



International Tsunami Information Center (ITIC)
A UNESCO/IOC-NOAA Joint Partnership
NOAA Center for Tsunami Research (NCTR)
May 2024

UN Decade of Ocean Science for Sustainable Development

UNESCO IOC TSUNAMI READY

Dr. Laura Kong
Director, ITIC, USA NOAA

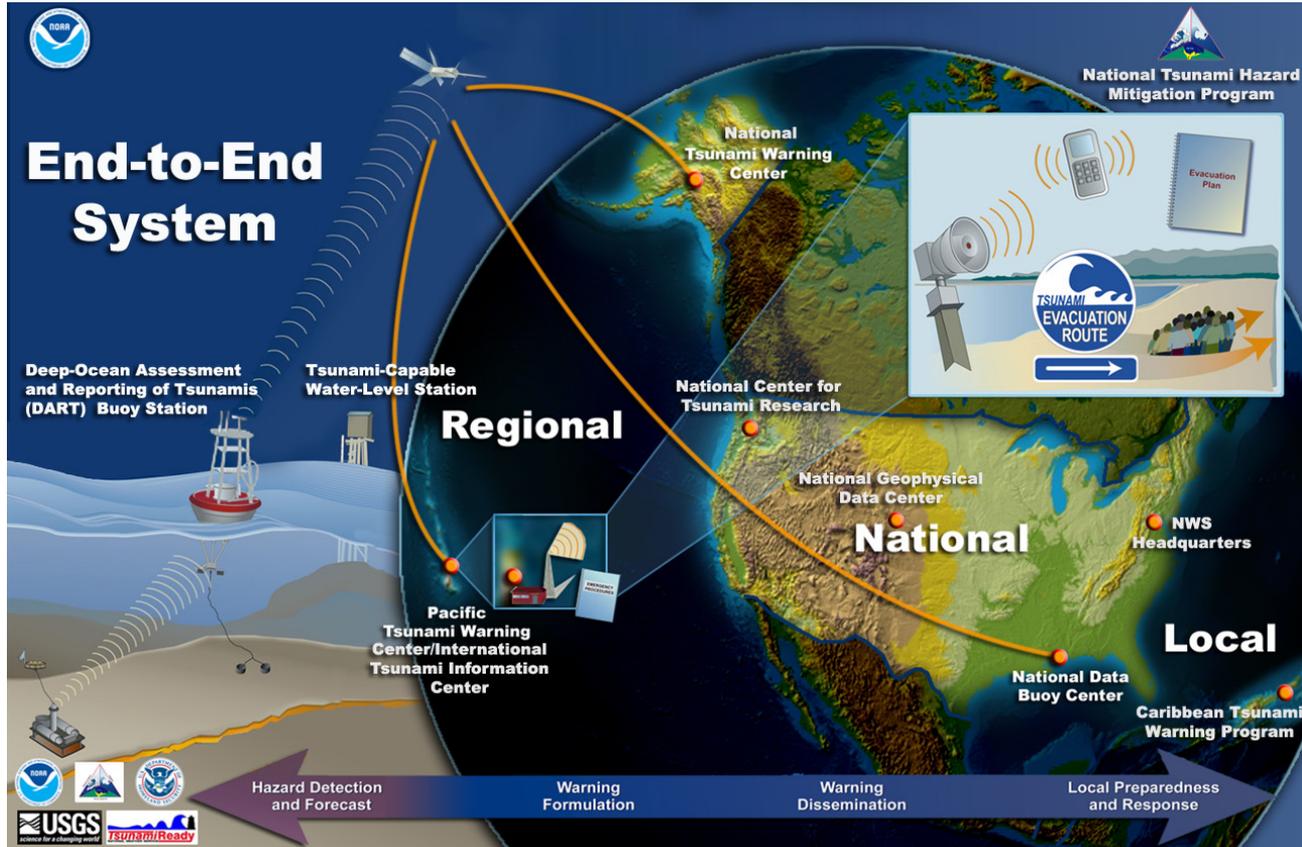
Chris Moore
Director, NOAA Center for Tsunami Research



