AvH7-47
7th Alexander von Humboldt International Conference
Penang, Malaysia, June 20-24, 2011

Corals, bryozoans and gastropods are able to calcify in acidified seawater

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Increasing atmospheric carbon dioxide (pCO_2) concentrations are causing ocean acidification, lowering surface ocean pH and carbonate ion concentrations. This is thought to be the cause of dramatic decreases in calcification rates of several marine organisms such as molluscs and corals during the course of this century. We transplanted bryozoans, corals and gastropods near volcanic vents (Ischia, Italy) where CO_2 emitted from the seafloor acidifies the water column mimicking future scenarios in a natural environment. Calcification and dissolution rates were measured after long-term *in situ* acclimation. Although early life history stages are vulnerable (Cigliano *et al*., 2010), we found that adults were able to calcify at pH levels projected in the next 300 years although the acidification dissolves shells and skeletons. Calcification and protective mechanisms in the range of species investigated indicates that they are more resilient to ocean acidification than previously thought. Boron isotopic composition of coral grown both in aquaria at pH_T 7.8 and at CO_2 vents showed that pH at the site of calcification was regulated by the animal and allowed calcification even in undersaturated seawater (Trotter *et al*., 2011). Calcification occurs between the tissue and the shell or skeleton where extrapallial fluid (in molluscs) and extracellular calcifying fluid (in corals) pH is 0.5 to $>$ 1 unit higher than in ambient seawater. Therefore, empirical relationships between seawater carbonate state and calcification can not be used alone to predict the effects of ocean acidification on marine species. To predict the response of marine calcifiers to ocean acidification similar work is needed to broaden our understanding of the biological mechanisms of biomineralization.

Cigliano M., *et al*. 2010. Effects of ocean acidification on invertebrate settlement at natural volcanic CO_2 vents. *Marine Biology* 157: 2489-2502.

Trotter J, *et al*. 2011. Quantifying the pH 'vital effect' in the temperate zooxanthellate coral *Cladocora caespitosa*: Validation of the boron seawater pH proxy. *Earth and Planetary Science Letters* 303: 163-173.