RALPH Observations of shoreface sedimentation processes at Martinique Beach

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Nova Scotia's Eastern Shore is a moderate to high energy, wave-dominated environment that follows the well-defined cycle of summer sediment accretion and winter erosion.

In order to characterize summer accretion, the RALPH data acquisition system was deployed in 11 metres depth on the shoreface seaward of Martinique Beach, recording wave height, current velocities at 30 cm and 100 cm above the bed, light transmission, and time lapse photography at 30-minute intervals. This deployment was intended to characterize fairweather sediment dispersal in terms of wave climate, near-bottom velocity field, bedforms and their migration patterns.

Low energy background conditions persisted for much of the deployment and were characterized by wave heights of less than 0.5 metres and maximum oscillatory current velocities at 1 metre of 20 cm per second, low suspended sediment concentration and relatively stable bedform patterns. Three moderate energy events during the deployment were characterized by r.m.s. wave heights up to 1.2 metres and maximum current velocities of 65-80 cm per second. Bursts of suspended sediment accompanied the passage of large wave groups during periods of bedform reorganization. Bed configurations developed in the fine sand at the site included a relatively stable pattern of short-crested long-wave length ripples; a sinuous short-crested pattern; short- and long-wave length bifurcated ripples; and linear long-crested ripples with wave lengths ranging from 6-21 cm. The bedform pattern was observed to migrate primarily in a landward direction and only under the long-crested short-wave length ripple configuration. This behaviour was associated with higher velocities during the moderate energy storm events.

This data set indicates that fairweather beach and near shore bar accretion results from active sediment transport across the shoreface by adjustment of the inner-shelf equilibrium profile.