



EXERCISE PACIFIC WAVE 2017

A Pacific-wide Tsunami Warning and Enhanced Products Exercise

15–17 February 2017

Volume 1

Exercise Manual

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and Enhanced Products Exercise**

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1. BACKGROUND

The Intergovernmental Oceanographic Commission (IOC) of UNESCO established the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) in 1965 in response to the 1960 earthquake off the coast of Chile that generated a tsunami killing 2,000 people locally, and hundreds in the far field in Hawaii, Japan, and the Philippines. The main focus of the Group is to facilitate the issuance of timely international alerts, and advocate for comprehensive national programmes in hazard assessment, warning guidance, and preparedness (*ITSU Master Plan, 2004 revision*; *PTWS Medium-Term Strategy 2014-2021* (IOC/2013/TS/108); *PTWS Implementation Plan 2013*, vers 4). In 2005, ITSU was re-established as the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System with a new acronym ICG/PTWS.

The US Pacific Tsunami Warning Center (PTWC), established in 1965 with the start of the Tsunami Warning System in the Pacific, serves as the Tsunami Service Provider (TSP) for the Pacific. In response to Member State requests for additional regional information, Japan began operation of its Northwest Pacific Tsunami Advisory Center (NWPTAC) in March 2005, and in April 2006 expanded on an interim basis to the South China Sea. The NWPTAC, which serves as the TSP for the northwest Pacific, provides timely alerts for earthquakes occurring in the northwest Pacific. As of October 2015, the NWPTAC had issued the advisories for 190 events in total since it started the service in March 2005.

A Pacific-wide tsunami exercise is an effective tool for evaluating the readiness of PTWS countries and to identify changes that can improve its effectiveness. The international tsunami exercises were first conceived and conducted in 2006 by the ICG/PTWS under the leadership of the PTWS Exercises Task Teams with strong contributions from the International Tsunami Information Center (ITIC), PTWC, and Japan Meteorological Agency (JMA). Altogether there have been six IOC-coordinated international exercises, “Exercises Pacific Wave” 2006, 2008, 2011, 2013, 2015 and 2016.

The exercises, using a multitude of Pacific scenarios and accompanied by tsunami message products from the Pacific Tsunami Warning Center, Japan Northwest Pacific Tsunami Advisory Center, and the US National Tsunami Warning Center (formerly West Coast and Alaska Tsunami Warning Center), have been used to evaluate the effectiveness of the Tsunami Warning and Mitigation System and measure the readiness of countries to respond, as national tsunami warning centres and emergency response agencies and the public, to distant and local tsunamis. “Exercises Pacific Wave” 2011, 2013, and 2015 were additionally used to introduce and obtain feedback from tests, and validate the PTWC new enhanced forecast products which became official on 1st October 2014. “Exercise Pacific Wave” 2016 and 2017 are being used to evaluate experimental NWPTAC Enhanced Products and identify necessary modifications before the Enhanced Products are formally adopted in 2018.

At its 26th session, the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVI, Honolulu, United States of America, 22–24 April 2015) approved the conduct of “Exercise Pacific Wave” 2017 (PacWave17) during the first Quarter of 2017. At the Steering Committee (SC) of the ICG/PTWS (Honolulu, 29 June–2 July 2016), it was decided that PacWave17 would take place on 15-17 February 2017.

The Steering Committee also considered the progress of South China Sea Tsunami Advisory Center (SCSTAC) Tsunami Advisory Products, and agreed to take the opportunity to include testing of the SCSTAC products with PacWave17. Exercise details were discussed and agreed by the Task Team on the Establishment of the SCSTAC (TT-SCSTAC) at its 2nd Meeting on 24–25 October 2016 in Beijing. The testing and evaluation of the SCSTAC products will be done in parallel with PacWave17, and is overseen by the TT-SCSTAC with support from ITIC.

2. EXERCISE PURPOSE

“Exercise Pacific Wave” 2017 (PacWave17) intends to support the development of improved tsunami products and procedures, including the Enhanced Products of the Pacific Tsunami Warning Center (PTWC) and the Northwest Pacific Tsunami Advisory Center (NWPTAC) of the Japan Meteorological Agency (JMA).

The aim of PacWave17 is to test the NWPTAC and the PTWC enhanced Products.

PacWave17 provides a valuable opportunity for Pacific countries to test the new products, review their tsunami response procedures and test internal and external communication systems. Regular exercises are important for maintaining staff readiness in case of a real event. This is especially true for tsunamis, which are infrequent, but when they occur, require a rapid response. Every Pacific country is encouraged to participate.

3. EXERCISE OBJECTIVE

The overall objectives for Exercise Pacific Wave 2017 are to:

1. Test communications from the PTWS PTWC and NWPTAC Tsunami Service Providers to Member States;
2. Test whether the PTWS PTWC and NWPTAC Tsunami Service Provider products are interpreted by Member States accurately and in a timely manner;
3. Test national and regional communication;
4. Test national and regional cooperation.

Each country may expand and/or customise its own objectives for the exercise.

4. NEW ENHANCED PRODUCTS

The PTWC Enhanced Products are threat information products based on tsunami wave forecasts, rather than on earthquake magnitude and time or distance to impact. Several levels of tsunami threat have been established, and forecast threat levels are assigned to polygons representing segments of extended coastlines or to island groups. Details on the PTWC New Enhanced Products for the PTWS are provided in [IOC Technical Series 105](#) (IOC/2013/TS/105 Rev.3), User's Guide to the Pacific Tsunami Warning Center Enhanced Products for the PTWS (2014); the User's Guide can also be downloaded from the PacWave17 web site (<http://www.pacwave.info>)

The PTWC Enhanced Products were first introduced in “Exercise Pacific Wave” 2011 (PacWave11) and feedback received through the post-exercise evaluation. “Exercise Pacific Wave” 2013 continued the development of the PTWC final products by introducing improved versions that addressed the feedback and comments received from PacWave11 and other meetings in 2011–2013.

At the Twenty-fifth Session of the ICG/PTWS (September 2013), Member States were asked to review and discuss the new products, and approve them, and agreed on an official changeover date in 2014. The new Enhanced Products went live to Member States of the ICG/PTWS on 1 October 2014. Exercise Pacific Wave 2015 again tested the PTWC Enhanced Products.

At the 26th Session of the ICG/PTWS (April 2015), Member States approved the development of new enhanced products by the Japan Northwest Pacific Tsunami Advisory Center. The NWPTAC new enhanced products consist of an initial text message prepared from a pre-established tsunami

simulation database and following text messages accompanied by graphical products based on real-time simulation techniques. The graphical products will be disseminated exclusively to national authorities of the recipient countries. There will be no change to the format of the text messages from the current format.

Full changeover to the new enhanced products is planned for 2018, after approximately one year's parallel issuance of existing and enhanced products. The new products are being introduced and feedback obtained through "Exercises Pacific Wave" 2016 and 2017.

