As more coastal environments are being developed around the world, the scientific community needs to provide best practices in coastal management and associated risks, such as storm related erosion and tsunamis. Along the east coast of the South Island, New Zealand, ocean currents transport sediment from south to north. However, Banks Peninsula interrupts the northerly drift of sediment along the Canterbury coast, resulting in a back-马克线 that has built South Brighton Spit southward across the mouth of the Avon-Heathcote Estuary. Outflows from the estuary are continuously influenced by the coastal processes that are building the spit. Ground penetrating radar (GPR) surveys were collected along the width of South Brighton Spit at its most southerly extent. The processed GPR data provides a subsurface image of the coastal sedimentary deposits that can be correlated to the layering of the spit. Using a stratigraphic analysis, the GPR transects show continuous to semi-continuous horizontal and slightly dipping reflection patterns. The reflection patterns are interpreted as:

1) sandy beach deposits from coastal wave action that push sand onto the shore, and 2) aeolian sand dunes from offshore winds that blow the beach sand into dunes further inland.

The continuous to semi-continuous eastward dipping reflections (blue) are interpreted as layers within aeolian sand dunes formed from predominantly offshore easterly winds that blow the beach sand further inland by saltation and surface creep. Typically beach sand is blown up the windward side of a sand dune and then slumps down the dune’s leeward side (slip face) where eventually the sand grains come to rest. At South Brighton Spit the sand surface is often “wet” so when sand grains are transported they “stick” to the windward side of the sand dunes creating eastward dipping layers. The observed reflection patterns show that as deposition is actively occurring these coastal sand dunes are prograding oceanward.

The GPR profile is a representative section of the GPR transects collected on South Brighton Spit. The continuous to semi-continuous slightly dipping reflections are traced in red. The eastward dipping reflections are interpreted as prograding sandy beach faces that result from coastal wave action. Progradation occurs when sand is moved up and down the shore of South Brighton Spit by beach drift.

Sediment deposited onshore by wave action and beach drift is transported further inland by aeolian processes, such as saltation and surface creep, forming coastal sand dunes. Sediment deposited offshore is transported over South Brighton Spit by longshore drift. The change in direction of the current circulates water and sediment southward near the Avon-Heathcote Estuary. The accumulated sediment is presently forming South Brighton spit which continues to build southward across the mouth of the estuary. Over the past several decades the relative size and physical location of the spit has fluctuated due to changing coastal and aeolian geomorphic processes. Eolian geomorphic processes.

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