Effect of Seasonal parameters in the mobilization process of Arsenic in groundwater at Nadia, WB

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Groundwater in Bengal Basin is severely affected by high concentration of arsenic (As). Most common As release mechanism considered is reductive dissolution of Fe/Mn-oxy-hydroxides due to microbial degradation of organic matter present in the sediment. The seasonal variability in As concentration in groundwater, based on a few observations, showed lowering of As concentration during monsoon season and incremental growth during dry period. There were suggestions that surface water bodies being the triggering factor of mobilizing As into the groundwater as they infiltrate and replenish the excess drawdown of groundwater during dry time [1], [2]. In the present study we used combination of stable isotope tool ($\delta^{13}C$ of DIC and $\delta^{18}O$, δD in groundwater) along with microbial count as tracers for estimating recharge of surface water into ground water in different seasons. Our observations documented around 60% surface water contribution during dry Post monsoon season (Nov-Dec) as compared to 30% contribution during summer time or Pre monsoon season (March-April). We argue the role of seasonal temperature in driving the microbial population in the surface water. The supply of microbially contaminated surface water triggered As relaese in the regional ground water. Summer temperatures favour growth of microbial community [3] and favour decay of organic matter promoting anoxic condition [4] supporting our hypothesis of conducive dissolution of As from the sediment into the groundwater. Here we have showed the conjugate effects of seasonal temperature and surface water recharge into groundwater as primary factor controlling the variability of As in the groundwater of Nadia district West Bengal.

[1] Harvey et al., (2002) Science 298(5598), 1602-1606; [2] Neumann et al., (2010) Nature Geoscience 3(1), 46-52 ; [3] Bisht et al., (2014) Journal of Environmental Biology 35(2), 363-367; [4] Bandopadhyay et al., (2017) Soil and Sediment Contamination: An International Journal 26(5), 471-485