–976.