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Using a hydrous manganese oxide (HMO) doped gel probe to measure rates of reductive dissolution

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Reductive dissolution of redox-sensitive minerals such as manganese (Mn) oxides in natural sediments is an important mechanism for trace element mobilization into groundwater. A gel probe sampler has been constructed to study reductive dissolution of Mn-oxides. The gel consists of a polyacrylamide polymer matrix doped with hydrous Mn oxide (HMO). It is cut into slabs and placed into slots etched into a Plexiglas probe, and coved with a membrane filter. The probe is designed to be inserted into sediments and allowed to equilibrate with sediment porewater. The amount of Mn reductively dissolved from the gel is measured by comparing the amount of Mn initially embedded into the gel with the amount remaining in the gel exposure to a reducing agent. In this study, the gel probes were used to compare the rates of reduction by ascorbic acid, manganese reducing bacteria *Shewanella oniedensis* strain MR1, and natural sediments in a laboratory microcosm. In addition, modeling has been used to connect the reaction rates observed for HMO doped in gels to the reaction rate observed for “free” HMO.