ICG/PTWS Tsunami Ready Recognition Programme

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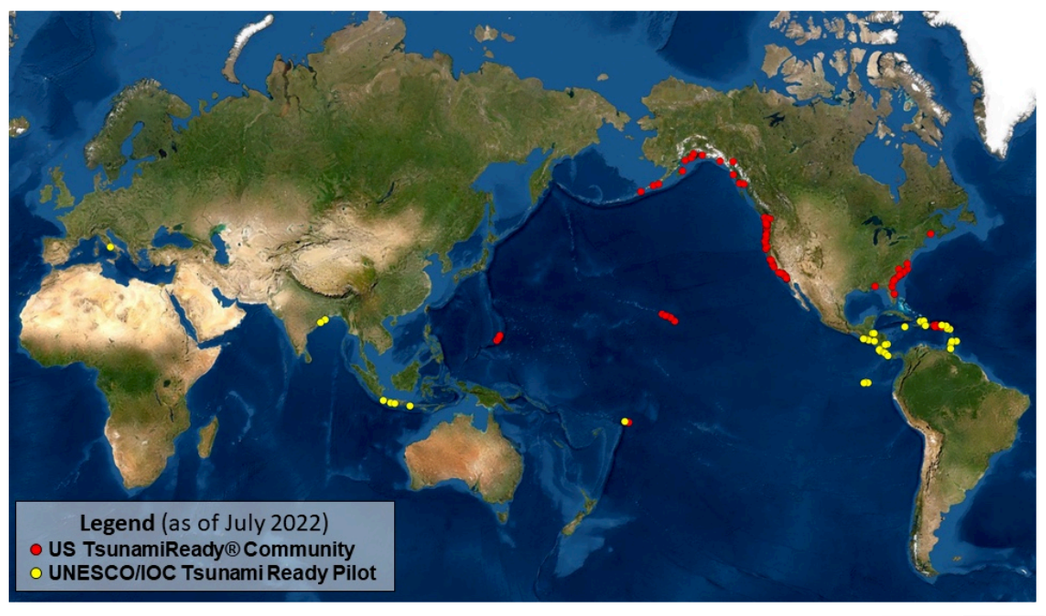


Goals

Adopt and implement national and local disaster risk reduction strategies and plans…*aimed at* ***preventing… [reducing] existing risk…strengthening… resilience***

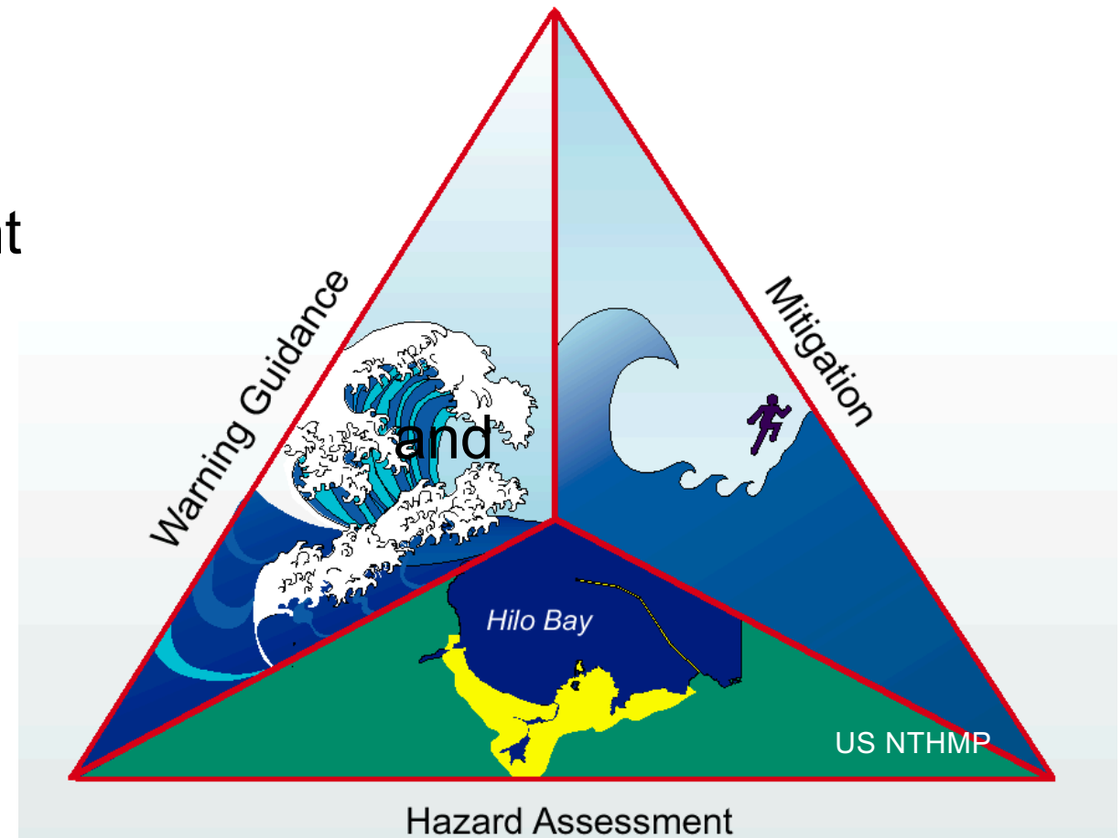
- Prevent new and **reduce existing disaster risk through the implementation of integrated and inclusive** economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional **measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response** and recovery, and thus strengthen resilience
- The pursuance of this goal requires the **enhancement of the implementation capacity and capability** of developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income countries facing specific challenges, including the mobilization of support through international cooperation for the provision of means of implementation in accordance with their national priorities.

TEWS Strategic Pillars

Tsunami Early Warning and Mitigation Systems (TEWS): Progress, gaps, challenges, and opportunities for strengthening

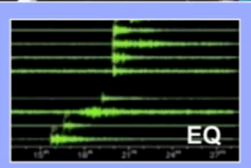
- Tsunami Hazard & Risk Assessment
- Warning System Development
- Mitigation, Preparedness Awareness

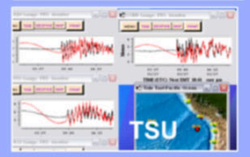
TEWS design is end-to-end, inclusive and people-centred in design.

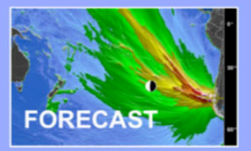


End-to-End Tsunami Warning

EQ
Tsunami

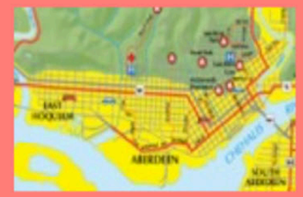






Country Alert System

Emergency Alert System & Mass Media



Public

TWC - Science	DMO / EMA – Safety	
Intl / Natl	Natl / Prov / Local Govt	Community

EQ
T=0

Race against Time

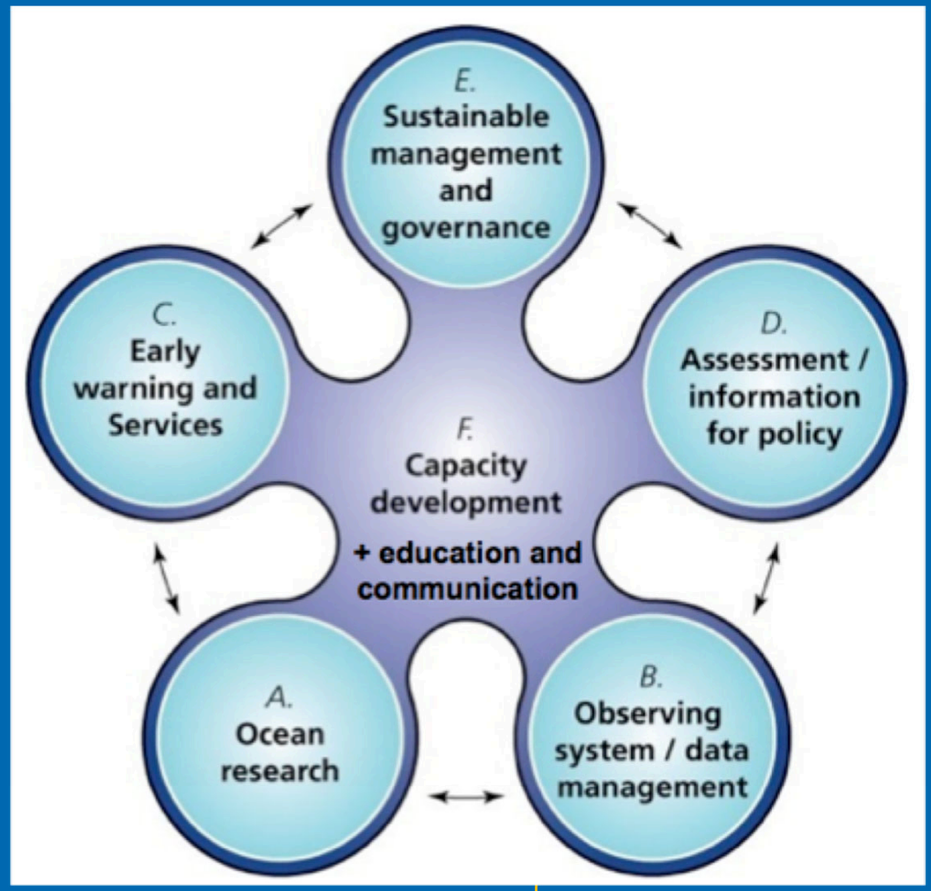
LIVES
SAVED

WAVE
T=20 min

Intergovernmental Oceanographic Commission (IOC) of UNESCO

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

- Only intergovernmental body of the United Nations (UN) system for ocean science
- Established 1960, 150 Member States