Outline

- ❑ **USA Tsunami Program**
- ❑ **UNESCO-IOC GTEWS**
- ❑ **UN Ocean Decade Tsunami Programme goals**
- ❑ **USA Tsunami Ready support**

Tsunami Warning System



NOAA Tsunami Program

Tsunami Warning and Threat Information



US DOMESTIC CONUS, CANADA
National Tsunami Warning Center
Palmer, AK



US HAWAII, AM SAMOA, GUAM/CNMI, PR, USVI, BVI
INTERNATIONAL – PACIFIC, CARIBBEAN
Pacific Tsunami Warning Center
Honolulu, HI

NOAA Tsunami Program

Information, Preparedness, Mitigation



■ International Tsunami Information Center (ITIC)

ITIC est 1965, ITIC Caribbean Office (ITIC-CAR) est 2010



■ National Tsunami Hazard Mitigation Program (NTHMP)

- Partnership among Federal and State/Territorial agencies
- Promotes a culture of tsunami preparedness and response



■ TsunamiReady® Program (est. 2001, NWS lead)

- Improves community awareness, preparation, and education
- Strengthens local emergency operations
- 194 communities in United States recognized (Oct 2021)



■ NWS Weather Forecast Offices



NOAA Tsunami Program

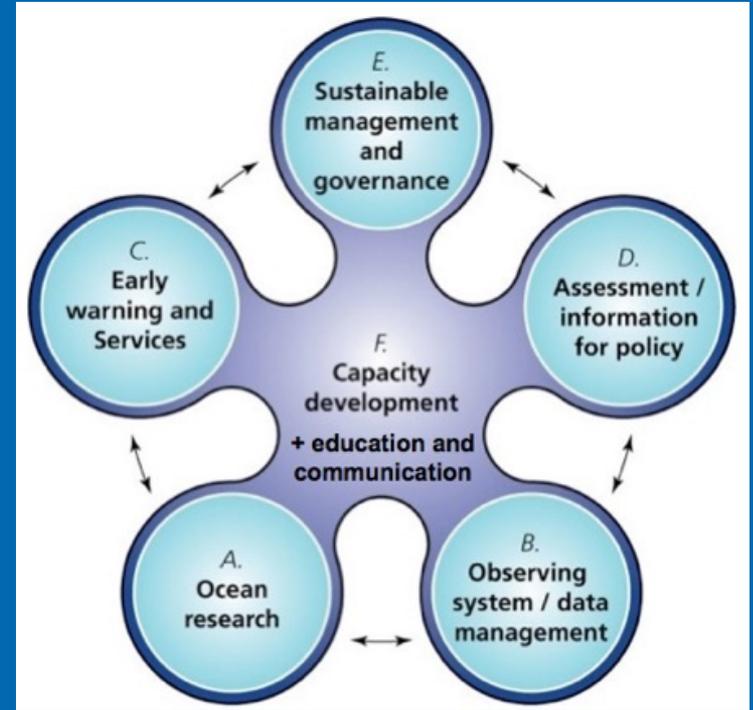
International Tsunami Activities



- ❑ Support UNESCO Intergovernmental Oceanographic Commission (IOC) as **IOC Tsunami Service Provider (TSP)** and as **IOC Tsunami Information Center (TIC)** for coordinated tsunami warning and mitigation systems in Pacific and Caribbean:
 - **Pacific Tsunami Warning Center (PTWC)**
 - **International Tsunami Information Center (ITIC) - Pacific**
 - **NWS HQ Tsunami Program (US Tsunami National Contact)**
- ❑ After 2004 Indian Ocean Tsunami, U.S. Tsunami Warning Centers' capabilities enhanced to include alert services for Caribbean (permanent in 2016) and Indian Ocean (interim to 2013)
- ❑ In 2010, NWS SR Caribbean Tsunami Warning Program (CTWP) established to support region. Moved under NWS PR ITIC in 2017. Renamed ITIC Caribbean Office (support CTIC, CARIBE-EWS) in 2021
- ❑ NOAA Centers for Environmental Information (NCEI) serves as ICSU World Data Service for Marine Geology and Geophysics for Global Tsunami Historical Database, Significant Earthquakes, Significant Volcanic Eruptions.

