Quantifying reactive transport processes governing arsenic mobility in a Bengal Delta plain aquifer

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Over the last few decades significant progress has been made to characterise the extent and severity of groundwater arsenic pollution in S/SE Asia and to understand the underlying geochemical processes [1-3]. However, comparably little effort has been made to merge these findings into a fully coupled, quantitative framework that allows for a process-based assessment of the current and prediction of future arsenic behaviour. Therefore this contribution investigates suitable modelling approaches for a process-based quantification of microbially mediated reductive dissolution of iron oxide minerals and the concomitant release of sorbed arsenic at the field-scale.

We employ data from an *in situ* field experiment in the Bengal Delta Plain which investigated the influence of organic matter on the mobility of Fe, Mn, and As concentrations [4] to guide our model development and to constrain model parameterisation. In that study it was found that after the controlled injection of sucrose, concentrations of Mn increased 7.5 times, Fe increased 36 times and As increased between 19 and 49% compared to baseline values. The modeling study shows that the disparity between dissolved Fe and As concentrations can be attributed to As sorbing to remaining Fe-minerals and the newly formed Fe(II) and mixed Fe(II/III) mineral phases.

[1] Nickson *et al* (2000) *Applied Geochemistry,* **15** (2000) 403-413. [2] Smedley *et al* (2002) *Applied Geochemistry,* **17** (2002) 517-568. [3] Islam *et al* (2004) *Nature*, **430** (2004) 68-71. [4] Neidhardt *et al* (2014) *Chemical Geology,* **367** (2014) 51-62.