Crustal Warping and Sediment Supply as Controls on Recent Coastal Development in Newfoundland

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Differential postglacial rebound has produced a wide range of Holocene relative sea-level (RSL) responses across Newfoundland, with profound effects on coastal evolution. Raised postglacial marine features are found throughout the island, except in the southeast, where submergence is though to have prevailed since the early Holocene, as suggested by published models invoking marginal forebulge collapse. The models imply a zonation from southeast to northwest, where isostatic uplift has resulted in ongoing emergence, at least until very recently. Evidence from the Strait of Belle Isle, including a raised beach-ridge sequence that terminates seaward in an active transgressive storm ridge, suggests that even in this area RSL may now be stationary or rising.

The pattern of Holocene RSL on the northeast coast is not well known. Recent evidence suggests that the wide beach-ridge plain at Doting Cove may be of considerable age: indurated and stained beach-ridge sand between -0.1 m and +2.3 m above present MWL is mantled by freshwater peat up to 2.8 m thick. No large onshore sediment supply is identifiable in this area, in contrast to the situation at many other large beach-ridge deposits on the island.

In St George's Bay where RSL has been rising from a mid-Holocene minimum, large amounts of glacigenic sand and gravel have been removed from 40 km of coastal exposures and transported northward to form a 15-km long spit complex at Flat Island. The oldest freshwater peats on this barrier date to 1.36 ka BP. In the southeast, at Placentia on the Avalon Peninsula, a large glacigenic source has provided the sediment source for the extensive gravel beach-ridge plain on which the town is constructed. The oldest basal peat here dates to 2.11 ka BP. In contrast, small barriers at a number of other sites on the Avalon, where glacigenic sources are more limited, show a pattern of earlier beach-ridge progradation followed by transgressive storm-ridge development involving reworking of the earlier barrier sediment. Both regressive and transgressive phases have occurred within the context of rising RSL and the change in the pattern of barrier development is believed to have been triggered by a decrease in sediment supply as erodible material along the shore was progressively depleted.