Details of the proposed enhancement of NWPTAC products are as follows:

a. Text products

- Forecast method
 - Tsunami forecast database (the first message –and the second message, in the case of an update of hypocentral parameters–, without graphics)
 - Real-time simulation (subsequent messages, with graphical products)
- Contents (basically no change from the current format)
 - Hypocentral parameters (origin time, location, magnitude)
 - Tsunamigenic potential
 - Coastal blocks
 - Forecast amplitude and arrival time
 - Observed amplitude and arrival time
- Dissemination of products
 - GTS, FAX and E-mail

b. Graphical Products (Maps)

- Forecast method
 - Real-time simulation
- Contents
 - Deep-Ocean tsunami amplitude forecast map
 - Tsunami travel time map
 - Coastal tsunami amplitude forecast map
- Dissemination of products
 - E-mail

5. EXERCISE DATES

PacWave17 will be held within the period of 15-17 February 2017. Participating countries may choose to run their exercise at any time between 15-17 February 2017, allowing flexibility to avoid conflict with other important national events. PacWave17 is recommended to be a tabletop Exercise and will not be a live exercise. All products will be available beforehand on the PacWave17 website (<http://www.pacwave.info>).

5.1 PROVISIONAL TIMELINE AND MILESTONES

4 November 2016	Nomination of a National Contact for PacWave17
1 December 2016	Exercise Manual available on www.pacwave.info (including scenarios)
16 January 2017	NWPTAC Users Manual for PacWave17 available on www.pacwave.info (until this date, please refer to 'Manual on Experimental NWPTAC Enhanced Products for PacWave16')
31 January 2017	Exercise messages posted
15–17 February 2017	PacWave 17
18 February–10 March 2017	Countries to complete and submit evaluation survey online
28–31 March 2017	Draft PacWave17 Preliminary Results discussed at the ICG/PTWS-XXVII session
21 April 2017	Draft PacWave17 Preliminary Report available to Member States
30 June 2017	Final PacWave17 Summary Report uploaded to www.pacwave.info

6. EXERCISE SCENARIO

Each country will be responsible for designing its own national, provincial and/or local level exercise(s) in line with the international Exercise Pacific Wave exercise framework.

Six scenarios are available to allow all participating countries to select and exercise a distant/regional/local source tsunami event. Countries are recommended to choose one scenario to exercise. The exercise scenarios include major tsunamis generated by great earthquakes in the following areas (see [Annex I](#) for scenario details):

- Manila Trench
- New Britain-San Cristobal Trench
- New Hebrides Trench
- Tonga Trench
- Peru-Chile Trench
- Colombia-Ecuador Trench

The exercise will require Member State evaluation of both PTWC and experimental NWPTAC enhanced products, issuing of appropriate country specific alerts by National Tsunami Warning Centres, decision-making, including steps taken just prior to public notification. Member States may conduct the exercise through to the community level if they wish (however, this is not a requirement of the exercise).

If applicable, each country will be responsible for designing its own national, provincial and/or local level exercise(s) in line with the international Exercise Pacific Wave exercise framework.

7. TYPE OF EXERCISE

It is recommended that Exercise Pacific Wave 17 be carried out in a tabletop format (also referred to as a 'discussion exercise', or 'DISCEX').

Participants are presented with a situation or problem that they are required to discuss and for which they have to formulate the appropriate response or solution. Normally, the exercise requires no simulation other than the scenario and/or prewritten exercise injects. An exercise controller or moderator introduces a simulated scenario to participants and, as the exercise advances (in time), exercise problems and activities (injects) are further introduced. This type of exercise is used to practice problem solving and coordination of services with or without time pressures. There is no deployment or actual use of equipment or resources.

An example of a Tabletop Exercise may involve only key stakeholders, such as the National Tsunami Warning Centre and the National Disaster Management Office, discussing their response to a tsunami threat in a particular area, where the only injects are tsunami messages from the international tsunami warning centres such as the PTWC in Hawaii, which describe the nature of the threat.

8. FURTHER GUIDANCE – HOW TO PLAN, CONDUCT AND EVALUATE TSUNAMI EXERCISES GUIDELINE

The IOC Manual and Guides 58, *How to Plan, Conduct and Evaluate IOC Tsunami Wave Exercises* (IOC/2011/MG/58, 2013, English, Spanish) has been developed to aid countries in planning, conducting, and evaluating a tsunami exercise at a national and/or provincial level. The guide is also available at the PacWave17 website (<http://www.pacwave.info>).

9. ASSUMPTIONS

Each country will be responsible for determining what assumptions should be considered as part of its national, provincial, and/or local tsunami exercise.

10. EXERCISE PARTICIPATION

All Pacific countries are encouraged to participate in the exercise. However, it is up to each country to decide what level of governmental participation they will undertake. At a minimum, to meet the objectives of PacWave17, it is recommended that the National Tsunami Warning Centre and the National Disaster Management Office, participate.

Each country's lead agency and its PacWave17 National Contact will be responsible for:

- **During the initial phase of exercise planning:**
 - Determining their country's level of participation.
 - Planning their exercise through the country's Exercise Planning Team.
- **During the exercise:**
 - Responding as necessary to fulfil their all-of-government and National, provincial and/or local arrangement obligations.
- **After the exercise:**
 - Encouraging the conduct of debriefs and evaluations by in-country agencies.
 - Completing the PacWave17 Exercise Evaluation Form based on in-country feedback.

11. EXERCISE DOCUMENTATION

Exercise Pacific Wave 2017 planning, conduct, and evaluation should take into account the following documents:

- [IOC Circular Letter No 2636](#): Pacific Tsunami Warning and Mitigation System (PTWS) Exercise Pacific Wave 2017 (PacWave17), 15-17 February 2017, issued 16 August 2016
- *Exercise Pacific Wave 2017, A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 15-17 February 2017. Volume 1: Exercise Manual*, IOC Technical Series No 131. UNESCO/IOC 2016 (English) (*this document*)
- *User's Guide for the Pacific Tsunami Warning Center Enhanced Products for the Pacific Tsunami Warning System*. [IOC Technical Series No 105](#). UNESCO/IOC rev. 2014 (English, Spanish)
- *Users Guide for the Northwest Pacific Tsunami Advisory Center Enhanced Products for the Pacific Tsunami Warning System*. (English, draft January 2017)
- *Operational Users Guide for the Pacific Tsunami Warning and Mitigation System (PTWS)*, ([IOC Technical Series N° 87](#), revised in August 2011 (English))
- *How to Plan, Conduct, and Evaluate IOC Tsunami Wave Exercises*, [IOC Manuals and Guides No 58](#), 2013 (English, Spanish)

All information related to Exercise Pacific Wave 2017 is available at the exercise website: <http://www.pacwave.info>

12. EXERCISE PRODUCTS

PacWave17 will commence with a “dummy” kickoff exercise message from each Tsunami Service Provider at the earthquake time for each scenario in order to test communications from Tsunami Service Providers to countries. Participating countries should select a relevant scenario and its most convenient date and time to conduct the Tabletop Exercise within the 15-17 February 2017 time period. Participating countries may amend the exercise messages to suit their own timetable.

All PTWC and NWPTAC products will be provided online at the PacWave17 website in advance to help countries plan and prepare. It is recommended to download from the PacWave17 website, the PTWC and NWPTAC products and messages for the appropriate scenario prior to the day of the exercise.

The earthquake origin time default date and time of the messages can be adjusted by participating countries to coincide with their selected Tabletop Exercise local date and time. Subsequent message issuance date and times, and earthquake and tsunami arrival times should then also be adjusted accordingly.

All documentation and correspondence relating to this exercise is to be clearly identified as **PacWave17** and **For Exercise Purposes Only**.

