BRUNO, R. STEPHANIE, Department of Geology and Geophysics, Louisiana State University, Baton Rouge, Louisiana 70803, Bruno and Associates, 5129 Chestnut St., New Orleans, LA 70115, and JEFFREY S. HANOR, Department of Geology and Geophysics, Louisiana State University, Baton Rouge, Louisiana 70803

Large-Scale Fluid Migration Driven by Salt Dissolution, Bay Marchand Dome, Offshore Louisiana

The presence of salt at shallow depths has played a significant role in the development of the deep basin hydrogeology of the Gulf of Mexico sedimentary basin. Data on fluid pressures, temperatures, and salinities derived from 20 wireline logs from a 24 km^2 area on the southeast flank of the Bay Marchand dome illustrate the role that subsurface dissolution of salt within the Louisiana continental shelf has had on kilometer-scale fluid flow in the region. At least three distinct hydrogeologic regimes exist within the study area. The shallowest studied is a lower Pleistocene–upper Pliocene hosted hydropressured regime having fluids of normal marine salinity. The deepest regime is characterized by overpressured Miocene sediments having marine salinities and less. The middle regime, hosted by Pliocene and upper Miocene sediments, is characterized by hypersaline waters derived by salt dissolution near the top of the Bay Marchand dome. At least two salinity plumes having a cumulative thickness of a kilometer or more are migrating to the south and southeast downdip within sandy intervals. The main plume appears to originate on the east face of the dome. Discontinuities in salinity variations in the southernmost part of the area reflect fluid compartmentalization by faults. Excess dissolved salt within the study area corresponds to the dissolution of 0.3 cubic km of the salt dome. Salt dissolution may thus have partly contributed to the complex set of extensional structures, which have been documented above the dome.