

Toward a computational history of science: The dynamics of socio-epistemic networks and the renaissance of general relativity

Original

Toward a computational history of science: The dynamics of socio-epistemic networks and the renaissance of general relativity / Lalli, R; Wintergrün, D. - ELETTRONICO. - (2020), pp. 253-265. (Intervento presentato al convegno XXXIX Convegno annuale SISFA tenutosi a Pisa nel 9-12 settembre 2019) [10.12871/978883339402237].

Availability:

This version is available at: 11583/2971010 since: 2022-09-06T15:55:01Z

Publisher:

Pisa University Press

Published

DOI:10.12871/978883339402237

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

EGU24-9664, updated on 05 Sep 2024

<https://doi.org/10.5194/egusphere-egu24-9664>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Carbon sequestration uncertainties: bridging the model-data gap for enhanced weathering

Salvatore Calabrese¹, Matteo Bertagni^{2,3}, Giuseppe Cipolla⁴, Leonardo V. Noto⁴, and Amilcare Porporato^{2,3}

¹Biological and Agricultural Engineering, Texas A&M University, College Station, United States of America
(salvatore.calabrese@ag.tamu.edu)

²The High Meadows Environmental Institute, Princeton University, Princeton, NJ, USA

³Department of Civil and Environmental Engineering, Princeton University, Princeton, NJ, USA

⁴Dipartimento di Ingegneria, Università degli Studi di Palermo, Palermo, Italia

Enhanced weathering (EW) is a promising strategy for sequestering CO₂ by amending cropland and forest soils with crushed silicate materials. However, current model-based estimates suffer from numerous uncertainties resulting from the incomplete representation of the weathering process in soils and a lack of model-data comparisons. Here, we address this gap by improving and validating an ecohydrological and biogeochemical soil model that captures the EW dynamics in the upper soil layers. We present a systematic model-experiment comparison leveraging four experiments with different degrees of complexity, ranging from simple closed incubation systems to fully open mesocosm experiments. The comparison reveals an encouraging observation-model agreement for the primary variables of interest, such as rock alkalinity release and CO₂ sequestration. The comparison also demonstrates that the weathering rates consistently fall below those of flask dissolution experiments, underlining the need to update mineral weathering rate formulations in soils. As measurements from field trials become available, further model-data comparisons will help refine the model in support of large-scale EW deployments.