Intergovernmental Oceanographic Commission (IOC) of UNESCO

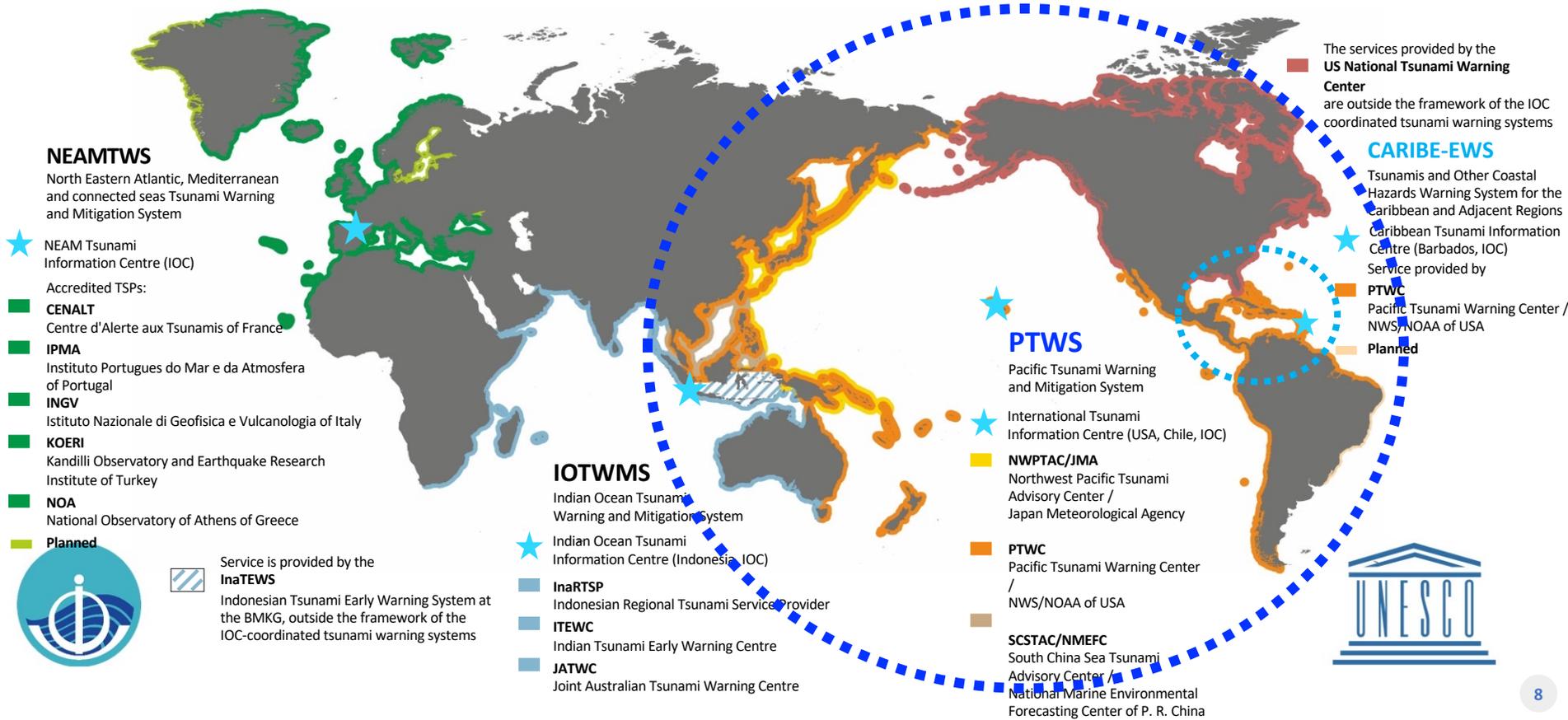
- The only intergovernmental body of the UN system for ocean science
- Established 1960, 150 Member States (2024)



