

# Project Title: The UK's tsunami risk from earthquakes, submarine landslides and volcano flank collapses: from model scenarios to risk mitigation

**Lead Institution/Department:** University of Bristol School of Earth Sciences

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## Summary

Tsunamis rarely reach the UK's shores, but when they do, their impacts have been catastrophic. Historical accounts and geological data describe wave heights of 3 meters in Cornwall, generated by a massive earthquake offshore Portugal in 1755, and a 21-meter tsunami that hit the Shetlands and caused 3-6 meter run-up along the vulnerable eastern Scottish shoreline due to a submarine landslide on the continental shelf in the Norwegian Sea around 8,000 years ago. How vulnerable is the UK's current critical infrastructure along the coastline, such as ports and (nuclear) power stations, to plausible tsunamis triggered by submarine earthquakes, landslides or volcano flank collapses in the Atlantic? How might offshore energy infrastructure in the North Sea be affected? This project will use computer modelling to generate plausible scenarios in the North Sea and Atlantic, and assess the flooding risks to critical infrastructure along the UK's shores. In collaboration with emergency planners and other stakeholders, these scenarios will be used to evaluate current early warning mechanisms, flood defences, emergency planning and policies. Tangible outputs may include recommended risk mitigation actions and policies.

## Methods

This multi-disciplinary project will draw on the latest scientific insights into the plausibility and likelihood of major sources of triggered tsunamis, namely earthquakes, submarine landslides and volcanic flank collapses in the Atlantic and North Sea, to generate plausible tsunami scenarios that could lead to substantial flooding in the UK. This involves computing seafloor displacements from plausible sources, using high-resolution bathymetry data as boundary conditions in the shallow water equation to simulate tsunami waves, and computing run-up along the UK's shorelines. Through stakeholder engagement and focus groups, this project will evaluate current monitoring and early warning systems, flood defences, emergency plans and policies in light of these scenarios.

## Background reading and references

Giles (2020). *Tsunami hazard with reference to the UK*. *Geol. Soc. Eng. Geol. Special Publ.* <https://doi.org/10.1144/EGSP29.3>

Haslett and Bryant (2008). *Historic tsunamis in Britain since AD 1000: a review*. *Natural Hazards and Earth System Science*, <https://doi.org/10.5194/nhess-8-587-2008>

Horsburgh et al. (2008). *Impact of a Lisbon-type tsunami on the UK coastline and the implications for tsunami propagation over broad continental shelves*. *J. Geophys. Res.* <https://doi.org/10.1029/2007JC004425>

**How to Apply:** The deadline for this position is 8th April 2024. The studentship will begin in September 2024. Please apply to the “PhD in Geographical Sciences (Physical Geography)” at <https://www.bristol.ac.uk/study/postgraduate/apply/>