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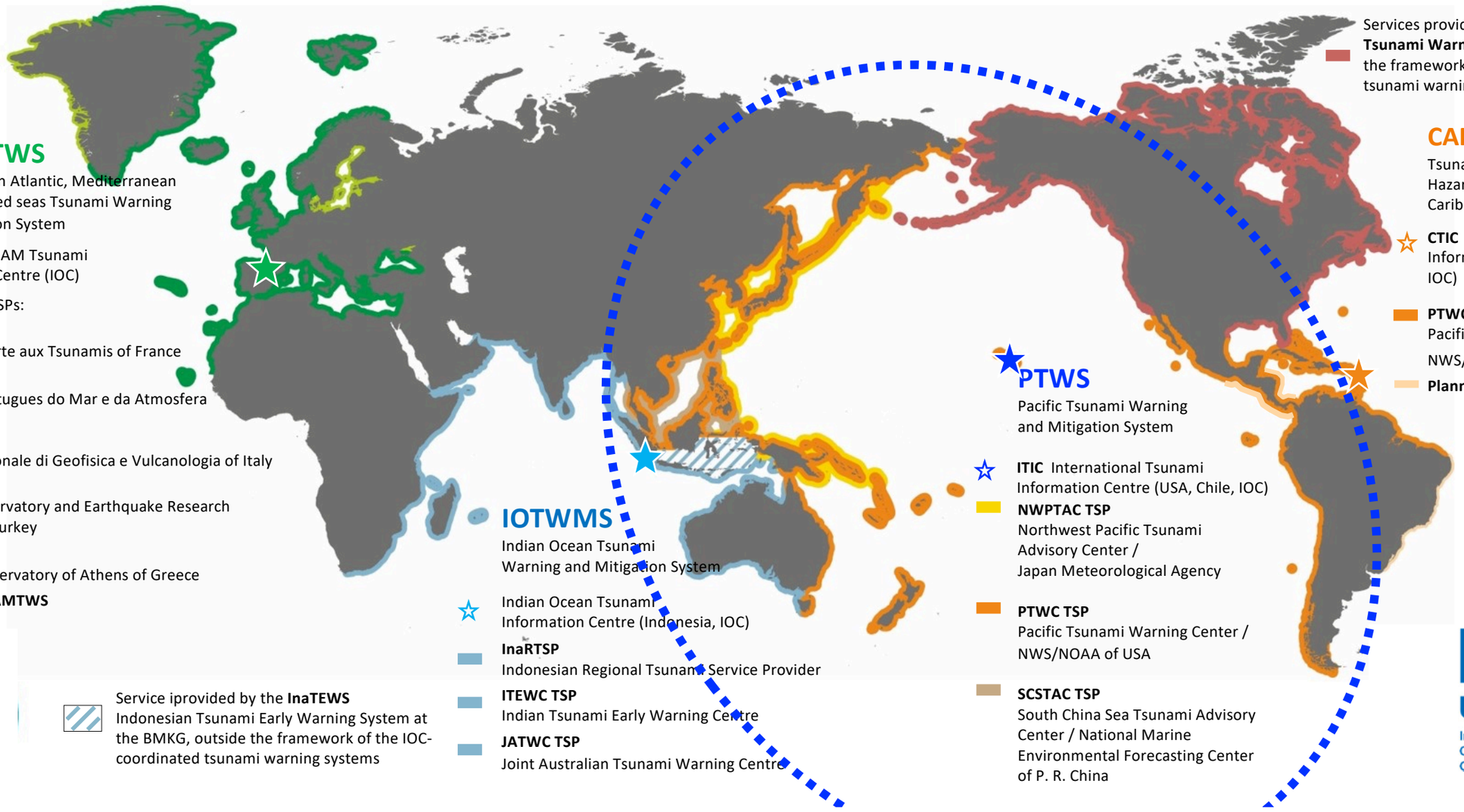
Intergovernmental Oceanographic Commission

GLOBAL TSUNAMI WARNING AND MITIGATION SYSTEMS

Intergovernmental Oceanographic Commission of UNESCO

2021 www.ioc-tsunami.org



NEAMTWS

North Eastern Atlantic, Mediterranean and connected seas Tsunami Warning and Mitigation System

NEAMTIC NEAM Tsunami Information Centre (IOC)

Accredited TSPs:

CENALT
Centre d'Alerte aux Tsunamis of France

IPMA
Instituto Portugues do Mar e da Atmosfera of Portugal

INGV
Istituto Nazionale di Geofisica e Vulcanologia of Italy

KOERI
Kandilli Observatory and Earthquake Research Institute of Turkey

NOA
National Observatory of Athens of Greece

Planned NEAMTWS

IOTWMS

Indian Ocean Tsunami Warning and Mitigation System

Indian Ocean Tsunami Information Centre (Indonesia, IOC)

InaRTSP
Indonesian Regional Tsunami Service Provider

ITEWC TSP
Indian Tsunami Early Warning Centre

JATWC TSP
Joint Australian Tsunami Warning Centre

Service iprovided by the **InaTEWS** Indonesian Tsunami Early Warning System at the BMKG, outside the framework of the IOC-coordinated tsunami warning systems

PTWS

Pacific Tsunami Warning and Mitigation System

ITIC International Tsunami Information Centre (USA, Chile, IOC)

NWPTAC TSP
Northwest Pacific Tsunami Advisory Center / Japan Meteorological Agency

PTWC TSP
Pacific Tsunami Warning Center / NWS/NOAA of USA

SCSTAC TSP
South China Sea Tsunami Advisory Center / National Marine Environmental Forecasting Center of P. R. China

Services provided by the **US National Tsunami Warning Center** are outside the framework of the IOC-coordinated tsunami warning systems

CARIBE-EWS

Tsunamis and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions

CTIC Caribbean Tsunami Information Centre (Barbados, IOC)

PTWC TSP
Pacific Tsunami Warning Center / NWS/NOAA of USA

Planned TSP PTWS, CARIBE-EWS

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UN – Global Partnerships

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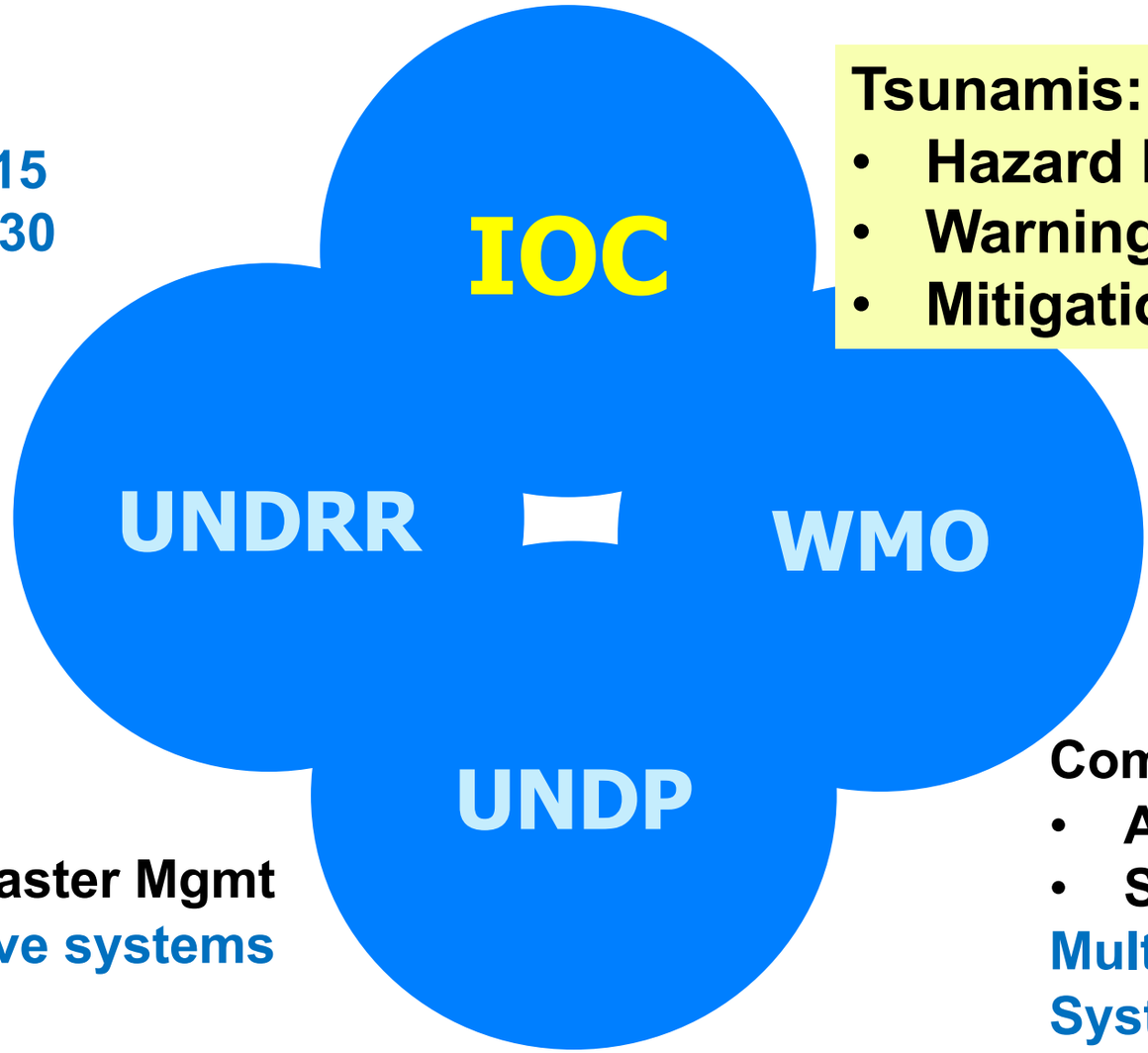
DRR platforms
- Hyogo 2005-2015
- Sendai 2015-2030

Awareness
- DRR Oct 13
- WTAD Nov 5



Tsunamis:
- Hazard Risk
- Warning guidance
- Mitigation, Preparedness

Disaster Mgmt
Institutional / Legislative systems

Communication (GTS)
- Alerts
- Sea Level Data

Multi-hazard Early Warning Systems (MHEWS)

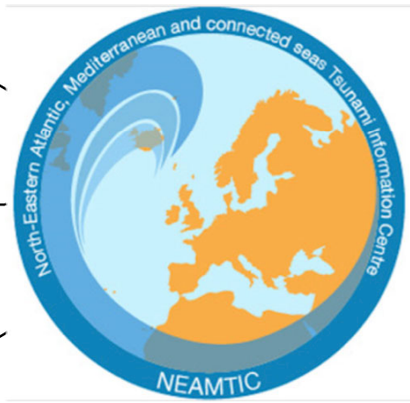
UN – How Does it Function?

