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Insights into Sedimentology and Evolution of a Modern Carbonate Tidal Flat from Historical and Satellite Imagery: Andros Island, Bahamas

Study of modern depositional systems facilitates analysis of the spatial patterns and processes of sedimentation. This project analyzed characteristics and historical evolution of modern tidal flats on Andros Island, Bahamas, by interpreting Landsat data, ultra-high resolution (1m) Ikonos imagery, and historical aerial photographs in the context of carbonate sedimentology.

Qualitatively, tidal flats exposed on the northwest coast of Andros Island are one of the few areas that include a well-developed channel belt, shallow marshes, and an irregular coast. Although they also include an irregular coast, tidal flats in west-central Andros include interconnecting channels and well-defined hammocks but have few ponds. The tidal flats of southwest Andros are considerably wider, include straight, wide, but shallow channels, numerous deeper ponds, and well-developed hammocks that appear to define several remanent shorelines.

On Ikonos images, not only can these major physiographic elements of the tidal flat (e.g., channels, levees, beach ridges, ponds) be clearly recognized, but features down to the scale of individual mangroves are discernable. Data of this resolution, when compared with historical aerial photos, illustrate headward erosion (up to 100 m/48 yrs) of many tidal channels, stabilization of channel bars, 30-50 m (/48 yrs) of shoreline erosion, progradation of the supratidal high algal marsh and partial filling of some tidal ponds.

These observations illustrate the complexity of patterns and processes on this tidal flat and are likely comparable to those of ancient analogs.