SEDIMENTOLOGICAL EFFECTS OF HURRICANE ALLEN ON SOUTH TEXAS COAST MODEL OF STORM INFLUENCE ON BARRIER-ISLAND COAST EVOLUTION

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ABSTRACT

Hurricane Allen pushed a storm tide as much as 5 m high onto the south Texas barrier-island coast on August 8-10, 1980, causing extensive erosion and redistribution of sand. Amount and intensity of beach alteration were related directly to the path taken by the storm's eye and to the morphology of the barrier islands.

The principal resulting sedimentary features are the storm channels and the washover fans (Fig. 1) built on the lagoonal side by sand eroded from the beach and the foredunes. The northernmost point where sand was carried across the barrier island, through a reopened storm-cut channel, was on Matagorda Peninsula 208 km north of the storm's center. Remnants of 13 older storm channels were reopened on Matagorda Island, but little sand was transported to the lagoon. On Mustang Island and northern Padre Island, both of which have a well-developed foredune ridge, only the three old natural outlets of Corpus Christi Bay were reopened. Along the southern half of Padre Island which was little or no foredune ridge, 106 storm channels breached the barrier island; the 35-km sector across which the storm's center passed was almost awash.

The enormous amount of sand carried across south Padre Island and into the Laguna Madre is arranged in a classic display of overlapping fans that contain a variety of megabedforms. Comparison of aerial photographs made after Hurricane Allen with those made after Hurricane Buelah, which crossed the same coastal sector in 1967, shows both the repetitive and long-term cumulative effects of hurricanes on the sedimentary regime of barrier islands and their adjacent lagoons.

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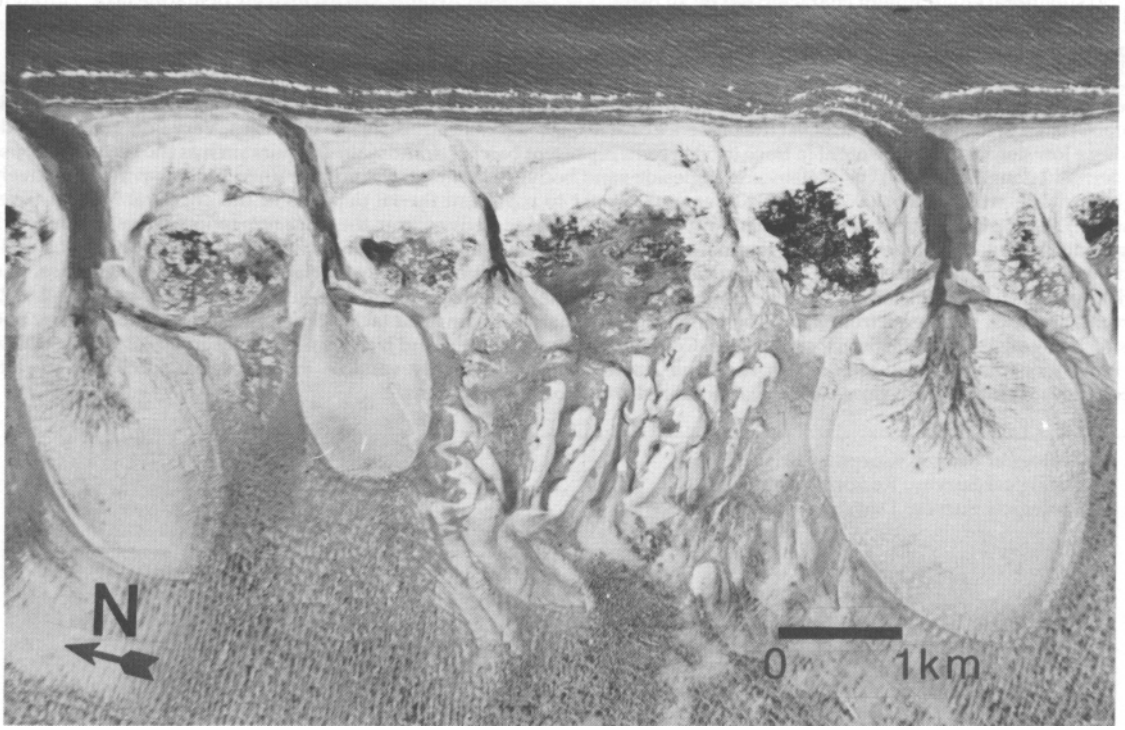

Figure 1. Storm channels and washover fans resulting from storm tides by Hurricane Allen on August 8-10, 1980. Sand was transported from the beach and foredunes across South Padre Island toward and partly into Laguna Madre. Note the prevailing east-west orientation of the older back dunes and the newly formed small sand bodies closer to the lagoon. The washover fans clearly reveal the major channels and their distributaries through which sand was transported. This aerial photograph shows part of the beach 6.3 to 15 km south of Port Mansfield jetties. Taken on August 20, 1980, by NASA for U. S. Geological Survey.