- Providing timely, accurate Tsunami Warning advice by Tsunami Service Providers (TSP)
- Is based on the joint operation of international networks of detection connected with national tsunami warning centres
- Governance under UNESCO/IOC
- Each nation is responsible for issuing warnings in their territory and protect its own population.
- National warning centres must have strong links with emergency preparedness authorities (national, provincial and local)

IOC Tsunami Information Centers

PTWS
USA NOAA – IOC Partnership
1965
Chili SHOA Associate Director
1998

NEAMTWS
EC DG ECHO
France, Greece, Italy, Portugal
2011-13



IOTWS
Indonesia – IOC Partnership 2012
(formerly JTIC since 2006)

CARIBE-EWS
Barbados– IOC Partnership
2015 (approved 2007)

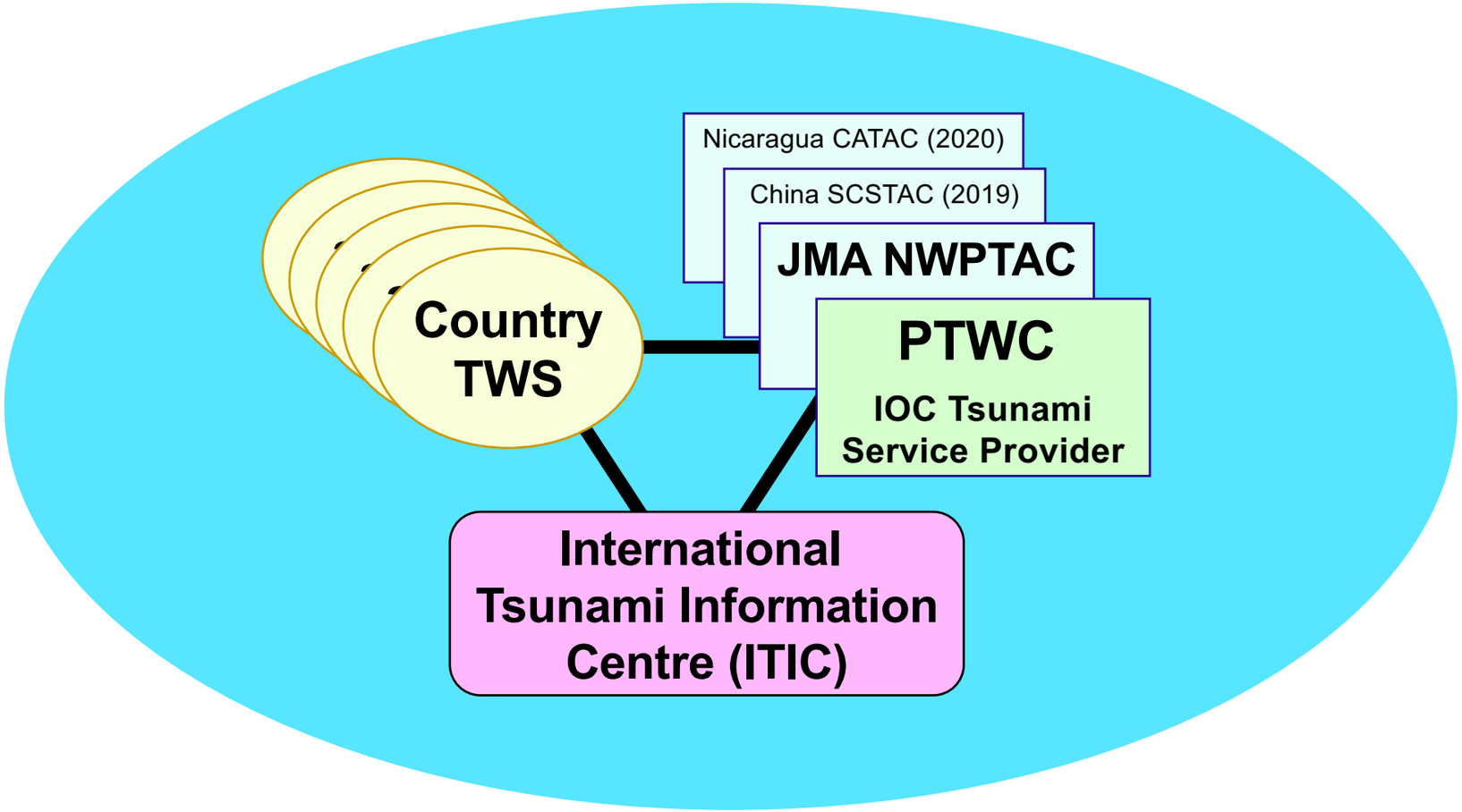
ITIC – INTERNATIONAL
IOC Mandate & Functions (1977)

http://www.tsunamiwave.org/

- **Monitor / Recommend Improvements** to PTWS and other tsunami warning systems – communications, data networks, evaluations, dissemination
- **Assist in establishing** regional and national tsunami systems – comprehensive risk reduction
- Serve as **technology transfer** resource; Encourage research to improve evaluations; Conduct **trainings to build capacity**
- Serve as an information resource for **preparedness / education; Develop, publish, distribute materials**
- Serve as an information resource on **historical tsunamis – database, post-event surveys**