Each country is also welcome to modify estimated arrival times or estimated wave amplitudes to suit their preference; for example, to have the arrival of tsunami sooner and with a larger amplitude.

13. EXERCISE DELIVERY/FORMAT

All messages for the different scenarios ([Annex I](#)) are listed in the Master Schedule of Events List (MSEL, [Annex II](#)).

Distribution of the series of Tsunami Service Provider messages for each scenario within each country (available beforehand on the exercise website) will be the responsibility of each country.

Each PacWave17 National Contact and their Exercise Planning Team should decide whether the exercise scenario messages are made known to the other national, provincial and local agencies prior to the exercise.

During the exercise, the Exercise Control Team may choose to feed the bulletins into the exercise at times of their own choosing, or alternatively put them in envelopes with the time they must be opened written on each, with each key participating agency having their own set of envelopes.

Country Exercise Planning Teams may want to add their own national and/or local injects.

14. MASTER SCHEDULE OF EVENTS LIST (MSEL) – EXERCISE SCRIPT

The Master Schedule of Events List (MSEL) is a detailed sequence of events used by Exercise Control Team to ensure that the exercise runs smoothly.

The International Master Schedule of Events List (MSEL) giving the timeline for issuance of international products, and the product types are given in [Annex II](#).

Each country's Exercise Control Team will be responsible for executing Master Schedule of Events List.

15. POST-EXERCISE EVALUATION

All exercises should have a learning focus. Learning is maximised when there is a continuous process of review to draw out the lessons identified. Review is the process of evaluating and validating the exercise. The exercise should also test an agency's Standard Operating Procedures (SOPs).

A review and hot and cold debrief should evaluate the effectiveness of arrangements in place and identify if there are any corrective actions and gaps to fill. The hot and cold debriefs are then used to complete the "Exercise Pacific Wave" 2017 post-exercise evaluation form.

All participating countries are asked to provide feedback through the PacWave17 Evaluation Form ([Annex III](#)) by 10 March 2017. It is requested that each country compile evaluations from its jurisdictions and/or agencies, and submit only one PacWave17 evaluation. Forms should be submitted online by visiting https://www.surveymonkey.com/s/pacwave17_eval. This feedback will greatly assist in the evaluation of "Exercise Pacific Wave" 17 and the finalisation of the NWPTAC Enhanced Products.

15.1 DEBRIEFING

A post-exercise debrief is a critical review of the entire exercise. It identifies those areas that were handled well, those areas where issues were experienced, and recommendations for improvement.

The aim of organisational debriefing is for staff to communicate their experiences of the exercise so that lessons can be identified. Arrangements (plans, procedures, training, etc.) can then be modified to reflect lessons identified along with best practice, and therefore improve the agency's ability to respond in future exercises/real events.

Each agency that participates in PacWave17 is expected to conduct its own debrief after the exercise. This may take the form of a hot debrief (or hotwash) on the day of the exercise, with each participating agency conducting its own cold (formal) debrief within the week(s) following the exercise.

A formal exercise debrief inclusive of all participants in the respective countries will be required to facilitate a collective and official evaluation. The method (in person meeting, survey, teleconference, or other means) used to collect the data required is to be decided upon by the individual participant countries.

The feedback received from this structured debrief is then used to complete standard evaluation forms which are to be based on the overall exercise objectives, plus any additional evaluation forms or tools developed by each country.

A useful guide to debriefing is one used by New Zealand Ministry of Civil Defence & Emergency Management (ISBN 0-478-25467-9). It can be found at:

<http://www.civildefence.govt.nz/assets/Uploads/publications/is-06-05-organisational-debriefing.pdf>

15.2 EXERCISE VALIDATION

The final stage of the exercise process is to determine whether or not the exercise has met its objectives. At the country level, a national exercise should compare the performance of the agencies involved during the exercise against the performance expected. After validation, countries and agencies may need to change or develop new plans, procedures, and training programmes. Exercise outcomes may be retested in future tsunami exercises, or new exercises written to meet newly identified needs

15.3 EVALUATION CRITERIA

There will be two types of evaluation criteria. The first type will be international criteria based on the overall exercise objectives (see Section 2 above). These are provided in Annex III. The second type will be criteria to be determined by each individual country to measure its own objectives.

In compiling the "Exercise Pacific Wave" 2017 Summary Report, the Exercise Task Team will only require the international evaluation from each participating country.

15.4 EVALUATORS

Countries may appoint Exercise Evaluators to observe and evaluate selected objectives during their exercise. Evaluators should be subject matter experts in the field they are evaluating, such as in warning centre operations, emergency response, or in specific agency areas of responsibility.

Appointing and assigning evaluators is the responsibility of each participating country.

15.5 OBSERVERS

"Exercise Pacific Wave" 2017 may generate interest within the wider sector or local community. Visitors from other agencies (whether local or international) may be invited to observe various exercise activities. Media may also be invited to observe as a way of helping to increase tsunami

awareness. Some media may also participate or be simulated, if they are part of the official warning and evacuation dissemination chain.

The invitation of internal or external agency personnel to observe the exercise is the responsibility of each participating country.

15.6 EVALUATION TOOLS

The goal of the exercise evaluation is to validate strengths and identify opportunities for improvement within the participating organisations. This is to be accomplished by collating supporting data; analysing the data to compare effectiveness against requirements; and determining what changes need to be made by participating organisations. At the international level, this would involve the ICG/PTWS as the intergovernmental coordinating group supporting effective tsunami warning and decision making.

Evaluation of an exercise should focus on the adequacy of plans, policies, procedures, assessment capabilities, communication, resources and inter-agency/inter-jurisdictional relationships that support effective tsunami warning and decision-making at all levels of government. Participants that choose to include additional objectives, for example by exercising public warning and/or response plans, can expand the evaluation form accordingly. The evaluation of such additional objectives will be for the use of the particular participating agency only, and is not required for the PTWS “Exercise Pacific Wave” 2017 Summary Report.

The evaluation tool aims to inform and facilitate individual participant country evaluations as well as the “Exercise Pacific Wave” 2017 Summary Report.

All participating countries are asked to complete the official PacWave17 Exercise Evaluation Form ([Annex III](#)) **by 10 March 2017**. Forms should be submitted online by visiting https://www.surveymonkey.com/s/pacwave17_eval.

15.7 EXERCISE PACIFIC WAVE 2017 SUMMARY REPORT

The Exercise Task Team will compile the “Exercise Pacific Wave” 2017 Summary Report based on the official Exercise Evaluation Forms received. The report will include the following:

- Exercise description
- Post-Exercise Evaluation Summary and Findings
- Identification of Best Practices or Strengths
- Identification of Areas for Improvement
- Recommendations on Plans of Action for Improvement

16. REAL EVENTS DURING EXERCISE PLAY

In the case of a real event occurring during the exercise, PTWC and JMA/NWPTAC will issue their normal message products for the event. Such messages will be given full priority and a decision will be made by each international centre whether to continue or cease their participation in the exercise. Smaller earthquakes that only trigger a Tsunami Information Bulletin will not disrupt the exercise.

Nationally, each country may suspend or terminate the exercise for their own reasons.

