Making Sense of Chromium Migration and Immobilization in the Hyporheic Zone

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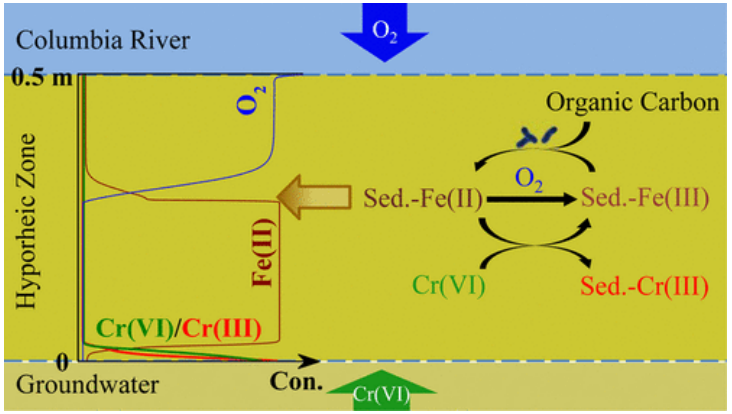
Objective

- To identify the impacts of dynamic river flow conditions on the transport, behavior, and immobilization of contaminants (in this case, chromium (Cr)) in the zone where river water and groundwater mix (the hyporheic zone or HZ).

New Science

- Researchers used sediment samples from the Columbia River HZ in the U.S. Department of Energy's Hanford 300 Area, which is located downstream of several chromium (Cr) contaminant plumes.
- Researchers used a combination of laboratory experiments and numerical models to investigate two things: 1) multi-component interactions between chromium (Cr), iron (Fe), oxygen (O), and organic carbon (OC) in HZ sediments and 2) their effects on how contaminants travel and when and how they're immobilized.



An illustration of the hyporheic zone in relation to water and groundwater, and the complex mixing of various elements and microbial communities.

Significance

- The results of this study provide important insights into the role of river dynamics on the effectiveness of the HZ as a natural barrier for immobilizing contaminants. River and groundwater exchange can help sustain this natural barrier through delivery of organic matter that stimulates microbial reduction of iron, which in turn reduces and immobilizes Cr.

Yuanyuan Liu, et al. "Coupled Hydro-Biogeochemical Processes Controlling Cr Reductive Immobilization in Columbia River Hyporheic Zone." *Environ. Sci. Technol.*, 2017, *51* (3), pp 1508–1517. DOI: 10.1021/acs.est.6b05099