ETRiS Newsletter Issue 3 · 2026

GEO-INQUIRE PTRA WORKSHOP 2026

1–4 JUNE 2026 · GFZ POTSDAM

ETRiS team was actively involved in steering the development and delivery of the scientific training for the Geo-INQUIRE and EPOS TCS Tsunami training workshop "From Scenarios to Consequences: Probabilistic Tsunami Risk Analysis," held at GFZ Potsdam, Germany, from June 1–4, 2026. Together with researchers from GFZ, UCL, NGI, INGV, UNINA, University of Aveiro and University of Cantabria, the ETRiS team helped deliver training covering tsunami hazard, exposure, fragility and vulnerability modeling, and risk assessment. Through expert lectures and hands-on group exercises, participants explored practical probabilistic tsunami risk analysis workflows using datasets, tools, and Jupyter notebooks from Geo-INQUIRE and EPOS TCS Tsunami. The workshop also provided an opportunity to introduce ETRiS services and strengthen collaboration within the tsunami risk research community.



A Refreshed ETRiS Identity

ETRiS has introduced a new logo and refreshed visual identity, bringing a fresh look to its website, newsletter, and communications.

Simulation Data Lake

The materials from the Geo-INQUIRE PTRA Workshop are now available on the Simulation Data Lake, with a dedicated DOI for access and citation:

Jalayer, F., Ebrahimian, H., Soltani, S., Abbate, A., Babeyko, A., Lanucara, P., Lorito, S., Løvholt, F., Oostwegel, L. J., Ragu Ramalingam, N., Salmanidou, D., & Silva, V. (2026). From Scenarios to Consequences: Probabilistic Tsunami Risk Analysis (PTRA) with Geo-INQUIRE Services (Version 1.0.0). Simulation Data Lake. **https://doi.org/10.82554/sdl-622.710**

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Modeling Tsunami Evacuation with ABM

Probabilistic Tsunami Evacuation Modeling Using Agent-Based Modeling

EDITORIAL / AGENT-BASED MODELING / By Saeed Soltani

- **1. From Tsunami Scenarios to Evacuation Outcomes**

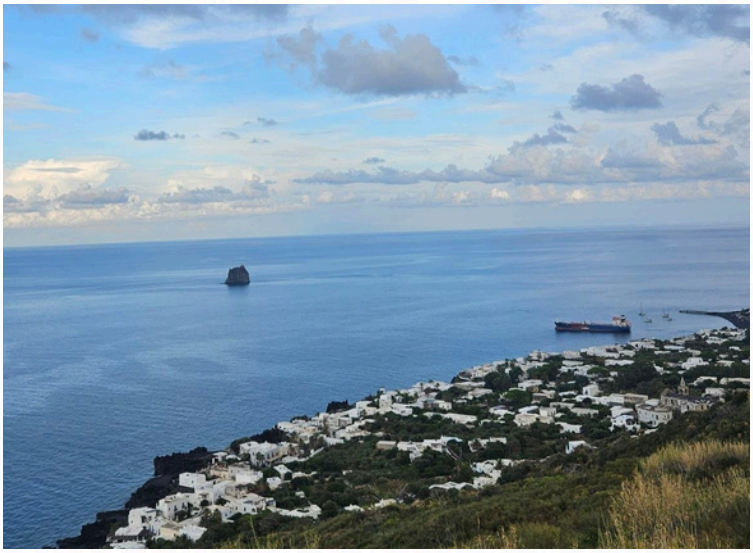
Probabilistic Tsunami Hazard Analysis (PTHA) provides invaluable information about possible tsunami inundation scenarios. However, estimating potential human consequences of these scenarios requires considering the evacuation process itself. Even under the same hazard conditions, outcomes can vary depending on where people are, how quickly they respond, and how they move through the built environment. Agent-Based Modeling (ABM) is a simulation-based approach that represents these processes through the decisions, movements, and interactions of individuals within their environment.

- **2. how Does Agent-Based Evacuation Modeling Work?**

Agent-Based Modeling (ABM) is a bottom-up computational approach that represents individuals as autonomous agents operating within a digital environment. Each agent is characterized by individual attributes, such as evacuation tendency, mobility constraints, and response delays, and follows behavioral rules that guide its decisions and actions. As the simulation progresses, agents continuously respond to changing conditions, make decisions, and interact with their surroundings and other agents. As a result, behaviors and interactions at the micro-level collectively give rise to emergent patterns at the macro-level, ultimately shaping the overall evacuation process.

- **3 . From Individual Simulations to Probabilistic Outcomes**

A single ABM simulation represents only one possible evacuation situation, defined by a tsunami scenario, one exposure model, and one behavioral characteristics. These conditions are uncertain. Tsunami scenarios differ in inundation extent and arrival time, population exposure can vary in each scenario, and individuals may respond differently to the same warning.



Stromboli Island, Italy. Photo by: Saeed Soltani.

To account for these variations, all the uncertain inputs are described using probability distributions and sampled through Monte Carlo simulations. Each ABM run uses a different combination of hazard, exposure, and behavioral conditions, producing an evacuation outcome that records how many individuals reach safety. Repeating this process generates a range of possible evacuation outcomes, allowing us to examine how uncertainty in hazard, exposure, and human behavior affects evacuation performance.

