Groundwater signatures and mixing patterns around El Paso del Norte area of the Rio Grande aquifer system using environmental tracers

Astrid Y. Lozano Acosta

El Paso, TX, 79903, aylozano@hotmail.com

Geochemical and isotopic data from the literature for aquifers around El Paso del Norte area is gathered and analyzed to identify mixing patterns and study their hydraulic connectivity. Most of the aquifers are recognized as part of the Rio Grande aquifer system and represent an interlinked series of basins. Existing information on groundwater flow direction and interbasin flow help interpret the data. Using environmental tracers, groundwater groups were identified and characterized, including possible instances of mixing among them. The results were then compared to dendrograms produced from a multivariate analysis of the data as well as to published classification schemes. This study specifically identifies a number of samples in the Valle de Juárez aquifer that match the signature of groundwater groups found near the Jornada-Mesilla divide as well as mixing with the Hueco Bolson endmembers. Groundwater from Conejos-Médanos resembles a mix of at least two distinct water types identified in the Laguna de Patos aquifer; their similarities with a number of samples in the Mesilla Basin, Diablo Plateau, and southern Hueco Bolson suggest mixing and/or a common source or lithology. Springs from the Diablo Plateau and Red Light Draw located at normal faults along the southeastern Hueco boundary are discharging groundwater with similar characteristics. A number of regional geochemical trends were also identified. The results illustrate aquifer dynamics and highlight the importance of data integration for the analysis of regional and local systems, which has implications for water management, quality, and availability topics.

Keywords:

groundwater, environmental tracers, Rio Grande aquifer system, interbasin flow, multivariate analysis, transboundary aquifers

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