

Structural Deformation of the Southern Florida Peninsula during the Late Miocene to Early Pliocene: Geophysical Log Evidence

Robert G. Maliva¹, Thomas M. Missimer², and Weixing Guo¹

¹CDM, 9311 College Parkway, Suite 1, Fort Myers, FL 33919

²Missimer Groundwater Science, Inc., 3214 McGregor Blvd., Fort Myers, FL 33901

ABSTRACT

The long prevailing paradigm for the structural evolution of south Florida during the Tertiary Period is one of gradual subsidence. The long-term sedimentation rate was close to the subsidence rate, resulting in the deposition of over 3,000 ft of shallow-water carbonate sediments, and after the Eocene Epoch, mixed carbonate and siliciclastic sediments. However, seismic reflection profiles run in coastal areas of Florida have documented late Tertiary folding, which has been variously attributed to karstic collapse and structural compression. Many of the folds are symmetrical.

Geophysical and lithologic logs from over 120 wells in Lee and Collier counties in southwest Florida were studied to elucidate the nature, extent, and timing of the deformation. Gamma ray logs are particularly useful as they record regional marker beds, which were isochronous pulses of phosphate and clay deposition. The maximum local relief of the folds evident in the studied logs is over 325 ft. The marker beds and formation boundaries can be correlated to cores from which detailed chronostratigraphic data are available. Strata as young as middle and late Miocene are deformed and late Miocene and Pliocene-age strata fill accommodation space. The deformation affected over 775 ft of Miocene and older strata and is not related to any known karst feature. The well log data confirm the occurrence of a late Miocene to early Pliocene structural deformation event in the southern Florida peninsula, which has been buried by younger strata.