Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.31816

Carbon dioxide removal and co-benefits of enhanced weathering in tropical soils: a case study with sugarcane in Brazil

CHRISTINA S. LARKIN, PHILIPP SWOBODA, MAYRA MANIERO RODRIGUES, JUNYAO KANG, VERONICA FUREY, LETICIA SCHWERZ, BRUNO RAMOS, MARCELLA DAUBERMANN, JEANDRO VITORIO, MATTHEW CLARKSON AND MARIANE CHIAPINI

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Terrestrial enhanced weathering (EW) is a promising emerging carbon dioxide removal (CDR) technique which involves the acceleration of natural weathering processes via the deployment of crushed rock feedstocks, typically Ca- and Mg-rich silicates, in soils. While models predict this has the potential to remove multiple gigatonnes of CO2 annually[1,2], urgent verification is needed with empirical studies across a range of environments[3,4]. Various potential agronomic co-benefits are also suggested for silicate rock powders in the tropics[5] but there are few studies conducted under commercial field deployment conditions.

Here we report the effects of basalt rock powder applied to sugarcane grown on an oxisol in Brazil, SP. This site generated the world's first independently verified carbon credits via EW in December 2023, through the registry Isometric. The experiment was directly embedded within the commercial fields of the farm and set up in August 2023 as a randomized block design with four treatments (0, 10, 50, 100t/ha; surface applied) and four replicates. Agronomic management was kept identical to the operations of the farm. Various soil health parameters including cation exchange capacity, pH, organic matter, and macro- and micronutrients as well as different biometric parameters and nutrient uptake in the sugarcane itself were monitored. Carbon dioxide removal was monitored via a multi-measurement approach including in soil waters and soils. Detailed multi-parameter results from one year of post-application monitoring of the experiment will be presented.

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