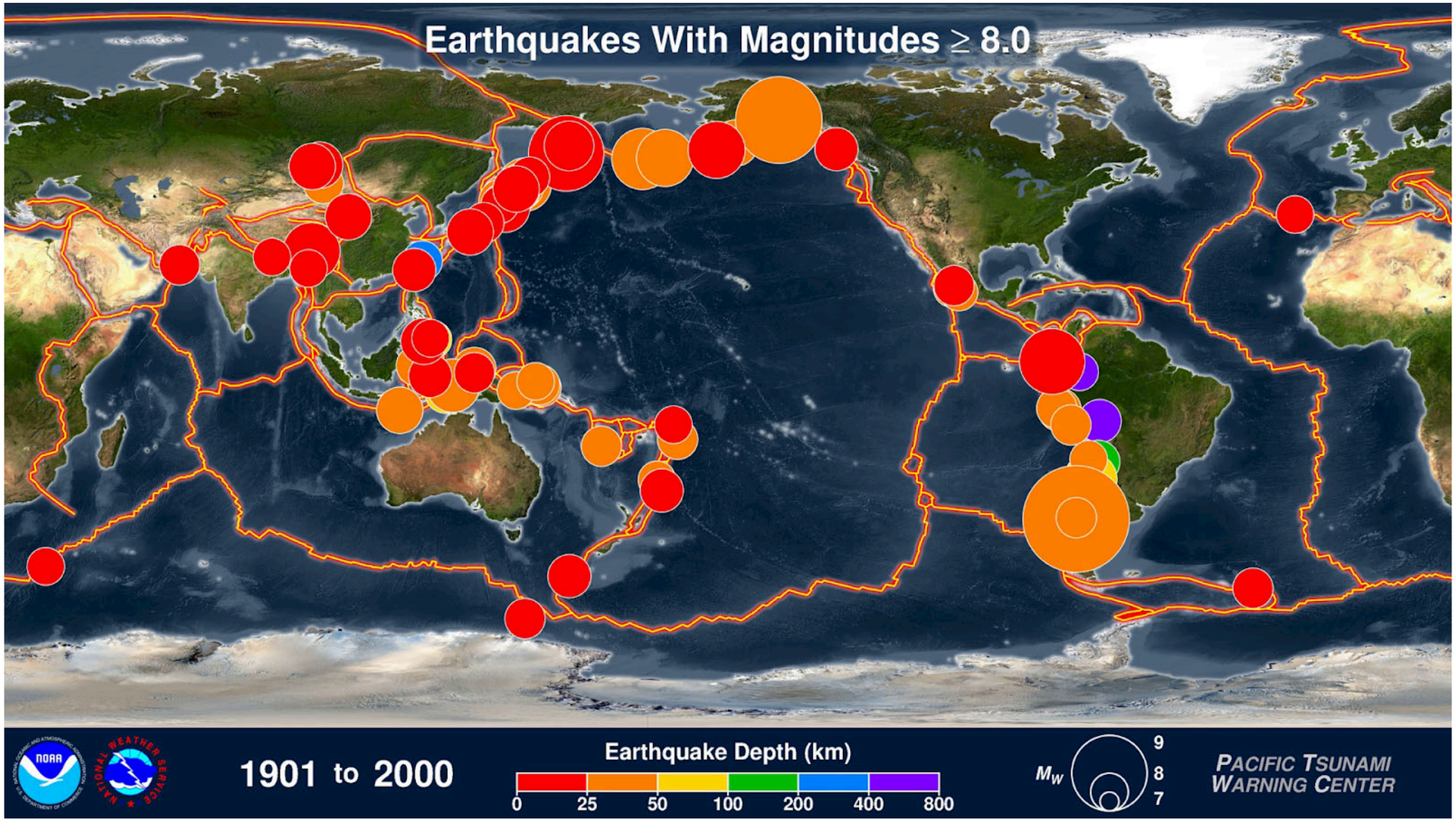
https://vimeo.com/192771669

PACIFIC TSUNAMI WARNING & MITIGATION SYSTEM
ICG/PTWS: FOUNDATIONAL ELEMENTS

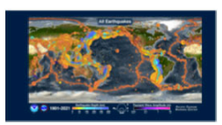


https://vimeo.com/124650777

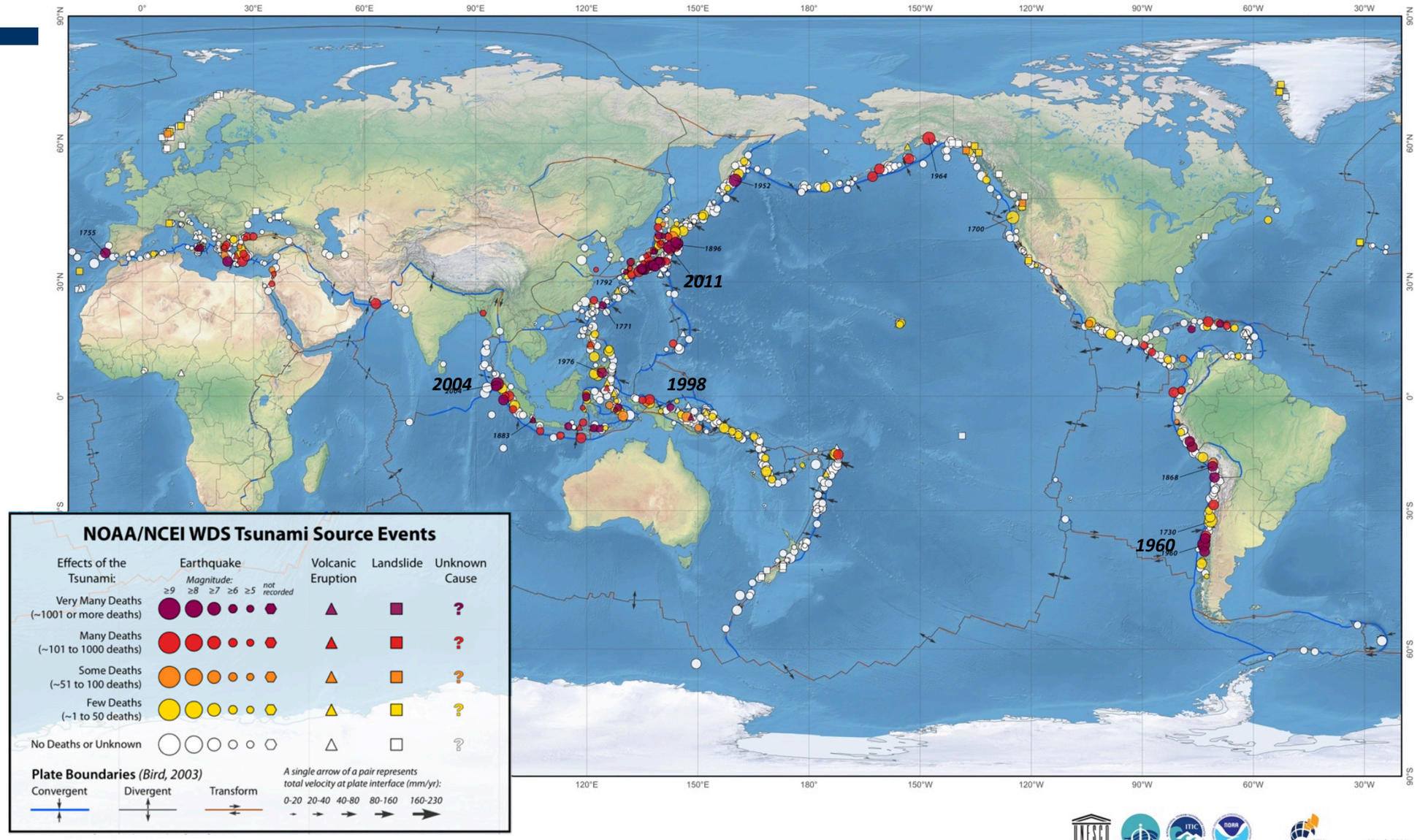
DANGEROUS EARTHQUAKES - GLOBAL



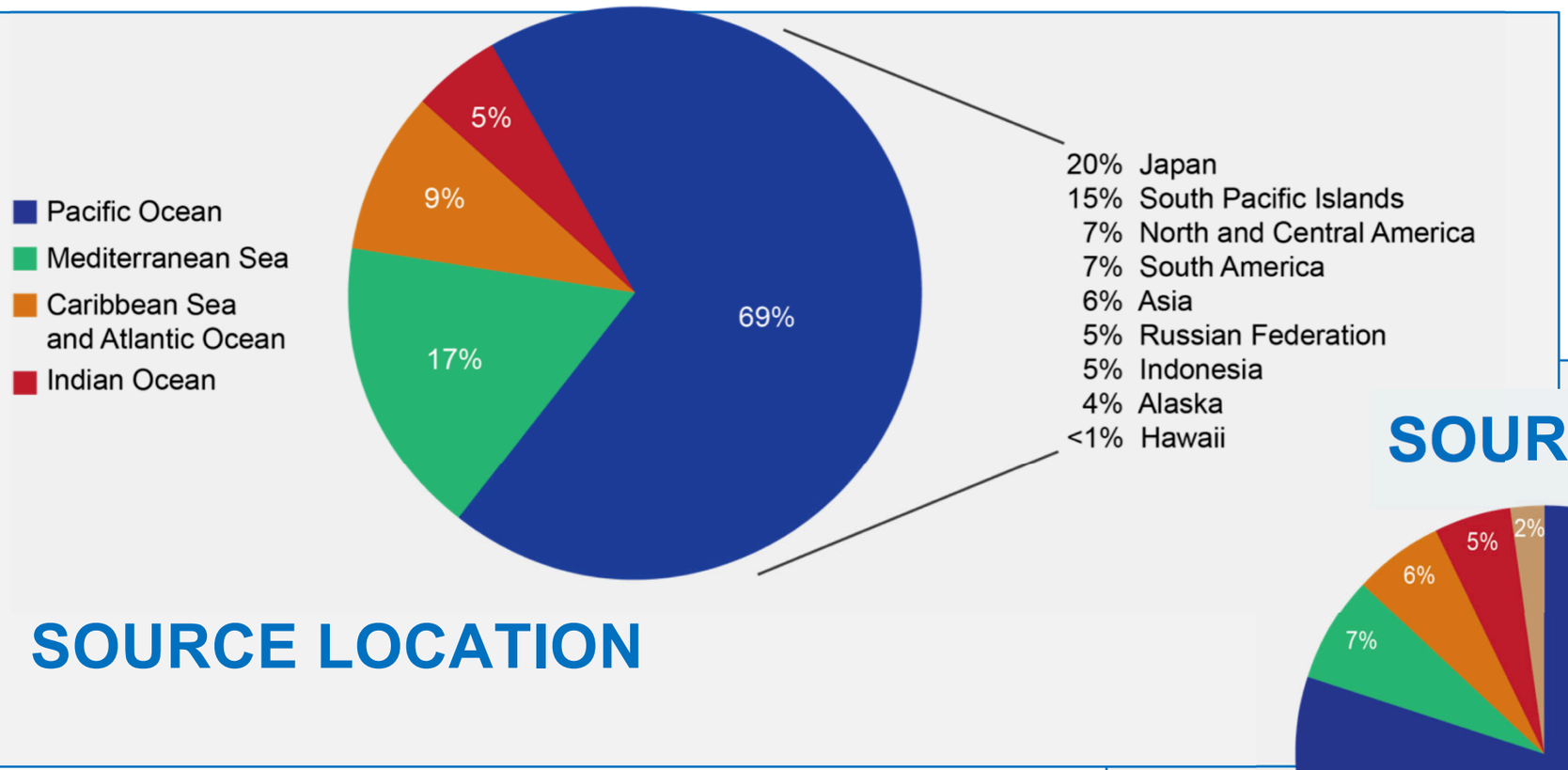
Click below for video EQ-Tsunami 1901-2021



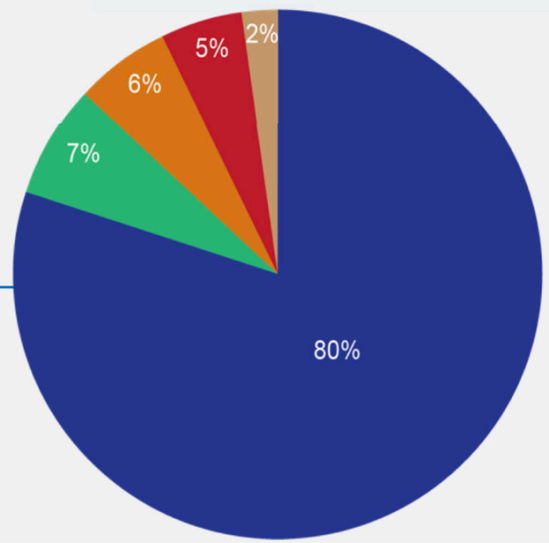
DEADLY TSUNAMIS – GLOBAL (1620 B.C to A.D. 2022)



DEADLY TSUNAMIS – GLOBAL (1620 B.C to A.D. 2022)



