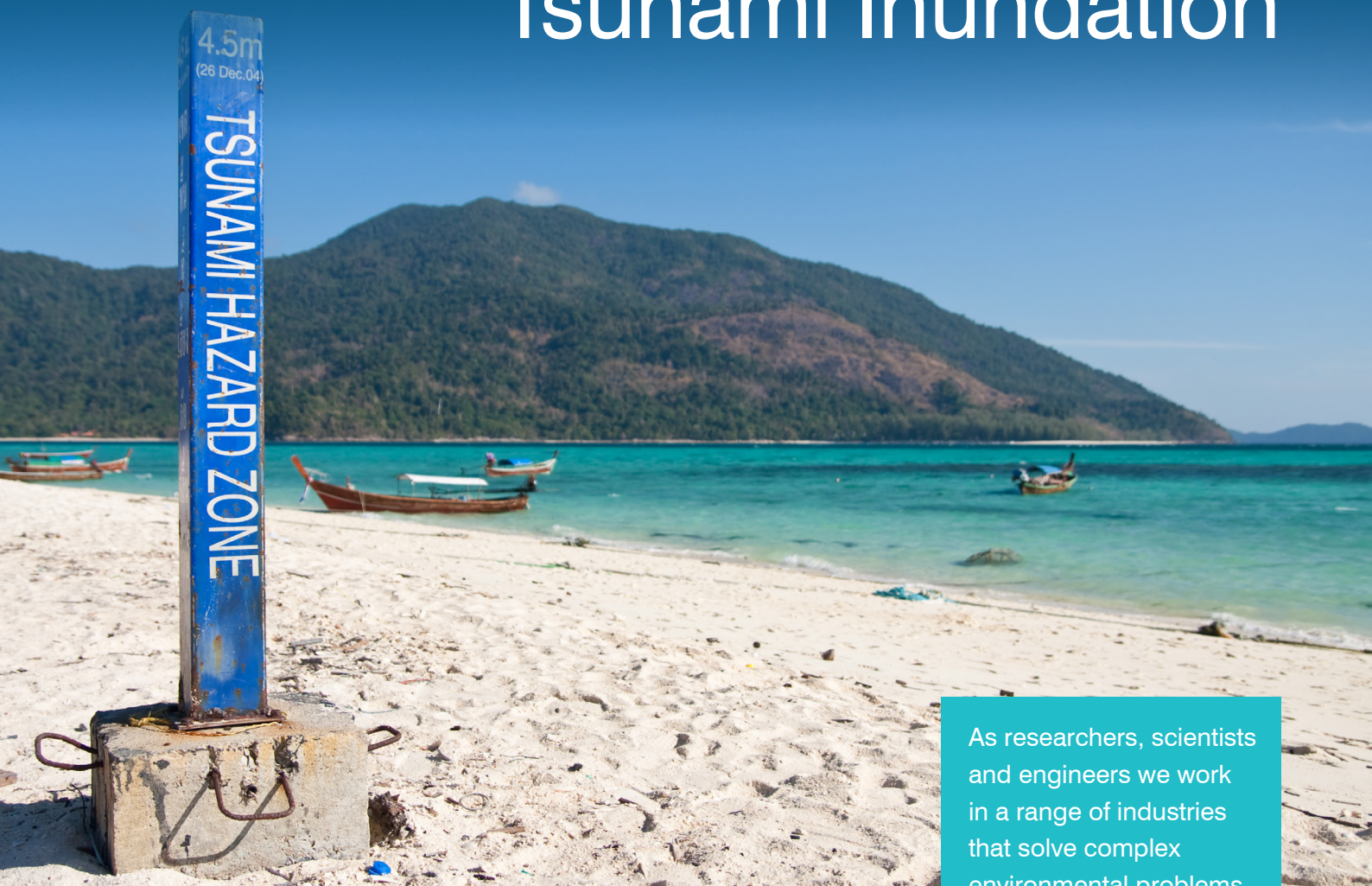# TUFLOW

Tsunami Inundation

Tsunamis are a deadly by-product of tectonic activity beneath the ocean floor. They rapidly propagate through deep water giving little opportunity for communities to safely evacuate and can be of a scale orders of magnitude more severe than a storm tide. With much of the world's population located within low-lying coastal areas, the socio-economic impact can be extreme, as demonstrated by the 2004 Boxing Day and 2011 Japanese tsunamis.

Population growth along our coasts places an ever-increasing number of people at risk of tsunami inundation. To understand and mitigate this risk, accurate numerical models are needed.

