Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37405

Insights from large-scale enhanced rock weathering deployments in the Southeast United States

JANNIK MARTENS, RENNIE JONES, BEN BRODIN, JAKE SCHNEIDER, KURT YEAGER, MARY YAP AND ELLIOT CHANG

Lithos Carbon, Inc.

Enhanced rock weathering (ERW) is a promising pathway for scalable carbon dioxide removal (CDR), with the potential to remove gigaton-scale CO_2 from the atmosphere in the coming decades. As ERW moves from pilot studies to commercial deployment, large operational datasets are becoming critical for understanding real-world basalt weathering dynamics in commercial agricultural systems, and informing robust monitoring, reporting, and verification (MRV) frameworks.

Here, we present results from a large commercial soil geochemical and agronomic dataset following the application of superfine basalt by Lithos Carbon. This presentation focuses on 25 basalt deployments initiated in early 2025, spanning more than 2,500 hectares of agricultural land in the Southeast United States, where basalt was applied at a rate of 46 metric tons per hectare. Weathering dynamics are monitored through approximately 1,500 geolocated soil sampling points that are revisited at 3–6 month intervals as part of ongoing monitoring efforts. At the time of presentation, the dataset will encompass over 12 months of post-application geochemical and agronomic observations.

We provide a learning-centric perspective, synthesizing large-scale basalt weathering patterns observed across aggregated agricultural fields, focusing on changes in soil cation concentrations, pH, base saturation, and cation exchange capacity associated with feedstock dissolution. We examine temporal and spatial variability in weathering signals across differing seasons, soil types, and management regimes, and demonstrate how field-level aggregation across individual deployments strengthens feedstock dissolution quantification at scale. Finally, we contextualize ERW-derived CDR estimates within the published literature across multiple quantification approaches, highlighting implications for future ERW scale-up and the evolution of scientifically rigorous MRV frameworks.