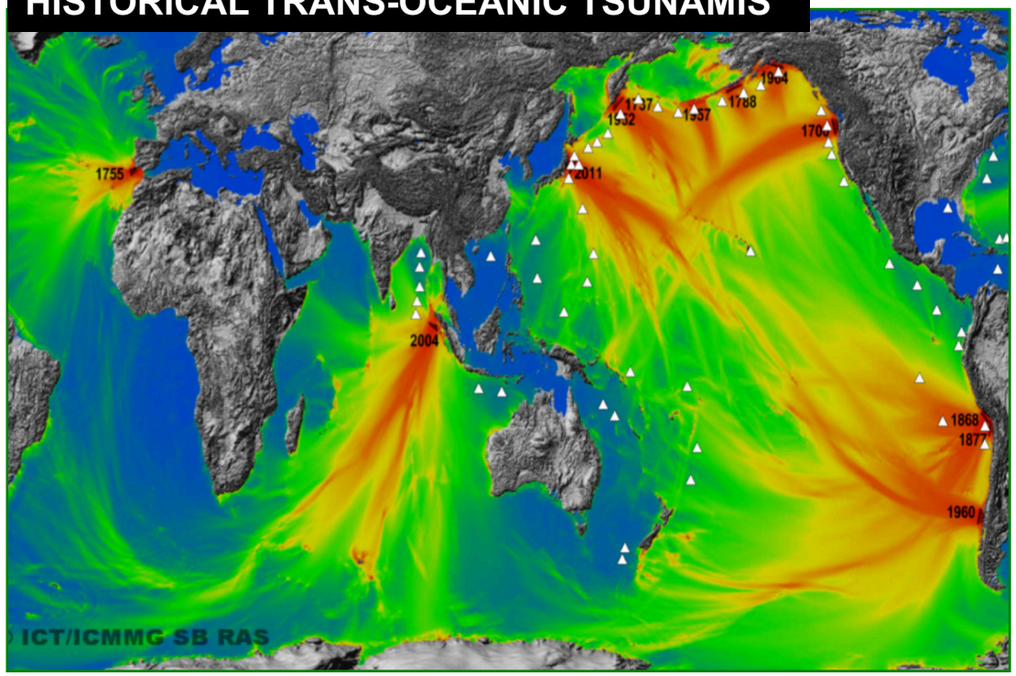
SOURCE LOCATION



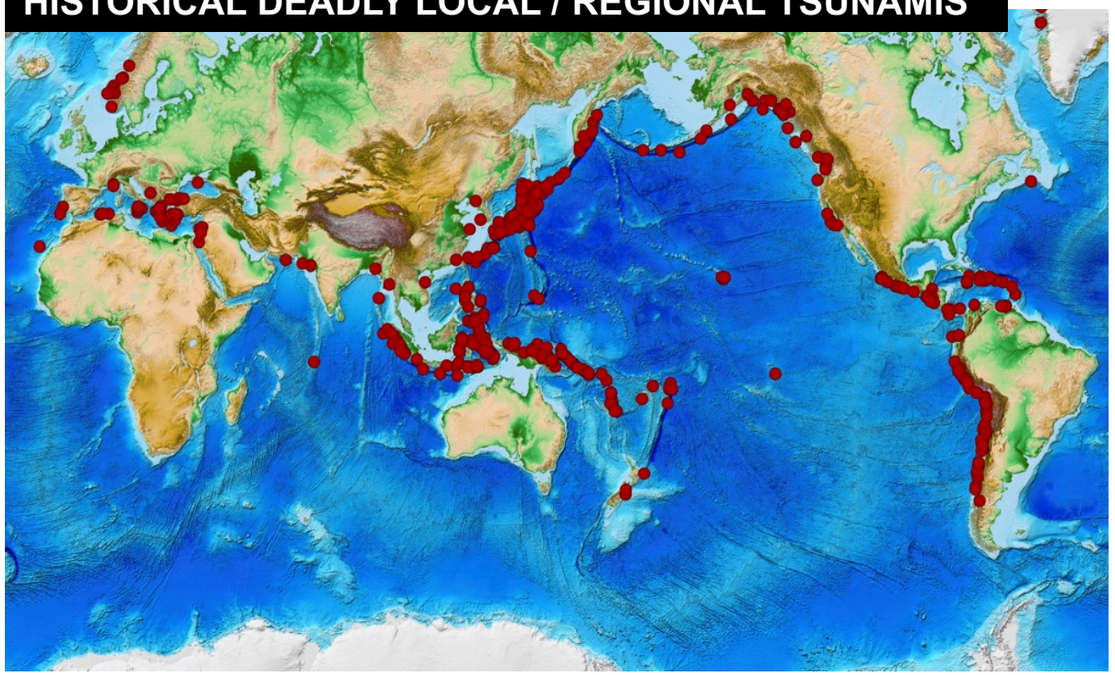
SOURCE GENERATION

PACIFIC TSUNAMIS

HISTORICAL TRANS-OCEANIC TSUNAMIS



HISTORICAL DEADLY LOCAL / REGIONAL TSUNAMIS



- 69% of world's tsunamis in Pacific and marginal seas
- 99% of deaths in Pacific from Local or Regional Tsunamis (90% globally)

2021 United Nations Decade of Ocean Science for Sustainable Development

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

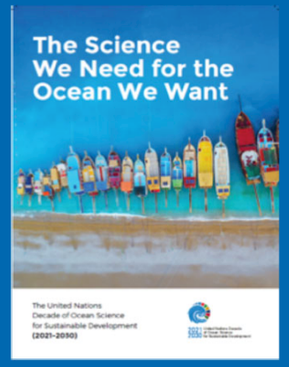
Vision:

"The science we need for the ocean we want"

Mission:

Transformative Ocean Science solutions for sustainable development, connecting people and our ocean

2016-2017



2018-2019

2019-2020

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Ocean Decade Goals: Societal Outcomes

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

4. A Predicted Ocean

Society understands and can respond to changing ocean conditions.

5. A Safe Ocean

Life and livelihoods are protected from ocean-related hazards.

6. An Accessible Ocean

Open and equitable access to data, information and technology and innovation.

Capacity Development

Cross-cutting. No one left behind.

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Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

unesco Intergovernmental Oceanographic Commission

OCEAN DECADE TSUNAMI PROGRAMME

Seeking Major Advances in SCIENCE and PREPAREDNESS

RESILIENCE!

New observational and analysis technologies to move from a **high-uncertainty** assumption-based capability to a **low-uncertainty** dynamic-based capability

Communities respond to tsunami threats by combining accurate

1. Real-time impact forecasts

with

2. Deep community preparedness.

Tsunami disaster impacts are minimized, enabling rapid restoration of critical infrastructure and services

Comprehensive institutional & community preparedness and capacity building efforts aimed at achieving

IOC Tsunami Ready

designation across all socio-economic categories

Tsunami Ready

OCEAN DECADE TSUNAMI PROGRAMME

A SAFE OCEAN

THE MAIN SOCIETAL OUTCOME

TO MAKE 100%

OF COMMUNITIES AT RISK OF TSUNAMI PREPARED FOR AND RESILIENT TO TSUNAMIS

BY 2030

- ***Tsunami Coalition***: *collaborative with critical UN stakeholders, civil protection, others ==> Raise profile. Facilitate resourcing*
- ***Capacity Development***: *augmented through IOC Ocean Teacher Global Academy (OTGA) ==> Global reach, deep curricula*

History of the Implementation of Tsunami Ready

2001

US NOAA National Weather Service established TsunamiReady® Program

2011

US NWS initial funding for joint NWS and UNESCO/IOC **TsunamiReady®** pilot in Caribbean and international community

2015

IOC Assembly approved UNESCO/IOC Tsunami Ready Recognition Pilot Programme

2017

United Nations declared Decade of Ocean Science for Sustainable Development 2021 - 2030

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

2021

IOC Assembly established IOC Ocean Decade Tsunami Programme including Tsunami Ready

2022

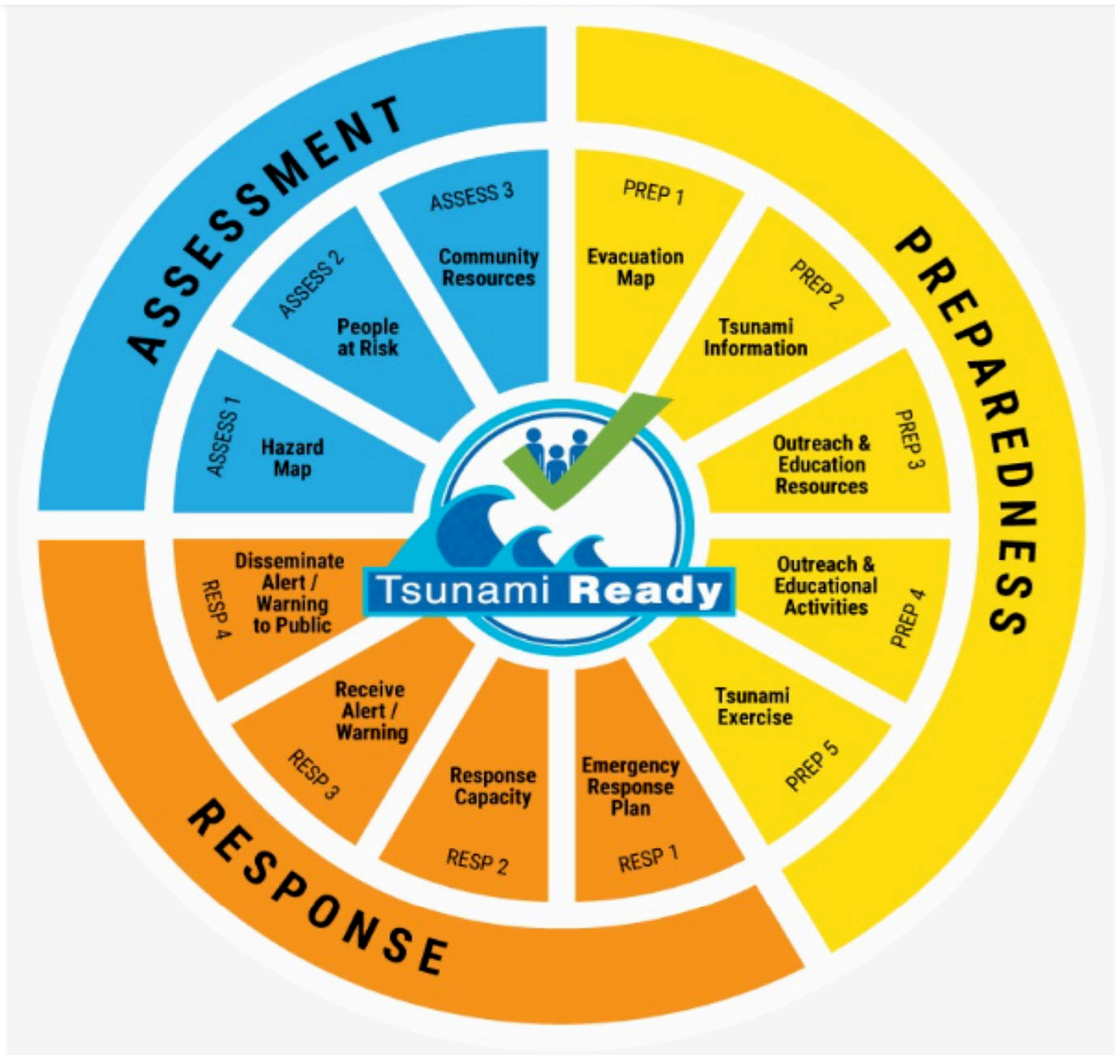
UNESCO/IOC established Tsunami Ready Recognition Programme

2030

Globally 100% At-Risk Communities Tsunami Ready

UN OCEAN DECADE TSUNAMI PROGRAMME:

100% AT-RISK COMMUNITIES TSUNAMI READY



- **STRATEGY:**
  Be Aware, Be Prepared
- **FRAMEWORK:**
  - Harmonized global guidelines UNESCO IOC Tsunami Ready
  - Performance-based Community Recognition
- **ACTION:**
  - National programs empower Communities,
  - Communities demand national actions
- **GLOBAL MEASURE**

