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TITLE: The Fate of Cold-Water Corals in a Changing World: A Geological Perspective

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ABSTRACT:

As ?ecosystem engineers? framework-forming scleractinian cold-water corals (CWC) build reefs that are unique biodiversity hotspots in the deep sea. Correlating the spatial occurrence of the most common CWC species with modelled environmental conditions, revealed the ecological requirements and tolerances of these species. However, still limited field observations and poorly understood geographical distribution patterns of the CWC restrict the application of the existing knowledge towards assessing their fate (e.g., local extinction, newly established populations) under ongoing global change. Hence, the risk to cross ecological tipping points causing the demise (or establishment) of entire CWC reefs remains unclear. Thus, a major challenge is to identify the key environmental parameters (or stressors) having the potential to control CWC vitality by providing such tipping points. This is largely hampered by the overall lack of present-day observations of such tipping point crossings. However, evidence for such events is frequently preserved in geological records revealing that entire CWC ecosystems vanished or returned at specific moments in the past. Here, a geological approach is presented that by correlating geological CWC records with paleoceanographic data describing past environmental changes allows to identify a set of key environmental drivers that directly or indirectly control CWC vitality. Thus, by combining such a geological approach with common biological techniques (see above) to describe the ecological tolerance of the most important reef-building CWC has a great potential to better assess their future spatial distribution in times of accelerating global change and to improve the sustainable management of the important deep-sea ecosystems formed by CWC.

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