Enhanced weathering & the role of plants: Results from the Antwerp experiment

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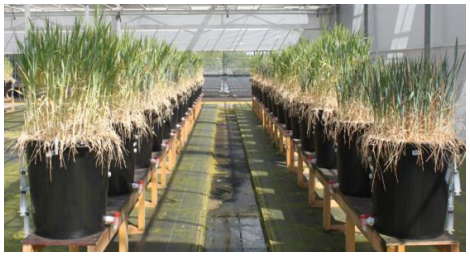
Understanding the evolution of geogenic matter fluxes in soils after the application of rock products in the top layer is relevant to evaluate the alteration of soil solutions and their concomitant saturation states. In the future the practice of applying rock products will continue and presumably, areas affected will spread [1]. This trend will likely be driven by attempts to optimize carbon dioxide removal by inorganic carbon sequestration, increasing biomass production, soil organic carbon stocks, and afforestation. Those efforts demand a certain amount of geogenic nutrients, which need to be supplied and replaced.

After the application of 22 kg m^{-2} olivine powder into the upper 10 cm of the soil, release patterns and the downward transport of an array of elements, as well as reaction processes, are investigated in a mesocosm experiment established at Antwerp University.

Elevated DIC and Mg concentrations are detected in cases of olivine presence in mesocosms with wheat and barley, if compared to the mesocosms without plants and/or olivine. Such a signal is not observed for dissolved silica. Elevated Ni and Fe contents in soil solution are observed too, but Cr remains comparably low. In general, the enhanced weathering signal has not progressed below 30 cm in depth after one year. New data on the geochemistry of soil particles and minerology will be presented, and the role of plant transpiration on solution geochemistry will be discussed.



[1] Hartmann, J., et al. (2013) Enhanced chemical weathering as a geoengineering strategy to reduce atmospheric carbon dioxide, supply nutrients, and mitigate ocean acidification. *Reviews of Geophysics*; **51(2)**, 113-149. doi: 10.1002/rog.20004