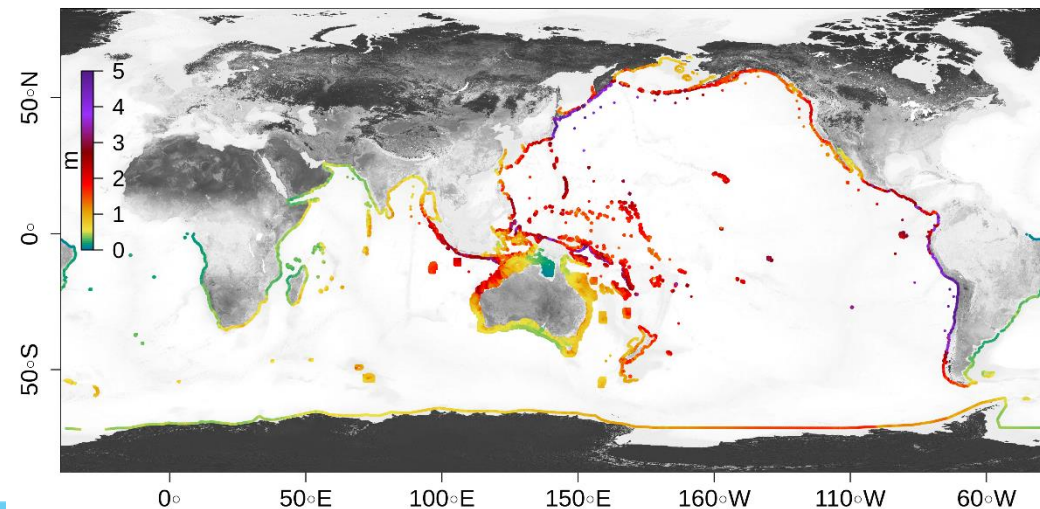
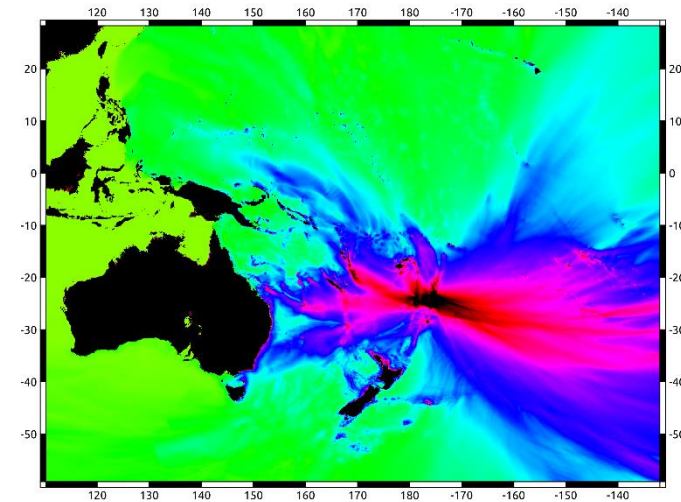
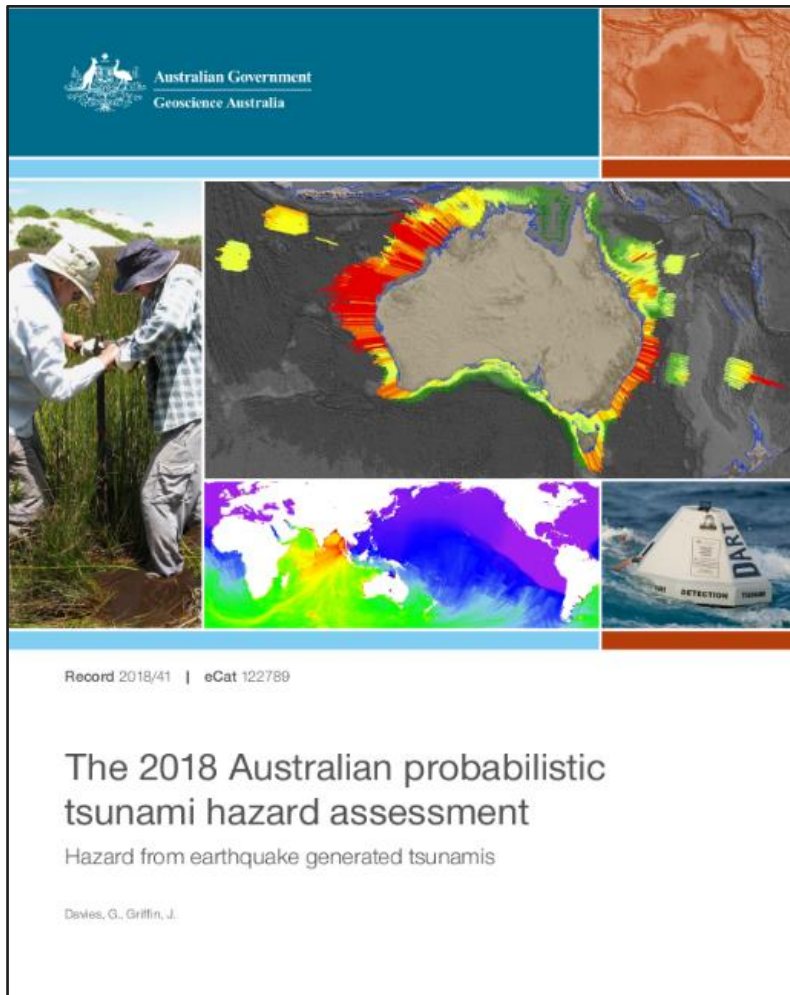
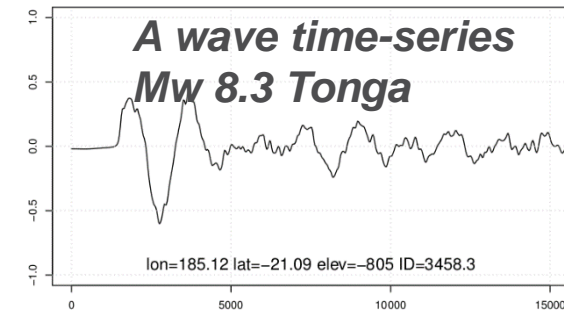
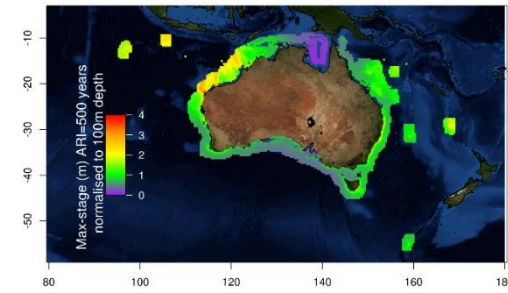


