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A Geo-structurally Based Correction Factor for Apparent Dissolution Rates in Fractured Media

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Field measurements of apparent geochemical weathering reaction rates in subsurface fractured porous media are known to deviate from laboratory measurements by multiple orders of magnitude. To date, there is no geologically based explanation for this discrepancy that can be used to predict reaction rates in field systems. Proposed correction factors are typically based on ad hoc characterizations related to geochemical kinetic models. Through a series of high-fidelity reactive transport simulations of mineral dissolution within explicit 3D discrete fracture networks, we are able to link the geo-stuctural attributes with reactive transport observations. We develop a correction factor to linear transition state theory for the prediction of the apparent dissolution rate based on measurable geological properties. The modified rate law shows excellent agreement with numerical simulations, indicating that geological structure could be a primary reason for the discrepancy between laboratory and field observations of apparent dissolution rates in fractured media.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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