

Future perspective on the response of marine calcifiers to “evil twins” of climate change due to increased PCO₂

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This talk is developed from our comprehensive review paper of PEPS: Kawahata, H., Fujita, K., Iguchi, A., Inoue, M., Iwasaki, S., Kuroyanagi, A., Maeda, A., Manaka, T., Moriya, K., Takagi, H., Toyofuku, T., Yoshimura, T., Suzuki, A. (2019) Perspective on the response of marine calcifiers to global warming and ocean acidification –Behavior of corals and foraminifera in a high CO₂ world “hot house” . Progress in Earth and Planetary Science 6: 5 (p.1-37).

Our planet will experience global warming and ocean acidification due to increased partial pressure of CO₂ in the atmosphere. They are often referred to as the “evil twins” of climate change, potentially inducing severe threats in the near future.

Generally, majority of marine calcifying organisms show decreases in calcification rates in response to acidified seawater by increased pCO₂. However, the response often differs depending on situations, species, and life-cycle stage. Calcification of *Calcarina gaudichaudii*, generally increased with increased pCO₂. As one possible cause of these different sensitivities, *Calcarina* hosts diatoms as its symbiotic algae. High-CO₂ seawater is favorable to diatom growth.

X-ray micro-computed tomography will provide valuable information regarding biomineralization including calcification of planktic and benthic foraminifera in response to ocean acidification as well as regarding carbonate dissolution.

Based upon the analysis of the biogeochemical cycle (today, at P/E boundary and in Cretaceous), “high speed” and “high level” pCO₂ are the primary and secondary factors, respectively, leading to acidification in the Earth surface’ s system. Over the long-term, it is well known that alkalinity has fluctuated largely in the Earth’ s surface environment. Therefore, it is important to quantitatively reconstruct alkalinity, which is another key factor determining the saturation state of carbonate minerals.

Keywords: global warming, ocean acidification , calcifiers, carbonate, alkalinity