















### **GLOBAL EARTHQUAKE MODEL 2018** A Step Toward Earthquake Resilience

5th of December 2018 | 0900h - 1800h | CAR College, Pavia, Italy











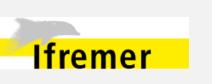








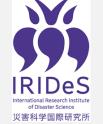










































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Abstract: The tsunamis occurred worldwide in the last two decades have highlighted the need for a thorough understanding of the risk posed by relatively infrequent but often disastrous tsunamis and the importance of a comprehensive and consistent methodology for quantifying the hazard and risk. In an effort to coordinate and streamline these activities and make progress towards implementing the Sendai Framework of Disaster Risk Reduction (SFDRR) we have initiated the Global Tsunami Model (GTM) network, with the aim of i) enhancing our understanding of tsunami hazard and risk on a global scale and developing standards and guidelines for it, ii) providing a portfolio of validated tools and benchmarks for probabilistic tsunami hazard and risk assessment at a range of scales, and iii) developing a global tsunami hazard reference model. This GTM initiative has grown out of the tsunami component of the Global Assessment of Risk (GAR15), which has resulted in an initial global model of probabilistic tsunami hazard and risk. Started as an informal gathering of scientists interested in advancing tsunami hazard analysis, the GTM is currently in the process of being formalized through letters of interest from participating institutions. The initiative has now been endorsed by the United Nations International Strategy for Disaster Reduction (UNISDR) and the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR). The GTM Governance, Structure, and the GTM first activities and future roadmap will be now implemented in the framework of the recently awarded COST Action AGITHAR.

#### **Background – why GTM?**

- Previous work on hazard and risk for UN-ISDR and GFDRR
  - Multi-institutional work needed to advance global risk understanding
- Example: Global Assessment Report, GAR
  - Full tsunami risk analysis, estimates of losses for nations
- Idea: Need to gather scientific community for
- Collective effort for improved understanding of global tsunami hazard and risk
- Provide reference maps
- Improve methods, develop guidelines and standards
- Non-exclusive initiative from the tsunami community itself
- Ensure relevance towards stakeholders

#### GTM's added value and vision

The GTM overall vision and goals are to collaboratively achieve a thorough understanding of tsunami hazard and risk, together with the processes that drive them

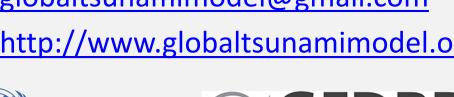
- Facilitate compatibility and improve probabilistic tsunami hazard and risk analysis methods through the development of standards, guidelines, methods, tools, and identification of key research questions
- The development of regional and global reference probabilistic tsunami hazard and risk maps, as well as standardized processes for developing local hazard and risk analyses
- Establish reference pools of experts for completing and reviewing tsunami hazard and risk assessments from stakeholders
- The provision of a *consistent input and contribution to* multi-hazard risk assessment through high-level harmonization with organizations covering other natural hazards
- The interaction with stakeholders to ensure relevance and proper dissemination of results and *uncertainty* communication to non-scientists
- To develop the above products while **being mindful of** their benefits for society

**Current GTM participation** 34 partners have signed Lol's, many more partners interested (involved in meetings, publications, etc.)

**Interested in GTM?** 

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#### **Priority items**

Short term priority, with focus on hazard during first phase:

- Framework for uncertainty treatment
- Submarine fault characterization
- Tsunami hazard from non-seismic sources
- Homogenized global tsunami data handling

#### Long term and overarching goals:

- Seismic source (probability and modelling)
- Non-Seismic source (probability and modelling)
- Tsunami (probability and modelling)
- Probabilistic Tsunami Hazard Assessment, **PTHA**
- Vulnerability and fragility
- Probabilistic Tsunami Risk Assessment, PTRA
- Dissemination and geoethics (transparency uncertainty communication)

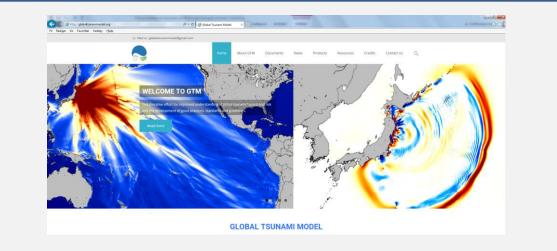
# **Contributed projects and activities**

