COST Action AGITHAR
Accelerating Global science In Tsunami HAzard and Risk analysis

J. Behrens and AGITHAR Team

J. Behrens, F. Løvholt, F. Jalayer, et al. (2021): *Probabilistic Tsunami Hazard and Risk Analysis – A Review of Research Gaps*, Frontiers in Earth Science, **9:114**, DOI:10.3389/feart.2021.628772.

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About AGITHAR

2019 Brussels: Start

2019 Valletta: Setting the scene

2020 Rome: Intense work on gaps

2021 online work

2022 Málaga: Readjusting work plan

2022 Prague: Intense work on Book

2023 Plan science meeting


Brussels, April 2019


Málaga, June 2022


Valletta, October 2019


Prague, September 2022


Rome, January 2020

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Challenge

- Assess, benchmark, improve, and document **methods** to analyze tsunami hazard and risk,
- Understand and communicate the **uncertainty** involved, and
- Interact with **stakeholders** in order to understand the societal needs and thus
- Contribute to their effort to **minimize losses**

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Important Goals

- Assessment and provision of a common inventory of PTHA and PTRA approaches
- Identification and development of performance metrics and test cases (benchmarks) for individual components
- Open Access data repositories with standardized interfaces
- Development of a structure for standardized PTHA and PTRA workflows
- Quality assurance for PTHA and PTRA
- Implementation and dissemination of PTHA and PTRA methods to stakeholders and end users
- Joint guideline development of workflows with stakeholders

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Deliverables

#	month	description
1	12 ✓	report on science gaps
2	24 ✓	report on SPTHA
3	24 ✓	repository for data, reports, etc.
4	30 ✓	report on interdisciplinary challenges
5	36	guidelines on stardardized PTHA
6	36	guidelines on standardized PTRA
7	48	report on future research directions

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Funding

Period	Time	Total Amount
1	05/2019-04/2020	~110.000 €
2	05/2020-10/2021	~102.000 €
3	11/2021-10/2022	~138.000 €
4	11/2022-09/2023	~111.000 €

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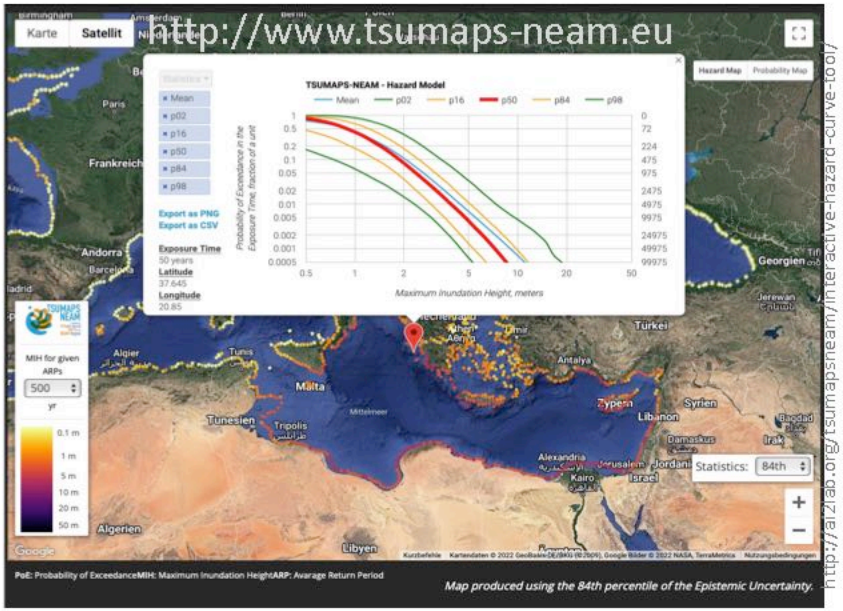
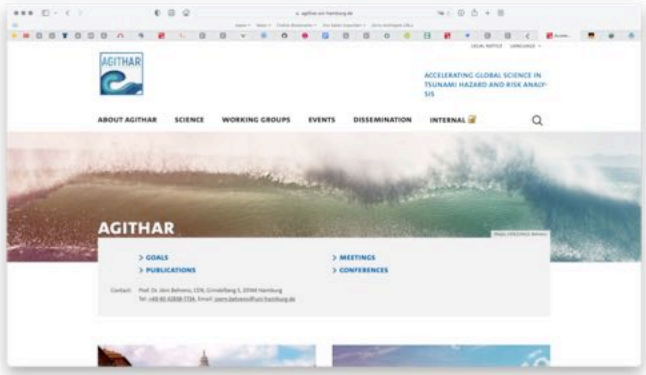
PTHA/PTRA