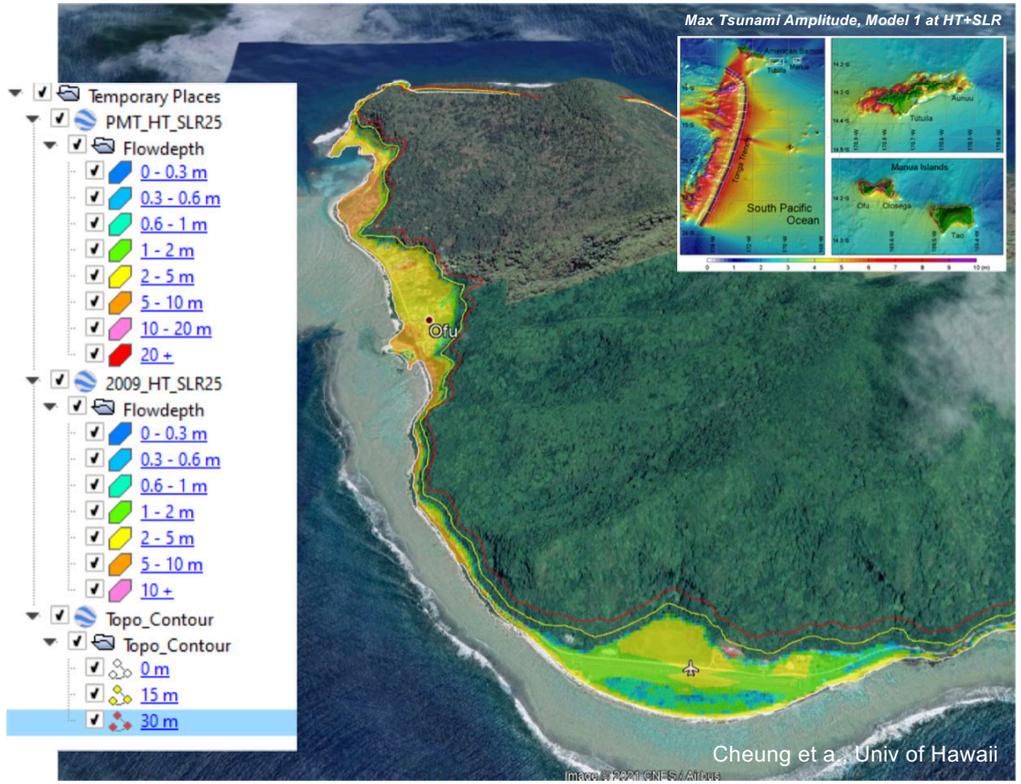
unesco
Intergovernmental Oceanographic Commission

Standard Guidelines for the Tsunami Ready Recognition Program, UNESCO IOC TS 74

UNESCO IOC Tsunami Ready Recognition Guidelines

ASESS-1. INUNDATION MAP.

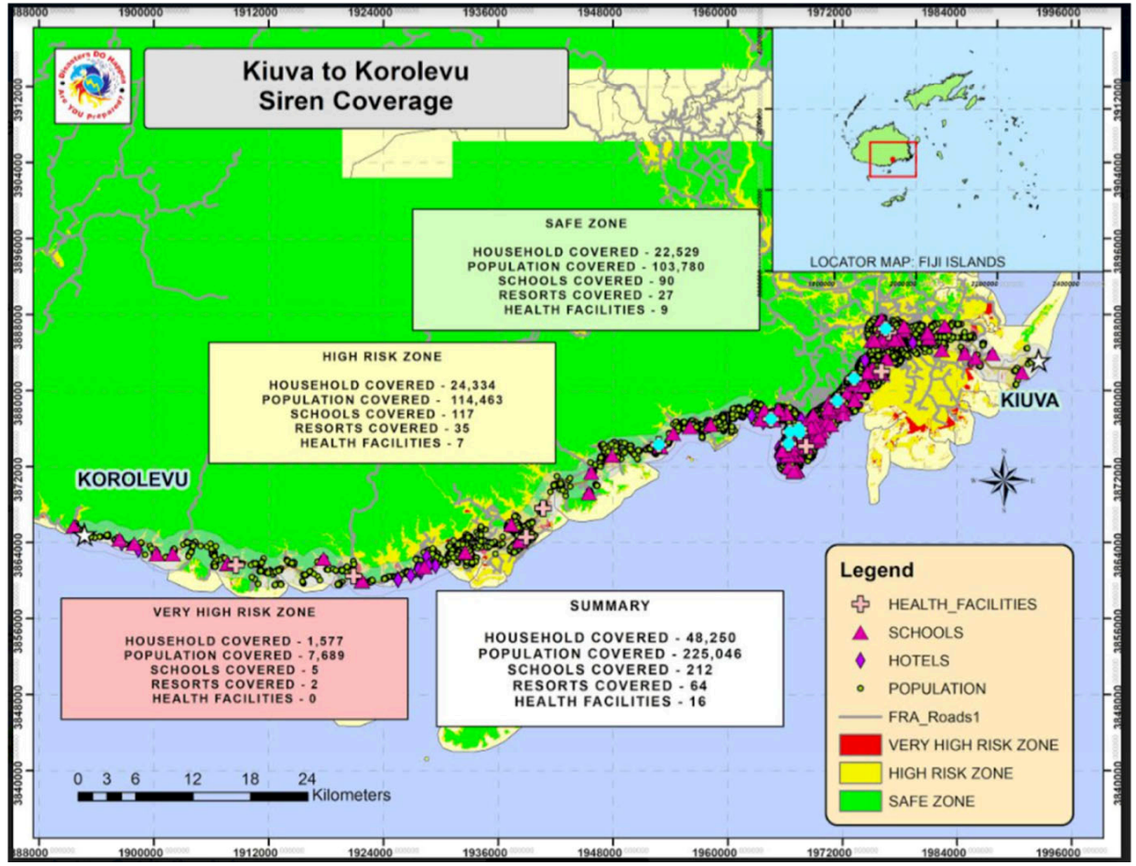
Tsunami Hazard Zones mapped and designated



Inundation Map - Ofu, Manu'a Islands, American Samoa

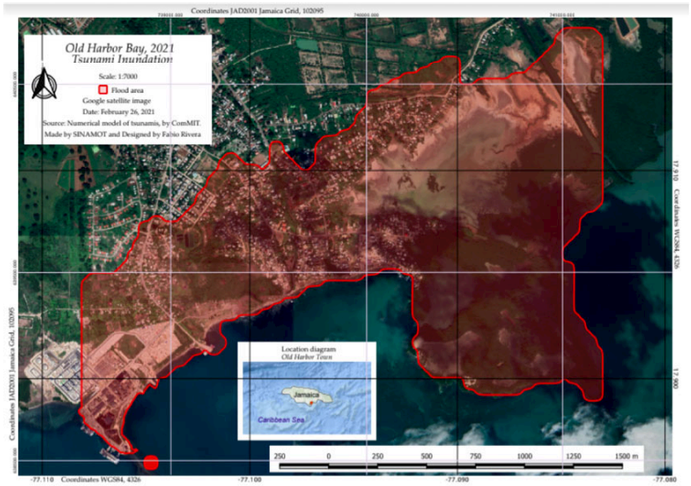
ASSESS-2. PEOPLE AT RISK.

Number of people in Tsunami Hazard Zone Estimated



Assessment – Inundation Map

I	ASSESSMENT (ASSESS)
1	ASSESS-1. Tsunami hazard zones are mapped and designated
2	ASSESS-2. The number of people at risk in the tsunami hazard zone is estimated
3	ASSESS-3. Economic, infrastructural, political, and social resources are identified



Inundation map developed for Old Harbour Bay, Jamaica

Identification of Tsunami Sources - For Eastern Caribbean, Expert Group Meeting have identified the seismic sources. Volcano and Landslide sources are currently not considered in most modeling.

Minimum bathymetric requirements for modeling of coastal hazards:

- Full data coverage within the Area of Interest (determined by tsunami/surge modeling group).

- Substantial part of the digital elevation model (DEM) domain should be interpolated from underlying data of equal or higher resolution than the nominal resolution of the DEM.

- High accuracy and recently collected data at the coast, nearshore, and in regions of low topography are essential. Particularly in populated and/or facilities (harbors, emergency facilities, etc.).

- Source data used to generate DEMs for tsunami inundation modeling must be of at least 90 m resolution to satisfy the minimum level of acceptable modeling results, although higher resolution is strongly recommended.

UNESCO IOC Tsunami Ready Recognition Guidelines

ASESS-3. COMMUNTY RESOURCES.

Economic, infrastructural, political and social resources identified

Economic, Infrastructural, political and social resources survey and consultation (participatory approach) conducted