EXISTING SERVICES OF THE GLOBAL TSUNAMI WARNING SYSTEM

Intergovernmental Oceanographic Commission of UNESCO

2021 www.ioc-tsunami.org



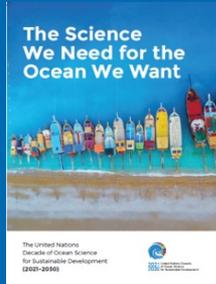


Vision:
*“The science we need
for the ocean we want”*

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



2016-2017



2018-2019



2019-2020

Ocean Decade Goals: Societal Outcomes



1. A Clean Ocean

Sources of pollution are identified and reduced
Or removed.



2. A Healthy and Resilient Ocean

Marine ecosystems are understood,
protected, restored and managed.



3. A Productive Ocean

Supporting sustainable food supply and a
sustainable ocean economy.



Ocean Decade Goals: Societal Outcomes



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.



OCEAN DECADE TSUNAMI PROGRAMME

Seeking Major Advances in SCIENCE and PREPAREDNESS

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

1. Real-time impact forecasts

with

2. Deep community preparedness

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

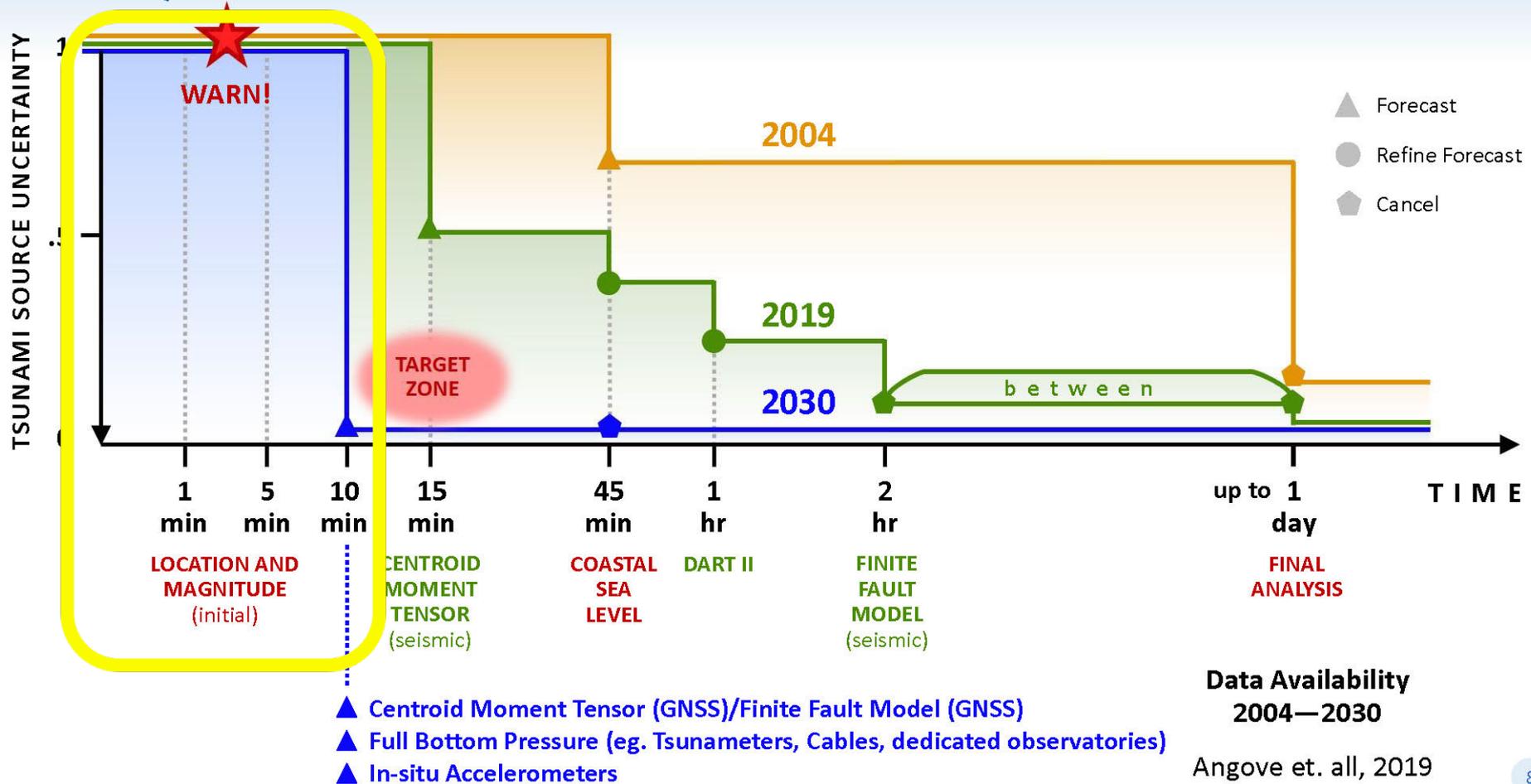
RESILIENCE!

