Contribution ID: **802** Type: **Oral Presentation**

Bridging the continuum and discrete models developed to simulate solute transport and distribution in drying porous media

Thursday, 25 May 2023 09:30 (15 minutes)

Solute migration and formation of solids in capillary porous media exposed to evaporation is central to many engineering and environmental applications. In order to predict the evolution of solute concentration in a porous medium, the macroscopic continuum models (CMs) are commonly employed. However, the predictive aptitudes of the CMs is still questionable at this stage. In this work, we solve the classical advection-diffusion equation for solute transport in a capillary porous medium exposed to evaporation for the limiting condition of capillary-dominated regime. The solution of the CM is compared with pore network simulations. The results of both models are analyzed in terms of instantaneous and time-averaged local solute concentration profiles. On this basis, the ability of the CM to predict the time for the onset of solid formation (i.e. the time that is required for local solute concentration to reach saturation concentration) is assessed. Furthermore, we characterize the degree of heterogeneity in the liquid phase structure (i.e. splitting the bulk liquid into the main cluster, the isolated clusters and the isolated single menisci) by performing pore network Monte-Carlo simulations. Based on the statistical analysis of Monte-Carlo simulations, we compute the probability of first solids to appear in the respective liquid phase elements. Solute enrichment is more pronounced in the isolated single menisci and isolated clusters due lack or significant hindrance to back-diffusion as a result of discontinuity in the liquid phase.

Participation

In-Person

References

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

Deutschland

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary author: Mr KHARAGHANI, Abdolreza

Presenter: CHEN, Jing

Session Classification: MS06-A

Track Classification: (MS06-A) Physics of multiphase flow in diverse porous media