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TITLE: Ocean acidification drives community shifts towards simplified non-calcified habitats in a subtropical?temperate transition zone

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ABSTRACT:

Abstract Rising atmospheric concentrations of carbon dioxide are causing surface seawater pH and carbonate ion concentrations to fall in a process known as ocean acidification. To assess the likely ecological effects of ocean acidification we compared intertidal and subtidal marine communities at increasing levels of p CO₂ at recently discovered volcanic seeps off the Pacific coast of Japan (34° N). This study region is of particular interest for ocean acidification research as it has naturally low levels of surface seawater p CO₂ (280?320 µatm) and is located at a transition zone between temperate and sub-tropical communities. We provide the first assessment of ocean acidification effects at a biogeographic boundary. Marine communities exposed to mean levels of p CO₂ predicted by 2050 experienced periods of low aragonite saturation and high dissolved inorganic carbon. These two factors combined to cause marked community shifts and a major decline in biodiversity, including the loss of key habitat-forming species, with even more extreme community changes expected by 2100. Our results provide empirical evidence that near-future levels of p CO₂ shift sub-tropical ecosystems from carbonate to fleshy algal dominated systems, accompanied by biodiversity loss and major simplification of the ecosystem.

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