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Sedimentary architecture and late Holocene dynamics of a polar gravel spit (King George Island, Antarctic Peninsula)

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Content

Sedimentary architecture and late Holocene development of a polar bay-mouth gravel spit system are presented based on ground-penetrating radar data, historical aerial images and radiocarbon dating. The spit is situated at the mouth of a tributary fjord formed by a tide water glacier and developed under the circumstances of an overall sea level fall. The system comprises two distinct marine terraces, situated below 0.8 m and at 3 to 5.7 m above present mean sea level. The upper terrace developed around 0.4 ka cal BP. It comprises several beach ridges formed by packages of seaward-dipping beds delimited by erosional unconformities. Beach ridges situated towards the more exposed western part of the spit facing the main fjord are internally characterized by convex aggradational bedding pattern. The lower terrace is located inside the bay in a more sheltered situation and comprises several curved beach ridges internally characterized by seaward-dipping beds delimited by erosional unconformities. The upper terrace is nowadays subjected to erosion and an up to 5 m high cliff developed towards the main fjord. There is a distinct shift in the direction of spit progradation through time, which we see as a reaction to intensified wave action at the beach and the retreat of the adjacent tide-water glacier. Furthermore, the lower terrace showed accelerated progradation during the last decades, probably in reaction to a reduction in annual sea-ice coverage, a lowering of the rate of glacioisostatic uplift and the subsequent stabilization of sea level, and an increased sediment availability.