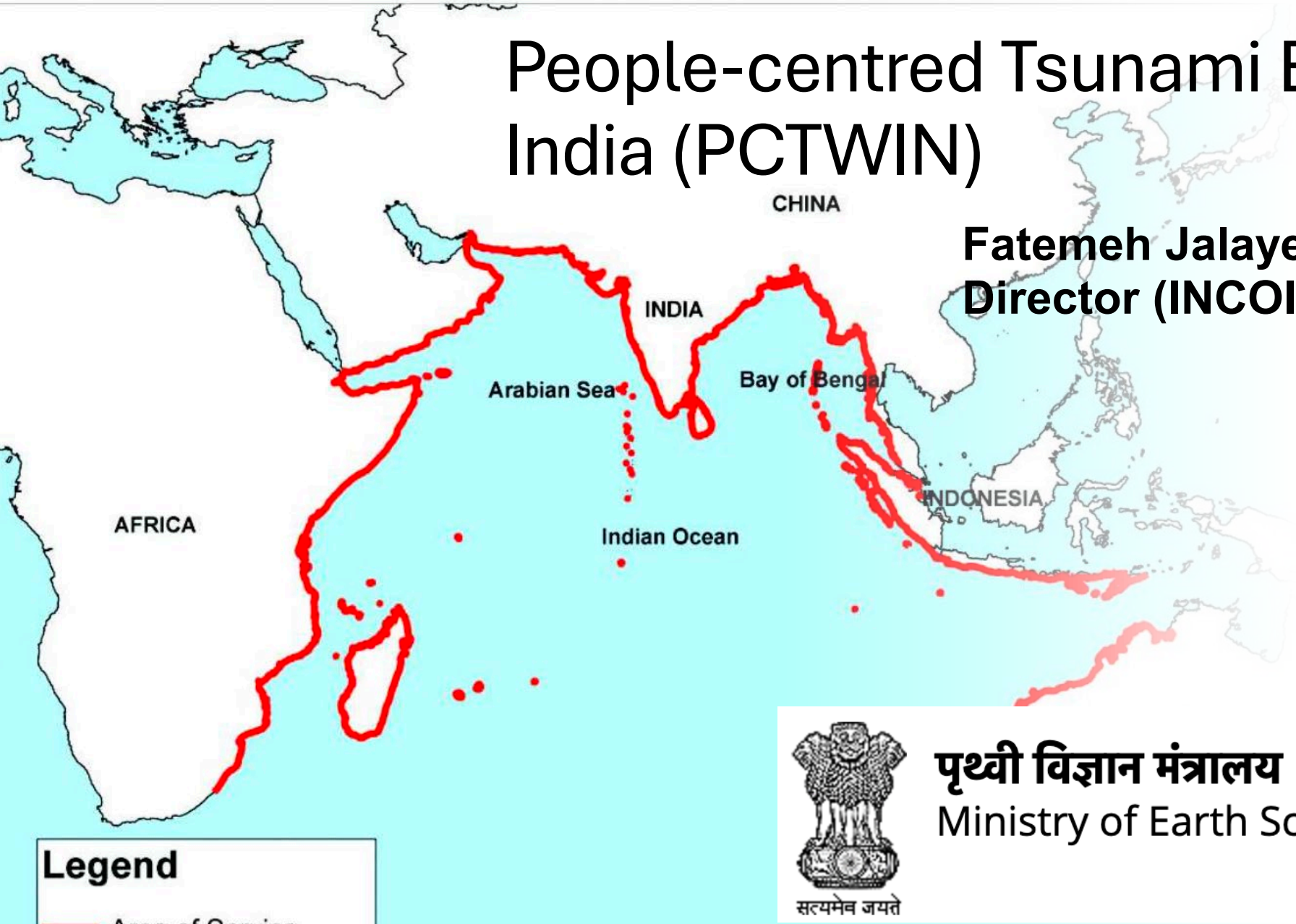
People-centred Tsunami Early Warning for India (PCTWIN)

Fatemeh Jalayer (UCL)
Director (INCOIS)



