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Commission

ICG/PTWS-XXIX
1, 2, 7, 8 December 2021
Virtual

PacWave20

Agenda 3.6
PacWave20 Summary Report

Emilio Talavera, INETER, Nicaragua * #
Laura Kong, International Tsunami Information Center * #
Margarita Martinez, ONEMI, Chile #

** Co-Chairs, Task Team on PacWave20*
 # Co-Chairs, Task Team on PacWave (PacWave22)

Task Team on PacWave20 Members

Co-chairs

Laura Kong – ITIC, USA

Emilio Talavera – INETER, Nicaragua

Margarita Martinez, ONEMI, Chile (joined for PacWave22

Members:

- **Jo Guard, New Zealand**
- **Chip McCreery – USA**
- **Anthony Blake - SWP – SPC SOPAC**
- **Silvia Chacon CA-PAC**
- **David Coetzee - WG 3 Chair**
- **Viviana Dionicio, Colombia**
- **Ji Min Lee, Republic of Korea**
- **Yuelong Miao, Australia**
- **Jerome Aucan, France-New Caledonia**
- **Viacheslav Gusiakov, Russian Federation**
- **Ryosuke Sakakibara, JMA**
- **Robert Greenwood, Bureau of Meteorology Australia**
- **Carlos Zuniga, SHOA, Chile**
- **Wilfried Strauch, INETER, Nicaragua**

Reduction in Scope due to COVID-19 Pandemic

PTWS Steering Committee decision (June 2020)

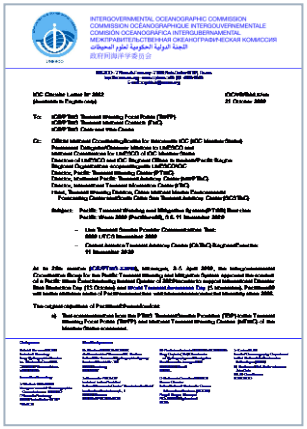
Because of the COVID-19 pandemic, which began in December and likely will continue for the remainder of 2020, Member States have generally been unable to dedicate sufficient planning and preparation resources to plan or conduct of Exercise Pacific Wave 2020 (PacWave20) in the manner outlined in Rec PTWS-XXVII.1 (April 2019)

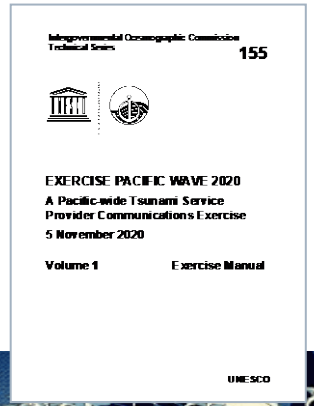
The PTWS SC reiterated the difficulty of conducting PacWave20 as planned given the current COVID-19 global situation, and recommended that PacWave20 only tests Objectives a. and d. Accordingly, the PacWave20 will consist of :

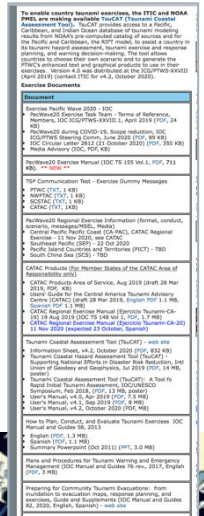
- **Objective a. Communication test on November 5, 2020**
- **Objective d. CATAC regional exercise**
- Other activities are encouraged but are at the discretion of the country.

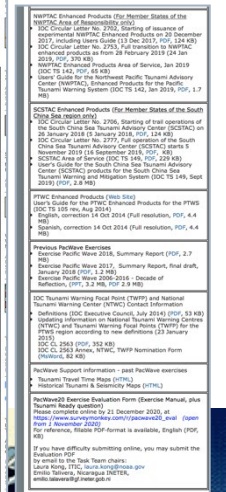
Milestones

- PacWave20 website www.pacwave.info
- Exercise announced IOC Circular Letter 2812, 21 Oct 2020
- Exercise Manual, IOC TS 155, 22 Oct 2020
- 2 Webinars, 28-29 Oct 2020
- Post-Exercise Evaluation Form available 1 Nov 2020 due 21 Dec 2020 *(submit/resubmit Sept 2021)*
- 24 countries (including 2 sub-national entities) submitted evaluations. Many more probably received COMM TEST, but did not submit evaluations
- Draft Summary Report, 20 Sep 2020, Review by ICG/PTWS-XXIX
- Publication, January 2022









PacWave logo and hashtag

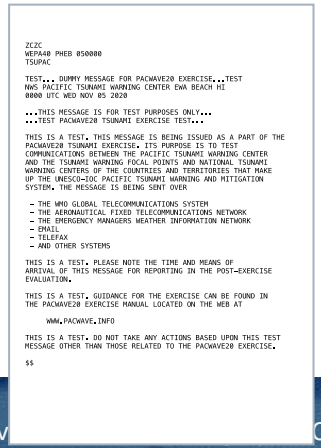
Hashtag:

#PacWave20

Exercise format – Objective a.