Communities
respond to tsunami threats
by combining accurate

Comprehensive
institutional & community
preparedness
and capacity building
efforts aimed at achieving
IOC Tsunami Ready
designation across
all socio-economic
categories



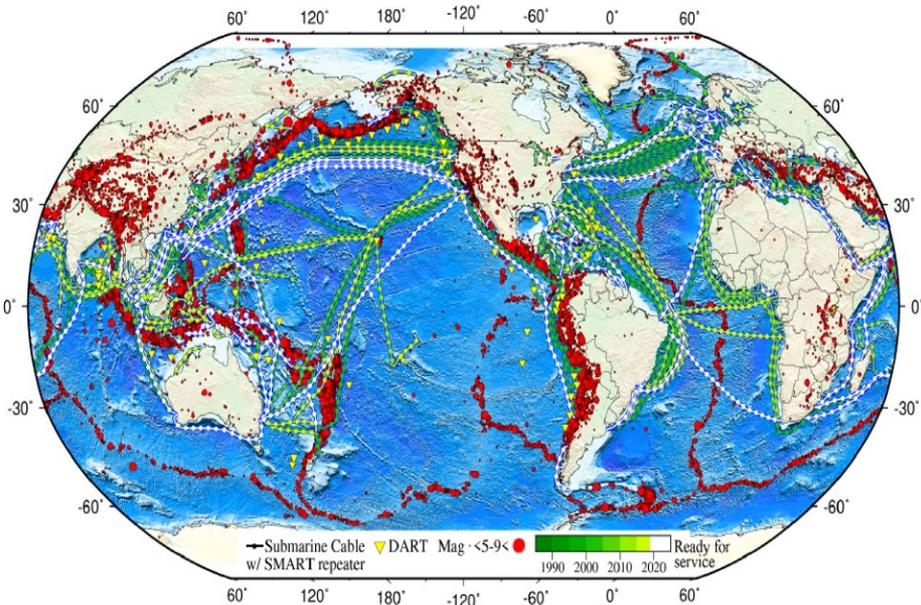
EXPECTED IMPROVEMENT IN TSUNAMI FORECAST TIME AND ITS QUALITY DUE TO IMPLEMENTATION OF NEW TECHNOLOGIES



FASTER, BETTER EARTHQUAKE SOURCE CHARACTERIZATION FASTER TSUNAMI DETECTION / REAL-TIME MONITORING: UNDERSEA SMART CABLES, GNSS NETWORK

