

## **Carbon Dioxide Removal and High-Performance Computing: Planetary Boundaries of Earth Shots**

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Natural climate solutions aim to remove carbon dioxide from the atmosphere by leveraging the carbon storage potential of natural ecosystems. Two methods currently being explored entail converting carbon dioxide to bicarbonate through spreading minerals on land (enhanced weathering) or adding alkalinity to the ocean by mineral spreading or removing acid (ocean alkalinity enhancement). If employed at scale, these climate solutions could remove atmospheric carbon dioxide and alleviate ocean acidification. Currently, there is no end-to-end framework to assess the impacts of enhanced weathering or ocean alkalinity enhancement, which are likely to be pursued in parallel. This work will create a modeling framework that connects rainfall, soils, rivers, coastal oceans, and open oceans to fully evaluate the impact of these natural climate solutions on atmospheric carbon dioxide concentrations, ecosystems, and ocean pH.

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