- **ONE (1) LIVE Communications Test**
- **0000 UTC, 5 November 2020**
- **PTWS TSP to MS TWFP / NTWC**
- **Usual communication methods**

PTWC



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ZCZC
WEPA40 PHEB 050000
TSUPAC

TEST... DUMMY MESSAGE FOR PACWAVE20 EXERCISE...TEST
NWS PACIFIC TSUNAMI WARNING CENTER EWA BEACH HI
0000 UTC WED NOV 05 2020

...THIS MESSAGE IS FOR TEST PURPOSES ONLY...
...TEST PACWAVE20 TSUNAMI EXERCISE TEST...

THIS IS A TEST. THIS MESSAGE IS BEING ISSUED AS A PART OF THE
PACWAVE20 TSUNAMI EXERCISE. ITS PURPOSE IS TO TEST
COMMUNICATIONS BETWEEN THE PACIFIC TSUNAMI WARNING CENTER
AND THE TSUNAMI WARNING FOCAL POINTS AND NATIONAL TSUNAMI
WARNING CENTERS OF THE COUNTRIES AND TERRITORIES THAT MAKE
UP THE UNESCO-IOC PACIFIC TSUNAMI WARNING AND MITIGATION
SYSTEM. THE MESSAGE IS BEING SENT OVER

 - THE WMO GLOBAL TELECOMMUNICATIONS SYSTEM
 - THE AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK
 - THE EMERGENCY MANAGERS WEATHER INFORMATION NETWORK
 - EMAIL
 - TELEFAX
 - AND OTHER SYSTEMS

THIS IS A TEST. PLEASE NOTE THE TIME AND MEANS OF
ARRIVAL OF THIS MESSAGE FOR REPORTING IN THE POST-EXERCISE
EVALUATION.

THIS IS A TEST. GUIDANCE FOR THE EXERCISE CAN BE FOUND IN
THE PACWAVE20 EXERCISE MANUAL LOCATED ON THE WEB AT

     WWW.PACWAVE.INFO

THIS IS A TEST. DO NOT TAKE ANY ACTIONS BASED UPON THIS TEST
MESSAGE OTHER THAN THOSE RELATED TO THE PACWAVE20 EXERCISE.

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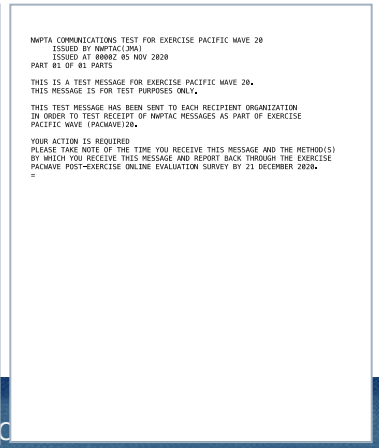
NWPTAC



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NWPTA COMMUNICATIONS TEST FOR EXERCISE PACIFIC WAVE 20
     ISSUED BY NWPTAC(JMA)
     ISSUED AT 0000Z 05 NOV 2020
PART 01 OF 01 PARTS

THIS IS A TEST MESSAGE FOR EXERCISE PACIFIC WAVE 20.
THIS MESSAGE IS FOR TEST PURPOSES ONLY.

THIS TEST MESSAGE HAS BEEN SENT TO EACH RECIPIENT ORGANIZATION
IN ORDER TO TEST RECEIPT OF NWPTAC MESSAGES AS PART OF EXERCISE
PACIFIC WAVE (PACWAVE)20.

YOUR ACTION IS REQUIRED
PLEASE TAKE NOTE OF THE TIME YOU RECEIVE THIS MESSAGE AND THE METHOD(S)
BY WHICH YOU RECEIVE THIS MESSAGE AND REPORT BACK THROUGH THE EXERCISE
PACWAVE POST-EXERCISE ONLINE EVALUATION SURVEY BY 21 DECEMBER 2020.
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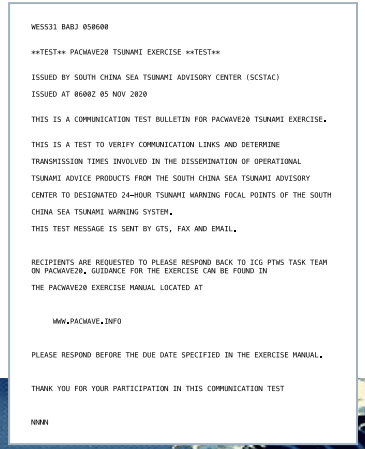
SCSTAC



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WES531 BABJ 050600

**TEST** PACWAVE20 TSUNAMI EXERCISE **TEST**

ISSUED BY SOUTH CHINA SEA TSUNAMI ADVISORY CENTER (SCSTAC)

ISSUED AT 0600Z 05 NOV 2020

THIS IS A COMMUNICATION TEST BULLETIN FOR PACWAVE20 TSUNAMI EXERCISE.