UNESCO IOC Tsunami Ready Recognition Guidelines

PREP-1. EVACUATION MAP
Easily understood tsunami evacuation maps

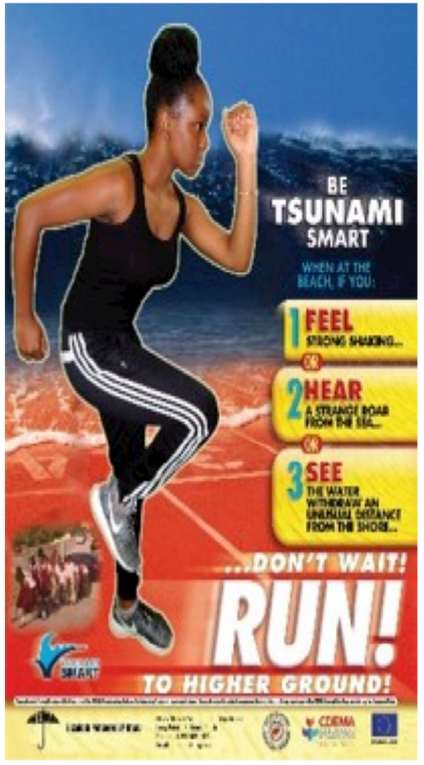
Nuku'alofa, Tonga

PREP-2. TSUNAMI INFORMATION
Information including Signage Displayed

UNESCO IOC Tsunami Ready Recognition Guidelines

PREP-3. OUTREACH AND EDUCATION RESOURCES

Outreach, public awareness and education resources available and distributed



Samoa

WORLD TSUNAMI AWARENESS DAY
5 NOVEMBER

PREP-4. OUTREACH AND EDUCATION ACTIVITIES. Held at least 3 times a year

UNESCO IOC Tsunami Ready Recognition Guidelines

PREP-5. TSUNAMI EXERCISE.
Annual Community Tsunami Exercise

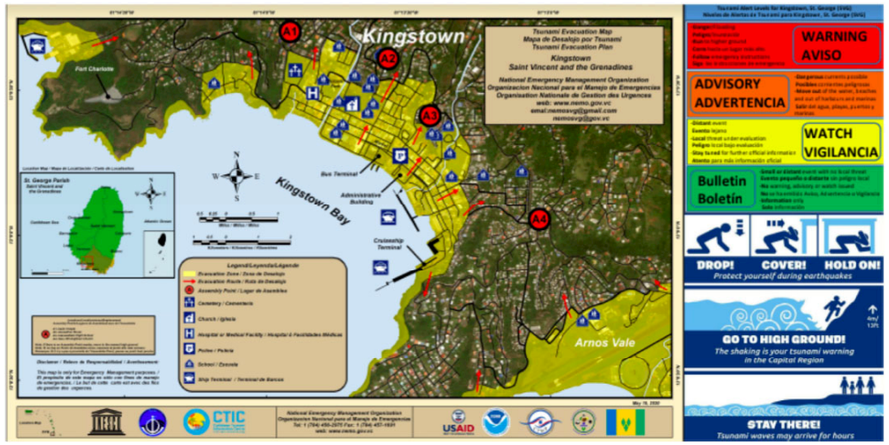
Exercise Pacific Wave 2022
PICT Regional Exercise

Tonga

Cedeño, Honduras, 2017

Preparedness

II	PREPAREDNESS (PREP)
4	PREP-1. Easily understood tsunami evacuation maps are approved
5	PREP-2. Tsunami information is publicly displayed
6	PREP-2. Outreach and public awareness and education resources are available and distributed
7	PREP-3. Outreach or educational activities are held at least three times a year
8	PREP-4: A community tsunami exercise is conducted at least every two years



Evacuation map developed for Kingstown, SVG

Tsunami Hazard Zone sign in Grenada

Community tsunami exercise in BVI

Educational activity
in Trinidad and Tobago

UNESCO IOC Tsunami Ready Recognition Guidelines

RESP-1. EMERGENCY RESPONSE PLAN
Community tsunami emergency response plan approved


PLAN DE RESPUESTA DE EMERGENCIA PARA TSUNAMIS DEL MUNICIPIO DE MARCOVIA

Comité de Emergencia Municipal

9 de febrero de 2017

Cedeño, Honduras
Emergency Response Plan, 2017

RESP-2. RESPONSE CAPACITY
Capacity to manage emergency response operations during tsunami in place

St. Kitts Emergency Operations Center

UNESCO IOC Tsunami Ready Recognition Guidelines

RESP-3. RECEIVE ALERT / WARNING

Redundant and reliable means to receive official tsunami warnings 24x7 are in place

RESP-4. DISSEMINATE ALERT/WARNING TO PUBLIC.

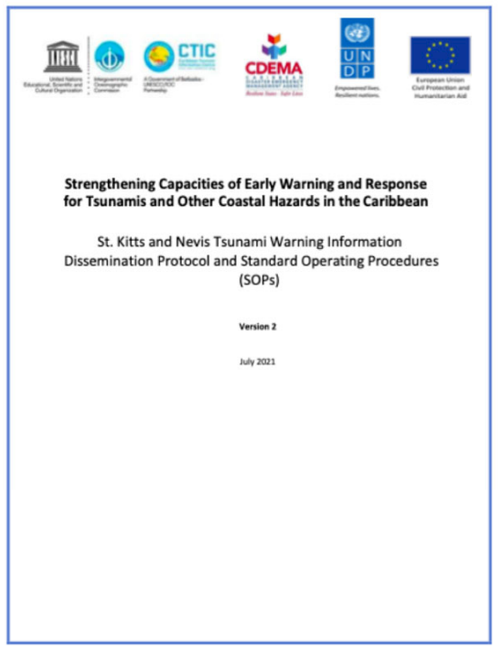
Redundant and reliable means to disseminate official tsunami warnings and information to public 24x7 in place

Samoa

Honduras

Response

III	RESPONSE (RESP)
9	RESP-1. A community tsunami emergency response plan (ERP) is approved
10	RESP-2. The capacity to manage emergency response operations during a tsunami is in place
11	RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place
12	RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place



Strengthening Capacities of Early Warning and Response for Tsunamis and Other Coastal Hazards in the Caribbean

St. Kitts and Nevis Tsunami Warning Information Dissemination Protocol and Standard Operating Procedures (SOPs)

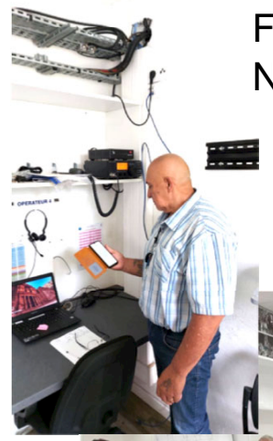
Version 2

July 2021

SOP for SKN (For the case of a community within a country, there must be a National SOP as well as the local SOP)

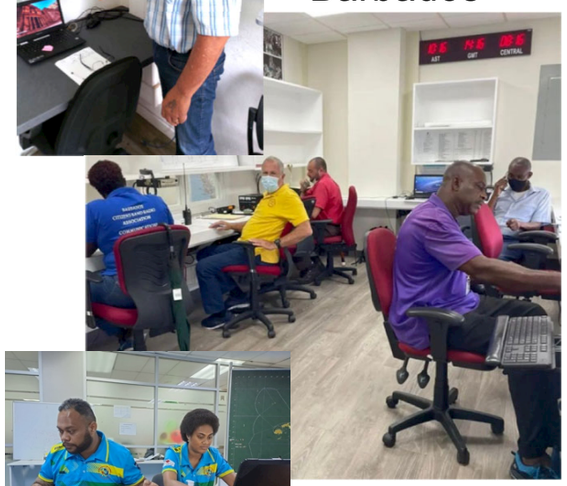
TSP Notification	Earthquake	Wave forecast	ETA	NTWC Alert Level	Emergency Response Action
Tsunami Threat Message	**Magnitude:** >7.0 **Depth:** <100km	≥ 1 m	<3 hrs	WARNING	Evacuate xxx zones
			3 - 6 hrs	WATCH	Prepare to evacuate
			>6 hrs	INFORMATION	Monitor for subsequent forecasts
		0.3 to 1 m	<3 hrs	ADVISORY	Evacuate beaches and harbours
			3 - 6 hrs	WATCH	Prepare to evacuate
			>6 hrs	INFORMATION	Monitor for subsequent forecasts
		< 0.3 m	-	INFORMATION	Monitor for subsequent forecasts

Criteria for tsunami alerts and emergency response actions



France – New Caledonia

Barbados



Fiji

UN OCEAN DECADE TSUNAMI PROGRAMME:

100% AT-RISK COMMUNITIES TSUNAMI READY

UNESCO IOC TSUNAMI READY INDICATORS	
I	**ASSESSMENT (ASSESS)**
1	ASSESS-1. Tsunami hazard zones are mapped and designated
2	ASSESS-2. The number of people at risk in the tsunami hazard zone is estimated
3	ASSESS-3. Economic, infrastructural, political, and social resources are identified
II	**PREPAREDNESS (PREP)**
4	PREP-1. Easily understood tsunami evacuation maps are approved
5	PREP-2. Tsunami information is publicly displayed
6	PREP-2. Outreach and public awareness and education resources are available and distributed
7	PREP-3. Outreach or educational activities are held at least three times a year
8	PREP-4: A community tsunami exercise is conducted at least every two years
III	**RESPONSE (RESP)**
9	RESP-1. A community tsunami emergency response plan (ERP) is approved
10	RESP-2. The capacity to manage emergency response operations during a tsunami is in place
11	RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place
12	RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place

- **STRATEGY:**
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  - Performance-based Community Recognition
- **ACTION:**
  National programs empower Communities
- **GLOBAL MEASURE**

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Standard Guidelines for the Tsunami Ready Recognition Program, UNESCO IOC TS 74

