Coral reef sediment dissolution in a changing ocean: insights from a temporal field study

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Southern Cross University, Coffs Harbour, NSW

Calcium carbonate sediments form an essential part of coral reefs yet have often been overlooked when studying the effects of future ocean acidification (OA). This original field-based research aims to assess the temporal variability of organic and inorganic sediment metabolism under ambient and elevated pCO_2. OA caused a shift from net precipitation to net dissolution, but the sensitivity to OA varied seasonally, depending on interactions with temperature and benthic productivity. A slack-water approach of net ecosystem calcification revealed that sediments can play an important role in carbonate budgets, particularly at night, and become increasingly important as the oceans continue acidifying.

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Diamonds — time capsules of volatiles and the key to dynamic Earth evolution

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The Earth consists of a core, mantle, crust, and atmosphere. Noble gas analyses of basaltic rocks indicate that the present-day structure of the Earth comprises a slightly degassed lower mantle and highly degassed upper mantle. The extent and timing of mantle in- and out-gassing and sources of volatiles are, however, not well-constrained and require quantification for development of a high-resolution model of the structure of the Earth's mantle and its evolution to a differentiated state. Noble gas data for the Earth's mantle are still almost exclusively limited to two temporal end-members: i) the present-day mantle, with compositions from modern basalt glasses, and ii) the undifferentiated primordial Earth at 4.6 Ga, with data from extra-terrestrial samples