THIS IS A TEST TO VERIFY COMMUNICATION LINKS AND DETERMINE
TRANSMISSION TIMES INVOLVED IN THE DISSEMINATION OF OPERATIONAL
TSUNAMI ADVICE PRODUCTS FROM THE SOUTH CHINA SEA TSUNAMI ADVISORY
CENTER TO DESIGNATED 24-HOUR TSUNAMI WARNING FOCAL POINTS OF THE SOUTH
CHINA SEA TSUNAMI WARNING SYSTEM.
THIS TEST MESSAGE IS SENT BY GTS, FAX AND EMAIL.

RECIPIENTS ARE REQUESTED TO PLEASE RESPOND BACK TO ICG PTWS TASK TEAM
ON PACWAVE20. GUIDANCE FOR THE EXERCISE CAN BE FOUND IN
THE PACWAVE20 EXERCISE MANUAL LOCATED AT

     WWW.PACWAVE.INFO

PLEASE RESPOND BEFORE THE DUE DATE SPECIFIED IN THE EXERCISE MANUAL.

THANK YOU FOR YOUR PARTICIPATION IN THIS COMMUNICATION TEST

NNNN
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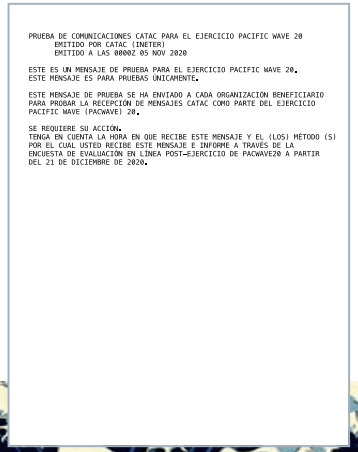
CATAC



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PRUEBA DE COMUNICACIONES CATAC PARA EL EJERCICIO PACIFIC WAVE 20
     EMITIDO POR CATAC (INETER)
     EMITIDO A LAS 0000Z 05 NOV 2020

ESTE ES UN MENSAJE DE PRUEBA PARA EL EJERCICIO PACIFIC WAVE 20.
ESTE MENSAJE ES PARA PRUEBAS ÚNICAMENTE.

ESTE MENSAJE DE PRUEBA SE HA ENVIADO A CADA ORGANIZACIÓN BENEFICIARIO
PARA PROBAR LA RECEPCION DE MENSAJES CATAC COMO PARTE DEL EJERCICIO
PACIFIC WAVE (PACWAVE) 20.

SE REQUIERE SU ACCIÓN.
TENGA EN CUENTA LA HORA EN QUE RECIBE ESTE MENSAJE Y EL (LOS) MÉTODO (S)
POR EL CUAL USTED RECIBE ESTE MENSAJE E INFORME A TRAVÉS DE LA
ENCUESTA DE EVALUACION EN LINEA POST-EJERCICIO DE PACWAVE20 A PARTIR
DEL 21 DE DICIEMBRE DE 2020.
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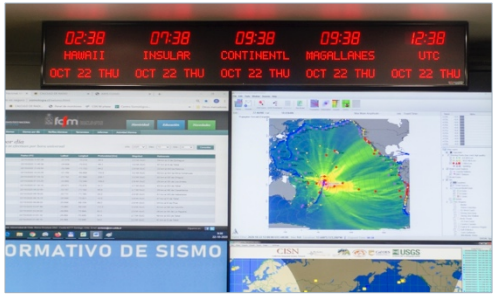
PTWS Regional Exercises – Objective c. and d.

- SEP Regional Exercise – 22 October 2020
- CATAC Regional Exercise – 11 November 2020

SEP Regional Exercise – 22 Oct 2020



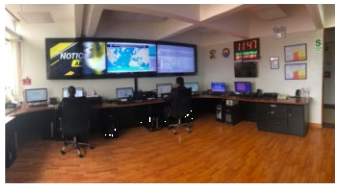
- Involving TWC Chile, Colombia, Ecuador, Peru
- PTWC played by Peru
- M8.8 north of Tonga
- 0900, lasting 6 hrs, simulating bulletins, monitoring of sea level / DART stations
- Improve regional coordination procedures.

