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TITLE: Inorganic carbon physiology underpins macroalgal responses to elevated CO2

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ABSTRACT:

Abstract Beneficial effects of CO 2 on photosynthetic organisms will be a key driver of ecosystem change under ocean acidification. Predicting the responses of macroalgal species to ocean acidification is complex, but we demonstrate that the response of assemblages to elevated CO 2 are correlated with inorganic carbon physiology. We assessed abundance patterns and a proxy for CO 2 :HCO 3 ? use (? 13 C values) of macroalgae along a gradient of CO 2 at a volcanic seep, and examined how shifts in species abundance at other Mediterranean seeps are related to macroalgal inorganic carbon physiology. Five macroalgal species capable of using both HCO 3 ? and CO 2 had greater CO 2 use as concentrations increased. These species (and one unable to use HCO 3 ? ) increased in abundance with elevated CO 2 whereas obligate calcifying species, and non-calcareous macroalgae whose CO 2 use did not increase consistently with concentration, declined in abundance. Physiological groupings provide a mechanistic understanding that will aid us in determining which species will benefit from ocean acidification and why.

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