B35L-1558 - Field trials testing carbon sequestration and agricultural co-benefits of enhanced silicate weathering with basaltic soil amendments in a corn-soybean agricultural field in Northfield, Minnesota

Wednesday, 15 December 2021
16:00 - 18:00
Convention Center - Poster Hall, D-F

Abstract

Enhanced silicate weathering (ESW) in agricultural lands is a widely applicable natural climate solution that has potential to sequester significant amounts of atmospheric carbon dioxide (CO_2) over decadal time scales. ESW applies crushed silicate rock to soils in order to increase inorganic carbon sequestration. Silicate rocks are likely to improve soil and crop health and can be applied using pre-existing liming equipment. Model estimates are generally optimistic for the scalable potential of ESW. However, in order for ESW to become adopted more broadly, there is an essential need for more field trials demonstrating carbon sequestration and agricultural co-benefits.

This project describes a new ESW field trial conducted in Northfield, Minnesota. Our study is situated on a 20 acre agricultural field on the campus of Carleton College with well-drained silty loam soil overlying sandstone bedrock currently farmed under a corn-soybean rotation with strip-tillage. Baseline soil sampling was conducted in June 2021, and the first 10 tn ac^{-1} application of basaltic rock dust to 6 half acre test plots occurred after harvest in November 2021. Here, we present results of rock dust characterization, baseline soil properties, and our approach to constraining carbon sequestration. Soil bulk density, pH, cation-exchange capacity, elemental composition, organic matter, and carbonate mineral content are all evaluated for baseline properties and used to assess impacts of rock dust on soil. The rate of carbon sequestration due to ESW will be quantified through measurements of bicarbonate in soil waters sampled with lysimeters and soil calcium carbonate content. In addition, we will monitor aqueous cations in

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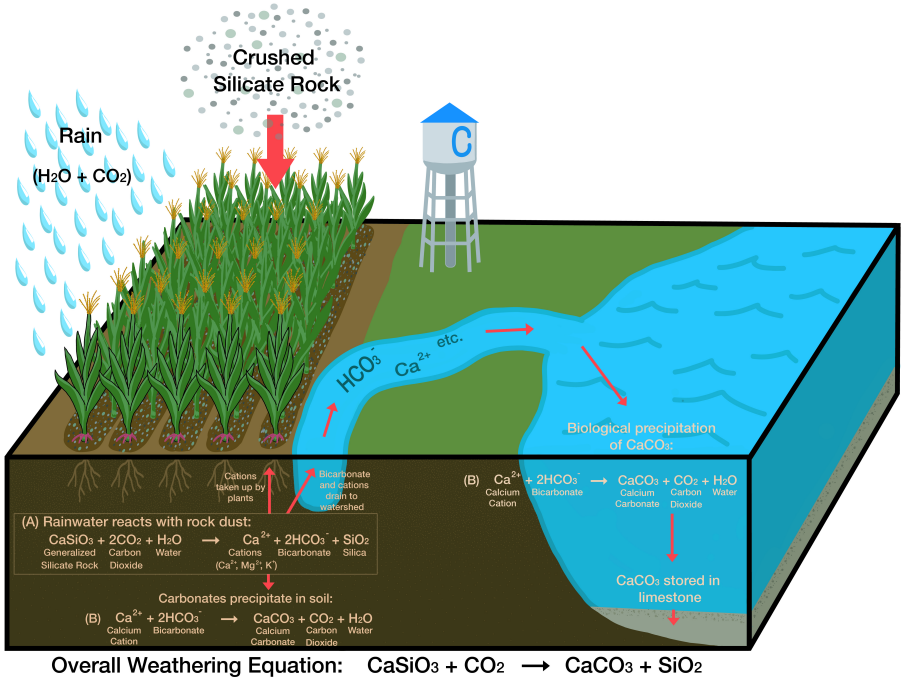
and policymakers to pursue ESW as a liming substitute and climate mitigation practice.



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