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Enhanced Rock Weathering in Agricultural Settings: Real-World Analysis of Carbon Dioxide Removal, Crop Yields, and Soil pH

GAVRIELLE WELBEL[1], TOM REERSHEMIUS[1], MARYA MATLIN-WAINER[1], ISABELLE DAVIS[1], SOPHIE LIEBERMAN[1], CHRISTOPHER T. REINHARD[2] AND NOAH J. PLANAVSKY[1]

[1]Yale University

[2]Georgia Institute of Technology

Presenting Author: gavrielle.welbel@yale.edu

Enhanced rock weathering is a potentially promising technology for removal of atmospheric carbon dioxide, which could mitigate the worst effects of climate change. Most work on enhanced rock weathering has focused on adding crushed silicate-based-rock (e.g. basalt) onto managed lands to capture carbon dioxide from the atmosphere and transport it as bicarbonate for permanent storage in oceans. Crushed basalt can be sourced as a by-product from mining operations, where it would otherwise be considered waste material. Agricultural fields are a prime setting because they are vast even surfaces that experience significant precipitation and can benefit from the rock as a fertilizer. Basalt can neutralize soil pH, increase crop yields, and introduce minerals to the soil [1]. However, there are few empirical constraints on the extent of weathering in working farms [2]. Here we show pH, yield, and weathering outcomes through the most robust on-farm geospatial analysis of enhanced rock weathering deployment to date. Hay and corn yields were boosted, soy yields were consistent, neutral pH was maintained, and there were multiple tons of carbon dioxide removal per hectare of land. This work supports that, at scale, rock weathering could capture gigatons of carbon dioxide, utilize a waste product from mining sites, and improve crop yields and soil health.

[1] Beerling et al., *Nature* 583, 2020.

[2] Maya Almaraz et al., Frontiers in Climate 4, 2022.