Probabilistic Tsunami Hazard and Risk Analysis

- Planning
- Building Codes
- Industry
- Preparedness





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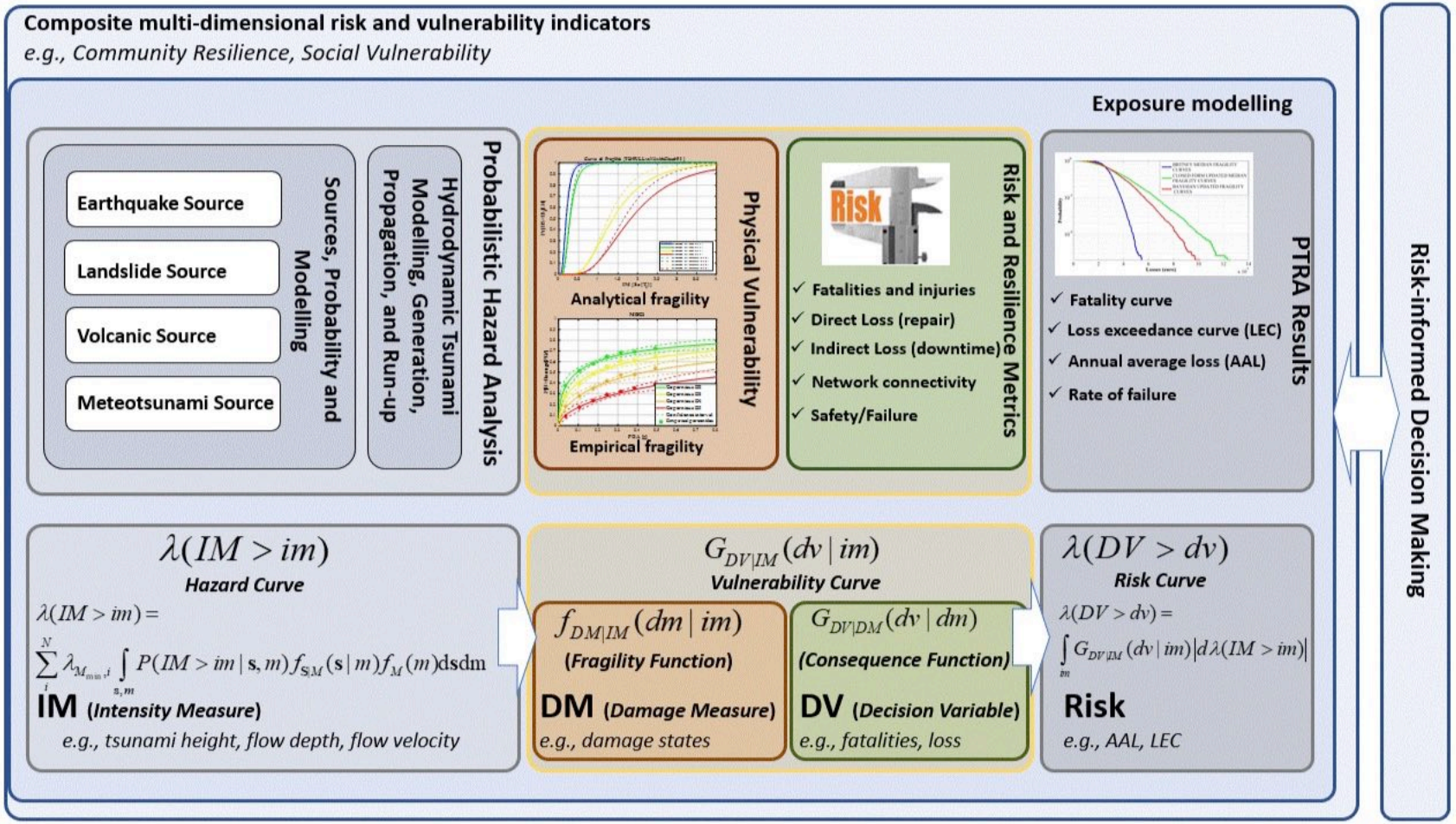
Probabilistic Framework



