# North Sea Tsunami Archives: Understanding the Sedimentary Evidence in the Offshore region of the Shetland Islands

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Assessing the long-term tsunami hazard in the North Sea region requires studying the sedimentary evidence of past tsunamis at key locations. The Shetland Islands have emerged as a crucial field laboratory for studying tsunami deposits. However, up until now, focus has been mostly on onshore tsunami deposits and much less on their offshore counterparts, eventhough these have a higher likelihood of being preserved in the sedimentary record, especially in sufficiently deep marine environments, below the storm wave base. Within the NORSEAT Project (North Sea Tsunami Deposits Offshore Shetland Island), we aim to identify and trace tsunami deposits offshore, study their sedimentary characteristics and extent, and determine whether the offshore record holds evidence of events additional to those already known from the onshore record (i.e. the Storrega tsunami, a ca. 5500 yr old and ca. 1500 yr old event), which would offer new insights into recurrence intervals.

Two surveys with RV Belgica have been conducted in 2022 and 2023, during which high-resolution geophysical data (multibeam bathymetry, subbottom data) was collected, along with vibrocores from 32 sites, spread over three embayment areas around the Shetland Islands. In many of the cores, we observe coarse-grained graded beds sandwiched between finer-grained shell hash deposits. These coarser layers, often with sharp basal contacts are normally graded, and suggest temporary interruptions of the steady-state sedimentary regime and are interpreted as possible event deposits based on their contrasting textural and lithological characteristics. Preliminary luminescence ages indicate that some of these graded beds are in the range of the 8150 cal yrs BP Storegga tsunami and the 1400 cal yrs BP tsunami event.

The next phase of our analysis will focus on determining the precise ages and depositional patterns of these layers through radiocarbon dating, grain-size analysis, geochemical analysis, microtextural analysis, heavy mineral distribution patterns, and microfossil distribution within the sediment cores. These aim to establish a robust tsunami event stratigraphy for the region. Combined with planned relative sea-level reconstructions, this stratigraphy will enable us to improve the paleotsunami run-up height assessment by correlating onshore and offshore deposits.