Dynamics of Arsenic in Pozuelos basin, Central Andes, Argentina

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High concentrations of arsenic (As) in groundwater occur in the Central Andes. Groundwater with As levels above WHO guidelines (10 µg/L) is the main source of drinking water for Andean communities in Pozuelos basin. Pozuelos is a semi-arid closed basin with a playa lake (PL) on its depocenter. In Pozuelos, there are at least three potential sources for As in groundwater i) As sulfides in mining wastes, and acid mine drainage (AMD); ii) rich Au-As mineralized shales; and iii) volcanic eruptive non-mineralized rocks.

In Pozuelos, AMD has the highest concentration of As (0.7 – 44 mg/l), decreasing in groundwater (8.22 – 113 µg/L) and rivers (1.7 – 20 µg/L) and increasing again in the PL (~ 200 µg/L). The As(V) concentration is much greater than the As(III) concentration in AMD, groundwater and rivers, while As(III) ≈ As(V) concentration in the PL. Oxidation promotes higher As(V) concentration in shallow groundwater, rivers and AMD. High evaporation could increase As concentrations in PL, but the relative increase of As(III) suggests biological reduction processes.

Despite the obvious source of As in sulfides for As-bearing groundwater in Pozuelos, these are localized sources and redox and sorption processes often immobilize As from AMD sources. Arsenic does not correlate well with any other parameter in water, but high concentrations of B and Li coupled to As could indicate volcanic sources. High concentrations of B and Li are also found in AMD.

Environmental isotopes ($\delta^{34}S_{SO4}$, $\delta^{18}O_{SO4}$, $\delta^{18}O_{H2O}$, δD_{H2O}) in combination with water geochemistry will contribute to understanding more about multiple As sources, mobility and behavior under semi-arid conditions in this region of Central Andes. High resolution drilling and spectroscopic analysis in selected samples will contribute to elucidate As-bearing conditions in the aquifer of Pozuelos basin.