2022


[Commentary on #42: Nature Geoscience, 15, 341, 2022]

Paper #24 reports the first coupled dynamic enhanced rock weathering model findings in which a soil profile weathering model is coupled to a land surface model with nitrogen cycle representation. The modelling advance is akin to moving from equilibrium vegetation models developed in the 1980s to dynamic global vegetation models now embedded in Earth system models. It allows us to account mechanistically for N-fertilizer effects on basal mineral weathering rates. Simulations are uniquely (for ERW modelling analyses) constrained by resource production scenarios. We show adding rock dust to UK agricultural soils could remove between 6 and 30 million tonnes of carbon dioxide (CO₂) from the atmosphere annually by 2050 -- up to 45 per cent of the atmospheric carbon dioxide removal needed for the UK to reach net zero.


2021


Paper #33 reports enhanced weathering by N2-fixing legumes trees in tropical forests facilitated by the recruitment of a below-ground microbiome that also benefits neighbouring trees.


2020


Paper #28 reports first evidence from LC3M field trials for consistent mitigation of N2O fluxes from US corn-belt soils over three growing seasons following basalt amendment.


Paper #24 develops the theory to simulate the weathering of particle size distributions, and an initial nation-by-nation assessment of CO2 removal potential by enhanced weathering constrained by current and future energy policy scenarios using an advanced and robust computationally efficient modelling approach.


Paper #24 reports the first evidence from mesocosm experiments that amendment of a UK agricultural soil with crushed basalt increased yields of the C4 crop Sorghum and introduced a detailed 1-D soil profile PhreeqC reactive transport model for simulating rock grain weathering and carbon capture.


2019


2018


[Commentary on #11: Editorial Nature 554, 404-405, 2018]

Paper #11 reported the first detailed evidenced-based synthesis advancing our understanding of how enhanced rock weathering could operate with agricultural systems to sequester carbon and promote food and soil security


2017