- **4. From Evacuation Outcomes to Risk Assessment**

The outcomes of simulations will be used to investigate evacuation risk within a probabilistic framework. By combining simulated evacuation outcomes with likelihood of tsunami scenarios, it becomes possible to assess evacuation performance across a range of potential events. The model can also help explore how evacuation risk changes under different conditions, such as the availability of tsunami warnings, while accounting for the uncertainties associated with population distribution, and variations in human behavior. In this way, ABM provides a basis for incorporating human response and evacuation dynamics into probabilistic tsunami risk assessment.

Research, Events & Project Updates

TCS TSUNAMI CB MEETING GTM STRATEGY MEETING IN OSLO

22–23 October 2026 • Oslo, Norway

The Global Tsunami Model (GTM) Strategy Meeting was held at NGI in Oslo on 22–23 October 2026, bringing together members of the GTM community to discuss strategic priorities and future activities. Fatemeh Jalayer presented a community roadmap for Probabilistic Tsunami Risk Assessment (PTRA), focusing on shared community risk products, integrated hazard-to-risk workflows, and stronger collaboration with GTM and EPOS initiatives.

The meeting followed the 7th EPOS TCS Tsunami Consortium Board Meeting, held on 20–21 October 2026 at NGI. The Board reviewed progress under the 2026 work plan and discussed priorities for 2027, including tsunami risk assessment, service provision, computational developments, and integration with EPOS infrastructure.



FIRST RIAGE GLOBAL EARTHQUAKE WORKSHOP

18–19 May 2026 • London, United Kingdom

The first RIAGE (Re)Insurance–Academia Global Earthquake Workshop was held at University College London on 18–19 May 2026, bringing together researchers, engineers, and insurance industry professionals to exchange knowledge on earthquake risk and catastrophe modeling. Discussions covered time-dependent and cascading risks, advances in exposure and vulnerability modeling, and emerging technologies in catastrophe risk management. Hossein Ebrahimian presented the dataset of empirical vulnerability models provided by ETRiS. Fatemeh Jalayer co-chaired the workshop and participated in an expert panel discussion, helping strengthen collaboration between academia and the insurance industry to advance risk assessment and resilience.



More news: eurotsunamirisk.org/news/

Research, Events & Project Updates

TCS TSUNAMI RISK WORKSHOP IN POTSDAM

4–5 June 2026 • Potsdam, Germany



The TCS Tsunami Risk Workshop, held in Potsdam on 4–5 June 2026, brought together the TCS Tsunami community to discuss priorities for future tsunami risk services. Fatemeh Jalayer introduced the objectives of the newly formed Risk Topic Group, while ETRiS team members contributed to discussions on human exposure, fragility and vulnerability products, evacuation modelling, and PTRA workflows. The workshop also explored the development of Jupyter-based tools, integration of risk products into EPOS services, and collaboration with the Global Tsunami Model (GTM) to shape a roadmap for future activities.

ETRIS AT EGU26: EPOS GO! CHALLENGE

3-8 may 2026 • Vienna, Austria



At the EGU General Assembly 2026 in Vienna, Saeed Soltani presented ETRiS research linking probabilistic tsunami hazard analysis with agent-based evacuation modelling to estimate the probability of safe evacuation. The presentation explored the potential integration of this workflow into EPOS Integrated Core Services–Distributed (ICS-D), highlighting opportunities for distributed computing, data management, and Python- and GIS-based analysis. Saeed was also selected as one of the three winners of the EPOS Go! Challenge, marking an additional achievement for ETRiS at the conference.

ETRIS AT EPOS DAYS 2026

16-20 March 2026 • Cagliari, Italy

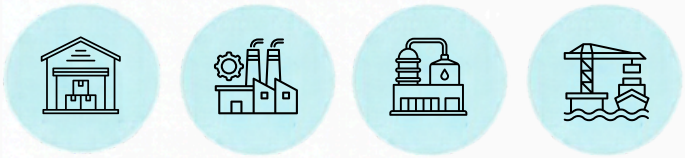


Some of ETRiS team members participated in EPOS Days 2026, held in Cagliari, Italy, on 16–20 March, contributing to discussions on scientific collaboration and the development of European research infrastructures. Fatemeh Jalayer reported on the the Sponsored Research Activity (SRA) related to cross-thematic core services collaboration on multi-risk at the Service Coordination Committee (SCC), while Saeed Soltani contributed to the Early Career Researchers programme as a rapporteur for Thematic Core Services discussions. He also presented a Jupyter-based agent-based modeling framework linking probabilistic tsunami hazard analysis with evacuation modeling, demonstrating its potential for estimating safe evacuation probabilities and future integration into EPOS ICS-D.