GTATPS – CHILE

GTATPS – COLOMBIA

GTATPS – ECUADOR

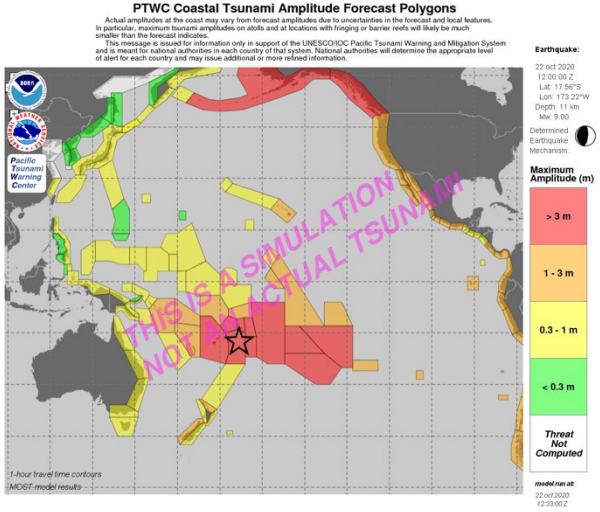
GTAPS - PERU



SEP Regional Exercise – 22 Oct 2020

Use of Tsunami Coastal Assessment Tool (TsuCAT)

- Exercise tool that allow countries to choose their own scenario and conduct their own exercises using the PTWC public text and enhanced graphical products.

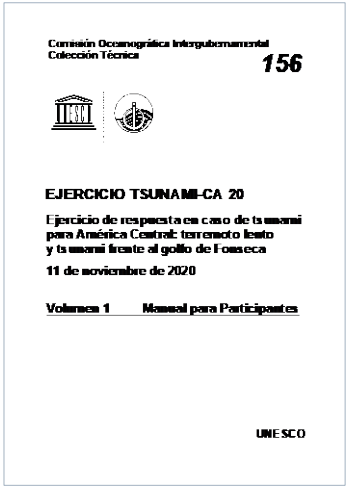


Total Messages sent by the end of Exercise:

1) Colombia: 09
2) Ecuador: 08
3) Perú: 11
4) Chile: 19

CATAC Regional Exercise – 11 Nov 2020

- Hosted by Nicaragua INETER
- Pacific and Caribbean coasts of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama
- 2nd Regional Exercise. Build from 1st Regional Exercise, 19 August 2019
- Further develop service and products


Comisión Oceanográfica Intergubernamental
Colección Técnica
156

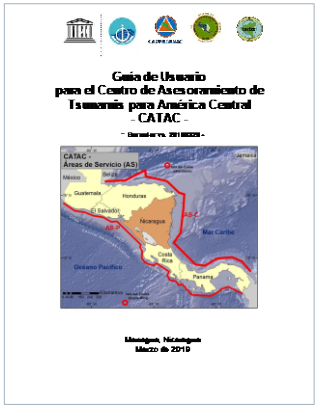
EJERCICIO TSUNAMI-CA 20

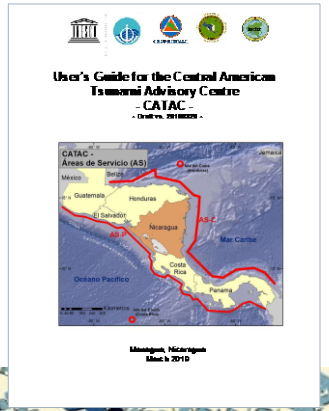
Ejercicio de respuesta en caso de tsunami para América Central: terremoto lento y tsunami frente al golfo de Fonseca

11 de noviembre de 2020

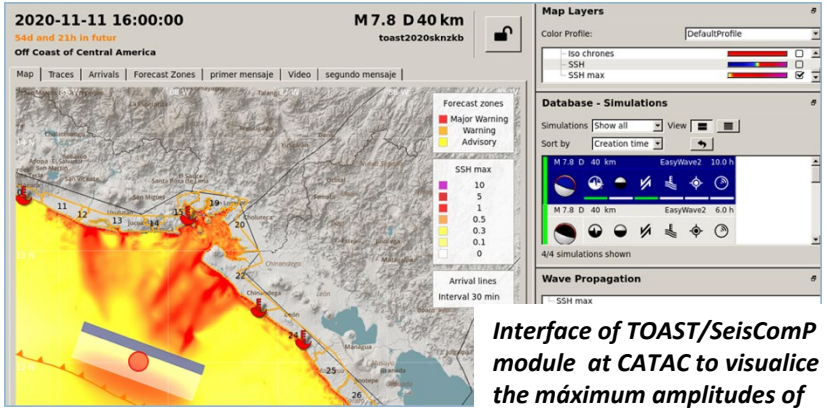
Volumen 1 Manual para Participantes

UNESCO

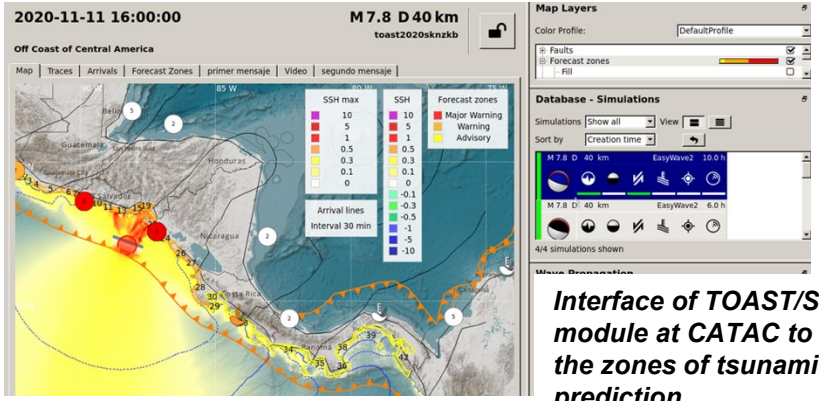

Guía de Usuario
para el Centro de Asesoramiento de Tsunamis para América Central
- CATAC -


