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SPECIAL SECTION: EMERGING PARTICLES AND BIOCOLLOIDS IN TERRESTRIAL AND AQUATIC SYSTEMS

Preface: Special section on emerging particles and biocolloids in terrestrial and aquatic systems

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Emerging contaminants such as engineered nanoparticles and microplastics, as well as colloids and biocolloids, enter subsurface environments after accidental or intentional release. Once released, these particles represent another mobile solid phase in the subsurface. Colloid transport is substantially different than solute transport. Furthermore, transport of nanoparticles and microplastic in porous media differs substantially from conventional colloid and biocolloid transport, because the transport properties of these particles change more significantly due to aggregation (homo- and heteroaggregation) and interactions with dissolved substances in soil. The formation of larger particles with different physical and chemical characteristics or the breakdown of larger particles due to biodegradation are visible changes. Although the fate and transport of emerging particulate contaminants have been examined extensively in the past few years, their behavior in the subsurface is not fully understood. This special section was motivated by a series of interdisciplinary sessions entitled "Emerging particles and biocolloids in terrestrial and aquatic systems," organized by the guest editors at the European Geosciences Union Annual Meeting in Vienna, Austria.

The papers in this special section deal with (a) the deposition and release of clay colloids and nanoparticles in porous media, where it was shown that heavy metals enhanced the attachment of clay colloids and that attached clay colloids can be released by cation exchange or reduction of the solution ionic strength (Shi et al., 2022); (b) the colloidal transport of heavy metals in low-advective-velocity environmental systems, where it was shown that when the interaction between sorbed contaminants with colloidal particles are ignored, the contaminant concentrations in aqueous environments might be underestimated under low flow velocity conditions (Sengor & Unlu, 2022); (c) the fate and transport of *Cryptosporidium parvum* oocysts in porous media in the presence of surfactants, where it was shown that the presence of a surfactant could either increase or decrease the mobility of protozoa in porous media depending on the soil type (Darnault et al., 2022); (d) the cotransport of titanium dioxide nanoparticles and formaldehyde in saturated and unsaturated porous media, where it was shown that substantial retention of titanium dioxide nanoparticles occurs in both saturated and unsaturated porous media, and that the transport of formaldehyde was hindered in the presence of titanium dioxide nanoparticles,

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especially at high ionic strength (Chrysikopoulos & Fountouli, 2022); (e) the effects of microplastic on water dynamics in porous media, where it was concluded that microplastics at high concentrations can significantly hinder water infiltration (Cramer et al., 2022); and finally (f) the interfacial convections at the water–nonaqueous-phase liquid interface in microfluidic systems, where it was shown that Marangoni, dissolution-driven, and evaporation-driven flow leads to enhanced mixing of phases in the vadose zone at nonaqueous-phase liquid–water interfaces (Wismeth et al., 2022).

AUTHOR CONTRIBUTIONS

Constantinos V. Chrysikopoulos: Writing – original draft. Thomas Baumann: Writing – review & editing. Meiping Tong: Writing – review & editing. Christophe Darnault: Writing – review & editing.

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