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Advances in Understanding Sorption and Transport Processes Affecting the Fate of Environmental Pollutants in the Subsurface

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The results of a call for a special issue that is now in press by the Journal of Contaminant Hydrology will be presented. This special issue is edited by the authors and is entitled "Sorption and Transport Processes Affecting the Fate of Environmental Pollutants in the Subsurface". A short abstract of each paper will be presented along with the most interesting results. Nine papers were accepted. Pollutants studied include: biocolloids, metals (arsenic, chromium, nickel), organic compounds such as hydrocarbons, chlorinated hydrocarbons, micropollutants (PAHs, PCBs), pesticides (glyphosate, 2,4-D). Findings presented in the papers include a modified batch reactor system to study equilibrium-reactive transport problems of metals. Column studies along with theoretical approximations evaluate the combined effects of grain size and pore water velocity on the transport in water saturated porous media of three biocolloids. A polluted sediment remediation method is evaluated considering site-specific conditions through monitoring results and modelling. A field study points to glogging and also sorption as mechanisms affecting the effectiveness of sub-surface flow constructed wetlands. A new isotherm model combining modified traditionally used isotherms is proposed that can be used to simulate pH-dependent metal adsorption. Linear free energy relationships (LFERs) demonstrate ability to predict slight isotope shifts into the groundwater due to sorption. Possible modifications that improve the reliability of kinetic models and parameter values during the evaluation of experiments that assess the sorption of pesticides on soils are tested. Challenges in selecting groundwater pollutant fate and transport models that account for the effect of grain-scale sorption rate limitations are evaluated based on experimental results and are discussed based on the Damköhler number. Finally, a thorough review paper presents the impact of mineral micropores on the transport and fate of organic contaminants especially when the porous geological media have very low organic carbon contents.