पृथ्वी विज्ञान मंत्रालय
Ministry of Earth Sciences
सत्यमेव जयते

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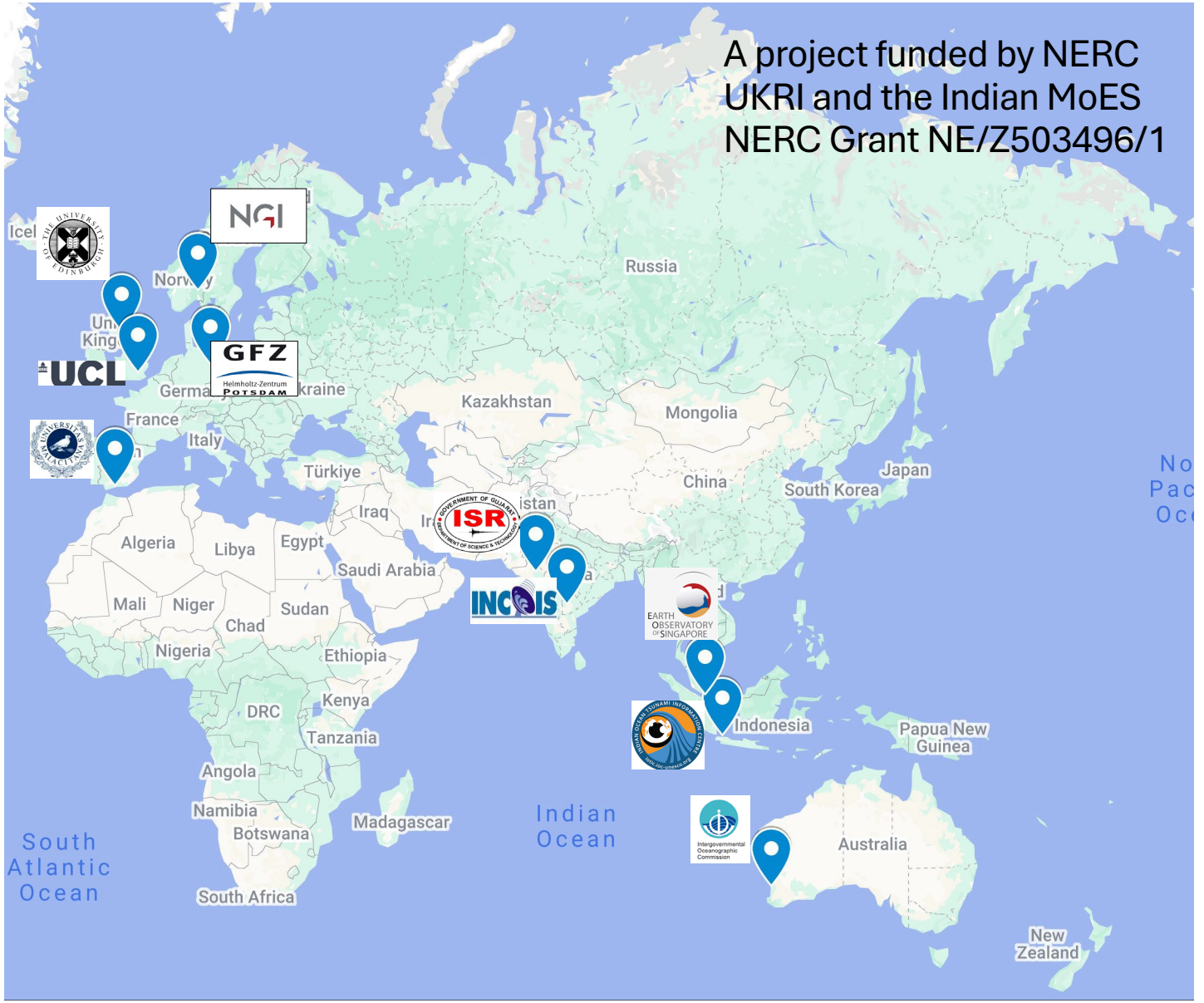
UKRI Natural Environment Research Council

PCTWIN Consortium

Project Leads:
Fatemeh Jalayer, University College London
Director, Indian National Centre for Ocean Information Services (INCOIS)