17. RESOURCING

Although participating countries will have advance notice of the exercise and may elect to stand up a special dedicated shift to allow normal core business to continue uninterrupted, it is requested that realistic resource levels be deployed in order to reflect some of the issues that are likely to be faced in a real event.

18. MEDIA ARRANGEMENTS

The UNESCO Division of Public Information / Sector for External Relations and Public Information will issue an international Media Advisory one week before the development of the “Exercise Pacific Wave” 17 providing details of the exercise. ICG/PTWS Member States should consider issuing at least one press release to their respective country’s media. Member States’ press releases will give adequate alert to their country’s population and give their local media time to conduct interviews and documentaries with participating exercise organisations in advance of the exercise.

[Annex IV](#) contains a sample press release that can be customised by Member States. The sample press release is provided in English. Samples in other languages can be found at the PacWave17 website (<http://www.pacwave.info>).

ANNEX I
SCENARIOS

Location	Depth	Magnitude	Latitude	Longitude	Past Exercise
Manila Trench (South China Sea)	35 km	9.0	15.44 N	119.36 E	-
New Britain-San Cristobal Trench	20 km	9.0	7.3 S	156.0 E	PacWave16
New Hebrides Trench	20 km	9.0	14.3 S	166.2 E	PacWave11
Tonga Trench	20 km	9.0	23.6 S	175.5 W	PacWave11, 15
Peru-Chile Trench	20 km	9.0	32.3 S	71.9 W	-
Colombia-Ecuador Trench	20 km	9.0	1.0 N	81.5 W	PacWave15

ANNEX II

INTERNATIONAL MASTER SCHEDULE OF EVENTS LIST

Scenario →	Manila Trench				New Britain-San Cristobal Trench				New Hebrides Trench				Tonga Trench		Peru-Chile Trench		Colombia-Ecuador Trench	
Center →	PTWC		NWPTAC		PTWC		NWPTAC		PTWC		NWPTAC		PTWC		PTWC		PTWC	
Date & Time (UTC)	#	TYP	#	TYP	#	TYP	#	TYP	#	TYP	#	TYP	#	TYP	#	TYP	#	TYP
15 Feb 1400															Quake		Quake	
1407															1	TI	1	TI
1435															2	TFR	2	TFR
1500															3	TFP	3	TFP
1600															4	TS	4	TS
1700															5	TS	5	TS
1800															6	TS	6	TS
1900															7	TS	7	TS
2000															8	TS	8	TS
2100									Quake				Quake		9	TS	9	TS
2107									1	TI			1	TI				
2120											1	TI						
2135									2	TFR			2	TFR				
2140											2	TFR						
2200									3	TFP			3	TFP	10	TS	10	TS
2300									4	TS			4	TS	11	TS	11	TS
2310											3	TS						
16 Feb 0000									5	TS			5	TS	12	TS	12	TS
0010											4	TS						
0100	Quake				Quake				6	TS			6	TS	13	TS	13	TS
0107	1	TI			1	TI												
0120			1	TI			1	TI										
0135	2	TFR			2	TFR												
0140			2	TFR			2	TFR			5	TS						
0200	3	TFP			3	TFP			7	TS			7	TS	14	TS	14	TS
0230	4	TFH																
0300	5	TS			4	TS			8	TS			8	TS	15	TS	15	TS
0310			3	TS			3	TS			6	TS						
0400	5	TS			5	TS			9	TS			9	TS	16	TS	16	TS
0440			4	TS			4	TS			7	TS						
0500	6	TS			6	TS			10	TS			10	TS	17	TS	17	TS
0600	7	TS			7	TS			11	TS			11	TS	18	TS	18	TS
0610			5	TS			5	TS			8	TS						
0700	8	TS			8	TS			12	TS			12	TS	19	TS	19	TS
0740			6	TS			6	TS			9	TS						
0800	9	TS			9	TS			13	TS			13	TS	20	TS	20	TS
0900	10	TS			10	TS			14	TS			14	TS	21	TS	21	TS
0910			7	TS			7	TS			10	TS						
1000	11	TS			11	TS			15	TS			15	TS	22	TS	22	TS
1040			8	TS			8	TS			11	TS						
1100	12	TS			12	TS			16	TS			16	TS	23	TS	23	TS
1200	13	TS			13	TS			17	TS			17	TS	24	TS	24	TS
1210			9	TS			9	TS			12	TS						
1300	14	TS			14	TS			18	TS			18	TS	25	TS	25	TS
1340			10	TS			10	TS			13	TS						
1400	15	TS			15	TS			19	TS			19	TS	26	TL	26	TL
1500	16	TS			16	TS			20	TS			20	TS				
1510			11	TS			11	TS										
1600	17	TS			17	TS			21	TS			21	TS				
1640			12	TS			12	TS										
1700	18	TL			18	TS			22	TL			22	TL				
1800					19	TS												
1900					20	TS												
2000					21	TS												
2100					22	TS												
2200					23	TS												
2300					24	TS												
17 Feb 0000					25	TS												
0100					26	TL												

Message Types: TI = PTWC/NWPTAC Initial Text Message
TFR = PTWC/NWPTAC text Message with a Forecast for the Regional near the Earthquake
TFP = PTWC Products with a Pacific-wide Forecast
TFH = PTWC Products with a Forecast for Shallow Marginal Seas (High-Resolution Forecast Model Run)
TS = PTWC/NWPTAC Text Message with Tsunami Observations
TL = PTWC Last Message for this Event

Note 1) Dummy messages will be issued at the time of the earthquake for each scenario.

Note 2) Participating countries may shift the schedule to adapt it to their own timetable.

ANNEX III

POST-EXERCISE EVALUATION

Exercise evaluation forms are to be completed by each participating agency and forwarded to the country “Exercise Pacific Wave” 2017 National Contact, or the country Tsunami National Contact. **The PacWave17 National Contact will compile the country Evaluation Form and complete and submit this online no later than 10 March 2017.**

Note: Only **one** on-line evaluation form is to be completed per country. The PacWave17 National Contact, TNC, or TWFP should compile sub-jurisdiction evaluations into one country evaluation to submit.

The PacWave17 Evaluation Form can be found at
https://www.surveymonkey.com/s/pacwave17_eval

Alternatively, the country evaluation forms can be submitted by email or fax to the Exercise PacWave 17 Task Team Chairs:

- Laura Kong (email: l.kong@noaa.gov, 1-808-725-6055), or
- Jo Guard (email: jo.guard@dpmc.govt.nz, fax: +64 4 817 8554), or
- Tomoaki Ozaki (email: hokusei@eqvol2.kishou.go.jp).