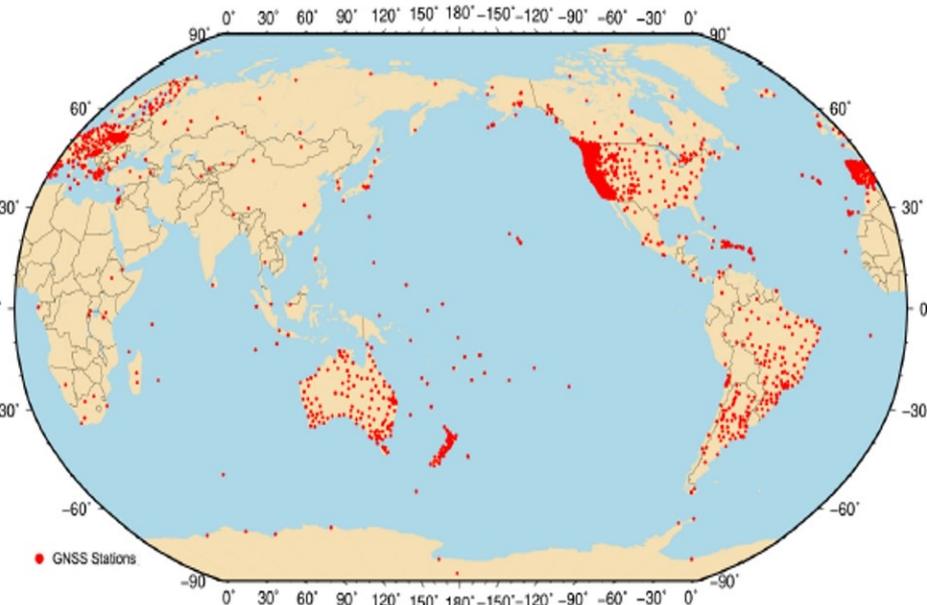
Historical seismicity (red), DART tsunami buoys (yellow triangles)

Current / planned (green/white) submarine cables
SMART repeaters shown every 300 km



Angove, M. et. al, 2019

Real-time GNSS stations (public networks, n=2,260)



Pacific Northwest Geodetic
Array/Central Washington University

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

CHAIR is LAURA KONG

➤ **Capacity Development:** "Tsunami Ready" training, augmented by online IOC Ocean Teacher Global Academy (OTGA) ==> Global reach, deep curricula

ITIC is OTGA STC

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 <u>are held at least three times a year</u>
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:**
Be Aware, Be Prepared
- ❑ **FRAMEWORK:**
 - Harmonized global guidelines UNESCO IOC Tsunami Ready
 - Performance-based Community Recognition
- ❑ **ACTION:**
National programs empower Communities
- ❑ **GLOBAL MEASURE**
12 indicators – Assessment, Preparedness, Response

Cedeño, Honduras (Feb 2017)



CEDEÑO
ES UNA COMUNIDAD

**TSUNAMI
READY**

**EN CASO DE TERREMOTO O ALERTA DE TSUNAMI
SALGA DE LA ZONA DE EVACUACIÓN**

16 DE FEBRERO DE 2017

Logos of UNICEF, UN, USAID, and other partners.



<https://www.youtube.com/watch?v=-vMTwO3xjY>

*ITIC Essential Community Preparedness
Capacity Building, Honduras, Central America, 2015-16*





Savaia, Lefaga, Samoa (June 2017)

O LE A E ULUFALE

LE NUU UA LAVA TAPENA MO SUNAMI

TSUNAMI READY



AFAI UA LAPATAIA I SE SUNAMI, IA AGAI LOA MA FAAVAVE I LE NOFOAGA SAOGALEMU

SUNAMI

O FA'AILO ONO V

Giant Clams

Savaia Village Tsunami Evacuation Map

'A MAEA ONA LULU SE MAPUFE MALIOSI MATUJA IA FAVATELEVAVE ESE LOA I NOFOAGA SAOGALEMU

FAALOLO IASALANATURA
 « agai tagata uma o loo i totouma o sone i nofoaga o saogalemu mauatuluga
 Lapataaga aloaia
 « Na o tagata o loo i totouma o sone e faalilo atu i le lapataaga aloaia e agai i nofoaga saogalemu mauatuluga.





