



## **Numerical modelling of the Storegga tsunami: consequences to the UK.**

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The Storegga slide was a large, tsunamigenic submarine slide off the coast of Norway that occurred around eight thousand years ago. The volume of material in the slide has been estimated at 3000 cubic kilometres – enough to cover Scotland to a depth of 30m. The tsunami generated had run-up height of around 20m on the Norwegian coast, 10m in Shetland, a few meters on the Scottish mainland coast and reached as far as Greenland. Run-up height can be estimated in certain locations via tsunami deposits, but these are not preserved everywhere. Numerical simulation of the slide and resulting tsunami can therefore help constrain how the slide moved by matching observed run-up heights and providing run-up estimates at other locations. The most accurate simulations need high resolutions near the coasts, particularly near tsunami run-up observations, in the slide region and to accurately calculate effects such as funnelling. However, there is a need to cover the whole of the Norwegian-Greenland sea to avoid issues such as model coupling and doing so at a constant resolution is computationally expensive. One recourse is to use multiscale modelling where the resolution of the model can change by orders of magnitude across a simulated domain. Here, we present a multiscale model where resolution varies from 500m to 50km across the domain thereby accurately resolving the coastlines and changes in bathymetry, but is still able to model the entire Norwegian-Greenland sea with reasonable computational effort. The model used is Fluidity, a finite-element, unstructured mesh model. We use a rigid block slide to initiate the wave and then track its propagation across the domain. Using this model we show how mesh, coastline, and bathymetric resolution affect the simulated wave. We also show the effect of including palaeobathymetric changes, due to ice loading and unloading, which have been neglected in previous numerical studies of the Storegga slide. This is the most complete and detailed simulation of the Storegga slide to date.