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Preface of the Special Issue of Applied Clay Science “8th International Conference on Clays in Natural and Engineered Barriers for Radioactive Waste Confinement”

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Preface

Preface of the Special Issue of Applied Clay Science “8th International Conference on Clays in Natural and Engineered Barriers for Radioactive Waste Confinement”

In many countries, clays are considered the potential host rock for the geological disposal of radioactive waste, and the use of compacted swelling clays as an engineered barrier component is envisioned within the multi-barrier concept in a wider range of host rocks.

The “Clay Conference” has established itself as an ideal forum for presenting recent developments in repository design and construction that include the use of clayey materials, such as bentonite-based backfill material, repurposed clay rock material, and clay host rocks. Following presentations at the conference that encompassed all aspects of clay science related to radioactive waste confinement, this special issue puts forward important contributions to this topic in the fields related to experimental and computational studies of mineralogy, geochemistry, transport, as well as mechanical and retention properties of clayey materials with an increasing interest on bentonites.

The wide breadth of disciplines and techniques covered in this collection of manuscripts reflects the need for multidisciplinary work that couples processes at multiple scales, ideally from the size of a clay layer to that of a geological formation (Kneuker et al., 2023; Mazurek et al., 2023), to build predictive capabilities that support long-term safety assessments. The present collection of manuscripts can also be seen as an image of shared scientific interests in the community. First, the contributions from Åkesson et al. (2023), Daniels et al. (2024), Dixon et al. (2023a), Dixon et al. (2023b), Gonçalves et al. (2023), Najser et al. (2023) and Pelegrí et al. (2023) demonstrate the growing interest of the community in the coupling of mechanical, hydrological and chemical properties. Second, the need to consider microstructure characterization to inform related small and large-scale models is also evident from the contributions of Baborová et al. (2023), Krejci et al. (2023), Middelhoff et al. (2023), Sakaki et al. (2023) and Zeng et al. (2023). Third, numerical simulations are now well-established approaches to bridge gaps between current basic process knowledge and defensible predictions (Gramegna et al., 2023; Mon et al., 2023; Montenegro et al., 2023; Mota-Heredia et al., 2023; Zhang et al., 2023).

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Christophe Tourmassat.
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Jean-Charles Robinet.
Maria Victoria Villar.

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