NOFOAGA SAOGALEMU SAFE LOCATION

Fa'amautu i Nofoga Saogalemu ma fa'atali le logoina atu e le Malo ua saogalemu le toe fo'i i nofoaga mauatalalo tu lata i le sami




UNESCO IOC
 Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System ICG/PTWS

Certificate of Recognition

Alii ma Faipule of Savaia, Lefaga
 Village Climate and Disaster Management Committee

For successfully implementing the UNESCO IOC Tsunami Ready Pilot Project in SAVAIA, LEFAGA, INDEPENDENT STATE OF SAMOA

June 19, 2017

[Signature]

Vladimir Ryabinin, PhD
 Assistant Director General and Executive Secretary, UNESCO

Ulu Bismarck Crawley
 Chief Executive Officer
 MNRE, SAMOA

Filomena Nelson
 Chair
 UNESCO IOC ICG/PTWS

SUNAMI TSUNAMI

AUALA SULUFA'I
 EVACUATION ROUTE



SUNAMI TSUNAMI



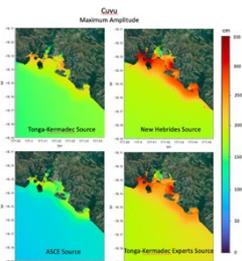
Fiji Coral Coast: Nayevuyevu and Sila Villages



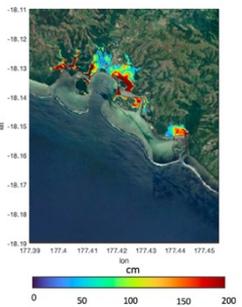
TR Recognition Ceremony: Nov 3, 2023

Implementation Approach - Stakeholders
 Mineral Resources Dept, National Disaster Management Office,
 Ministry of Lands, Provincial Administrator, iTaukei Affairs, Plan
 International, Partners in Community Development (Fiji), People
 Living with Disability Organization

Preparedness: Hazard and Evacuation



Maximum Composite Flow Depth



Hazard Assessment: Tsunami Sources and Inundation

TSUNAMI EVACUATION PROCEDURE

If you feel an earthquake - "ground" (strong) or "strong" (strong):

- Drop, cover and hold!
- After an earthquake, be aware that a tsunami may be generated.
- Move away from the beach immediately in a predetermined direction, through the land field.
- After an intense and prolonged earthquake or look for shelter in higher ground.
- As a community member, please follow Community Disaster Management Plan.
- Wait for an official "All Clear" message before leaving the shelter.

After the first tsunami wave, more waves are likely to come!

Wait for an official "All Clear" message before leaving the shelter.

IF IT IS LONG OR STRONG, GET HOME

COLA VINA!! WELCOME TO NAEVUEVU VILLAGE

TSUNAMI EVACUATION MAP

NA I VAKARO MO MURIA NI YACO NA UA LOKA

2.1.1. If you feel an earthquake - "ground" (strong) or "strong" (strong):

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IF IT IS LONG OR STRONG, GET HOME

COLA VINA!! WELCOME TO SILA VILLAGE

TSUNAMI EVACUATION MAP

NA I VAKARO MO MURIA NI YACO NA UA LOKA

2.1.1. If you feel an earthquake - "ground" (strong) or "strong" (strong):

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IF IT IS LONG OR STRONG, GET HOME



Community participatory training, 18-22 Sep 2023

GEOLOGICAL SERVICES DIVISION SEISMOLOGY UNIT

OFFICIAL WARNINGS

When tsunamis travel across the ocean from East, they might take more time to warn people what to do.

