Global Tsunami Model (GTM) Probabilistic Tsunami Hazard Assessment (PTHA)

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The aim of the study

GTM-PTHA is one of the Pilot Demonstrators (PD) of the EuroHPC JU ChEESE-2P project, within the scope of GTM organization. As an **updated version of Davies et al. (2018) global model**, this model will include stochastic slip models, spatially higher resolution of the calculation points with particular attention to relatively small islands, and the contribution of tides and long-term sea level variations, among other things. We also aim to make it interoperable with the GEM OpenQuake tools and consistent with similar seismic hazard models.

50 kmx50 km rectangular subduction mesh

Location of points of interest (POI) with amplification factors

HySEA

Global bathy/topo data

Linear combination of Green's functions
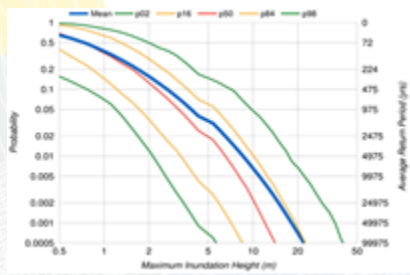
STEP-1
Probabilistic earthquake model

Scenario list of all potential earthquakes with their mean annual rates and related epistemic uncertainty

STEP-2
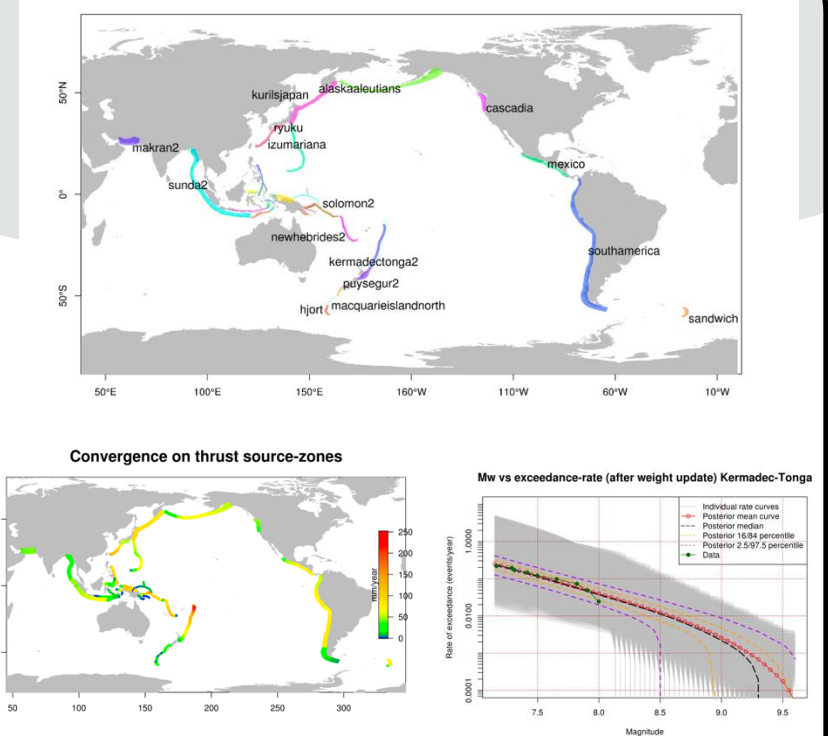### Tsunami generation and modeling in deep water

Mean annual rates and related epistemic uncertainty
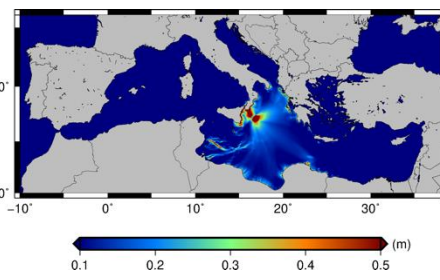
STEP-3
Hazard aggregation and uncertainty quantification

Regional hazard disaggregation

Australian PTHA18

Convergence on thrust source-zones
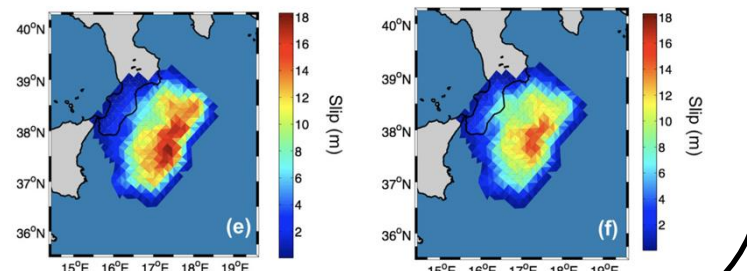
Mw vs exceedance-rate (after weight update) Kermadec-Tonga