- University College London
- Indian National Centre for Ocean Information Services
- Norwegian Geotechnical Institute
- Helmholtz-Zentrum GeoForschungs Zentrum
- Institute of Seismological Research
- The University of Edinburgh
- University of Málaga
- Earth Observatory of Singapore
- Intergovernmental Oceanographic Commission - UNESCO
- Indian Ocean Tsunami Information Centre



The objectives of PCTWIN are aligned with the pillars of people-centred early warning:

Improving disaster knowledge

Improved detection, observation, and forecasting of tsunamis

More inclusive tsunami warning communication; increased awareness and preparedness

To realise the desired objectives and impact, **PCTWIN** is divided into three work packages:

WP1 Knowledge Hub (Lead NGI) will unravel the fundamental physics and processes of earthquake and landslide tsunamis, to improve baseline tsunami hazard, exposure, and risk information (obj#1).

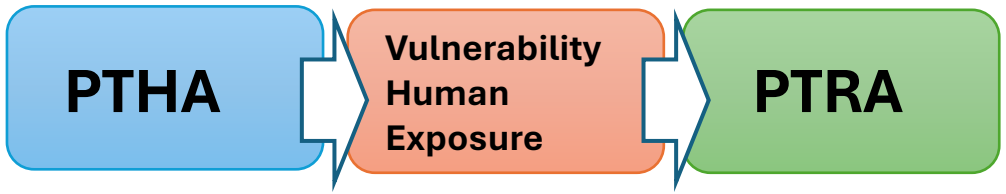
WP2 Early Warning (lead INCOIS) is the operational core of the project. It aims to improve and boost the technical and operational capabilities of ITEWC at the national level and the IOTWMS at the regional level (***obj#2***).

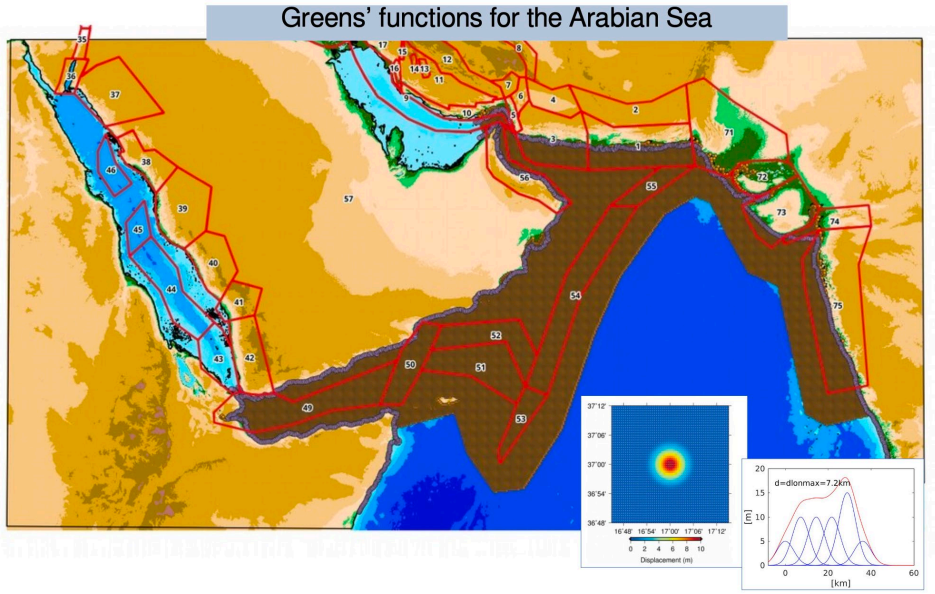
WP3 Resilience Hub (Lead UCL) focuses on participatory activities aiming at increasing public awareness and the level of preparedness of communities to respond to tsunamis (***obj#3***).