Exercise Pacific Wave 2017 Instructions on how to complete this Evaluation Form		
Step	Who completes this step?	Description
1	Each participating Agency/Country	Decide if your agency/country will include additional evaluation questions for each objective. Country/agency evaluation questions can be added at the end of each section. However, do NOT change the reference numbers to the questions.
2	Each participating Agency/Country	Print this form and mark your evaluation answers on it.
3	Each participating Agency/Country	<ul style="list-style-type: none"> • Answer each statement with either Y (Yes), N (No). • Comments should be used to explain/expand upon your Yes or No answer • Write your comments on the page following the evaluation questions. Note the question number in the left column and write your comments alongside.
4	Each participating Agency/Country	Send completed agency evaluation form to country PacWave17 National Contact so he/she can compile to complete Country PacWave17 Evaluation Form (this URL).
5	PacWave17 National Contact	PacWave17 National Contact should complete and submit the PacWave17 Evaluation Form by 10 March 2017 . (https://www.surveymonkey.com/s/pacwave17_eval). If there are problems or questions, please contact the PacWave17 Task Team co-Chairs (Laura Kong, laura.kong@noaa.gov ; Jo Guard, jo.guard@dpmc.govt.nz or Tomoaki Ozaki, hokusei@eqvol2.kishou.go.jp)

Exercise Pacific Wave 2017 Evaluation Form			
Contact Details			
Agency:		Country:	
Contact Name:		Contact Position:	
Contact Phone:		Contact Mobile:	
Contact E-Mail:			

Country Exercise Scenario	
Scenario Used:	Tick Scenario(s) used during PacWave17: <ul style="list-style-type: none"> <input type="radio"/> Manila Trench <input type="radio"/> New Britain-San Cristobal Trench <input type="radio"/> New Hebrides Trench <input type="radio"/> Tonga Trench <input type="radio"/> Peru-Chile Trench <input type="radio"/> Colombia-Ecuador Trench

OBJECTIVE 1
<i>Test communications from the PTWC, and NWPTAC Tsunami Service Providers to Member States/Countries.</i>

Ref No	Evaluation Statements/Questions	Yes	No	Comment	Not applicable
1.1	Did your country Tsunami Warning Focal Point receive the PTWS and/or NWPTAC information/threat message?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	If yes, when did you receive the message(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3	How did you receive the message(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="radio"/> GTS <input type="radio"/> AFTN <input type="radio"/> EMWIN <input type="radio"/> Fax <input type="radio"/> Email <input type="radio"/> CISON (Real-Time Earthquake Display) <input type="radio"/> RANET Heads-up SMS <input type="radio"/> Other (Please specify):				

OBJECTIVE 2

Test whether the PTWS PTWC/NWPTAC Tsunami Service Provider products are interpreted by Member States accurately and in a timely manner.

		Yes	No	Comment	Not applicable
Ref No	Evaluation Statements/Questions				
2.1	Information provided by the relevant TSP products was understood by the National Tsunami Warning Centre (NTWC)/National Disaster Management Office (NDMO).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2	How did your country assess the tsunami threat during the exercise? Please tick as many as apply: <ul style="list-style-type: none"> • National tsunami experts • National tsunami coordination committee • National tsunami historical database • NCEI/WDS tsunami historical database (web) • TsuDig historical database GIS tool (NCEI/ITIC offline) • National pre-computed tsunami scenarios • National tsunami forecasts • International tsunami forecasts. Note source of forecasts (PTWC, NWPTAC, US NTWC) in comments. • Communication with outside sources (such as ITIC, media, other). Please specify in the comments section. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3	The information provided assisted with decision making, e.g., warning levels, earthquake parameters, estimated arrival times, forecast wave heights, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4	The information issued by our country national Tsunami Warning Focal Point was according to standard operating procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OBJECTIVE 3

*To test national and regional **communication**.*

		Yes	No	Comment	Not applicable	
Ref No	Evaluation Statements/Questions					
3.1	The warning was disseminated to: <ul style="list-style-type: none"> Emergency services Other national government agencies Science agencies/universities involved in assessment Local government: provincial/regional level Local government: city/district level. Public 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.2	What time was the initial PTWC and/or NWPTAC PacWave17 scenario exercise start message sent to the agency or agencies listed in Q3.1? Please note the time using 24 hour clock and UTC, e.g., 14:35 UTC.	Note answer on the following comment page				
3.3	How did you send the initial PTWC and/or NWPTAC Exercise PacWave17 scenario exercise start message to the agency or agencies listed in Q3.1? <ul style="list-style-type: none"> Fax Email SMS Other (Please specify) 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.4	Did the national disaster management organisation (or equivalent) maintain communication with the National Tsunami Warning Centre throughout the event?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.5	If you answered yes to Q3D.1, what was the nature of the communication between the national disaster management organisation (or equivalent) with the national tsunami warning centre throughout the event?	Note answer on the following comment page				
3.6	Did the national disaster management organisation (or equivalent) maintain communication with local/regional disaster management organisations (or equivalent)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.7	If you answered yes to Q3.6, what was the nature of the communication between the national disaster management organisation (or equivalent) with local/regional disaster management organisations (or equivalent)?	Note answer on the following comment page				

OBJECTIVE 4							
<i>To test national and regional cooperation.</i>							
		Yes	No	Comment	Not applicable		
Ref No	Evaluation Statements/Questions						
4.1	The NTWC/NDMO has an activation and response process (standard operating procedures) in place for the receipt of tsunami warnings.		Y		N		C
4.2	The NTWC/NDMO knows its specific response role in the event of a tsunami.						NA
4.3	The NTWC/NDMO has, prior to the exercise, engaged in tsunami response planning.						
4.4	The NTWC/NDMO has undertaken activities to increase its capacity and capability to support a national tsunami response (for example, training, exercise, etc.) – Note activities in Comment section.						
4.5	The NTWC/NDMO has an appropriate management structure identified and documented to support tsunami response.						
4.6	The NTWC/NDMO has a tsunami mass coastal evacuation plan.						
4.7	Arrangements to assemble the in-country disaster management group relevant to decision-making on tsunami warning and response were in place before the exercise.						
4.8	A country tsunami emergency response plan (standard operating procedures) for regional/local tsunamis exists.						
4.9	The warning was disseminated to: <ul style="list-style-type: none"> • Emergency services • Other national government agencies • Science agencies/universities involved in assessment • Local government: provincial/regional level • Local government: city/district level. • Public 						
4.10	Regional/local tsunami exercises are routinely conducted in-country. Note last exercise in Comments section.						
4.11	Tsunami-related curriculum programmes are in place for all levels of education. Note which levels in Comments section.						
4.12	Communities have tsunami evacuation maps, routes, evacuation signs and assembly points for evacuation areas? Please note any gaps and future plans to fill gaps.						

GENERAL EXERCISE OBSERVATIONS

Provide feedback on the planning and conduct of PacWave17

Evaluation Statements / Questions. Indicate Yes or No	Yes	No
Overall assessment		
Country stakeholder agencies have a better understanding of the goals, responsibilities and roles in tsunami emergencies.		
Gaps in capability and capacity have been identified.		
Exercise planning (please make comments on the following page to all of the statements below)		
Overall, the exercise planning, conduct, format and style were satisfactory.		
Exercise planning went well.		
The PacWave17 exercise website pages were useful.		
This evaluation form was easy to use.		
PacWave17 Exercise Manual provided an appropriate level of detail.		
IOC Manual & Guides 58: How to Plan, Conduct, and Evaluate IOC Tsunami Wave Exercises was useful.		

Please provide a general statement on your Exercise Pacific Wave 17 experience.