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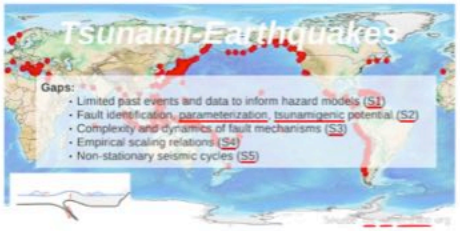
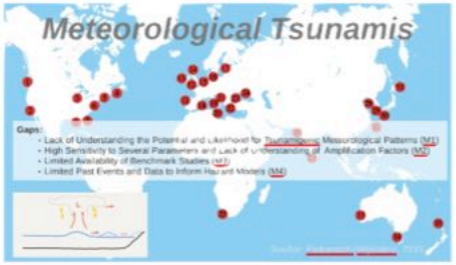
Uncertainties in Sources





Source uncertainties related to modeling

Complexity and dynamics of fault mechanisms (S3)

High Sensitivity to Several Parameters and Lack of Understanding of Amplification Factors (M2)
Limited Past Events and Data to Inform Hazard Models (M4)

Modeling Tsunami Generation and Propagation (V3)
Availability of Well Recorded Past Events or Benchmark Studies (V5)

Difference of onshore and offshore landslides (L2)
Limited availability of benchmarks (L4)

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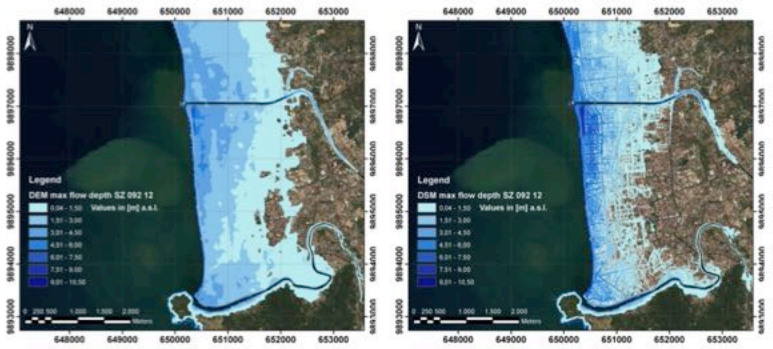
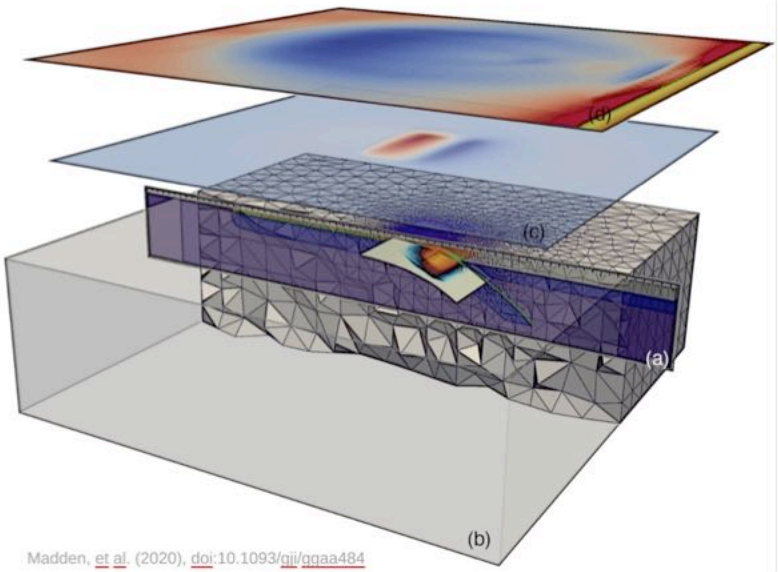
Modeling Uncertainties and Research Gaps

