Coupled Processes Influencing the Transport of Uranium over Multiple Scales

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In order to reliably estimate transport parameters, analyses of uncertainty and sensitivity are performed to determine the contributions of model and parameter estimation errors. Previous work involved the transport of Br, Co, and U(VI) in intact Hanford sediment cores in which flow is parallel or perpendicular to bedding (Mayes et al., 2003, in prep; Pace et al., 2003, 2007). Six different parameter combinations using convective-diffusive equation (Parker and van Genuchten, 1984) for simultaneously fitting nonreactive tracer Br and reactive tracer Co are attempted (Fig. 3).

![Image]

The hydraulic conductivity calculated from layered and effective parameters of unsaturated layered sediments were estimated using a physically-based Cantor Bar model to represent interbedded layers of coarse (blue) and red (fine) sediments (Tang et al., accepted). A direct averaging approach, the composite medium model, is used to scale the hydraulic parameters from individual layers to a composite system (e.g., Muslem, 1984; Yeh et al., 1985; Pruess, 2004). This approach has been criticized because it ignores variances in the hydraulic gradient (Ah or Δh) (Khaliel et al., 2002).

Therefore we tested the sensitivity of the model to variations in hydraulic gradient over scales of 10-100 cm.

**REFERENCES:**

4. Validate model with measurements at different scales.
5. Extend model from monofractal (2 materials) to multifractal (many materials).
6. Extend uncertainty analysis to large-scale models.

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