Background to the 2018 Australian Probabilistic Tsunami Hazard Assessment (PTHA18)

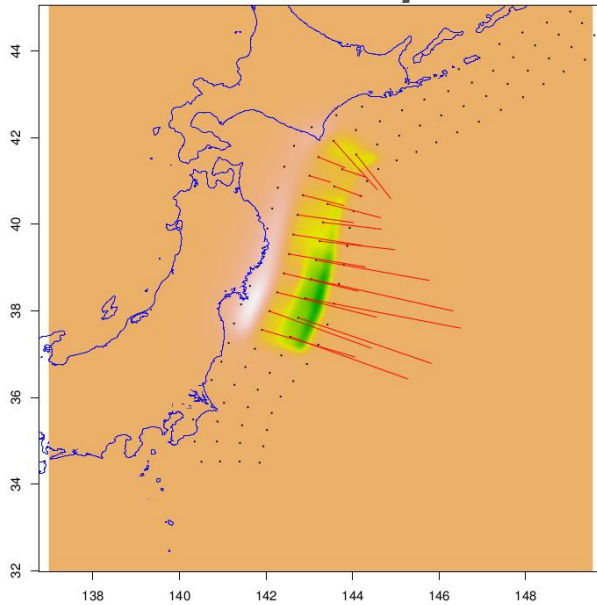


What the PTHA18 Provides

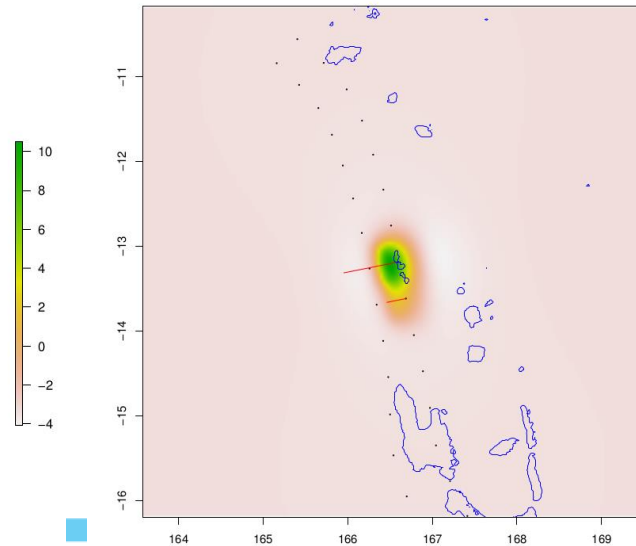
- Hundreds-of-thousands of earthquake-tsunami scenarios modelled in deep-water
 - *Purpose:* Forcing inundation models
 - Offshore wave time-series (36 hr)
 - 20,000 sites, most near Aust.
 - Initial water-surface deformation