- PTHA for Inundation Processes (H1)
- Tsunami Generation Modeling (H2)
- Tsunami Propagation Numerical Model (H3)
- Nonlinearity and Resonances (H4)
- Modeling Assumptions and Scaling (H5)
- Complex Inundation Simulation (H6)



T. Schlurmann et al., Last Mile - Evacuation, 2010



Madden, et al. (2020), doi:10.1093/gji/ggaa484

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Risk Analysis Uncertainties

Exposure Modeling

Lack of Detail
Lack of Data
Lack of Exposure Model and Taxonomy
Spatio-Temporal Variability

Physical Vulnerability

Asset Types and Scope
Multi Hazard Impact on Data
Tsunami Intensity
Building Assessment and Analysis Model

Risk and Resilience Metrics

Propagation of Uncertainty
Vulnerability Characterization Functions
Lack of Database
Networks and Lifelines
Multi-Hazard/Multi-Risk
Understanding Mortality
Multi-faceted aspects of Vulnerability

Social Vulnerability

Quantification
Ambiguous Definitions
Lack of Vulnerability Index
Multi-Dimensional Aspects
Response and Capacity
Risk Perception

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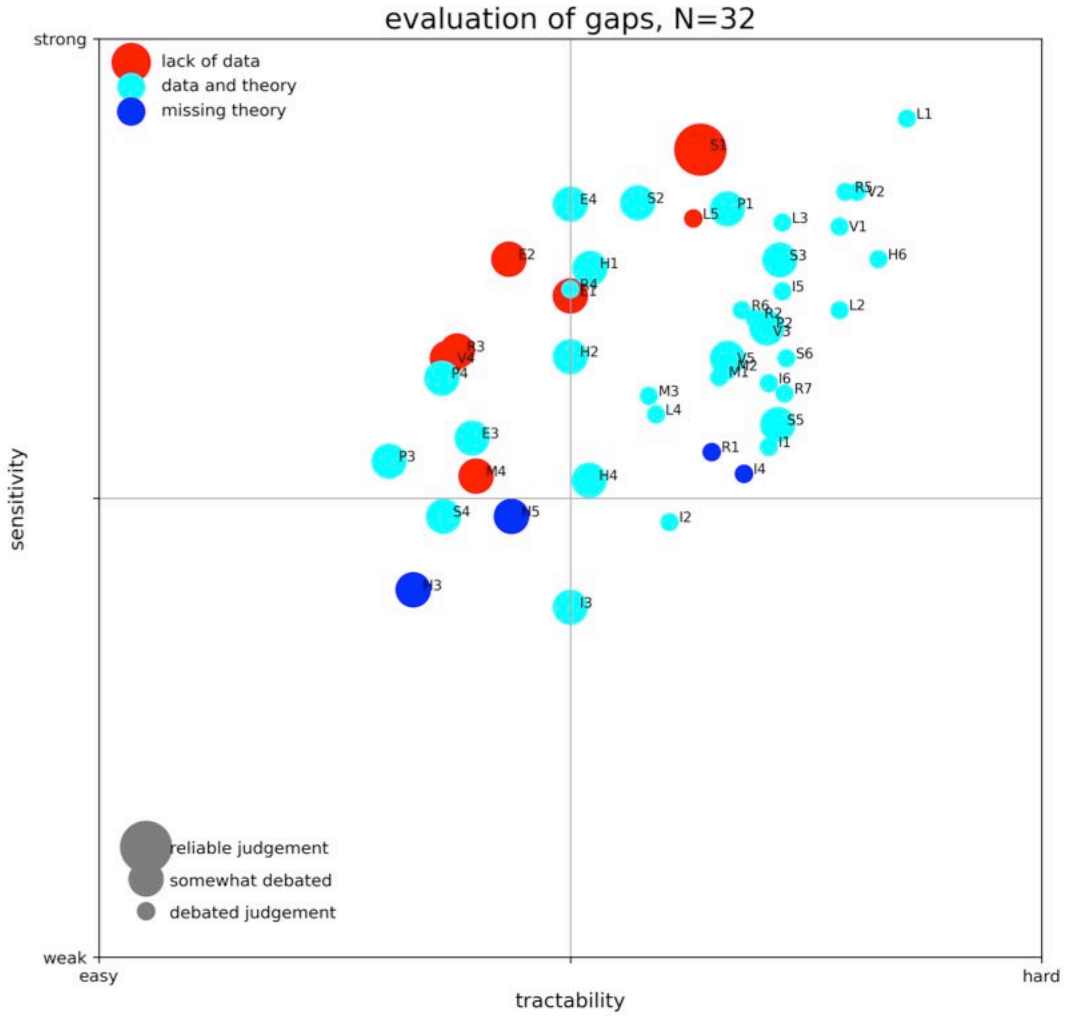
Evaluation of Research Gaps