TUFLOW has been developed and evolved over three decades to meet the challenging computational requirements needed to accurately propagate tsunamis from the deep ocean onto land. Our paper on modelling the Japanese tsunami at the 2013 IAHR conference aptly demonstrated the need for higher order numerical solutions to achieve model calibration to field measurements.
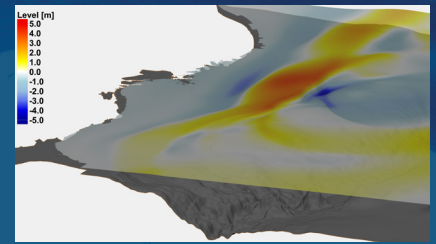
TUFLOW offers industry-leading accuracy, speed, numerical stability, and workflow efficiency to model complicated hydraulic phenomena like tsunamis. Enable your team to tackle the most difficult environmental problems with TUFLOW.

As researchers, scientists and engineers we work in a range of industries that solve complex environmental problems. Our assessments span scales from the molecular to global, from the instantaneous to the inter-decadal. Our projects require flexible, accurate, fast and powerful tools backed up by research, benchmarking and support.
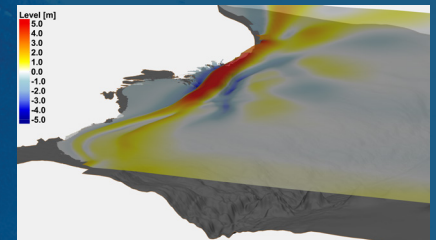
Higher order accuracy, fast, stable and shock capturing – the perfect tool for tsunami models

2011 Japan Tsunami Offshore

2011 Japan Tsunami Nearshore

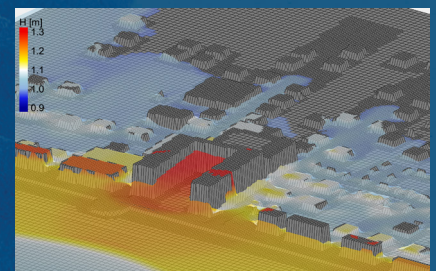Overland Tsunami Inundation

TUFLOW Feature Focus

- Freedom to use either a 2D and/or 3D solution.

- Higher order horizontal shock capturing scheme enables TUFLOW to accurately represent tsunami propagation as demonstrated through calibration to the Japanese Tsunami.

- All the terms of the 2D/3D long-wave hydrodynamic equations are represented including inertia and sub-grid turbulence.

- State of the art topographic/bathymetric sampling methods provide high resolution without comprising on run times.

- Integration with GIS provides rapid model build and result visualisation in your preferred GIS package.

- Choose between a flexible, quadtree or regular mesh.

- Access high speed compute through our heavily parallelised and GPU capable solvers.

- Model with confidence – TUFLOW has been benchmarked to physical tsunami models and real events.

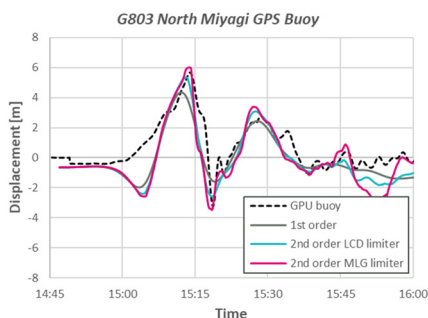- Optionally integrate stormwater networks or hydraulic structures with TUFLOW's dynamic 1D coupling.
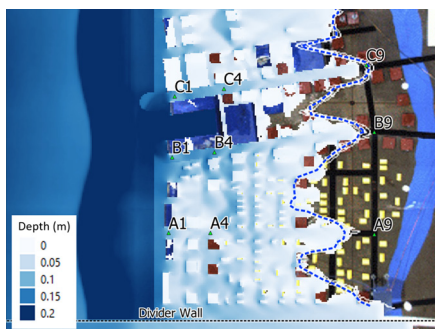

Japan Tsunami Calibration

Laboratory scale tsunami inundation benchmark test

TUFLOW's shock capturing hydraulic modelling engines offer industry-leading accuracy, computational speed, and numerical stability. Combined with using a flexible mesh, TUFLOW is especially suited for tsunami inundation modelling of coastal areas.

- Accurate tsunami propagation modelling in offshore areas is achieved using 2nd order spatial schemes.

- High-resolution numerical representation of complex geometry associated with the coastline and urban structures.

- Fine resolution modelling of tsunami inundation through urbanised coastal areas.

- Street level resolution allows realistic hazard mapping.

- Assessment of multiple event scenarios thanks to rapid simulations due to GPU acceleration.

- Robust wet/dry treatment and adaptive time-stepping ensure numerical stability.

TUFLOW is exhaustively benchmarked against theory, measurements from lab scale models, and real-world historical tsunami events. The fine resolution modelling allows the user to conduct detailed hazard mapping down to the street and property scale, which is crucial for risk mitigation and evacuation planning.

TUFLOW hydraulic modelling software is uniquely integrated with GIS and GUI software such as ArcGIS, MapInfo, QGIS, SMS and 12D, Flood Modeller, SMS, WaterRIDE. This enables workflow efficient model development, and meaningful mapping and plotting of results such as inundation, level, depth, velocity, velocity depth product, evacuation route inundation arrival time, inundation duration and hazard categories.

For more information:
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