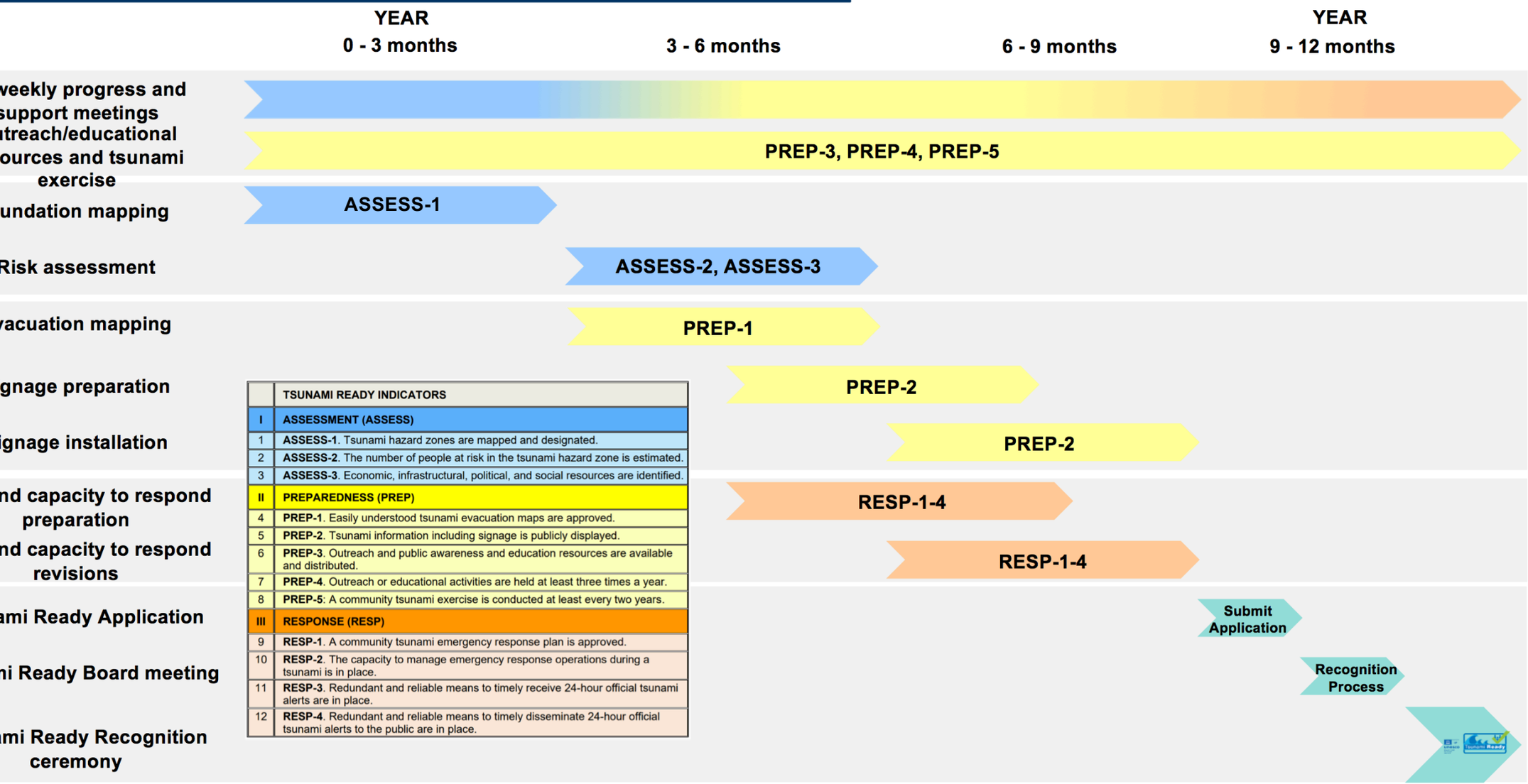
Community Selection

- Recognition level is community that has capacity and authority (not too big or too small)
- Voluntary – need to have interest
- Ability to receive and disseminate warnings
- Government Authority to apply for recognition
- Champions
- EOC or location to manage tsunami emergency

Verification, Recognition, Renewal Processes

- **Verification Process – site visit by IOC Tsunami Information Centre representative (ITIC for Pacific) to confirm community has met requirements**
- **Tsunami Ready Recognition Ceremony**
- **Recognition for 4 years, after which it needs to be renewed**
- **Over the 4 years, there should be maintenance, advancement and improvements. Include in**
  - National Reports to ICG/PTWS
  - PTWS Regional Working Group (PICT) reports
  - PTWS WG 3 (Disaster Risk Reduction and Preparedness) report
  - EXERCISE PACIFIC WAVE (PacWave) post-exercise surveys

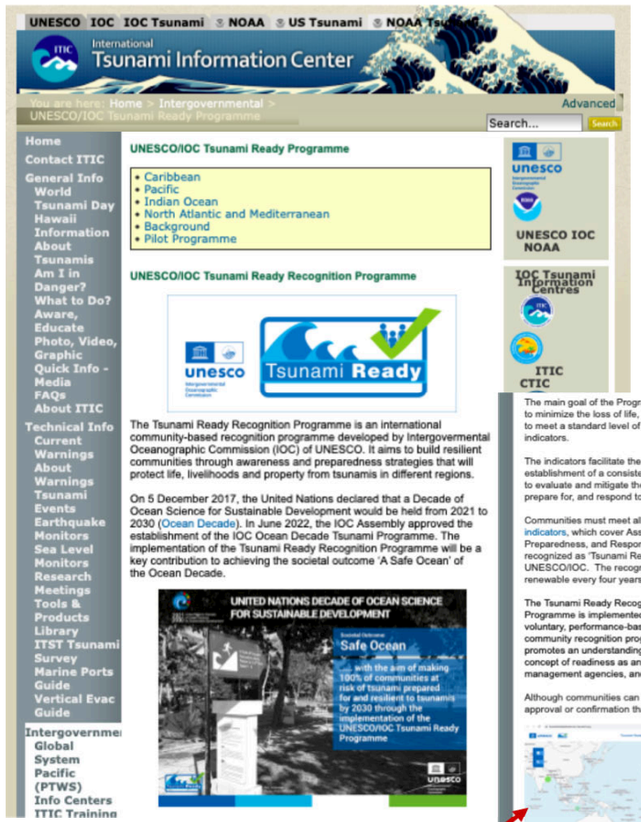
Tsunami Ready Recognition 1 year timeline

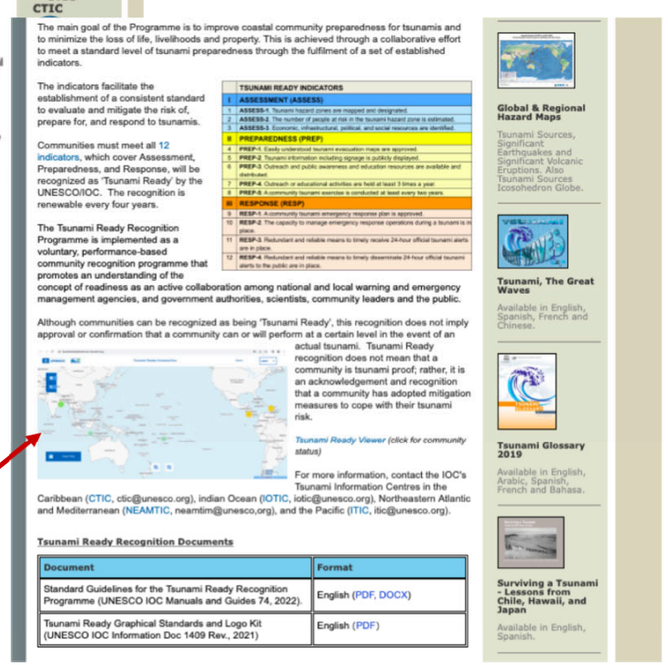


	TSUNAMI READY INDICATORS
I	**ASSESSMENT (ASSESS)**
1	**ASSESS-1**. Tsunami hazard zones are mapped and designated.
2	**ASSESS-2**. The number of people at risk in the tsunami hazard zone is estimated.
3	**ASSESS-3**. Economic, infrastructural, political, and social resources are identified.
II	**PREPAREDNESS (PREP)**
4	**PREP-1**. Easily understood tsunami evacuation maps are approved.
5	**PREP-2**. Tsunami information including signage is publicly displayed.
6	**PREP-3**. Outreach and public awareness and education resources are available and distributed.
7	**PREP-4**. Outreach or educational activities are held at least three times a year.
8	**PREP-5**: A community tsunami exercise is conducted at least every two years.
III	**RESPONSE (RESP)**
9	**RESP-1**. A community tsunami emergency response plan is approved.
10	**RESP-2**. The capacity to manage emergency response operations during a tsunami is in place.
11	**RESP-3**. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	**RESP-4**. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

UNESCO IOC Tsunami Ready web site

www.tsunamiready.org

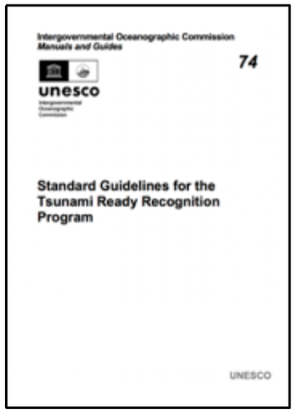




Tsunami Ready Viewer

How to get Tsunami Ready

- **Standard Guidelines for the Tsunami Ready Recognition Program**
  (IOC Technical Series 74, 2022)



- **Facilitated by IOC Tsunami Information Centres**
  Contact International Tsunami Information Centre (ITIC, itic@unesco.org,laura.kong@noaa.gov)

- **Tsunami Ready web site –** information, resources
  www.tsunamiready.org

Be Safe. Be Prepared. Get Pacific Tsunami Ready!

LINKS: Pacific Islands Western Pacific Eastern Pacific

Tsunami Ready Training – TEMPP

- **Tsunami Evacuation Maps, Plans, and Procedures (TEMPP) –**
  IOC MG 82 *Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises (2020)*
- Manual (English, Spanish)
- Supplement 1 (Detail Module Explanations, Guidance) (English)
- Specialized Documents

http://itic.ioc-unesco.org/index.php?option=com_content&view=category&layout=blog&id=2166&Itemid=2640

IOC Manual and Guide 82 (2019) - TEMPP

PREPARING FOR COMMUNITY TSUNAMI EVACUATIONS: FROM INUNDATION TO EVACUATION MAP, RESPONSE PLANS, AND EXERCISES

4 Foundation Blocks

- *Key element of tsunami response involves evacuation, including self-evacuation of exposed people & key assets to safer areas*
- *Effective and successful evacuations require proper planning by relevant authorities.*

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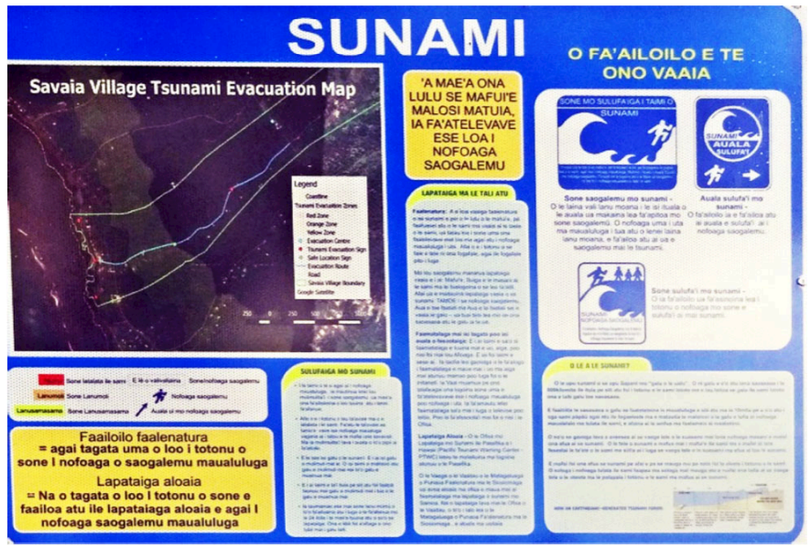
Ostional, Costa Rica (May 2017)

Savaia, Lefaga, Samoa (June 2017)



Thank You. Questions?

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