User's Guide for the Central American Tsunami Advisory Centre
- CATAC -

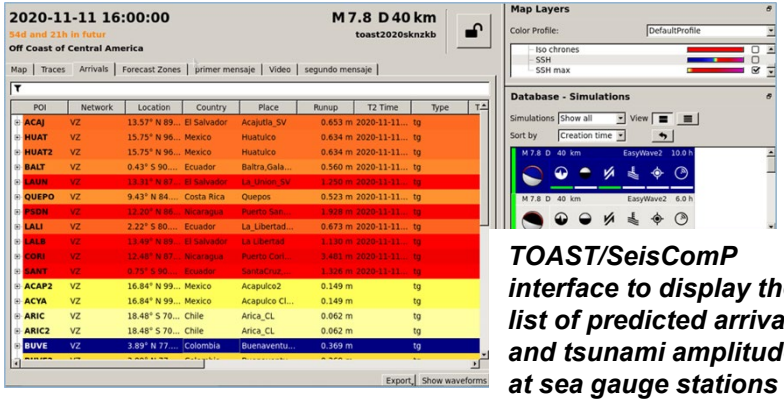
CATAC TSUNAMI-CA-20 EXERCISE on Tsunami Response for Central America:
Slow Earthquake and tsunami off the Gulf of Fonseca, November 11, 2020



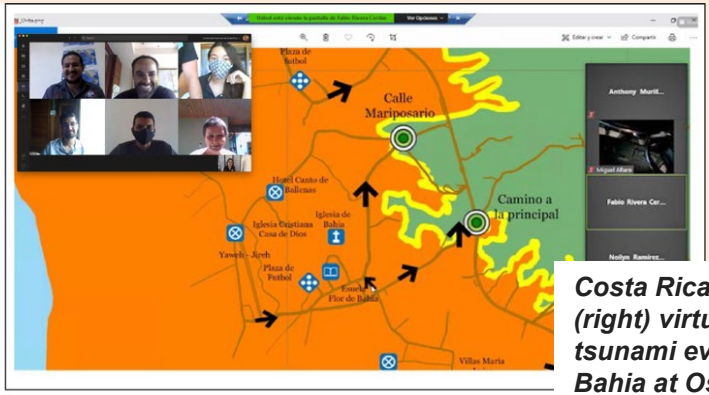
Interface of TOAST/SeisComP module at CATAC to visualice the máximum amplitudes of the tsunami



Interface of TOAST/SeisComP module at CATAC to visualice the zones of tsunami impact prediction



TOAST/SeisComP interface to display the list of predicted arrivals and tsunami amplitudes at sea gauge stations



Costa Rica NTWC staff (right) virtually simulated tsunami evacuation for Bahia at Osa, Puntarenas.

PTWS National Exercises – Objective b. (reports/images received by ITIC

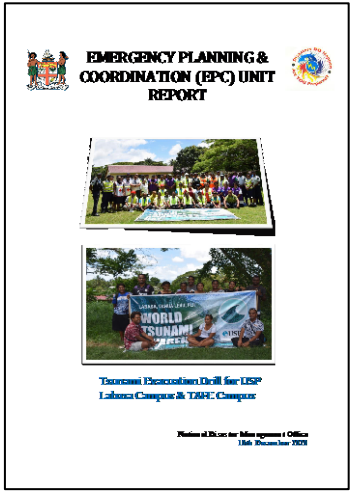
- Pacific Islands – Fiji, Tuvalu, Vanuatu
- Colombia (CNAT video)
- Russia

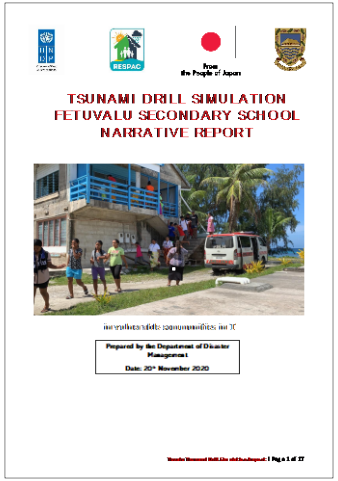






PacWave20 tabletop exercise conducted at the Sakhalin Tsunami Warning Center (STWC), Russia using the 2011 Japan tsunami as the scenario. Dr. Tatiana Ivashchuk, STWC Chief led discussions on the data analysis and warning procedures with staff from the STWC and Yuzhno-Sakhalinsk seismic station, and specialist from the Regional Ministry of Emergency Situations (right). Credit: T. Ivashchuk





PacWave20 website www.pacwave.info

Findings – Objective a (TSP comm test), b (national)

- The Live Communication Test from TSPs to Member State TWFPs (Objective a) was successful. PTWC, NWPTAC, SCSTAC Dummy Messages were received in a timely manner. All countries received the message by email, and 35% by GTS .

