



Impact of a Lisbon-type tsunami on the UK coastline, and the implications for tsunami propagation over broad continental shelves

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We investigate the propagation of tsunamis towards the European shelf break, using six different initial conditions (based on the 1755 Lisbon earthquake), in order to assess the hazard to this region. Only one of our source models, an assumed earthquake magnitude of 8.7 Mw with a zonal fault orientation, resulted in significant wave heights at the UK coastline. Due to wave spreading only a fraction of the tsunami energy from such an event reaches the northwest European shelf, which itself provides a further buffer through reflection and frictional dissipation. However, we found significant local re-amplification due to wave interactions and resonance on the continental shelf. The maximum elevations obtained were comparable to severe winter storm conditions, but with extreme local variability in the tsunami amplitude. Our results suggest that the impact of any repeat of this event would be very sensitive to the precise location and orientation of the source deformation, as well as by complex topographic interactions on the shelf. The uncertainties arising from the combination of source orientation and bathymetric interaction suggest that any assessment of risk, for places where tsunamis are likely, should consider a large ensemble of initial conditions.