The southern North Sea as a natural palaeo-laboratory to reconstruct the coastal response to Last Interglacial sea-level rise

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Current models that project sea-level rise beyond 2100 have large uncertainties because recent observation encompass a too limited range of climate variability to provide robust tests against which to simulate future changes. It is crucial to turn to the geological record where there are large-scale changes in climate, but the current interglacial provides limited evidence for how the Earth-system responds to increased temperatures, and therefore it is necessary to study previous climatically-warm periods. Global temperatures during the Last Interglacial were ~1°C warmer than pre-industrial values and 3-5°C warmer at polar latitudes, during which time global mean sea level was likely 6-9 m above present. Though the drivers of warming during the Last Interglacial are different to those of today, it is the amplified warming at polar latitudes, the primary locations of the terrestrial ice masses likely to contribute to long term sea-level rise, which makes the Last Interglacial an ideal palaeo-laboratory to understand coastal response to sea-level rise. However, our understanding of Last Interglacial sea level change is primarily limited to tropical and subtropical latitudes and it is important to understand the response of temperate estuarine settings to rising sea level.

The ERC-funded RISER project (Rates of Interglacial Sea-level Change, and Responses) focuses on specifically targeting palaeo shorelines buried within the southern North Sea, preserved beyond the limit of the Last Glacial Maximum ice sheets. Buried Last Interglacial sequences in this area provide a valuable record of marine transgression and are being unveiled in new geophysical and geotechnical datasets acquired to support the offshore renewable energy development. This offshore sedimentary archives offer significant advantages over the geomorphologically restricted onshore records allowing us to trace the transgression over a much large area, and should capture the earliest flooding of the Last Interglacial North Sea basin, when the far-field data suggests ice sheet melt was at it maximum. By integrating the already available datasets with...
newly acquired samples as part of the project, we aim to develop new palaeoenvironmental reconstructions of the Last Interglacial sea-level change from northwest Europe, providing the first chronological constraints on timing, and therefore rates. This has the potential to allow us to ‘fingerprint’ the source of melt (Greenland and/or Antarctica) during the interglacial sea-level highstand.