- TSUMAPS-NEAM (http://www.tsumapsneam.eu/)
- Tsunami hazard maps for DG-ECHO (European Civil Protection)
- Makes use of GTM pool of experts
- New global tsunami hazard assessment finalized (Davies et al., 2017)
- Deeper analysis on earthquake model epistemic uncertainties
- Reviews of Geophysics: Probabilistic Tsunami Hazard Analysis (Grezio et al., 2017)
- Dissemination activities for stakeholders
- UNISDR Words into action
- World tsunami awareness day
- JRC Science for DRM report

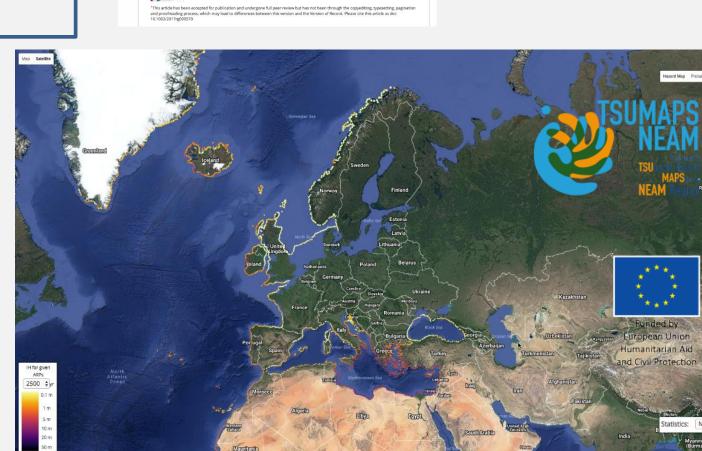
## **NEW in GTM**

**CONTRIBUTING TO Global Assessment** Report 2019 (GAR19)

COORDINATING THE AGITHAR COST **ACTION (STARTING 1/2019)** 







1/2500 exceedance rate run-up height Davies et al. (2017)

#### References and further reading w/ contributions by GTM

Global assessment report for disaster risk reduction

https://www.unisdr.org/we/inform/publications/42809 Løvholt F, Griffin J, Salgado-Galvez M (2015), Tsunami Hazard and Risk Assessment on the Global Scale, R.A. Meyers (ed.), Encyclopedia of Complexity and Systems Science, Springer

Davies, G., Griffin, J., Løvholt, F., Glimsdal, S., Harbitz C., Thio, H.K., Lorito, S., Basili, R., Selva, J., Geist, E., and Baptista, M.A. (2017), 2017 A global probabilistic tsunami hazard assessment from earthquake sources, Geological Society, London, Special Publications, 456, doi:10.1144/SP456.5

Grezio A, Babeyko A, Baptista MA, Behrens J, Costa A, Davies G, Geist EL, Glimsdal S, González FI, Griffin J, Harbtz CB, LeVeque RJ, Lorito S, Løvholt F, Omira R, Mueller C, Paris R, Parsons T, Polet J, Power W, Selva J, Sørensen M, Thio HK (2017), Probabilistic Tsunami Hazard Analysis (PTHA): multiple sources and global

applications, Rev. Geophys., 55, doi:10.1002/2017RG000579 Løvholt F, Davies G, Griffin J, Lorito S, Volpe M, Romano F, Salgado-Galvez M, Geist EL, Ross S, Aguirre-Ayerbe I, Fraser S, Thio HK, Canals M, González FI, Polet J, Mokhtari M, Kanoglu U, Paris R, von Hillebrandt-Andrade C, Baptista MA, Latief H, Papadopoulos G, Tsunami Hazard and Risk Assessment, in United Nations Office for Disaster Risk Reduction (UNISDR). Words into Action Guidelines. Geneva, Switzerland: UNISDR; 2017. http://www.preventionweb.net/files/52828 02tsunamihazardandriskassessment.pdf

Papadopoulos G, Lorito S, Løvholt F, Rudloff A, Schindelé F, Geophysical Risk: Tsunamis, in European Commission Disaster Risk Management Knowledge Centre. Science for Disaster Risk Management 2017:

Knowing Better and Losing Less. European Union: Luxembourg; 2017. https://ec.europa.eu/jrc/en/publication/science-disaster-risk-management-2017-knowing-better-andlosing-less