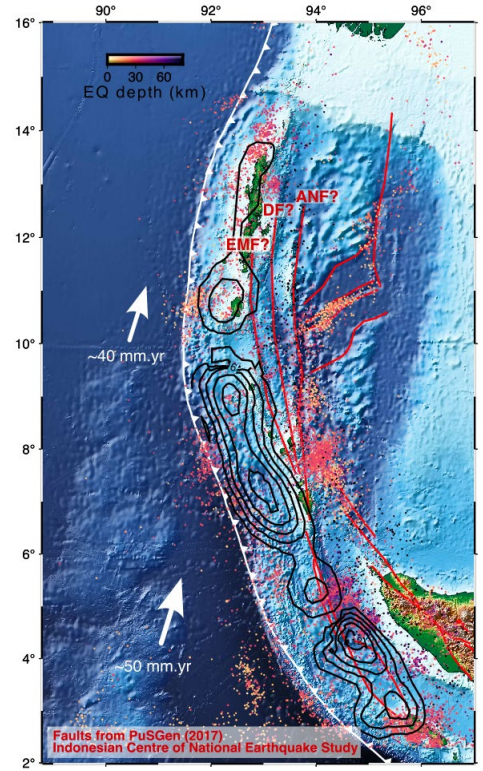
WP1: The Knowledge Hub (Lead NGI)

- **Probabilistic hazard analysis - PTHA**
  - Define sources and events probabilities
  - Create events with associated rates
  - Define hazard Points of Interest (POIs)
  - Simulate the wave propagation (and inundation)
  - Associate tsunami heights at the POIs with event probability and quantify the hazard

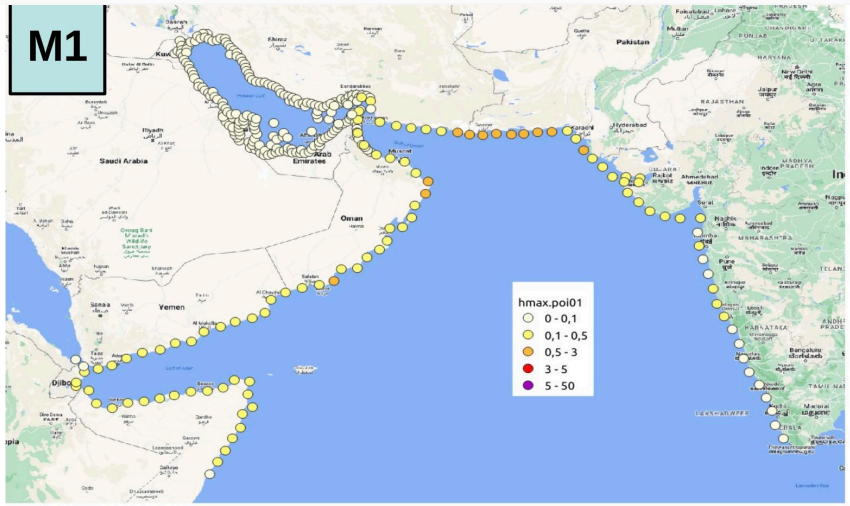
- **Risk and impact - PTRA**
  - Integrate inundation area with exposure
  - Assign vulnerability to each exposed asset
  - Compute Loss and risk metrics

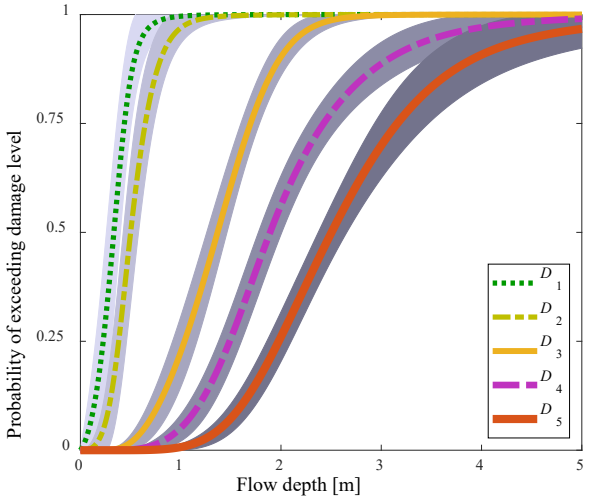






Molinari et al (2016)





A. Babeyko: Roadmap from PTHA 1.0 to Consensus Model UNESCAP TTF-31 NWIO Workshop on Tsunami Inundation Mapping, Oman, Apr 21-25, 2024

