Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

BBG21-01 Room:213 Time:May 1 09:00-09:15

Ocean Acidification and its effect on calcification since the late 19th century revealed by d11B of Ogasawara coral

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Boron isotopes ($d^{11}B$) of coral skeleton are known as a pH meter in the seawater. As pH of seawater is closely related to partial pressure of CO_2 (pCO_2) in the atmosphere, it is expected that $d^{11}B$ becomes pCO_2 indicator in the geological past too. However, $d^{11}B$-pH is under scrutinized since coral calcification itself probably affects the relationship. Although many studies have focused on $d^{11}B$ measurements for cultured corals under pH-controlled aquarium, those for living corals outdoors have rarely measured, which are limited to, for example, Great Barrier Reef and Guam. Here we show 125 years-records (AD1873-1998) of $d^{11}B$ and boron concentration (B/Ca ratio) for long-lived massive coral (Porites sp.) that was sampled at Chichi-jima, Ogasawara Islands, North West Pacific. They clearly reveal Ocean Acidification after the industrial revolution. We will discuss a relationship between ocean acidification and coral calcification from a slope of pH decline that is obtained from observational data. We will also discuss how B/Ca of calcium carbonate skeleton that is produced by marine calcifiers is reliable proxy for seawater pH, which is being paid a great attention mainly due to relative easiness to measure compared to isotopes.

Keywords: boron, Ogasawara, coral, calcification, Ocean Acidification