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SEDIMENT DELIVERY FROM BEACH TO DUNE AT MULTIPLE SITES ALONG A HETEROGENEOUS COASTLINE

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Coastal dunes provide a crucial defence against shoreline erosion but are increasingly vulnerable due to climate change-driven factors such as rising sea levels, increased storminess, and reduced sediment supply. Aeolian sediment transport from the beach to the foredune is fundamental for dune recovery following storm erosion. This study investigates aeolian sediment delivery from beach to dune at five sites along Cornwall's heterogeneous coastline, UK, to understand dune recovery processes and forecast future behaviour. Using a combination of field measurements and third-party data, we analyse both transport-limiting and supply-limiting factors affecting sediment transport. Each site was equipped with monitoring stations, including anemometers, cameras, and rain gauges, complemented by data from tide gauges and wave models. Preliminary observations over February and March 2024 revealed significant variability in aeolian transport events between sites, with north coast locations experiencing more frequent transport events (4-10 events) compared to south coast sites (0-2 events). The methodology was tested at Perranporth, where incorporating supply-limiting conditions significantly improved transport predictions. Excluding rainfall increased predicted transport by 22.7%, while removing groundwater and surge effects led to increases of 3.3% and 2.0%, respectively. Results demonstrate that rainfall is the dominant limiting factor under lower wind speeds, whereas groundwater and surge effects influence transport primarily during high-wind events but have minimal impact over a year with few such events. These findings highlight site-specific sensitivities that could justify optimizing computationally intensive models for long-term, multi-decadal simulations. Moreover, they underscore the overall importance of supply-limiting factors in predicting beach-to-dune sediment transport.