Grounwater thermalism into Valle de Celaya aquifer

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The Valle de Celaya aquifer is of tectonic origin and is located into the Celaya graben, Central Mexico. The study zone is markedly affected by two regional fault systems: Taxco – San Miguel de Allende (N-S), and Ixtla – La Joya (≈N25°W)[1]. The lithology of the area is constituted mostly by lake and alluvial deposits interlayered with Tertiary acidic tuffaceous volcanic rocks. The basement has been related to older basalts interleave with acid and intermediates tuffs. Fractured rocks of the younger volcanic sequence constitute the aquifer, being the main source from which the community has been extracting the more water quantity.

Hydrogeochemical analysis shows that ground water is of bicarbonate calcium water type reflecting thermal interactions of the aqueous phase with deep carbonate lithologies. The faults in the study area may be associated with local thermal manifestations (Santa Rita 2's well 48.3 °C and La Laja's well 60.4 °C). Silica concentration (12.6-91.8 mg/L) in the water correlates with temperature increment as well as with arsenic (0.001 0.109mg/L) and fluoride (<0.46 - 3.23 mg/L) concentrations.

It's proposed that the composition of the water is a thermal product of deeper regional flow water interactions with specific shallow lithologies (rhyolites, ignimbrite, tuffs, and volcanic of intermediate compositions). Some outcrops of these units are likely exposed near Celaya City. There is a strong structural control for the efficient transfer of fluids from the fractured medium.

Recorded δD and $\delta^{18}O$ values measured in Celaya's groundwater have similar distribution to that of Wassenaar et al. 2009 [2] data. The regresion line is secant to Mexico Groundwater regresion and didn't display a shift on isotopic composition.

[1] Alaníz-Álvarez et al. (2004). BSGM, Volumen Conmemorativo del Centenario, 65. [2] Wassennar et al. (2009) Journal lof Geochemical Exploration **102**, 123-136.