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Establishment of groundwater baseline using end-member mixing analysis in the groundwater flow system approach

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The aim of this research is to establish the groundwater baseline in a sub-basin located in the southwest of Mexico City, an area affected by anthropogenic activities.

The methodology consists of groundwater sampling in 40 sites to measure major ions and physicochemical parameters as temperature, pH, Eh, and total dissolved solids. The end-member mixing analysis was applied using the groundwater flow system approach. The groundwater baseline was established using flow components that were defined.

The main results are: to found four groundwater flow components: 1) local, 2) intermediate, 3) cold regional, and 4) hot regional; to established a groundwater baselines; to relate the anomalous concentrations of nitrate and sulfate due to anthropogenic activities in the area; to associate the fertilizer use, wastewater, and the canal leaching black waters as the principal sources of these concentrations.

The conclusions show the importance to use the groundwater flow system approach to differentiate natural processes as hydrochemical evolution due to water-rock interaction of the anthropogenic influence. In the context where groundwater is extracted without knowing its baseline and the anthropological implications, the groundwater flow system approach to permit generated best management and administration strategies.