

## **Enhancing school ocean and climate outreach via deep-sea coral geochemistry**

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The oceans store and transport a huge amount of heat, nutrients, and carbon, playing crucial roles in sustaining marine ecosystems and regulating climate. However, under the pressing global climate crisis, the oceans are facing increasing threats, including warming, deoxygenation and acidification. Through investigations into how past oceans both responded to and modulated historical climate shifts, the vulnerability and resilience of the oceans and the ecosystems they support can be assessed to guide future marine protection and policy. Enhancing ocean and climate literacy is critical for raising public awareness, and school students are one of the key target audiences. However, in the current education systems of many countries, the ocean and climate sciences are often poorly represented, highlighting the importance of delivering additional outreach sessions to reduce access barriers for the younger generation.

Deep-sea corals are adapted to a broad range of ocean environments, as they do not require light or warm temperatures to survive. The coral skeletons record geochemical signals of ambient seawater, and can be absolutely dated by radiometric approaches. As such, deep-sea corals are intriguing targets to unravel stories of past oceans, and help determine the critical environmental factors for marine ecosystem protection. Designed by a group of students from the Bristol Oceans Past and Present Group, and in collaboration with the university Widening Participation team, outreach sessions themed around deep-sea coral geochemistry were delivered to several groups of UK Year 12 students from diverse backgrounds during 2022–23. The sessions included a suite of activities, including mini-lectures, coral collection exhibition, hands-on booklet practice and discussion adapted from actual lab data, as well as ocean circulation experiment demonstration. The students experienced the university study and research environment, and were introduced to a broad range of ocean and climate topics that extended beyond traditional classroom topics. With the aid of feedback, we hope to improve future outreach sessions by increasing the delivery flexibility regardless of time and space limits, incorporating more novel and interactive activities, expanding audiences, and mobilising participation enthusiasm of the students when facing low teacher-student ratios.