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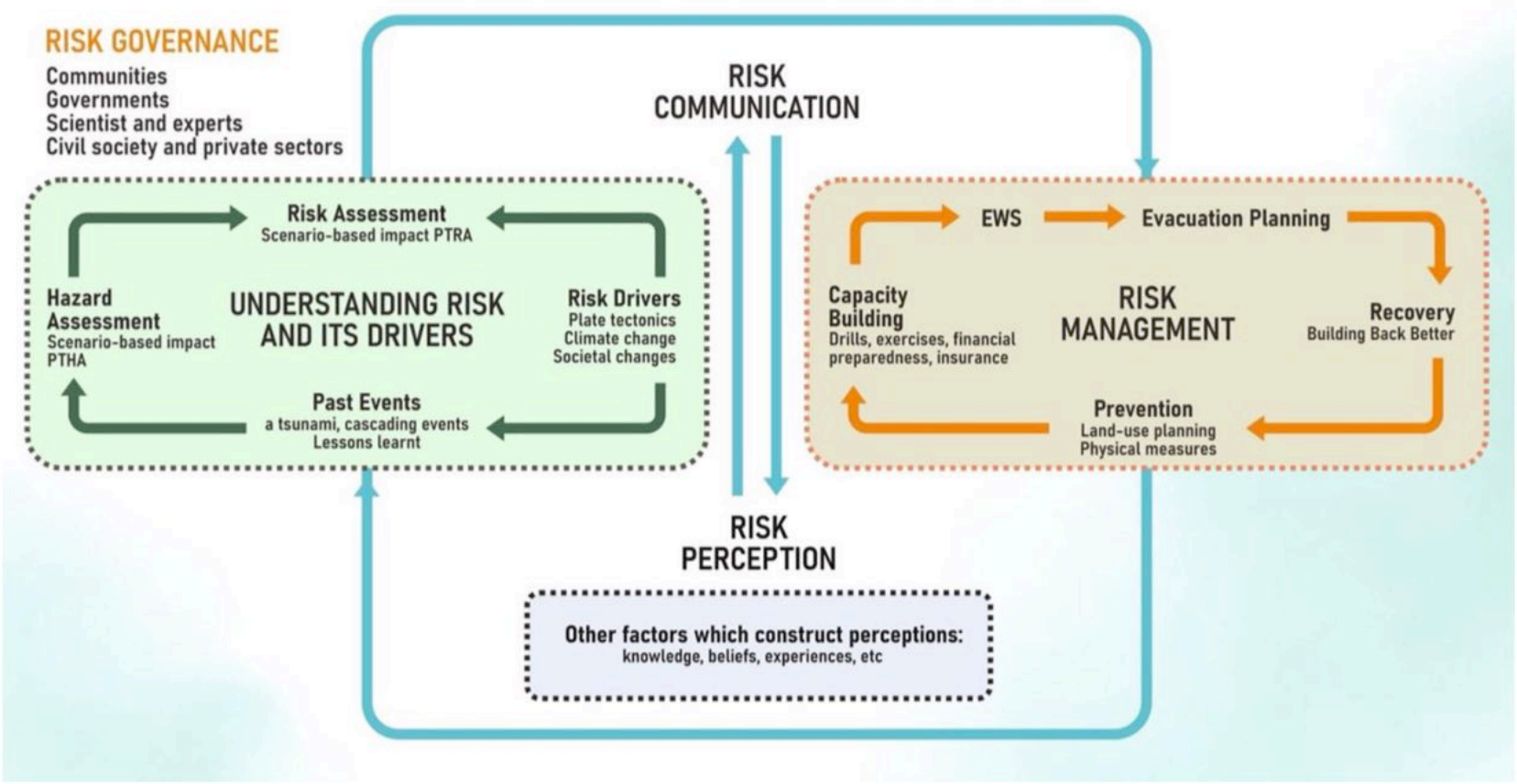
Risk Communication



