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The Efficiency and Rate of Carbon Dioxide Removal by Enhanced Rock Weathering of Olivine in Rivers and at Coasts

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Enhanced rock weathering (ERW) of olivine in rivers and coastal locations is a potentially scalable carbon dioxide removal (CDR) solution. However, there are still great uncertainties regarding its dissolution rate under realistic coastal and riverine conditions. Here, a geochemical dissolution model is constructed in PHREEQC and combined with a grain-attrition model to better quantify the CO_2 sequestration efficiency under a variety of different aquatic conditions. Preliminary results indicate that larger olivine particle sizes (>150 um) are more sensitive to the choice of location than smaller particles (10-150 um), particularly due to impact of bed shear stress. Such findings are critical in assessing the feasibility of ERW in aquatic environments, for both accurate technoeconomic assessment and appropriate project siting.