

Sediment variability along a coarse-grained, high-energy coastline, Canterbury Plains, New Zealand

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The Canterbury Plains, New Zealand cap a low-accommodation, slowly subsiding basin with a variably progradational, retrogradational or stable coastline. The southern coast — Canterbury Bight — is transgressive, dominated by erosive, powerful southerly swell setting up high rates of longshore drift of gravel and sand. The coastal zone is gravelly and largely reflective. All rivers incise the floodplain transporting gravel to the coast because a steep gradient is maintained by marine transgression that causes rivers to downcut. Steep valley floor gradients prevent extensive estuarine conditions from developing on this transgressive coastline.

The northern coastline — Pegasus Bay — is situated in the wave shadow of a large, natural groyne of volcanic rocks, resulting in lower wave conditions affecting that coast. The southern half of Pegasus Bay within the wave shadow is sandy and progradational as a highstand wave-dominated delta and strandplain; the northern half is mixed sand and gravel and marginally progradational. The coastal zone changes northwards from dissipative to highly reflective. Along Pegasus Bay, gravel transported downstream in the Waimakarari River is deposited inland and predominantly sand is transported to the coast because the steep gradient cannot be maintained on the highstand progradational coast in the low accommodation basin. Further north, rivers are shorter, have a steeper gradient associated with proximity to the mountains, and transport gravel to the coast, even on the progradational coastline. Thus, for gravel to be transported to the coast, rivers must be both short and steep on a progradational coast, or be maintained as steep because of transgression.