PSI2009/602
Predicting impacts on coastal marine organisms based on long-term precise simulation of future ocean acidification

Yoshihisa Shirayama a, Eiji Kimoto b, Atsushi Egashira b, Katsumoto Kinoshita b, Go Suzuki a, Tetsuya Kato a,
Taiji Yamamoto a, Mitsuru Ohta b, Kikuo Okita a and Yukihiro Nojiri a
aSeto Marine Biological Laboratory, Kyoto University, 459 Shirahama, 649-2211 Wakayama, Japan
bKimoto Elektor Co., 3-1 Funahashi Cho, Ten’noji Ku, 543-0024 Osaka, Japan
National Institute for Environmental Studies, 16-2, Onogawa, Tsukuba, 305-0032 Ibaraki, Japan
yshira@bigfoot.com

The chemical property of inorganic carbon of the surface sea water has been changed in association with the increase of atmospheric concentration of carbon dioxide (CO2). By the middle of this century, this phenomenon (ocean acidification) is predicted to reach the level that sea water will be under the saturation for aragonite as well as dolomite. In such condition, marine organisms may be seriously impacted because the se minerals are major components of hard skeletons produced by calcifiers such as reef-building corals, mollusks and echinoderms. Many works have been done to evaluate the impact experimentally using seawater PCO2 of which is artificially increased. However, most works have been done at PCO2 level that is far above the level of future atmospheric condition. Also, considering that organisms will be exposed to the raised PCO2 condition for years, most experiments carried out for only weeks or months may not be long enough to evaluate the future impact. To predict future biological impacts associated with ocean acidification, we made a system that can simulate future PCO2 condition in the experimental seawater tank precisely. Major properties of the system are: 1) producing 3 L/hr of seawater adjusted at given PCO2 condition continuously, 2) producing seawater at 4 different PCO2 conditions, 3) reflecting the ambient daily and seasonal fluctuation of PCO2, 4) establishing equilibrium among PCO2 of the seawater and bubbling air by using counter current long pipe system, 5) certifying equilibrium among PCO2 of the seawater and bubbling air by measuring PCO2 of the adjusted seawater. We report results that evaluated the specifications of the system. In addition, preliminary results of the biological experiment using the system as well as other system that also tried to simulate the daily and yearly fluctuation of ambient seawater will be presented.

Number of words in abstract: 293
Keywords: Daily fluctuation - Ocean Acidification - Impact on benthos - Precise simulation
Technical area: Climate Change and Ocean Acidification
Special session: Not specified
Presentation: Oral presentation preferred
Special equipment: Video-projector (beamer)