- Due to the Pandemic, many countries did not test national communication and cooperation (Objective b) or national readiness (Objective c) within their country.

For countries that did

For communication and cooperation (Objective b):

- The majority of respondents disseminated the warning message to emergency services and other national and local (provincial, regional, city/district) government agencies, and to a lesser degree science agencies/universities involved in assessment.
- The warning message was disseminated usually by email or SMS. Social media methods of dissemination were also used. Nearly all considered these communication methods timely and appropriate.
- All indicated that the NTWC/NDMO were accurate and clear.

Findings – Objective b (national)

For readiness (evacuation, education and awareness):

- As a result of exercise, local stakeholders understand better their goals, responsibilities and roles in case of tsunami emergencies. Coastal communities aware of their tsunami risk and better prepared for tsunami
- Nearly all respondents have activation and response procedures in place, know their response role, and have engaged in prior tsunami response planning. Regular exercises are conducted.
- Most have country tsunami emergency response plans for distant, regional, and local tsunamis. Nearly all plans include processes to issue Safe-to-Return (All Clear).
- All conducted regular capacity and capability building training on procedures and communication, and conduct exercises top maintain readiness
- While most respondents indicated country has tsunami mass coastal evacuation plan, only 27% have tsunami evacuation routes and maps for all tsunami-vulnerable communities. Only 13% undertook community evacuation - most not done because of global situation and restrictions due to COVID-19.
- Nearly all have developed and disseminated tsunami-related public education and awareness materials, but only 33% have tsunami curriculum programmes in place for all levels of education

Findings – Objective c (regional), d. (CATAC), planning

- **Objectives c and d (regional)**
  - Due to Pandemic, few countries tested regional communication and cooperation (Objective 3) between countries. Main activities: data sharing, event information sharing and joint PacWave20 exercise (Southeast Pacific 22 Oc 2021, Central America Pacific Coast. 11 Nov 2021), South China Sea). Email primary communication method.
  - CATAC Regional Exercise conducted to evaluate format and content of Central America Tsunami Advisory Centre (CATAC) Products (Obj d). Respondents indicated text and graphical products from CATAC understood and useful, and assisted with decision-making.
- **Despite Pandemic, exercise planning did occur:**

  When it was possible, all respondents indicated that
  - Exercise planning, conduct, format and style were very satisfactory. Planning at international level went better than planning at national or provincial/local level.
  - Exercise documents / web site useful and detailed. Exercise Manual provided appropriate level of detail. All IOC Manual & Guides useful (Exercises, SOPs, Community Tsunami Evacuations)
  - About half used TsuCAT for exercise planning or hazard assessment

Findings – Overall

- Overall, exercise **went well. Highlights: choice of scenarios available, opportunity to work through / test** response procedures, SOPs, and communication methods. Several highlighted enthusiasm of participants. **Others noted key stakeholders were not present.**

- Overall, **several gaps or opportunities for improvement:**
  - Coordination with other ICG exercise needed to allow adequate exercise time
    For 2020, PacWave20 and IOWave20, and also 2018, too close in timing
  - More proactive engagement with stakeholders earlier in planning process,
    start overall planning earlier, and more encouragement of community participation needed
  - **Because of pandemic, guidelines for conducting virtual exercises would be useful**

- Review tsunami reporting formats (wave height vs tsunami amplitude).
  Advocate for increase sea level data sharing
- Additional forecast points requested for French Polynesia

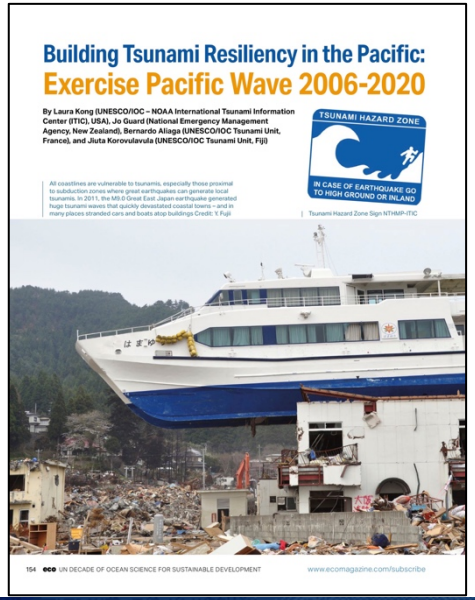
- **For evaluation survey,** improvements identified**:**
  - Provide copy of completed evaluation form after submission
  - Most indicated evaluation form easy to use. Few suggested form long – should shorten
  - Provide options to skip sections that were not exercised

