Exploring Frontiers in Kinetics and Mechanisms of Geochemical Processes at the Mineral/Water Interface

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One of the most important factors controlling the fate, transport, and bioavailability of nutrients and inorganic and organic contaminants in the Earth's Critical Zone is the kinetics. The timescales for geochemical processes range from milliseconds to years and beyond. The use of state-of-the-art analytical techniques, particularly in-situ spectroscopic and microscopic methods, has greatly advanced our understanding of geochemical reactivity and speciation at important critical zone interfaces. These techniques enable one to make measurements at small spatial and rapid temporal scales and better simulate natural environmental conditions. This presentation will illustrate the importance of coupling kinetics with molecular scale investigations to address important geochemical processes including surface complexation, mineral transformations, and oxidation-reduction dynamics.