Exercise Planning

Please provide a general statement about what went well .
<i>Insert comments</i>
Please provide a general statement about what did not go well .
<i>Insert comments</i>
Please provide a general statement about what could be improved .
<i>Insert comments</i>

Exercise Conduct

Please provide a general statement about what went well .
<i>Insert comments</i>
Please provide a general statement about what did not go well .
<i>Insert comments</i>
Please provide a general statement about what could be improved .
<i>Insert comments</i>

Exercise Debrief or Evaluation

Please provide a general statement about what went well .
<i>Insert comments</i>
Please provide a general statement about what did not go well .
<i>Insert comments</i>
Please provide a general statement about what could be improved .
<i>Insert comments</i>

ANNEX IV

SAMPLE PRESS RELEASE

TEMPLATE FOR NEWS RELEASE

USE AGENCY MASTHEAD

Contact: (insert name)
(insert phone number)
(insert email address)

FOR IMMEDIATE RELEASE
(insert date)

SEVENTH PACIFIC TSUNAMI DRILL SET FOR FEBRUARY 2017

(Insert country name) will join over 40 other countries around the Pacific Rim as a participant in a mock tsunami scenario during 15-17 February 2017. The purpose of this Pacific-wide exercise is to exercise country tsunami decision-making procedures and communication systems and processes. It will also provide an opportunity for those countries that receive products from the Northwest Pacific Tsunami Advisory Center (NWPTAC) in Japan to assess new experimental enhanced forecast products, including tsunami wave forecasts that enable each country to better assess its own tsunami threat.

“The recent events of the 2009 Samoa Islands, 2010 Chile, 2011 Japan, and the February 2013 Solomon Islands tsunamis have increased our need to be more prepared for such events,” said (insert name of appropriate official). “This important exercise will validate the enhanced products for future official use by countries of the Pacific Tsunami Warning and Mitigation System.

The exercise, titled Exercise Pacific Wave 2017 (PacWave17), will simulate Pacific countries being put into a Tsunami Warning situation requiring government decision-making. It is the seventh such exercise with the first having been carried out in May 2006, and subsequent exercises held in October 2008, November 2011, May 2013, February 2015 and February 2016.

Participating countries will select from six different Pacific scenarios and conduct a Tabletop Exercise within the second week of February. Destructive Pacific-wide tsunamis will be simulated through tsunami information messages from the Pacific Tsunami Warning Center in Hawaii and Japan’s NWPTAC, and then reviewed by focal points designated by each country that are responsible for their country’s tsunami response.

Insert paragraph tailored for specific country. Could identify participating agencies and specific plans. Could describe current early warning program, past evacuation drills (if any), ongoing mitigation and public education programs, etc. Could describe tsunami threat, history of tsunami hazards, if any.

The exercise is sponsored by UNESCO’s Intergovernmental Oceanographic Commission through its Intergovernmental Coordination Group of the Pacific Tsunami Warning and Mitigation System (ICG/PTWS)

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On the Web:

Exercise Pacific Wave 2017 information site: <http://www.pacwave.info>

Media Resources:

[http://itic.ioc-](http://itic.ioc-unesco.org/index.php?option=com_content&view=category&layout=blog&id=1150&Itemid=1150)

[unesco.org/index.php?option=com_content&view=category&layout=blog&id=1150&Itemid=1150](http://itic.ioc-unesco.org/index.php?option=com_content&view=category&layout=blog&id=1150&Itemid=1150)

Pacific Tsunami Warning and Mitigation System:

[http://www.ioc-](http://www.ioc-tsunami.org/index.php?option=com_content&view=article&id=11&Itemid=12&lang=en)

[tsunami.org/index.php?option=com_content&view=article&id=11&Itemid=12&lang=en](http://www.ioc-tsunami.org/index.php?option=com_content&view=article&id=11&Itemid=12&lang=en)

Pacific Tsunami Warning Center: <http://www.tsunami.gov>, <http://ptwc.weather.gov>

Northwest Pacific Tsunami Advisory Centre:

http://www.jma.go.jp/en/distant_tsunami/WEPA40/index.html

US National Tsunami Warning Center: <http://www.tsunami.gov>

[Insert country URLs]

ANNEX V

LIST OF ACRONYMS

DISCEX	Discussion Exercise' or Table top Exercise
ICG/PTWS	Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (formerly ITSU)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
ITIC	International Tsunami Information Center (UNESCO/IOC–NOAA)
JMA	Japan Meteorological Agency
MSEL	Master Schedule of Events List
NDMO	National Disaster Management Office
NOAA	National Oceanic & Atmospheric Administration (USA)
NTWC	National Tsunami Warning Centre
NWPTA	Northwest Pacific Tsunami Advisory
NWPTAC	Northwest Pacific Tsunami Advisory Center (Japan)
PTWC	Pacific Tsunami Warning Center (USA)
SCSTAC	South China Sea Tsunami Advisory Center (China)
SOP	Standard Operating Procedures
TT	Task Team
TNC	Tsunami National Contact
TWFP	Tsunami Warning Focal Point
UNESCO	United Nations Educational, Scientific & Cultural Organization
US NTWC	US National Tsunami Warning Center (USA)
WG	Working Group

IOC Technical Series

No.	Title	Languages
1	Manual on International Oceanographic Data Exchange. 1965	(out of stock)
2	Intergovernmental Oceanographic Commission (Five years of work). 1966	(out of stock)
3	Radio Communication Requirements of Oceanography. 1967	(out of stock)
4	Manual on International Oceanographic Data Exchange - Second revised edition. 1967	(out of stock)
5	Legal Problems Associated with Ocean Data Acquisition Systems (ODAS). 1969	(out of stock)
6	Perspectives in Oceanography, 1968	(out of stock)
7	Comprehensive Outline of the Scope of the Long-term and Expanded Programme of Oceanic Exploration and Research. 1970	(out of stock)
8	IGOSS (Integrated Global Ocean Station System) - General Plan Implementation Programme for Phase I. 1971	(out of stock)
9	Manual on International Oceanographic Data Exchange - Third Revised Edition. 1973	(out of stock)
10	Bruun Memorial Lectures, 1971	E, F, S, R
11	Bruun Memorial Lectures, 1973	(out of stock)
12	Oceanographic Products and Methods of Analysis and Prediction. 1977	E only
13	International Decade of Ocean Exploration (IDOE), 1971-1980. 1974	(out of stock)
14	A Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment and Baseline Study Guidelines. 1976	E, F, S, R
15	Bruun Memorial Lectures, 1975 - Co-operative Study of the Kuroshio and Adjacent Regions. 1976	(out of stock)
16	Integrated Ocean Global Station System (IGOSS) General Plan and Implementation Programme 1977-1982. 1977	E, F, S, R
17	Oceanographic Components of the Global Atmospheric Research Programme (GARP) . 1977	(out of stock)
18	Global Ocean Pollution: An Overview. 1977	(out of stock)
19	Bruun Memorial Lectures - The Importance and Application of Satellite and Remotely Sensed Data to Oceanography. 1977	(out of stock)
20	A Focus for Ocean Research: The Intergovernmental Oceanographic Commission - History, Functions, Achievements. 1979	(out of stock)
21	Bruun Memorial Lectures, 1979: Marine Environment and Ocean Resources. 1986	E, F, S, R
22	Scientific Report of the Interecalibration Exercise of the IOC-WMO-UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open Ocean Waters. 1982	(out of stock)
23	Operational Sea-Level Stations. 1983	E, F, S, R
24	Time-Series of Ocean Measurements. Vol.1. 1983	E, F, S, R
25	A Framework for the Implementation of the Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment. 1984	(out of stock)
26	The Determination of Polychlorinated Biphenyls in Open-ocean Waters. 1984	E only
27	Ocean Observing System Development Programme. 1984	E, F, S, R
28	Bruun Memorial Lectures, 1982: Ocean Science for the Year 2000. 1984	E, F, S, R
29	Catalogue of Tide Gauges in the Pacific. 1985	E only
30	Time-Series of Ocean Measurements. Vol. 2. 1984	E only
31	Time-Series of Ocean Measurements. Vol. 3. 1986	E only
32	Summary of Radiometric Ages from the Pacific. 1987	E only
33	Time-Series of Ocean Measurements. Vol. 4. 1988	E only
34	Bruun Memorial Lectures, 1987: Recent Advances in Selected Areas of Ocean Sciences in the Regions of the Caribbean, Indian Ocean and the Western Pacific. 1988	Composite E, F, S
35	Global Sea-Level Observing System (GLOSS) Implementation Plan. 1990	E only