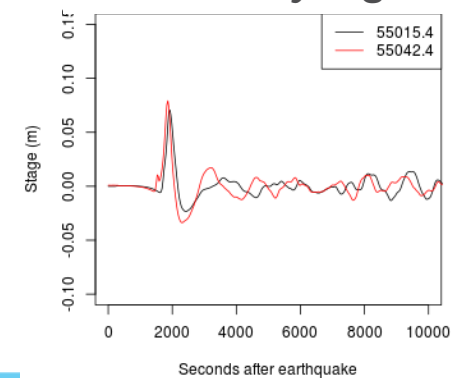
Mw 9.1 near Japan



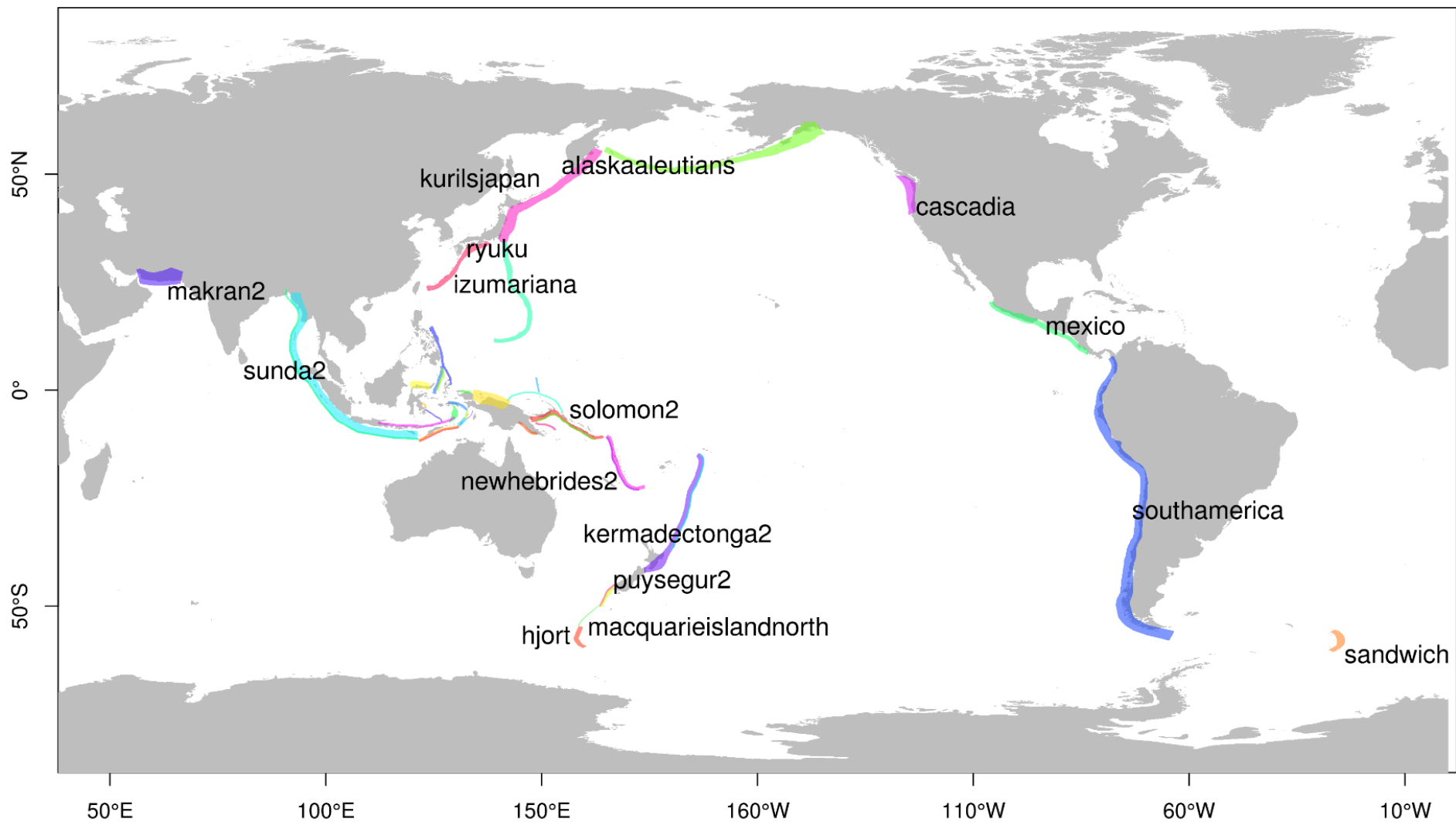
Mw 7.7 near Vanuatu



2 wave time-series Mw 7.8 Puysegur

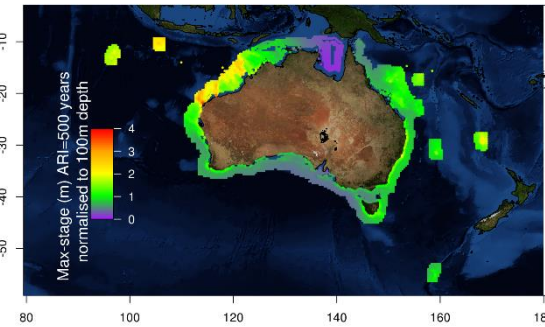
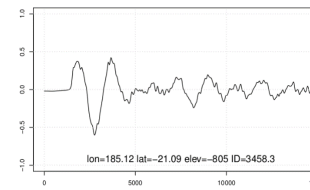


