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Long-term field studies in Canada on monitoring pedogenic carbonate formation in agricultural soils via enhanced weathering of wollastonite: status and latest findings

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Among the several methods that have been proposed for mitigating carbon concentration in the atmosphere, enhanced rock weathering is regarded as a low-cost, low-energy and readily scalable approach that can store atmospheric CO₂ for up to thousands of years through converting alkaline earth metals into stable carbonates. Application of silicate-rich minerals (e.g., wollastonite, basalt and olivine) has been found effective for capturing atmospheric carbon in different terrestrial mediums, including agricultural and urban soils.

In Ontario, Canada, we have been performing long-term research on pedogenic carbonate formation in agricultural soils amended with crushed wollastonite/dolomite rock mined in Ontario. The mineral has been applied to the topsoil of a number of experimental and farming fields, and shallow soil samples are periodically collected at different depths (including 0-15 cm, 15-30 cm, 30-60 cm, and 60-100 cm profiles) from these plots in order to estimate the rate and amount sequestered carbon, and its migration across soil/sub-soil horizons over several years.

These experiments are part of our effort to develop analytical and modeling toolboxes for verifying soil inorganic carbon sequestration, in view of qualifying this practice for carbon credits. Such toolboxes can become valuable for private and governmental entities in contributing to meet emissions reduction goals, and in encouraging the adoption of ERW as a reliable and verifiable negative emissions technology. This presentation will present the status of the field trials and toolbox development, and our latest findings and research directions.