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FROM DUNES TO OFFSHORE: A SEISMIC APPROACH TO COASTAL SEDIMENT RESOURCE ASSESSMENT

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Sandy beaches and dunes act as a natural sea defence against flooding event for coastal communities. In the context of rising sea level and increasing storm frequency and magnitude, understanding the coastal evolution of beach and dune systems is crucial for the effective management of coastal communities. To improve the accuracy of future shoreline modelling an understanding of the full coastal sediment resource is critical. In this study we use a passive seismic technique (Tromino) to assess beach and dune sediment thickness for 8 dune sites in Cornwall, southwest of England. We use Horizontal-to-Vertical Spectral Ratio (HVSr) analysis to identify microtremor resonance frequencies generated by contrasts in stiffness between geological layers to identify thickness of superficial deposits (e.g., sand) overlying harder layers (bedrock). Alongside the Tromino, an offshore active seismic campaign took place using a sub-bottom profiler (SBP). This dataset represents the continuity of the bedrock depth information beneath the seafloor. Existing cores data were also used to validate these results. This method showed a satisfying match between the onshore and offshore depth values of the bedrock. For example, at Perranporth the Tromino indicated a bedrock depth of 8m in the intertidal zone, where the SBP showcase a bedrock depth of 6m in the nearshore area. Leveraging the Tromino and the SBP offered an unprecedented insight into the mobile sediment budget, highlighting the thickness from the dune to the offshore section. This new method worked as a strong tool offering a complete insight into the mobile sediment budget.