PTHA18 Earthquake Source Zones

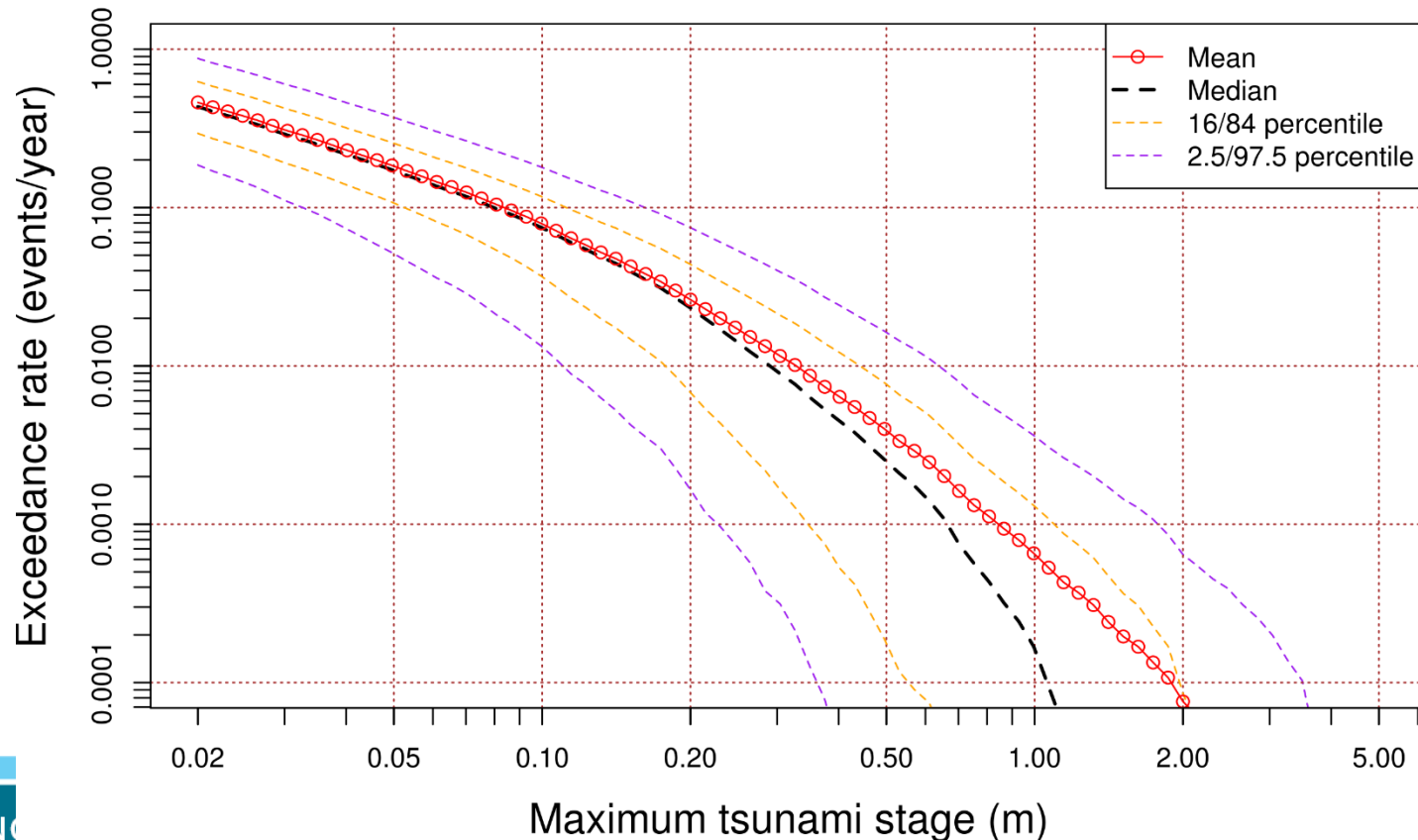


What the PTHA18 Provides

- *Exceedance-rates at all offshore points*
 - With quantified uncertainties



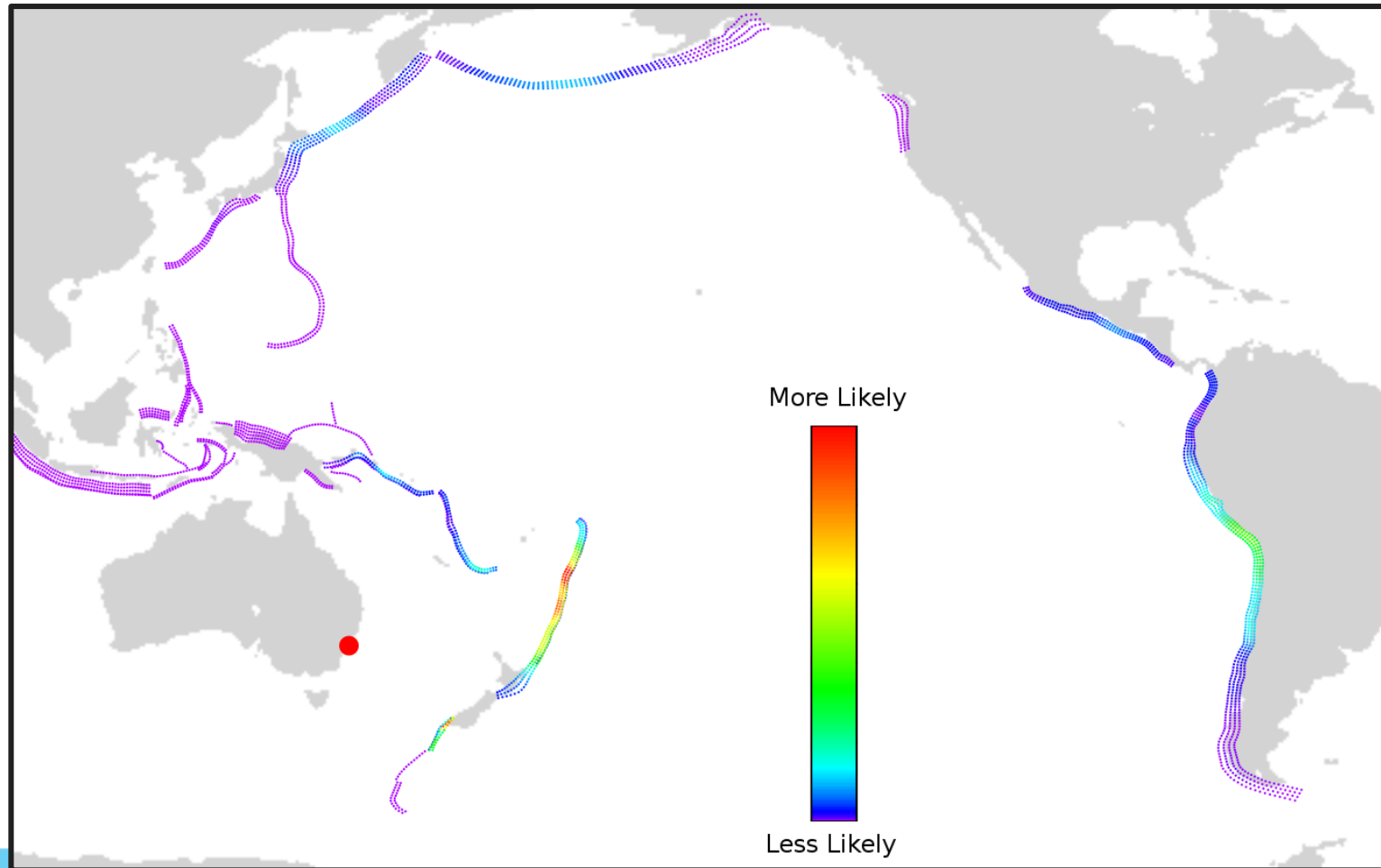
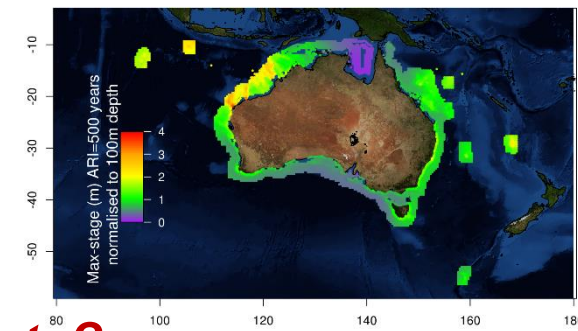
Maximum-stage (m) vs exceedance-rate @ DART-55012
Includes all source-zones



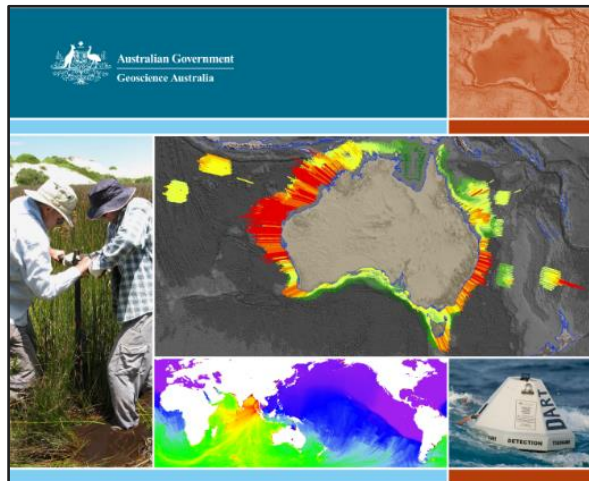
What the PTHA18 Provides

- *Source deaggregation information*

Where might an ARI=500 year tsunami originate?



