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Shoreface morphodynamics in Ireland and France

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The shoreface is defined as the transition zone between the beach and the inner shelf. Its morphodynamics are driven by weather-wave climate interaction where, during fair weather, shoaling waves favour onshore sediment transport, whereas high-energy events produce offshore directed currents which transport sediment offshore up to the inner shelf. Significant changes on the shoreface only occur at long temporal time scales and over large spatial domains, making their study challenging. Consequently, the role of the shoreface in beach and shoreline change has often been overlooked. As a result of the shoreface acting as both a sediment source and a sediment sink, as well as facilitating or impeding sediment transport, its contribution to nearshore dynamics is usually complex. When considering the longer term and larger-scale evolution of coastal systems however, the morphodynamics of the shoreface appears to be a determining factor in coastal and shoreline evolution.

Along high-energy coastal areas of (west) Ireland and north-western France, dominated by geomorphological features such as embayments, pocket beaches, sea cliffs and rock outcrops, the geological background plays a major role in the control of the coastal morphodynamics. This geological control acts to limit accommodation space, sediment availability and longshore sediment transport thus helping constrain the shape of the shoreface and therefore its dynamics and evolution.

The study of shoreface morphodynamics requires the combination of multiple datasets at variable temporal and spatial scales. In this study, the west coast of Ireland and France (Brittany), provides spatially extensive sea to shore continuous topo-bathymetry (multi-beam) datasets to allow the study of beach and shoreface morphology as well as examination of why particular coastal dynamics are at play. Furthermore, the existence of wave data from offshore buoys and nearshore wave models, will also allow the analysis of the hydrodynamic behaviour across a range of shoreface configurations.

The overall aim of the work is to advance our understanding of the morphodynamics of the shoreface in geologically complex regions like the west of Ireland and north west France and to examine its link to dune-beach system behaviour and shoreline evolution patterns.