
Hydrogeology of Northern Sierra de Chiapas, Mexico, Based on Spring Characterization

Laura Rosales Lagarde^{1,2}, Penelope J. Boston^{1,2}, Andrew R. Campbell¹, and Louise D. Hose³

¹New Mexico Institute of Mining and Technology, Socorro, New Mexico 87801

²National Cave and Karst Research Institute, Carlsbad, New Mexico 88220

³National Park Service, Gulf Coast Cooperative Ecosystem Studies Unit,
Texas A&M University, College Station, Texas 77843

ABSTRACT

Sierra de Chiapas (Chiapas Range) is a frontier for oil exploration due to its location southeast of the Chiapas-Tabasco giant oil field area. Some of the Cretaceous carbonate reservoir rocks outcrop at this range. A characterization of springs in northern Sierra de Chiapas provides information on the hydrogeology of this area. The spring characterization reflects groundwater types and composition, number of aquifers, aquifer characteristics, and possible flow-paths. This information is pertinent to hydrocarbon flow-paths because water with similar characteristics to one of the springs has been found in a production well at ~2000 m depth. Several areas contain springs with different compositions. The springs were classified based on their temperature and total dissolved solids (TDS) content as brackish and fresh water, and thermal, warm, or cold. Based on spring water δD and $\delta^{18}O$ both the brackish or fresh spring waters have a meteoric origin. The recharge area for the fresh water (some used as drinking water source) is the nearby carbonate topographic highs and the groundwater seems to flow only through local paths in carbonates until before reaching its discharge area. On the other hand, the brackish water is probably recharged at elevations lower than 1500 m either locally, at distal areas, or in the past. In addition to carbonates, the brackish water interacted with evaporites in the subsurface before reaching its discharge zone through intermediate or regional groundwater flow paths.