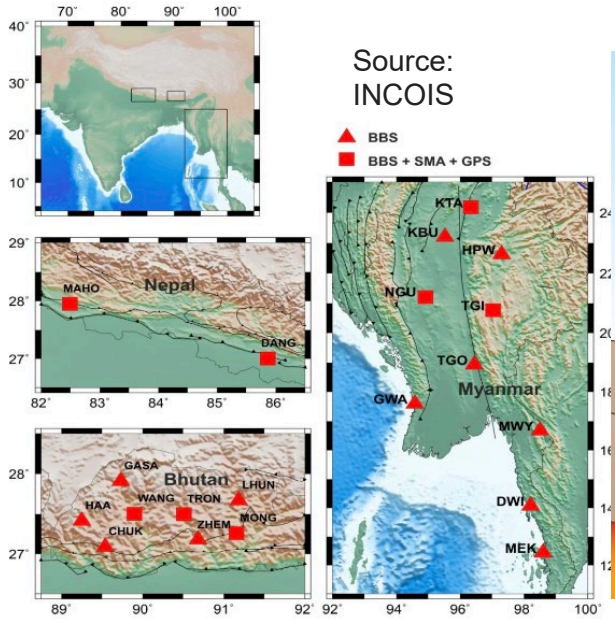
Sources: A. Babeyko (GFZ): Roadmap from PTHA 1.0 to Consensus Model, UNESCAP Project, Karen Lythgoe, Fatemeh Jalayer

WP2: Early Warning (Lead INCOIS)

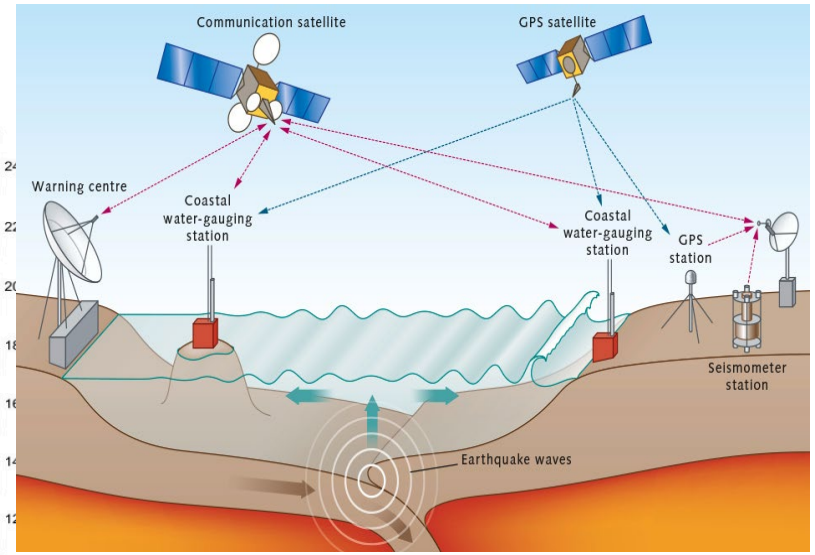
- Enhance the technical and operational capacities of the Indian Tsunami Early Warning Centre (ITEWC) and, in turn, the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) through advanced methods.
- Goal: To Improve tsunami detection, forecasting, and impact estimation capabilities to provide more effective and more inclusive tsunami warnings

Key Tasks:

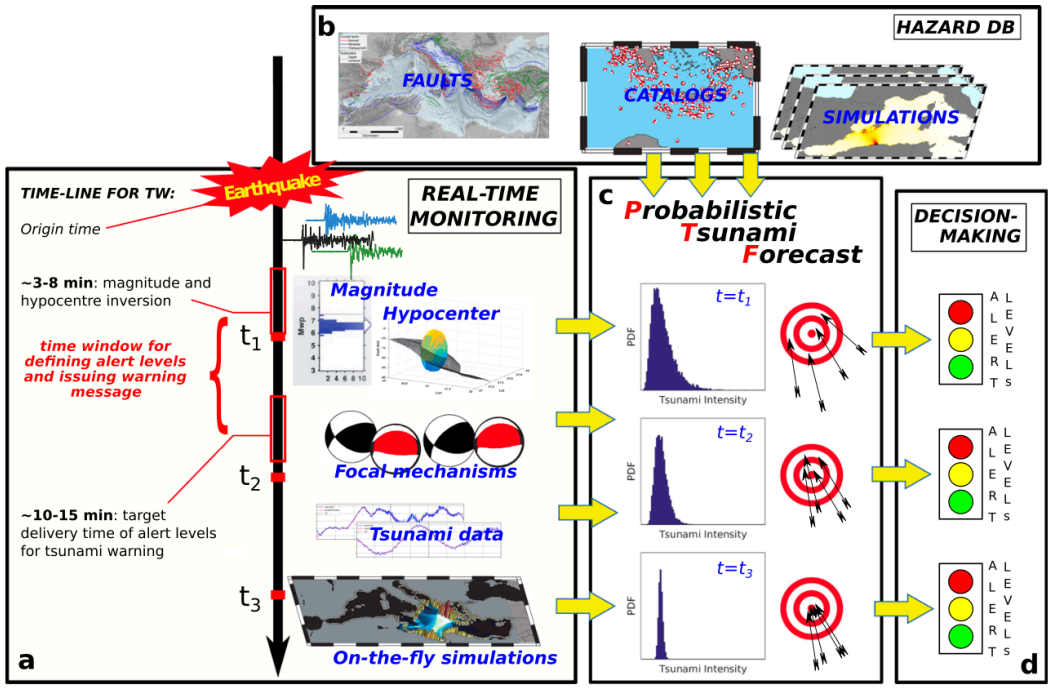
- Rapid source characterization using GNSS
- Machine-learning based tsunami inundation and impact forecasting
- Probabilistic tsunami forecasting



Source: INCOIS



Source: Selva, J., Lorito, S., Volpe, M., Romano, F., Tonini, R., Perfetti, P., Bernardi, F., Taroni, M., Scala, A., Babeyko, A. and Løvholt, F., 2021. Probabilistic tsunami forecasting for early warning. *Nature communications*, *12*(1), p.5677.



WP3 Resilience Hub

- Assess risk perceptions, situational awareness, and behavioural readiness for tsunamis in communities in Odisha and Kerala
- Understand human responses, decisions, and reactions to natural signs and official tsunami warnings.
- Co-design inclusivity markers that, alongside Tsunami Ready's existing 12 preparedness indicators, can measure the level of inclusiveness of preparedness actions.

PCTWIN embraces inclusive, local, and participatory methods for increasing the preparedness of the communities at tsunami risk.

This is facilitated by synergies with UNESCO initiatives in the Indian Ocean region such as the Tsunami Ready Recognition Program.

What does inclusion mean?

Increasing inclusion ↓

Type of Inclusion	What it means?	What are the implications?
Passive Inclusion	Named on a list	Vulnerable groups included on a contact list. Few or no opportunities for them to shape the process to work for them.
Active Inclusion	Enabled to act	Broad social participation enabled. Support provided for effective actions to take place.
Local Ownership	**Resilience building through independence**	Requires local decision makers to develop collaborative governance mechanisms to enable full participation of all. Develop local capacities to act without external aid.

PCTWIN Kick-Off Meeting
May28-30 2024, INCOIS, Hyderabad, India
Sources: INCOIS, Maureen Fordham

PCTWIN's pathway to long-term impact:

A. Reducing the number of casualties due to tsunamis (*Pathway A: Save lives)*

B. Contributing to collective knowledge of the processes generating tsunamis and their potential risks to the communities (*Pathway B: Share knowledge*)

C. Increasing the capacities of the local communities to be prepared for tsunami threats (*Pathway C: Enhance resilience*).

Possible Impact

Improving the knowledge of tsunami hazard for the Indian Coastlines

Improving the knowledge of population density and their concentration along the Indian coastlines

Significant reduction in tsunami source characterisation time (from 10 minutes to 3 minutes)

Embedding inclusivity markers in the Tsunami Ready Recognition Program (TRRP) of the UNESCO IOC.

Providing concrete support to Tsunami Ready Pilot location in synergy with the Indian Ocean Tsunami Warning and Mitigation System (UNESCO ICG IOTWMS)

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Staheholders Workshops:

- Participatory evacuation mapping
- Carfting Storylines

PCTWIN First Annual Meeting
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