Department of Environmental Science

Emily Sparer

Mentor: Martin Stute

Major Anion and Stable Isotope ($\delta^{18}O$, δD) Composition of Surface Waters in Bangladesh

About 57 million people in Bangladesh are exposed to drinking water containing arsenic that is above the World Health Organization standard of 10μg/L (BGS 2001). This has caused a range of health effects from skin lesions to cancer. The arsenic is found naturally in the groundwater aquifer sediments; however, the mobilization mechanism is still not entirely understood. There is also a high spatial variability in the groundwater arsenic concentrations.

Surface waters and precipitation are the source of recharge for the groundwater, thus patterns such as seasonal change affect groundwater composition. The question is to what extent does the chemical composition of recharge control the groundwater arsenic concentrations. The first step of this research project, which I completed here, was a careful analysis of the surface waters.

Anions (specifically chloride) and stable isotopes ($\delta^{18}O$, δD) in surface waters show a clear seasonal pattern. The concentration of chloride at 11 different surface water sites in Araihazar, Bangladesh was predicted under the assumption that it is only affected by natural processes (evaporation and precipitation). When these predictions were compared to the actual concentrations, it was found that the surface waters are indeed by influenced other processes. These include human waste disposal and/or chemicals related to irrigation such as fertilizers and pesticides, as well as groundwater interaction.