On the Spatial Heterogeneity of Groundwater Arsenic

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Groundwater contaminants of anthropogenic and geogenic origins, including arsenic, tend to have spatially heterogeneous distribution in aquifer at various spatial scales. The mechanisms for such spatial heterogeneity are still poorly understood despite recent advances in understanding of how preferential flow paths regulate contaminant transport.

To unravel the factors controlling the spatial heterogeneity of groundwater arsenic distribution across different spatial scales, it is very often helpful to conduct high spatial resolution hydrogeological and geochemical mapping efforts. Although this has been feasible at local scales as demonstrated by prior work in Araihazar, Bangladesh and Augusta, Maine, the sampling nevertheless utilizes existing domestic wells that tend to cluster in where human settlements are, thus not ideal to represent subsurface heterogeneity. This "uneven" distribution of available data is exacerbated at regional or basin scale.

New data will be collected from Yinchuan Plain in Northwest China to allow characterization of the degree of x-y-z spatial heterogeneity of groundwater As using an equal area grid approach. This allows a comparison with sampling using unevenly distributed samples. Logistic regression model will identify factors that are significant in explaining both local and regional scale spatial patterns of groundwater. The factors that will emerge from the modelling efforts across the scales are then deemed to be most relevant for further investigation.