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Titulo / Autores / Institución

TITULO DE LA PONENCIA

INTERACTION BETWEEN GROUNDWATER AND METEORIC WATER DETERMINED BY STABLE ISOTOPES (δ 18O, δ 2H), RADIOGENIC ISOTOPES ($^{87}SR/^{86}SR$), AND WATER CHEMISTRY: A CASE STUDY FROM THE CENTRAL MIDDLE MAGDALENA BASIN (MMB), COLOMBIA

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Categoría del resumen

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PALABRAS CLAVE

Radiogenic isotopes (87Sr/86Sr), stable isotopes (δ 18O, δ 2H), water mixtures, meteoric waters, connate waters.

CONTENIDO DEL RESUMEN

The present study reports new data on the isotopic and chemical composition of groundwater associated with Cenozoic Mugrosa Formation reservoirs in the Middle Magdalena Basin (MMB). This research was conducted using both conventional data (pH, conductivity, and ionic composition), stable isotope data (δ18O and δ2H), and radiogenic isotope data (87Sr/86Sr). The water samples were collected from production wells in the Mugrosa Formation reservoirs at

depths ranging between 1500 m and 2000 m.

The use of ionic and isotope ratios suggests an interaction between meteoric water and connate waters in the MMB. Meteoric waters exhibit a short residence time in the system and are chemically less evolved, as well as isotopically more depleted in δ18O and δ2H. These waters are present mainly toward the eastern part of the basin on the east flanks of the Nuevo Mundo Syncline. In contrast, connate waters are characterized by a longer residence time and are chemically more evolved, as well as isotopically enriched in δ18O and δ2H. These connate waters are present mainly in the western flanks of the Nuevo Mundo Syncline and close to the Salina, Arrugas and Casabe thrust faults.

The results in this study indicate that groundwaters in MMB originate from two sources: 1) infiltration of meteoric waters and 2) upward migration of deep saline waters derived from Cretaceous formations. Meteoric waters infiltrate on the eastern flank of the basin and flow through the Mugrosa Formation, where the water-rock reactions change its chemical composition (i.e., increasing sodium, calcium and potassium content). The connate waters originated from Cretaceous Formations migrate along the reverse fault's planes, mixing with meteoric waters, modifying the chemical and isotopic composition; consequently, the chloride content increases, and the δ 18O/ δ 16O ratio shows enrichment over meteoric waters.