PTHA18: Open source database, code & journal papers



Record 2018/41 | eCat 122780

The 2018 Australian probabilistic tsunami hazard assessment

Hazard from earthquake generated tsunamis

Davies, G., Griffin, J.

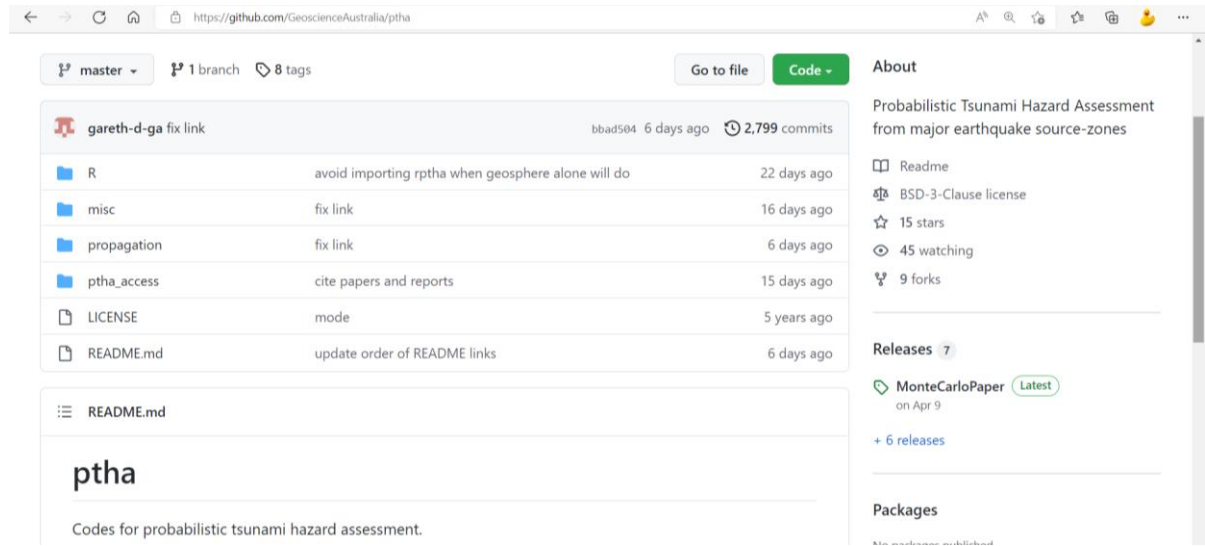
Pure Appl. Geophys.
© 2019 The Author(s)
<https://doi.org/10.1007/s00024-019-02299-w>

Sensitivity of Probabilistic Tsunami Hazard Assessment to Far-Field Earthquake Slip Complexity and Rigidity Depth-Dependence: Case Study of Australia

GARETH DAVIES¹ and JONATHAN GRIFFIN^{1,3}

Abstract—Probabilistic Tsunami Hazard Assessment (PTHA) often proceeds by constructing a suite of hypothetical earthquake scenarios, and modelling their tsunamis and occurrence-rates. Both tsunami and occurrence-rate models are affected by the representation of earthquake slip and rigidity, but the overall importance of these factors for far-field PTHA is unclear. We study the sensitivity of an Australia-wide PTHA to six different far-field earthquake scenario representations, including two rigidity models (constant and depth-varying) combined with three slip models: fixed-area uniform slip (with rupture area deterministically related to magnitude); variable-area uniform slip; and spatially heterogeneous slip. Earthquake-tsunami scenarios are tested by comparison with DART-buoy tsunami observations, demonstrating biases in some slip models. Scenario occurrence rates are modelled using Bayesian techniques to account for uncertainties in seismic coupling.

Destructive tsunamis are most often generated by large subduction zone earthquakes (Grezio et al. 2017). Although the highest runup usually occurs near to the source, earthquake-generated tsunamis show strong directivity and can remain hazardous at trans-oceanic distances (Ben-Menahem and Rosenman 1972). This was illustrated by the far-field impacts of the 2004 Sumatra-Andaman tsunami (300 deaths in Somalia), the 1960 Chile tsunami (203 deaths in Thailand and Japan), and the 1946 Aleutian



www.ga.gov.au/ptha

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Tsunami variability from uncalibrated stochastic earthquake models: tests against deep ocean observations 2006–2016

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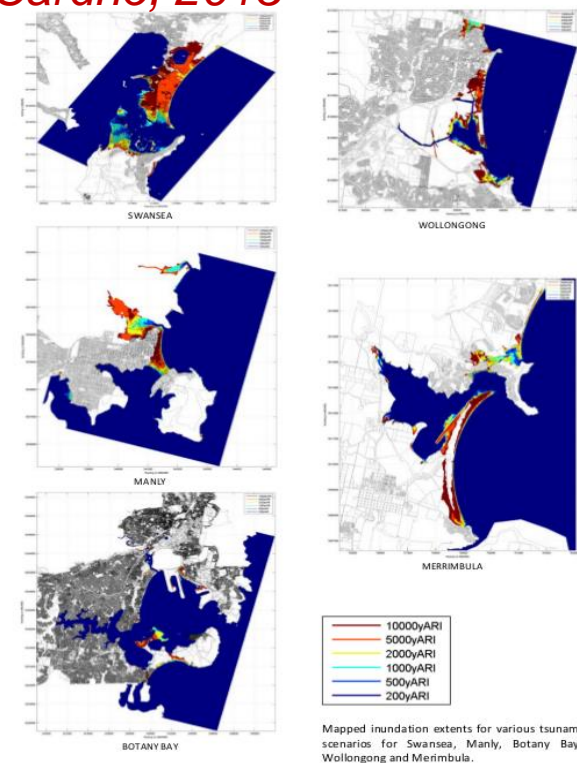
SUMMARY