More news: eurotsunamirisk.org/news/

ETRiS Data Product

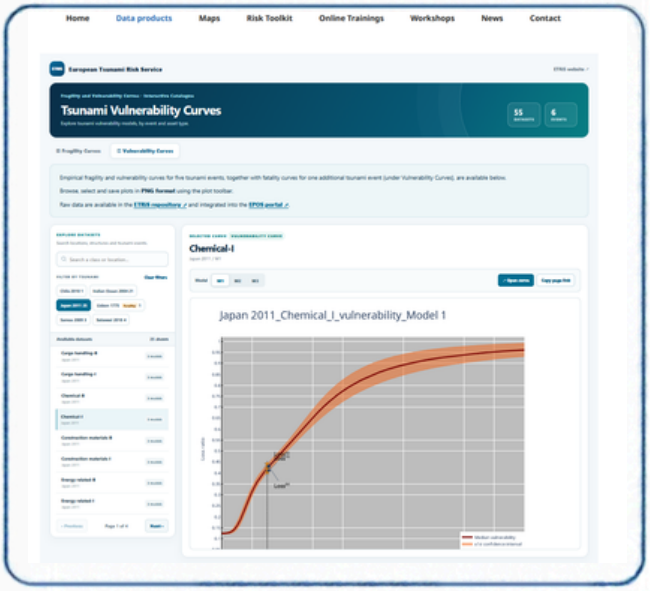
Fragility and Vulnerability Curves



162 Fragility and 162 Vulnerability Curve Sets

Explore empirical fragility and vulnerability curves for 54 asset types/administrative boundary, developed using three alternative statistical link functions (logit, probit, and complementary log–log). The datasets are derived from five major tsunami events and include one fatality curve for the Lisbon tsunami.

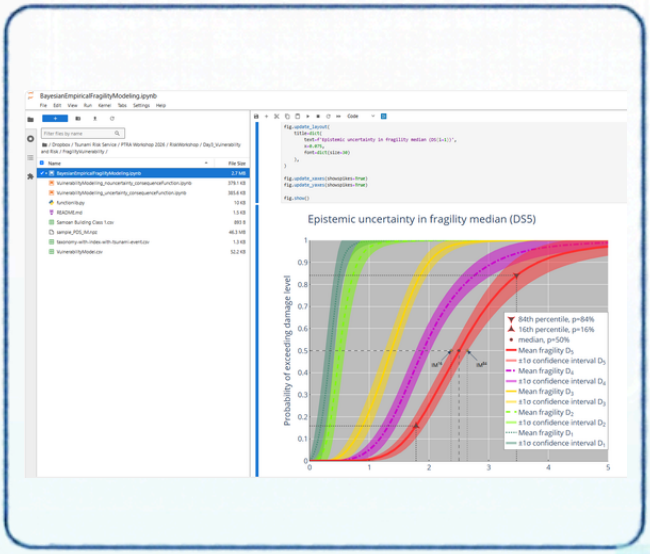
Explore our data products →



7 Jupyter Notebooks for Tsunami Risk Modeling

Explore seven Jupyter notebooks performing Bayesian fragility modeling, and developing vulnerability models using direct and fragility–consequence approaches and visualizing empirical fragility and vulnerability curves.

Explore our risk toolkit →



Read more: eurotsunamirisk.org/dataproducts

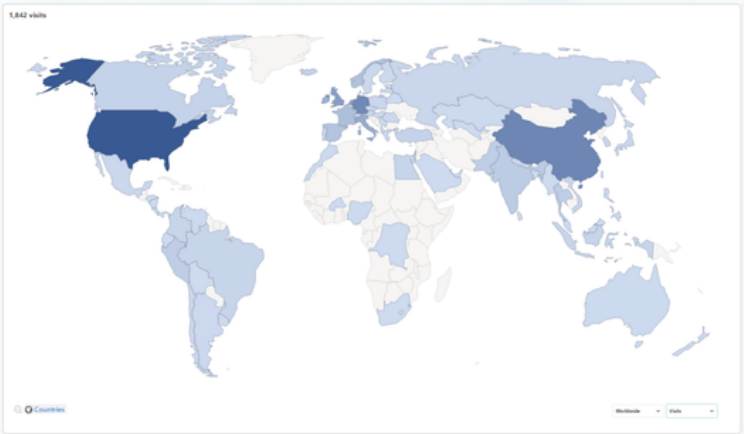
ETRiS Global Outreach and Website Statistics

The ETRiS website recorded 1,842 visits in 2026, showcasing its international reach. Particularly encouraging is the interest from tsunami-exposed countries in South and Southeast Asia, as well as along the Pacific coast of South America. Visits from smaller countries also highlight the geographical diversity of the audience and the relevance of tsunami risk information and resources worldwide.

Top Visitor Locations

COUNTRIES	CITIES
United States	Singapore
Singapore	Amsterdam
China	Potsdam
Germany	Dublin
Netherlands	Nanjing

[81 countries] | [254 Region] | [2732 page views] | 1842 Visits | [59.1%]





Read more: eurotsunamirisk.org/

Looking Ahead

We look forward to the release of ETRiS's new vulnerability models and the formal publication of the PTRA workflows, supported by comprehensive documentation. We also look forward to the consolidation of the Risk Working Group, bringing together experts from both EPOS TCS Tsunami and the Global Tsunami Model (GTM) communities to advance collaboration on tsunami risk assessment and services.

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Stay connected with ETRiS

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