

**GEOPHYSICAL VIEWS OF KARSTIC POROSITY AND GROUND-WATER FLOW  
WITHIN PLEISTOCENE HIGH-FREQUENCY CARBONATE CYCLES OF THE  
COASTAL BISCAYNE AQUIFER, SOUTHEASTERN FLORIDA, USA**

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**ABSTRACTS.**

The focus of this study is the karst Pleistocene limestone that comprises much of the coastal surficial Biscayne aquifer, which is an eogenetic karst aquifer. The principal study area encompasses about 460 km<sup>2</sup> and is located about 28 km west of the southeastern Atlantic coast of peninsular Florida, USA. Eogenetic karst aquifers are unique to young carbonate platforms, ramps, and islands and typically have a dual-porosity system consisting of matrix and conduit porosity, unlike older karst systems in which the matrix contributes little to the porosity system and ground water principally flows through conduit and fracture porosity. A new conceptual eogenetic karst model for the Biscayne aquifer is based on a robust data set that includes 50 continuously cored test holes, 47 digital optical borehole image logs, 130 line-km of ground-penetrating radar profiles, and 176 line-km of high-resolution seismic profiles. Integration of these data suggests that the Biscayne aquifer varies from the typical dual-porosity eogenetic karst model and is a triple-porosity system consisting of matrix, vuggy, and fracture porosity, resulting in a triple-flow carbonate ground-water system comprised of diffuse flow, conduit flow, and fracture flow.

Combined results show that vuggy and matrix porosity and hydraulic conductivity of the karst limestone of the upper Biscayne aquifer have a highly heterogeneous and anisotropic distribution that is mostly related to a relatively predictable vertical arrangement of depositional environments and depositional textures within a carbonate architecture of high-frequency cycles. For the upper Biscayne aquifer, results have been integrated into a three-dimensional conceptual flow model. Seismic profiles suggest that fractures and faults, possibly related to shallow dissolution features, contribute to complication of a more stratal-related carbonate diffuse and conduit ground-water flow system in the Biscayne aquifer.

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