Coral chemists: decoupling the carbonate system to survive

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Corals and coral reefs are important bellwethers of continued anthropogenic climate stress, and with new techniques (e.g., see Standish *et al*. [1], and Goldschmidt 08g) can represent unparalleled archives of ocean chemistry. There are a variety of factors affecting the health of corals worldwide, with temperature stress being the most well publicized, however additional factors such as acidification, eutrophication and sediment accumulation also impact reef health. Here we use a series of novel laboratory experiments and highly resolved field data from coral cores to improve our mechanistic understanding of how, via modification of the pH in the calcifying fluid, both external pH and changing nutrient content influence calcification and hence the nature of skeleton building. We present geochemical data from laser ablation and solution MC-ICP-MS to identify the state of the carbonate system within the calification fluid across skeletal elements in a variety of reef building corals. We find that changing the external nutrient content impacts the balance of ionic species within the calcification fluid, a strategy adopted by corals in order to continue aragonite growth. This internal chemsitry leads to a similar effect to changing the external pH in δ^{11}B-pH proxy data and therefore changing nutrients and growth strategy must be taken into account when reconstructing past ocean pH from coral geochemistry.

[1] Standish et al. (in press) *Rapid Commun. Mass Sp*.