This study tests three models for generating stochastic earthquake-tsunami scenarios on subduction zones by comparison with deep ocean observations from 18 tsunamis during the period 2006–2016. It focuses on the capacity of uncalibrated models to generate a realistic distribution of hypothetical tsunamis, assuming the earthquake location, magnitude and subduction interface geometry are approximately known, while details of the rupture area and slip distribution are unknown. Modelling problems like this arise in tsunami hazard assessment, and when using historical and palaeo-tsunami observations to study pre-instrumental earthquakes. Tsunamis show significant variability depending on their parent earthquake's properties, and it is important that this is realistically represented in stochastic tsunami scenarios. To clarify which aspects of earthquake variability should be represented, three scenario generation approaches with increasing complexity are tested: a simple fixed-area-uniform-slip

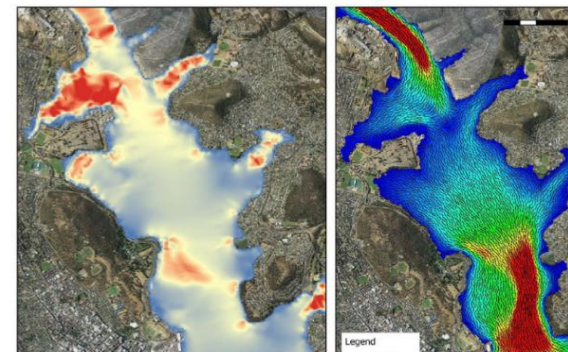
Why have an offshore PTHA ?

- Demand for tsunami hazard information:
 - Emergency Management Planning; Land-use planning ; Insurance
- Estimated onshore / nearshore impacts
 - How often will site-X be inundated?
- Nearshore models + offshore scenarios
 - **Problem:** Models of scenarios and return-periods are not standardized
 - Great variation of approaches & results
 - Hard to compare studies
 - **Solution:** *Standardized large-scale approach: PTHA provides this*

