

Origin of Florida Canyon by Spring Sapping: Evidence from High-Resolution Seismic Reflection Profiling

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The deepest portion of Florida Canyon, a large submarine canyon lying at the southwest corner of the Florida Platform, forms a box canyon that consists of a 3-km wide, sediment-filled, flat valley floor about 3400 m deep, surrounded by steep (45-90°) walls exposing Lower Cretaceous platform-interior dolostone. The head of this box canyon terminates in an amphitheater about 15-20 km from the Florida Escarpment. The walls of the amphitheater rise 750+ m above the flat floor. Previous workers suggest that this box canyon has formed by spring sapping caused from corrosive brines flowing out of the Florida Platform at the head of the box canyon and undermining the base of the canyon walls.

High resolution, single channel, sparker seismic reflection profiles from the western Straits of Florida support the suggestion that Florida Canyon originated by spring sapping. The top of the Lower Cretaceous dolostone is formed by the seismic reflector referred to as MCU (Mid-Cretaceous Unconformity). Our seismic data show that MCU has sagged about 200 m below its level elsewhere in the western Straits of Florida forming a circular depression 5-10 km in diameter that underlies the axis of the upper part of Florida Canyon immediately bankward of the box canyon. We suggest that this depression is a manifestation of dissolution of Lower Cretaceous dolostone by corrosive brines prior to their fluxing from the platform.

Our seismic data suggest that spring sapping was initiated in the Early Tertiary, most likely in the Paleocene. The seismic sequence overlying MCU (our Seismic Sequence 9) and forming part of the upper wall of Florida Canyon correlates with the Pine Key Formation of South Florida and is Late Cretaceous in age (based on dredging results). The thickness of Sequence 9 varies between 250 and 425 m in the western Straits of Florida, but thickness variations show no relationship with the axis of Florida Canyon. On the other hand, overlying Seismic Sequence 8, thought to correlate with the Paleocene Cedar Keys and Early Eocene Oldsmar Formations of South Florida, exhibits a pronounced thinning and change in reflector character to the north, coincident with the axis of the upper Florida Canyon.