



## Coastal morphodynamics in an Arctic fluvial-tidal transition zone in the deglaciaded Dicksonfjord, Svalbard

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Pronounced morphologic changes such as coastal retreat and delta progradation occur widely along the Arctic coastal regions in response to increased sediment flux, freshwater runoff, and wave activity caused by climate changes. Compared to open coast and large-scale deltas in the Arctic region, the coastal morphodynamics and associated sediment transport in the Arctic fluvial-tidal transition zone (FTTZ) are less well understood. A series of recurved spits are developed on the upper intertidal zone of microtidal flats in the FTTZ of deglaciaded Dicksonfjorden, Svalbard. The morphodynamics and sediment fluxes of the spit complexes were quantified using unmanned aerial vehicle (UAV)-assisted photogrammetry and Real-Time Kinematic GPS. Repeated annual survey indicates that the spits have elongated at  $22 \text{ m yr}^{-1}$  and have migrated landward at  $4.3 \text{ m yr}^{-1}$  over the last four years. The growth and migration rate of the spits increases seaward, where coastal cliffs consisting of an unconsolidated mixture of angular gravels and muds retreats at  $0.2 \text{ m yr}^{-1}$  with net erosion rate of  $0.02 \text{ m yr}^{-1}$  and provides local sediment source for the spits. In contrast, isolated gravel ridges, i.e., cheniers, on the tidal flats in the further landward did not migrate during the survey period. Archives of aerial photographs indicate that the cheniers had remained stationary since the 1930s, when a shoreline was located near the cheniers. The present study demonstrates that wave-induced overwash and longshore drift of coarse-grained sediments originated from the retreating cliffs are vital to the annual spit morphodynamics even in the innermost part of the fjord. Tidal flat progradation accelerated since the Little Ice Age with global warming trends by increased runoff from snow-fed rivers and alluvial fans, controls the centennial spit morphodynamics and distribution of wave-built morphology in the FTTZ of glacier-free Dicksonfjorden by regulating episodic sediment delivery via a seaward-shift in the locus of wave shoaling.