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Interdisciplinarity in AGITHAR

- Strongly based disciplinary identity
- Communication across bounds
- Community identifies via early warning
- Common political goal of effective early warning
- Modeling appears as “backbone”
- Demand for closer collaboration between natural and social sciences

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"It's something that I do every day." Exploring interdisciplinarity and stakeholder engagement in tsunami science

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Tsunamis are natural hazards that can have devastating societal impacts. While tsunamis cannot be prevented, their risk to coastal communities can be mitigated through targeted measures such as early warning, evacuation training or tsunami-aware spatial planning. The particularities of tsunamis—being rare events with high impact and a short yet operable time span for warning—structure the associated research approaches and sociotechnical innovations. In this paper, we explore interdisciplinary knowledge integration and stakeholder engagement in tsunami science based on interviews with researchers from various tsunami-related fields. We find that the interviewees' academic identities are typically grounded in a disciplinary core, out of which they subsequently cross boundaries. For all respondents, however, it is a matter of course that becoming and being a member of the tsunami community includes the need to communicate across boundaries. Our results show that the idea of early warning unites the tsunami field. Notably, however, it is not the material technology but the political goal of effective early warning that holds an integrative function across disciplines. Furthermore, we find modelling to be seen as the "backbone of everything" tsunami-related, which in combination with visualisation techniques such as a global map of tsunami risks also serves to integrate stakeholders beyond the tsunami research community. Interviewees mention the interaction between scientists and engineers as the exemplary interdisciplinary collaboration in tsunami science. There were fewer examples of collaborations with social scientists, rendering this a demand rather than a lived reality in current tsunami science. Despite the widely shared view that stakeholder engagement is an important element of tsunami science, respondents emphasise the associated challenges and indicate that this practice is not yet sufficiently institutionalised.

KEYWORDS
tsunami, interdisciplinarity, stakeholder engagement, geohazard, early warning

S. Rödder and F. Schaumann (2022): “It’s something that I do every day.” Exploring interdisciplinarity and stakeholder engagement in tsunami science. Front. Earth Sci. 10:949803. doi: 10.3389/feart.2022.949803.