GEM OpenQuake engine
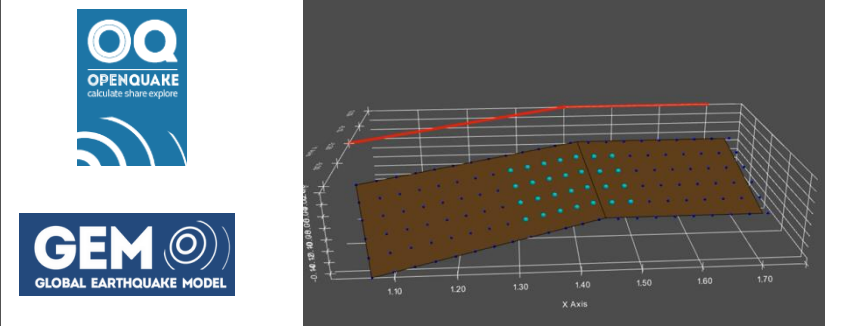
Stochastic slip models from ANTI-FASc

Ongoing Improvements

PTHA Compounding Tides and Sea Level Rise

Source | Still water level (including tides) | Hazard Intensity

Mean sea level (assumed fixed)
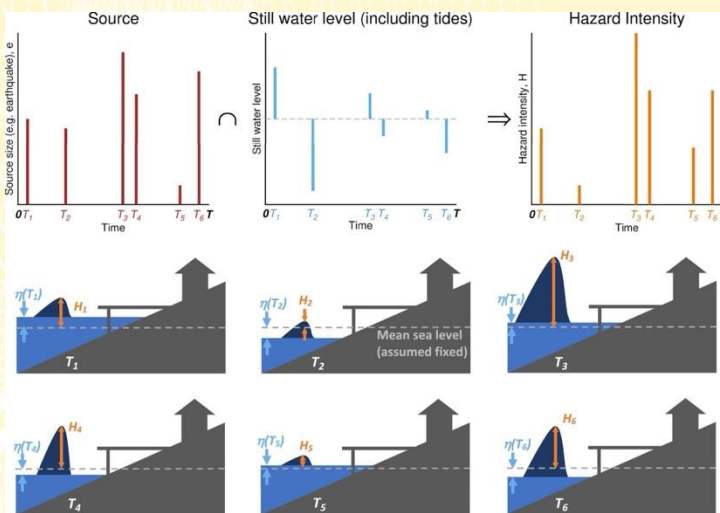
Sepúlveda et al., Earth's Future, 2022

New version of Tsunami-HySEA

a) vertical movement due to faulting

Upper plate

Lower plate

b) horizontal movement of slope
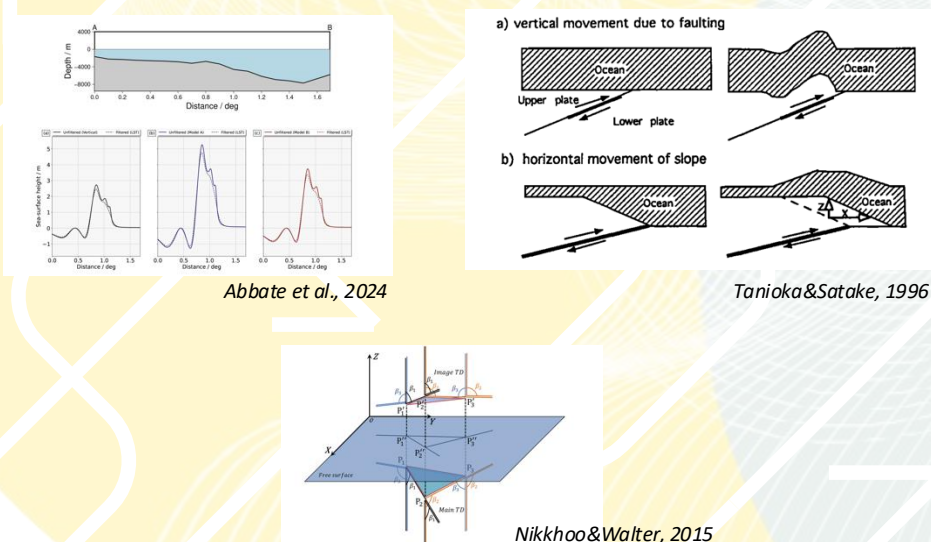
Abbate et al., 2024

Tanioka&Satake, 1996

Nikkhoo&Walter, 2015

Site-specific PTHA

640 m

160 m

40 m

10 m

Nested grids
4 levels
10 m resolution for coastal inundation