(continued)

36	Bruun Memorial Lectures 1989: Impact of New Technology on Marine Scientific Research. 1991	Composite E, F, S
37	Tsunami Glossary - A Glossary of Terms and Acronyms Used in the Tsunami Literature. 1991	E only
38	The Oceans and Climate: A Guide to Present Needs. 1991	E only
39	Bruun Memorial Lectures, 1991: Modelling and Prediction in Marine Science. 1992	E only
40	Oceanic Interdecadal Climate Variability. 1992	E only
41	Marine Debris: Solid Waste Management Action for the Wider Caribbean. 1994	E only
42	Calculation of New Depth Equations for Expendable Bathymetographs Using a Temperature-Error-Free Method (Application to Sippican/TSK T-7, T-6 and T-4 XBTS. 1994	E only
43	IGOSS Plan and Implementation Programme 1996-2003. 1996	E, F, S, R
44	Design and Implementation of some Harmful Algal Monitoring Systems. 1996	E only
45	Use of Standards and Reference Materials in the Measurement of Chlorinated Hydrocarbon Residues. 1996	E only
46	Equatorial Segment of the Mid-Atlantic Ridge. 1996	E only
47	Peace in the Oceans: Ocean Governance and the Agenda for Peace; the Proceedings of <i>Pacem in Maribus</i> XXIII, Costa Rica, 1995. 1997	E only
48	Neotectonics and fluid flow through seafloor sediments in the Eastern Mediterranean and Black Seas - Parts I and II. 1997	E only
49	Global Temperature Salinity Profile Programme: Overview and Future. 1998	E only
50	Global Sea-Level Observing System (GLOSS) Implementation Plan-1997. 1997	E only
51	L'état actuel de l'exploitation des pêcheries maritimes au Cameroun et leur gestion intégrée dans la sous-région du Golfe de Guinée (<i>cancelled</i>)	F only
52	Cold water carbonate mounds and sediment transport on the Northeast Atlantic Margin. 1998	E only
53	The Baltic Floating University: Training Through Research in the Baltic, Barents and White Seas - 1997. 1998	E only
54	Geological Processes on the Northeast Atlantic Margin (8 th training-through-research cruise, June-August 1998). 1999	E only
55	Bruun Memorial Lectures, 1999: Ocean Predictability. 2000	E only
56	Multidisciplinary Study of Geological Processes on the North East Atlantic and Western Mediterranean Margins (9 th training-through-research cruise, June-July 1999). 2000	E only
57	Ad hoc Benthic Indicator Group - Results of Initial Planning Meeting, Paris, France, 6-9 December 1999. 2000	E only
58	Bruun Memorial Lectures, 2001: Operational Oceanography – a perspective from the private sector. 2001	E only
59	Monitoring and Management Strategies for Harmful Algal Blooms in Coastal Waters. 2001	E only
60	Interdisciplinary Approaches to Geoscience on the North East Atlantic Margin and Mid-Atlantic Ridge (10 th training-through-research cruise, July-August 2000). 2001	E only
61	Forecasting Ocean Science? Pros and Cons, Potsdam Lecture, 1999. 2002	E only
62	Geological Processes in the Mediterranean and Black Seas and North East Atlantic (11 th training-through-research cruise, July- September 2001). 2002	E only
63	Improved Global Bathymetry – Final Report of SCOR Working Group 107. 2002	E only
64	R. Revelle Memorial Lecture, 2006: Global Sea Levels, Past, Present and Future. 2007	E only
65	Bruun Memorial Lectures, 2003: Gas Hydrates – a potential source of energy from the oceans. 2003	E only
66	Bruun Memorial Lectures, 2003: Energy from the Sea: the potential and realities of Ocean Thermal Energy Conversion (OTEC). 2003	E only

67	Interdisciplinary Geoscience Research on the North East Atlantic Margin, Mediterranean Sea and Mid-Atlantic Ridge (12 th training-through-research cruise, June-August 2002). 2003	E only
68	Interdisciplinary Studies of North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes (13 th training-through-research cruise, July-September 2003). 2004	E only
69	Biodiversity and Distribution of the Megafauna / Biodiversité et distribution de la mégafaune. 2006 Vol.1 The polymetallic nodule ecosystem of the Eastern Equatorial Pacific Ocean / Ecosystème de nodules polymétalliques de l'océan Pacifique Est équatorial Vol.2 Annotated photographic Atlas of the echinoderms of the Clarion-Clipperton fracture zone / Atlas photographique annoté des échinodermes de la zone de fractures de Clarion et de Clipperton Vol.3 Options for the management and conservation of the biodiversity — The nodule ecosystem in the Clarion Clipperton fracture zone: scientific, legal and institutional aspects	E F
70	Interdisciplinary geoscience studies of the Gulf of Cadiz and Western Mediterranean Basin (14 th training-through-research cruise, July-September 2004). 2006	E only
71	Indian Ocean Tsunami Warning and Mitigation System, IOTWS. Implementation Plan, 7–9 April 2009 (2 nd Revision). 2009	E only
72	Deep-water Cold Seeps, Sedimentary Environments and Ecosystems of the Black and Tyrrhenian Seas and the Gulf of Cadiz (15 th training-through-research cruise, June–August 2005). 2007	E only
73	Implementation Plan for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (NEAMTWS), 2007–2011. 2007 (<i>electronic only</i>)	E only
74	Bruun Memorial Lectures, 2005: The Ecology and Oceanography of Harmful Algal Blooms – Multidisciplinary approaches to research and management. 2007	E only
75	National Ocean Policy. The Basic Texts from: Australia, Brazil, Canada, China, Colombia, Japan, Norway, Portugal, Russian Federation, United States of America. (Also Law of Sea Dossier 1). 2008	E only
76	Deep-water Depositional Systems and Cold Seeps of the Western Mediterranean, Gulf of Cadiz and Norwegian Continental margins (16 th training-through-research cruise, May–July 2006). 2008	E only
77	Indian Ocean Tsunami Warning and Mitigation System (IOTWS) – 12 September 2007 Indian Ocean Tsunami Event. Post-Event Assessment of IOTWS Performance. 2008	E only
78	Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (CARIBE EWS) – Implementation Plan 2013–2017 (Version 2.0). 2013	E only
79	Filling Gaps in Large Marine Ecosystem Nitrogen Loadings Forecast for 64 LMEs – GEF/LME global project Promoting Ecosystem-based Approaches to Fisheries Conservation and Large Marine Ecosystems. 2008	E only
80	Models of the World's Large Marine Ecosystems. GEF/LME Global Project Promoting Ecosystem-based Approaches to Fisheries Conservation and Large Marine Ecosystems. 2008	E only
81	Indian Ocean Tsunami Warning and Mitigation System (IOTWS) – Implementation Plan for Regional Tsunami Watch Providers (RTWP). 2008	E only
82	Exercise Pacific Wave 08 – A Pacific-wide Tsunami Warning and Communication Exercise, 28–30 October 2008. 2008	E only
83.	<i>Cancelled</i>	
84.	Global Open Oceans and Deep Seabed (GOODS) Bio-geographic Classification. 2009	E only
85.	Tsunami Glossary	E, F, S
86	Pacific Tsunami Warning System (PTWS) Implementation Plan	<i>Electronic publication</i>

