Critical review

Seminar: **Reactive transport: numerical issues and challenges**

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The author conducted a study on the influence of basic concepts necessary to understand reactive transport. This research aimed to provide further evidence on the effect of solute transport and chemical reactions since results from previous research have been equivocal. The study reveals that the approach leads to a quite compact formulation, which causes a number of challenges to remain open.

In the first picture, there were perfectly bright gypsum crystals from a cave in Mexico. Honestly, It has nothing to do with what he was talking about, but the idea was clear. Gypsum crystals need water to grow and shine, as humans do too. Due to human anti-environment behavior, the contaminated water simply everywhere on the surface. The only healthy water is deep underground. Due to chemical reactions in the ground and flowing 50 years in the ground, the water is clear again. The ultimate goal of the seminar is to understand how solids react in porous media when water flows to the depth.

The author develops a theoretical model into two ingredients – the transport and the reaction — the transport in a view as advection, dispersion, and mixing. For example when the water flows wind, air flows, chimney smoke goes, wind drags a kite. The chemical reaction – different species within the water get together and produce something. The chemical reactions are many types and complex. That means you need to work with someone who knows. Collaborating with many great scientists is needed to solve this kind of problem.

After describing how do the two ingredients work, we can say that the interplay between transport and reactions is non-trivial. Saturation index calculations are needed. However, they fail to indicate how much calcite is dissolved, nor where dissolution rate is maximum. According to the author, the simulating reactive transport is needed to understand the fate of reacting solutes.

Jesús gives various examples to support his claim that “the mixing drives fast reactions.” Traditionally, mixing is simulated by means of dispersion. However, the dispersion is defined from integrated breakthrough curves, measures spreading. It means that the describing mixing and spreading in two different processes is one of the biggest challenges we are facing.

In summary, it has to be admitted that the current study is still far from being conclusive. Further studies must be undertaken, better measures must be developed, and larger samples must be used to improve our understanding concerning the exact relationship between mixing and spreading. One of the biggest problems of the study is that dispersivity grows with the test scale. Despite some deficiencies in methodology, the study has provided a very professional view to account for reactive transport of groundwater in porous media.

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