ECO UN Decade Special Issue, April 2020

Building Tsunami Resiliency in the Pacific:

Exercise Pacific Wave 2006-2020

By Laura Kong (UNESCO/IOC – NOAA International Tsunami Information Center (ITIC), USA), Jo Guard (National Emergency Management Agency, New Zealand), Bernardo Aliaga (UNESCO/IOC Tsunami Unit, France), and Jiuta Korovulavula (UNESCO/IOC Tsunami Unit, Fiji)



Building Tsunami Resiliency in the Pacific:
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All coastlines are vulnerable to tsunamis, especially those proximal to subduction zones where great earthquakes can generate local tsunamis. In 2011, the M9.0 Great East Japan earthquake generated huge tsunami waves that quickly devastated coastal towns – and in many places stranded cars and boats atop buildings Credit: T. Fuji

TSUNAMI HAZARD ZONE
IN CASE OF EARTHQUAKE GO TO HIGH GROUND OR INLAND

Tsunami Hazard Zone Sign NTHMP-ITIC

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Tsunamis are no-notice, fast onset natural hazards that can cause catastrophic impacts. We don't know when or where the next tsunami will hit, but we do know that when communities are prepared, lives are saved. People must evacuate before the tsunami hits, or thousands may die and massive economic loss incurred that together will have long lasting negative humanitarian, social and economic effects. Lessons learned from past local and trans-Pacific tsunamis from Chile in 1960 and 2010, in Indonesia in 2004 (Sumatra), 2006 (Java), and 2018 (Palu), in Samoa, American Samoa, and Tonga in 2009, in Japan in 2011, and in the Solomon Islands in 2013, attest to the importance of readiness: when a tsunami arrives and communities are ready to respond, lives are saved.

Nearly all of the world's earthquakes and most of the tsunamis occur in the Pacific Ocean and its marginal seas in the zone known as the "Ring of Fire" – in fact, 76 percent of the fatal tsunamis have been in the Pacific, and on average, there have been 1-2 each year since 1900. We also know that 99 percent of all tsunami casualties are from local or regional sources that hit within a few minutes or hours. Between 1980 and 2020, there were 26 local or regional deadly or damaging tsunamis in the Pacific.

Tsunami exercises and drills are effective tools to increase community readiness. They enable everyone to practice what they will do during a real tsunami. Tsunami Warning Centers practice their tsunami analyses so they can rapidly issue accurate warnings and forecasts, emergency management agencies practice their evacuation decision-making and first responder actions, critical facilities practice their shutdown procedures that will prevent catastrophic damage, and schools practice their procedures to keep schoolkids safe and parents informed. In each exercise or drill, people are practicing the right actions to take so they know what to do, and if there is a tsunami warning, every person will know where to evacuate to to be safe from the dangerous tsunami waves, or strong and unusual currents.

The first Pacific-wide exercise "Exercise Pacific Wave 2006" was conducted on 16 and 17 May 2006 using Philippines and Chile tsunami sources, under the auspices of the UNESCO Intergovernmental Oceanographic Commission (IOC Tsunami Programme and its Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS). The ICG/PTWS encompasses 46 Member States in and bordering the Pacific Ocean and its marginal seas. Subsequent exercises have been conducted bi-annually since 2006 (also 2008, 2011, 2013, 2015, 2016, 2017, 2018, 2020, http://www.pacwave.info). In addition to testing the international communication pathways, each country conducted its own national and local exercises. These have ranged from orientation workshops and straightforward communications tests to full-scale alerting and evacuations of people from tsunami hazard zones.

To support the tsunami exercises, the IOC has made available guidelines on exercises (How to Plan, Conduct and Evaluate UNESCO/IOC Tsunami Wave Exercises, IOC MG 58, 2012), warning and emergency management procedures (Plans and Procedures for Tsunami Warning and Emergency Management, IOC MG 76, 2017), and evacuation (Pre-

TSUNAMI EVACUATION DRILL

A Tsunami Evacuation Drill for a local tsunami starts with responding to strong shaking from a nearby earthquake, followed by evacuation for the tsunami, and afterward, a debrief or 'hotwash' to evaluate the exercise and improve the warning and evacuation process. Exercises not only strengthen community readiness, but also underpin response planning through continuous and regular review, assessment, and improvement.

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PacWave20 CATAC regional exercise scenario. Credit S. Chacón-Barrantes.

paring for Community Tsunami Evacuations: From Inundation to Evacuation Maps, Response Plans, and Exercises, IOC MG 82, 2020), as well as scenario development tools such as TsuCAT (Tsunami Coastal Assessment Tool, NOAA, ITIC, 2017), to assist countries in planning, conducting and evaluating their tsunami exercises.