WARNING	When to higher ground or to a higher ground quickly, or use local evacuation route	PREPARED
ADVISORY	When to higher ground or to a higher ground quickly, or use local evacuation route	PREPARED
WATCH	When to higher ground or to a higher ground quickly, or use local evacuation route	PREPARED
INFORMATION STATEMENT	When to higher ground or to a higher ground quickly, or use local evacuation route	PREPARED

GEOLOGICAL SERVICES DIVISION SEISMOLOGY UNIT

IF YOU FEEL AN EARTHQUAKE THAT IS LONG AND STRONG, A TSUNAMI MAY FOLLOW

WHAT TO DO IN CASE OF A TSUNAMI

- Drop, cover & hold during an earthquake
- Move inland or to a higher ground quickly, or use local evacuation route
- Wait for official ALL CLEAR before returning to the beach

Alerts & Warnings

Warning, Response, Awareness

Sila Village Nadroga Province, Fiji is Tsunami Ready

IN CASE OF STRONG OR LONG EARTHQUAKE, OR ANY OFFICIAL MESSAGE, GO TO HIGHER GROUND OR FURTHER INLAND

The recognition does not imply approval or promise that a community can or will perform at a certain level in case of tsunami. Tsunami Ready recognition does not mean that a community is tsunami proof. UNESCO-IOC recognizes that the community have built their capacity and implemented measures in accordance to the agreed indicators of UNESCO-IOC Tsunami Ready Programme, and that they will continue to maintain and ensure the sustainability of this preparedness level.

English	iTaukei (Fijian)
• Tsunami Hazard Zone	• Na Vanua oqo e rawa ni cabeta na Ualoka
• Tsunami Evacuation Route	• Na sala mo ni muria kina i drodro ni Ualoka
• Tsunami Safe Zone	• Nai drodro ni Ualoka
• Wait for Official All Clear	• Waraka me soli nai vakaro ni veisukayaki

ITIC TSUNAMI READY Project - FY21-25



- ❑ **USAID/BHA funds to NOAA/NWS/ITIC**
- ❑ **Countries:**
 - FY21-23: Marshall Islands (RMI), Micronesia (FSM), Palau
 - FY24+: Kiribati, Samoa, Solomon Islands, Vanuatu
- ❑ **Support:** ITIC and NOAA to implement Tsunami Ready using UNESCO IOC Indicators
- ❑ **Deliverables:** **Tsunami Ready communities recognized**
- ❑ **Country stakeholders:** National/Local DMOs (Preparedness/Emergency Response), National Tsunami Warning Center (NTWC), GIS resource agency (evacuation maps, data layers - demographics, coastline, elevation, built environment, infrastructure, schools, etc), Non-Government Orgs (NGOs), community groups

ITIC TSUNAMI READY Project - FY21-25



□ **Tasks / Work plan:**

Follow TEMPP (inundation map, evacuation map, response plan, awareness, exercise)

□ **Supporting agencies:**

- ITIC (lead) – Dr. Laura Kong, Marie Eble (Project Manager)
- NOAA National Center for Tsunami Research (NCTR) (inundation model/map) - Chris Moore
- NOAA PTWC (tsunami warning) – Dr. Charles McCreery
- IOC Tsunami/DRR (Suva) - Jiuta Korovulavula
- SPC: DRR- Litea Buikoto, Oceans (model, DEM) - Herve Damlamian, PCCOS – Dr. Jerome Aucan
- International Subject Matter Experts (SME, evacuation, response)

ITIC TSUNAMI READY Project – This Meeting



- **UNESCO IOC Tsunami Ready background information**
- **Morning:**
 - TR National Programme - What is a Community?
 - TR Community Resources – baseline generally what exists, needed
- **Afternoon**
 - TR Indicator Resources stocktake for target community
 - TR Implementation Checklist – Requirements & Actions for Indicators
 - What has been done already?
 - Determine availability and quality of Bathymetry/Topography data for Inundation Modeling
 - Implementation planning: Milestones (what, who, how, when).
What are resources needed



International Tsunami Information Center (ITIC)
A UNESCO/IOC-NOAA Joint Partnership
NOAA Center for Tsunami Research (NCTR)
May 2024

Thank You

Dr. Laura Kong
Director, ITIC, USA NOAA

Chris Moore
Director, NOAA Center for Tsunami Research

