Contribution ID: **141** Type: **Oral Presentation**

Process-dependent solute transport in porous media

Friday, 4 June 2021 10:55 (15 minutes)

Solute transport under single-phase flow conditions in porous micromodels was studied using high-resolution optical imaging. Experiments examined loading (injection of ink-water solution into a clear water-filled micromodel) and unloading (injection of clear water into an ink-water filled micromodel). Statistically homogeneous and fine-coarse porous micromodels patterns were used.
It is shown that the transport time scale during unloading is larger than that under loading, even in a micromodel with a homogeneous structure, so that larger values of the dispersion coefficient were obtained for transport during unloading.
The difference between the dispersion values for unloading and loading cases decreased with an increase in the flow rate. This implies that diffusion is the key factor controlling the degree of difference between loading and unloading transport time scales, in the cases considered here. Moreover, the patterned heterogeneity micromodel, containing distinct sections of fine and coarse porous media, increased the difference between the transport time scales during loading and unloading processes. These results raise the question of whether this discrepancy in transport time scales for the same hydrodynamic conditions is observable at larger length and time scales.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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Session Classification: MS25

Track Classification: (MS25) Subsurface Water Flow and Contaminant Transport Processes –Special Session in Honor of Harry Vereecken