For 2020, "Exercise Pacific Wave 2020" (PacWave20) took place during the period from September through to November, and consisted of varying international, national, and regional activities. On 5 November 2020 (World Tsunami Awareness Day), 46 countries around the Pacific Rim participated in a live international communications test from the IOC's Tsunami Service Providers (TSP) to every country's official tsunami warning authority. TSPs provide timely alerts to country National Tsunami Warning Centres who then assess their own tsunami threat and issue tsunami warnings to coastal communities accordingly. The TSPs in the Pacific are the Pacific Tsunami Warning Center (PTWC) in Hawaii, USA, the Northwest Pacific Tsunami Advisory Center (NWPTAC) in Japan, the South China Sea Tsunami Advisory Center (SCSTAC) in China, and the developing Central America Tsunami Advisory Center (CATAC) in Nicaragua.

Two additional sub-regional tsunami exercises also took place as part of PacWave20. One was in South America on 22 October 2020 between National Tsunami Warning Centres (NTWC) of Colombia, Ecuador, Peru, and Chile, and the other was in Central America on 11 November 2020 involving Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama. These exercises were conducted to improve and encourage regional communication and cooperation between countries during a real tsunami event. In South America, NTWC drills testing their Standard Operating Procedures (SOPs) have been conducted at least twice a year, each with increasing difficulty.

For the 2020 6-hour exercise, Peru played the role of the PTWC by sending bulletins to each NTWC for a Magnitude 8.8 earthquake north of Nukualofa, Tonga that impacted all countries. The TsuCAT tool, which enables countries to choose from more than 5,000 sce-

PacWave20 tabletop exercise conducted at the Sakhalin Tsunami Warning Center (STWC), Russia used the 2011 Japan tsunami as the scenario. Dr. Tatiana Ivelskaya, STWC Chief (left), led discussions on the data analysis and warning procedures with staff from the STWC and Yuzhno-Sakhalinsk seismic station, and specialists from the Regional Ministry of Emergency Situations (right). Credit: T. Ivelskaya.

narios, was used to select the scenario and generate PTWC's messages. In Colombia, the city of Tumaco conducted an evacuation exercise as part of PacWave20.

In Central America, the Central America Tsunami Advisory Center (CATAC) conducted its second regional exercise with the NTWCs. The exercise simulated a "slow" earthquake off the Gulf of Fonseca in the Pacific Ocean that impacted El Salvador, Nicaragua, and Costa Rica, as well as Mexico and Ecuador. The scenario was similar to the deadly tsunami of 1 September 1992 on the Pacific coast of Nicaragua, and the dangerous tsunami of 26 August 2012 in El Salvador and Nicaragua. In both cases, the lack of strong shaking led people living in coastal areas to mistakenly believe that the risk of tsunamis was low. During the simulation, Costa Rica issued a warning to the beachside community of Bahia at Osa, Puntarenas,

VIDEO: https://vimeo.com/542309373

In 2017, the town of Cedeño, Honduras became the 1st community in the Pacific to be recognized as Tsunami Ready. To meet the guidelines, the community conducted a full-scale tsunami exercise involving schools and the community on 16 February as part of "Exercise Pacific Wave 2017". At the Safe Assembly area, Tsunami Warning! comics (ITIC and IOC-UNESCO, IOC/INF-1223, 1993, rev. 2020) were distributed for the kids to learn more about warnings. Credits: ITIC, IOC Tsunami Unit.

who followed their tsunami preparedness and response plan and evacuated.

Countries also conducted national exercises to further test national communication, cooperation and local readiness.

A tsunami warning will only be successful if every person who lives, works, and plays along the coast is ready to respond and knows how to save their lives by moving out of harm's way before the big tsunami hits. Tsunami exercises are one of the most important activities for increasing community resilience and being a UNESCO IOC Tsunami Ready community (http://tsunamiready.org).

IOC-coordinated exercises have also been conducted in regions of the world, in the Caribbean annually since 2011 (also 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020), in the Indian Ocean regularly since 2009 (also 2011, 2014, 2016, 2018, 2020), and in the northeastern Atlantic and Mediterranean since 2012 (also 2014, 2017, 2021)

Discover more:

IOC Tsunami Programme: www.ioc-tsunami.org

WDS Geophysics - NOAA Global Historical Database: www.ngdc.noaa.gov/hazard/tsu.shtml

UN News Report on 2011 Japan Tsunami: www.news.un.org/en/story/2021/03/1086922

For PacWave20, Tuvalu conducted its Fetuvalu Secondary School Tsunami Evacuation drill (bottom right) on 19 November 2020 to test its National Response and the School Tsunami Response Plans. The scenario was a M8.8 earthquake in the Northern Tonga Trench. A total of 125 students (top) and 44 stakeholders participated. Agencies included the Department of Disaster Management as lead organizer, Tuvalu Met Services which tested its warning dissemination procedures, Department of Education, Red Cross, Police, Health Department, Tuvalu Broadcasting Corporation, Kaupule of Funafuti, Australian High Commission, and Lefeagai Community Disaster Committee.

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