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The next big AGITHAR thing

"Cookbook" for PTHA/PTRA

Ingredients
- Framework
- Components
- Matters of attention

Recipes
- Good practices
- Examples
- Realizations

Publisher: Springer series MPE, Open Access

Outline/Contents

1. Introduction (Framing the Problem) – approx. 15 pages
   a. Motivation
   b. Expected outcomes – temporal and spatial scales, impact metrics
   c. Available Data/Models/Resources – overview
   d. Transparency and reproducibility
   e. Main components of PTHA and PTRA – framework, ingredients, stakeholders
2. **Ingredients Chapters (each approx. 20-30 pages)**
   (1) Framework for PTHA/PTRA
   (2) Sources – types, recurrences, characteristics, modelling
   (3) Tsunami modelling
   (4) Exposure modelling
   (5) Vulnerability modelling
   (6) Characterization and evaluation of risk
   (7) Visualization and presentation of results, uncertainty communication
3. **Recipes (this list is still growing, each approx. 2-5 pages)**
   a. TSUMAPS example
   b. Seismic PTHA examples from New Zealand, Australia, etc.
   c. Data-driven seismic PTHA in the Mediterranean
   d. Surrogate-based seismic and landslide PTHA
   e. Landslide PTHA in Norway
   f. Meteorological PTHA in the Adriatic
   g. Volcanic PTHA in Italy
   h. Event-based PTRA in Mexico, Peru
   i. Global PTRA according to GAR
   j. Uncertainty propagation from Hazard to Risk in Indonesia
   k. Analytical Vulnerability Assessment in Italian Building
   l. TsunamiReady
   m. Probabilistic Tsunami Forecasting
   n. ...
4. Discussion
   a. Degree of advancement and maturity, critical revision, limitations
   b. Evaluations of possible achievements related to available resources
   c. The "final mile" – how to interact with stakeholders, cost-benefit analyses
   d. Open questions and gaps
   e. Recommendations

Total Volume: 300-350 pages

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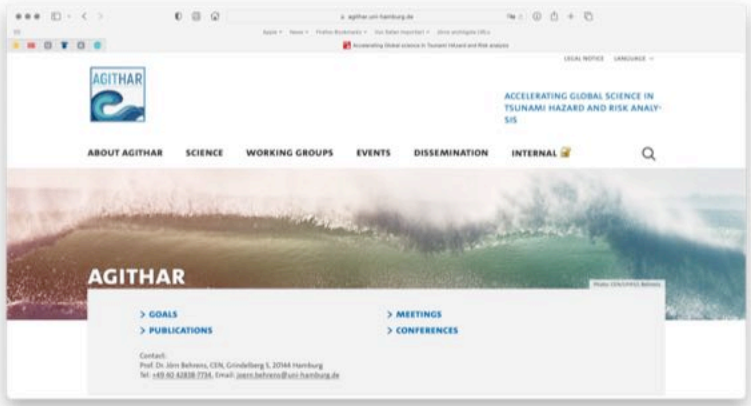

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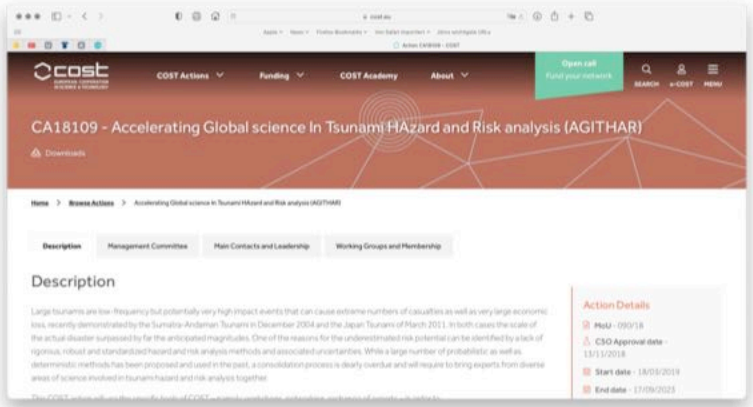

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