Contribution ID: **217** Type: **Oral Presentation**

Feedback mechanisms between precipitation and dissolution reactions across randomly heterogeneous conductivity fields

Monday, 30 May 2022 10:50 (15 minutes)

Our study investigates interplays between dissolution, precipitation, and transport processes taking place across randomly heterogeneous conductivity domains and the ensuing spatial distribution of preferential pathways. We do so by relying on a collection of computational analyses of reactive transport performed in two-dimensional systems where the (natural) logarithm of conductivity is characterized by various degrees of spatial heterogeneity. Our results document that precipitation and dissolution jointly take place in the system, the latter mainly occurring along preferential flowpaths associated with the conductivity field, the former being observed at locations close to and clearly separated from these. High conductivity values associated with the preferential flowpaths tend to further increase in time, giving rise to a self-sustained feedback between transport and reaction processes. The clear separation between regions where dissolution or precipitation takes place is imprinted onto the sample distributions of conductivity which tend to become visibly left skewed with time (with the appearance of a bimodal behavior at some times). The link between conductivity changes and reaction-driven processes promotes the emergence of non-Fickian effective transport features. The latter can be captured through a continuous time random walk model where solute travel times are approximated with a truncated power law probability distribution. The parameters of such a model shift towards values associated with increasingly high non-Fickian effective transport behavior as time progresses.

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References

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Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Unsure

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