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Tsunami inundation and maritime hazard investigation for a maximum credible tsunami scenario in Southeast Tasmania, Australia

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The east coast of Tasmania is directly exposed to tsunamis originating from the Puysegur subduction zone, and would be affected approximately 90 minutes post-earthquake. Tasmania does not experience tsunamis frequently, and tsunami hazard is poorly understood and planned for in the state. Moreover, the risk to Hobart port operations from a large tsunami has not previously been considered. This study applied numerical modelling to simulate the effects of a maximum credible tsunami (Mw 8.7 earthquake of New Zealand's southwest coast, combined with a highest astronomical tide), with the aim of determining potential coastal inundation levels, and assessing risks to shipping operations in Hobart Port.

Inundation modelling was performed using the ANUGA hydrodynamic library, together with a detailed terrain model constructed from LiDAR and bathymetric datasets. In addition, a dune erosion operator was written for ANUGA, to account for tsunami erosion of the sand dunes in front of affected areas. The maritime hazard assessment focused on tsunami impacts for shipping in the navigation channel and ports, including mobilisation and evacuation times required for specific vessel types that frequent the harbour.

Modelling results show a maximum incoming tsunami wave of approximately 7 m in exposed coastal areas, which could lead to inundation depths of > 4 m in some places. Significant seiching and wave reflections are evident in Hobart's main channel and embayments, which would pose a considerable risk to marine craft. An important finding of this study is that the feasibility of shipping evacuation from Hobart port is questionable, given the timeframes involved and the nature of simulated water disturbance.

This study demonstrates the use of numerical modelling to inform tsunami hazard assessment, and highlights an often overlooked aspect of tsunami hazard. Statewide emergency management plans are currently being updated to make use of this work.