Contribution ID: **674**

Type: **Poster Presentation**

Delineating external stressor signals as time-variant conditions affecting DNAPL source zone formation

Tuesday, 23 May 2023 16:10 (1h 30m)

Groundwater aquifer systems serve as a major source of drinking and irrigation water supply. In recent years, they have also become valuable for geothermal energy applications. The protection of groundwater against detrimental factors is crucial to preserve this valuable water supply and ensure a sustainable energy transition. Subsurface contamination by dense non-aqueous phase liquids (DNAPLs) can cause adverse effects for humans and the environment. These organic compounds are omnipresent in industrialized and developing countries, particularly in areas with energy production (e.g., oil and coal industries, chemical plants), industrial fabrication (e.g., steelworks, wood impregnation) and transportation hubs (e.g., railway systems, roads, airports). Once re-leased into soils, DNAPLs form slowly miscible source zones that can contaminate groundwater for decades.

Despite a range of existing subsurface remediation techniques, mostly for economic reasons, natural attenuation of aqueous DNAPL components in groundwater represents the most commonly applied cleanup option. As a con-sequence, the fate of contaminated sites remains unclear due to insufficient data and knowledge of DNAPL source zones. Climate change and anthropogenic activity may jointly add new hazard potentials by inducing hydraulic and thermal stressors potentially affecting present and emerging source zones. A robust understanding of the processes associated with DNAPL source zone formation under changing conditions is therefore crucial to ensure an efficient assessment of contaminated sites.

Our current research aims at systematically investigating the transient dynamics of DNAPL source zone formation, and employs experimental and model-based methodologies to evaluate the relevance of changing external stressors (hydraulic, thermal) compared to subsurface and fluid phase properties. In this study, we present a methodology to systematically delineate variation signals, necessary for the definition of boundary conditions in models considering changing conditions, from multi-scale field site information (e.g., monitored time series). For this, a range of field sites under variable anthropogenic pressures showing different intrinsic hydro(geo)logical characteristics are involved.

Participation

In-Person

References

MDPI Energies Student Poster Award

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

Country

Germany

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

This abstract is related to Energy Transition

Primary author: Dr ENGELMANN, Christian (TU Bergakademie Freiberg, Chair of Hydrogeology and Hydrochemistry)

Co-authors: Prof. FRENCH, Helen K. (Norwegian University of Life Sciences, Faculty for Environmental Sciences and Nature Management); Dr SOOKHAK LARI, Kaveh (The Commonwealth Scientific and Industrial Research Organisation, Department Land and Water, Floreat site); Prof. WERTH, Charles J. (The University of Texas at Austin, Department of Civil, Architectural and Environmental Engineering); Prof. SCHEYTT, Traugott (TU Bergakademie Freiberg, Chair of Hydrogeology and Hydrochemistry)

Presenter: Dr ENGELMANN, Christian (TU Bergakademie Freiberg, Chair of Hydrogeology and Hydrochemistry)

Session Classification: Poster

Track Classification: (MS18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers