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[PS]Erosion and Deposition along the West Florida Shelf Edge*

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Abstract

The West Florida Shelf is a distally steepened carbonate ramp that abruptly terminates at the Florida Escarpment. The modern shelf edge is located between 350-600m water depths where pelagic sedimentation should be the main depositional process. In 2012, RV Maria S. Merian visited two locations at the broken shelf edge where the seascape and facies are the results of two processes; (1) repeated slab erosion in which stratigraphic packages slide over the edge into the deep water and (2) winnowing by currents produces hardgrounds covered by a thin veneer of sediment. Morphologically, the shelf edge consists mainly of terraces, ridges and slabs. Cliffs of 50+m height at several stratigraphic levels document the repeated occurrence of mass wasting events. The size and depths of these events vary, producing highly variable erosional topography, i.e., submarine terraces and ultimately the formation of the Florida Escarpment. Backscatter data and ROV observations from the terraces document little sediment cover and mostly bare rocks that are sometimes covered with an Fe-Mn crust. The lack of sediments is a result of current erosion and winnowing, leaving behind sandy deposits or remove sediments completely forming hardgrounds. They are sparsely colonised by deep-water fauna despite the great availability of hard substrate for sessile organisms. Large coral mounds are not present in the area. In areas where sediments are present, they consist of bioturbated coarse to fine carbonate sand. A gravity core consisting of benthic and planktonic foraminifera grainstone dated with radiocarbon yields ages up of 12 kyrs at 0.23 mbsf and 42 kyrs at 0.98 mbsf, document the slow sedimentation rate. The underlying rocks also consist mostly of skeletal grainstone but are significantly older. They are dated with 87Sr/86Sr and yield different ages at the various terraces: the northern terrace is 1.4 – 1.5Ma in age, while the southern terraces are 1.6 – 2.1Ma and 9.8 – 10.3Ma, respectively. Sediment and rocks recovered consists of winnowed skeletal grainstone indicating that the modern current pattern has been active since early late Miocene. The current dominated rocky seascape is an ideal environment for cold-water coral growth. However, the sparse colonization and lack of coral mounds observed suggests that (1) currents might be too strong for coral larvae to settle and (2) currents winnow away sediments that is needed to build a mound.