

Ocean acidification and its implications for life throughout the Phanerozoic

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Ocean pH is a fundamental tracer of seawater chemistry, a critical control on marine biota, and an invaluable indicator of global environmental and climatic changes. The geological record is punctuated by perturbations to marine chemistry thought to be linked to pH decline—ocean acidification events—evidenced indirectly by the preferential disappearance of calcifying organisms from fossil assemblages and the decrease in calcium carbonate content of marine sediments resulting from large-scale changes in the global carbon cycle. Ocean acidification has been implicated in several mass extinctions and anoxic events which have steered the evolution of life on Earth, however, the associated changes to seawater pH have been difficult to constrain quantitatively. Recent advances in the application of the boron isotope proxy have provided new opportunities to reconstruct the evolution of ocean pH and atmospheric CO₂ in Earth's past. Reviewing the evolution of seawater pH throughout the Phanerozoic, we present an emerging view of ocean acidification and its role in (de)stabilisation of Earth's biosphere.