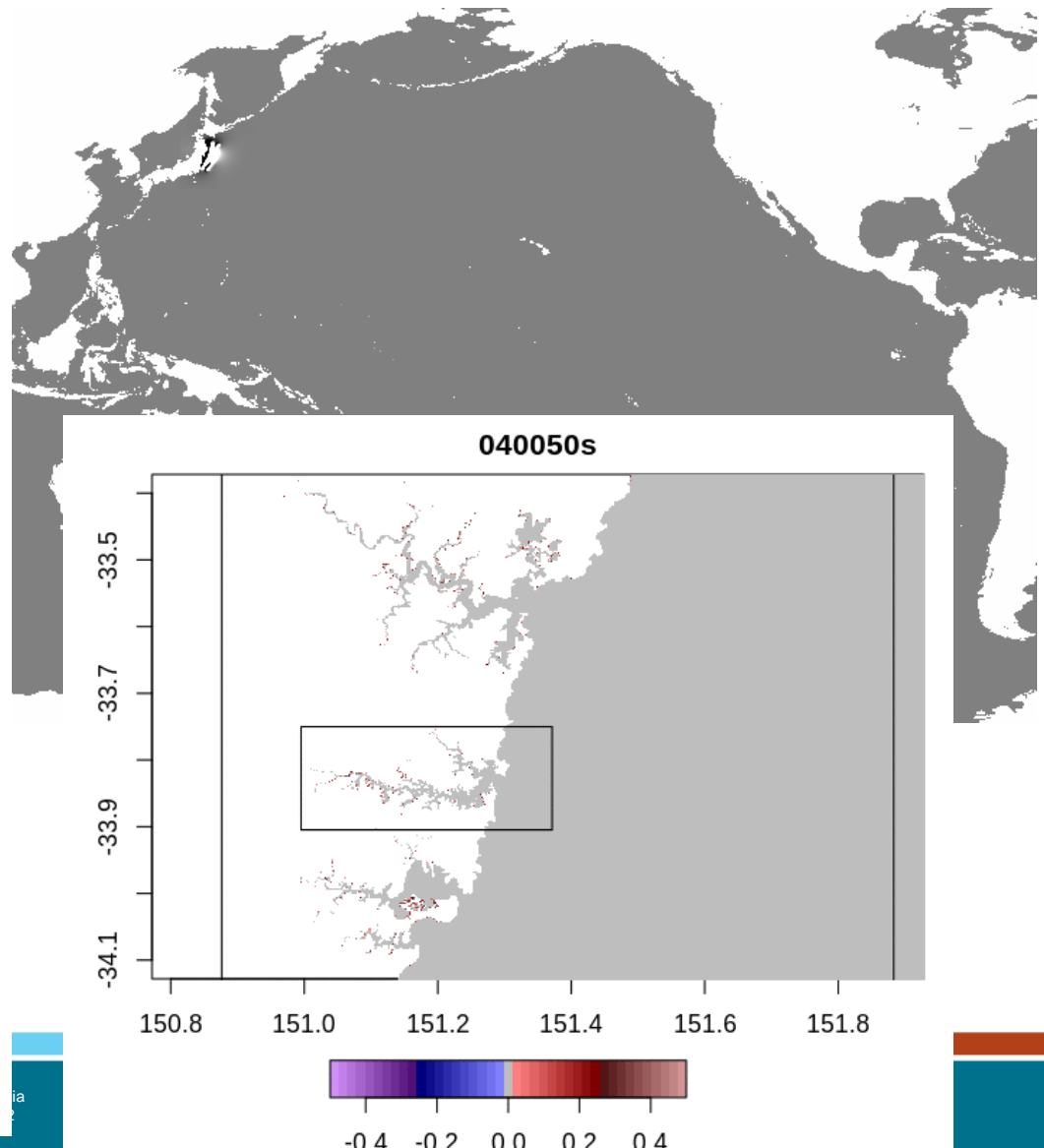
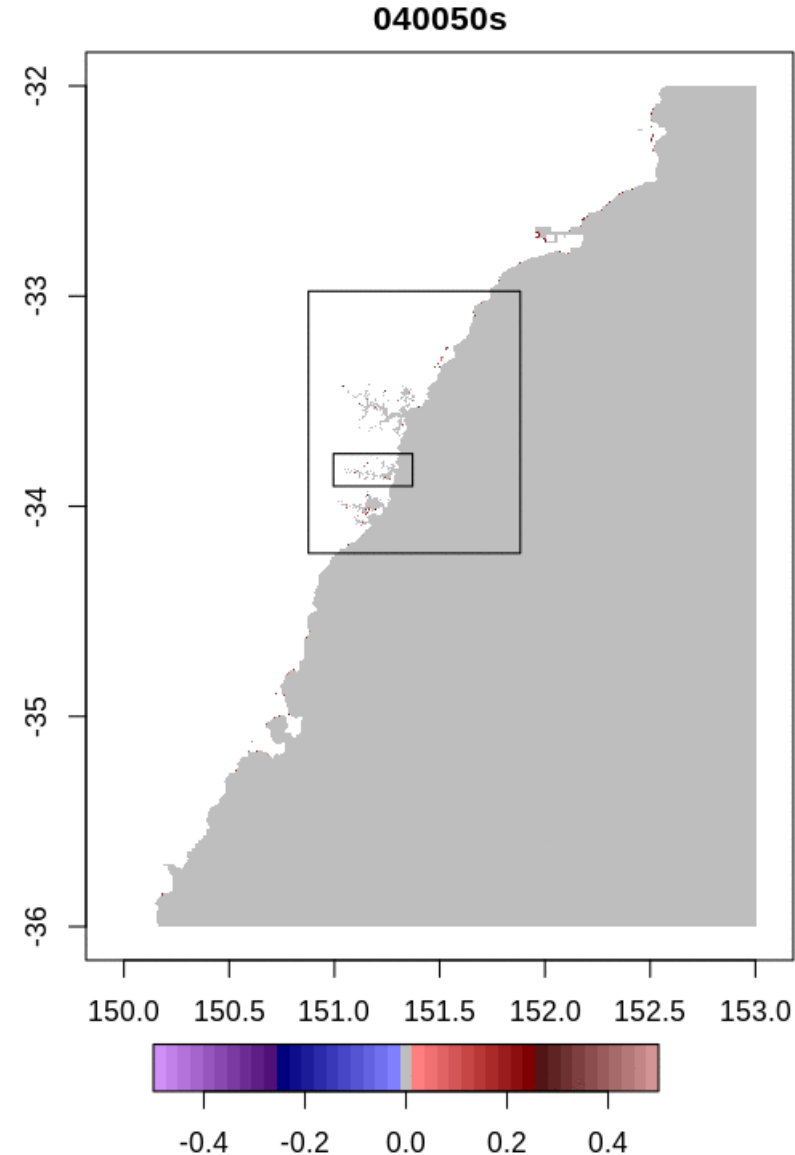
NSW Inundation Scenarios Cardno, 2013



SE Tas. Tsunami Scenario, Kain et al., 2017



Summary: Database with EQ-tsunami scenarios and return periods for inundation hazard studies



Our new guidelines focus on how to use the offshore PTHA for inundation hazard assessment

