Tracer test with arsenic(V) in an iron-reducing environment at the USGS Cape Cod Site (Mass. USA) - DTU Orbit (10/01/2019)

The transport of arsenic (V) (As V) in an aquifer environment is affected by sorption processes especially onto surfaces of iron hydroxides. During iron reduction, significant amounts of arsenic (III) As (III) may be released into the water. To study transport and reaction rates under field conditions, a small scale continuous tracer test was performed in the zone with iron reduction in a sandy aquifer at the USGS Cape Cod test site. During 4 weeks, a tracer solution containing suboxic water, arsenic (V) (6.7 μmol) and bromide (1.6 mmol) was injected. Downstream the breakthrough of bromide (used as a conservative tracer), As (V) and As (III) was observed. Only as close as 1 m downstream As (V) was detected during the injection period, probably because of adsorption or coprecipitation of As on hydrous ferric oxide generated by oxygenation of Fe (II). Anoxic conditions were reestablished shortly after terminating the injection, after which both As (V) and As (III) were observed at sampling points downstream. At the injection port, up to 50% of the total dissolved As was released as As (III). Over the next 3 months, both As (V) and As (III) moved more than 5 m downstream of the injection.

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