(continued)

87.	Operational Users Guide for the Pacific Tsunami Warning and Mitigation System (PTWS) – Second Edition. 2011	E only
88.	Exercise Indian Ocean Wave 2009 (IOWave09) – An Indian Ocean-wide Tsunami Warning and Communication Exercise – 14 October 2009. 2009	E only
89.	Ship-based Repeat Hydrography: A Strategy for a Sustained Global Programme. 2009	E only
90.	12 January 2010 Haiti Earthquake and Tsunami Event Post-Event Assessment of CARIBE EWS Performance. 2010	E only
91.	Compendium of Definitions and Terminology on Hazards, Disasters, Vulnerability and Risks in a coastal context	<i>Under preparation</i>
92.	27 February 2010 Chile Earthquake and Tsunami Event – Post-Event Assessment of PTWS Performance (Pacific Tsunami Warning System). 2010	E only
93.	Exercise CARIBE WAVE 11 / LANTEX 11—A Caribbean Tsunami Warning Exercise, 23 March 2011	
	Vol. 1 Participant Handbook / Exercise CARIBE WAVE 11 —Exercice d'alerte au tsunami dans les Caraïbes, 23 mars 2011. Manuel du participant / Ejercicio Caribe Wave 11. Un ejercicio de alerta de tsunami en el Caribe, 23 de marzo de 2011. Manual del participante. 2010	E/F/S
	Vol. 2 Report. 2011	E only
	Vol. 3 Supplement: Media Reports. 2011	E/F/S
94.	Cold seeps, coral mounds and deep-water depositional systems of the Alboran Sea, Gulf of Cadiz and Norwegian continental margin (17th training-through-research cruise, June–July 2008)	E only
95.	International Post-Tsunami Survey for the 25 October 2010 Mentawai, Indonesia Tsunami	E only
96.	Pacific Tsunami Warning System (PTWS) 11 March 2011 Off Pacific coast of Tohoku, Japan, Earthquake and Tsunami Event. Post-Event Assessment of PTWS Performance	E only
97.	Exercise PACIFIC WAVE 11: A Pacific-wide Tsunami Warning and Communication Exercise, 9–10 November 2011	
	Vol. 1 Exercise Manual. 2011	E only
	Vol. 2 Report. 2013	E only
98.	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and connected seas. First Enlarged Communication Test Exercise (ECTE1). Exercise Manual and Evaluation Report. 2011	E only
99.	Exercise INDIAN OCEAN WAVE 2011 – An Indian Ocean-wide Tsunami Warning and Communication Exercise, 12 October 2011	E only
	Vol. 1 Exercise Manual. 2011	
	Supplement: Bulletins from the Regional Tsunami Service Providers	
	Vol. 2 Exercise Report. 2013	
100.	Global Sea Level Observing System (GLOSS) Implementation Plan – 2012. 2012	E only
101.	Exercise Caribe Wave/Lantex 13. A Caribbean Tsunami Warning Exercise, 20 March 2013. Volume 1: Participant Handbook. 2012	E only
102.	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas — Second Enlarged Communication Test Exercise (CTE2), 22 May 2012.	E only
	Vol. 1 Exercise Manual. 2012	
	Vol. 2 Evaluation Report. 2014	
103.	Exercise NEAMWAVE 12. A Tsunami Warning and Communication Exercise for the North-eastern Atlantic, the Mediterranean, and Connected Seas Region, 27–28 November 2012.	E only
	Vol. 1: Exercise Manual. 2012	
	Vol. 2: Evaluation Report. 2013	
104.	Seísmo y tsunami del 27 de agosto de 2012 en la costa del Pacífico frente a El Salvador, y seísmo del 5 de septiembre de 2012 en la costa del Pacífico frente a Costa Rica. Evaluación subsiguiente sobre el funcionamiento del Sistema de Alerta contra los Tsunamis y Atenuación de sus Efectos en el Pacífico. 2012	Español solamente (resumen en inglés y francés)
105.	Users Guide for the Pacific Tsunami Warning Center Enhanced Products for the Pacific Tsunami Warning System, August 2014. Revised Edition. 2014	E, S

106.	Exercise Pacific Wave 13. A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 1–14 May 2013. Vol. 1 Exercise Manual. 2013 Vol. 2 Summary Report. 2013	E only
107.	Tsunami Public Awareness and Education Strategy for the Caribbean and Adjacent Regions. 2013	E only
108.	Pacific Tsunami Warning and Mitigation System (PTWS) Medium-Term Strategy, 2014–2021. 2013	E only
109.	Exercise Caribe Wave/Lantex 14. A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, 26 March 2014. Vol. 1 Participant Handbook. 2014	E/S
110.	Directory of atmospheric, hydrographic and biological datasets for the Canary Current Large Marine Ecosystem, 2 nd edition: revised and expanded. 2016	E only
111.	Integrated Regional Assessments in support of ICZM in the Mediterranean and Black Sea Basins. 2014	E only
112.	11 April 2012 West of North Sumatra Earthquake and Tsunami Event - Post-event Assessment of IOTWS Performance	E only
113.	Exercise Indian Ocean Wave 2014: An Indian Ocean-wide Tsunami Warning and Communication Exercise.	E only
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121.	Exercise Indian Ocean Wave 14, an Indian Ocean wide Tsunami Warning and Communications Exercise, 9–10 September 2014	<i>In preparation</i>
122.	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas. Sixth Communication Test Exercise (CTE6), 29 July 2015. Vol. 1: Exercise Manual Vol. 2: Evaluation Report	E only
123.	Preparing for the next tsunami in the North-Eastern Atlantic, the Mediterranean and Connected Seas – Ten years of the Tsunami Warning System (NEAMTWS)	<i>In preparation</i>
124.	Indicadores Marino Costeros del Pacífico Sudeste / Coastal and Marine Indicators of the Southeast Pacific (SPINCAM)	E/S
125.	Exercise CARIBE WAVE 2016: A Caribbean and Adjacent Regions Tsunami Warning Exercise, 17 March 2016 (Venezuela and Northern Hispaniola Scenarios) Volume 1: Participant Handbook	E only

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126	Exercise Pacific Wave 16. A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 1-5 February 2016. Volume 1: Exercise Manual.	E only
127	How to reduce coastal hazard risk in your community – A step by step approach	E only
128.	Exercise Indian Ocean Wave 2016: An Indian Ocean-wide Tsunami Warning and Communications Exercise, 7–8 September 2016 Vol 1: Participant Handbook Vol. 2: Evaluation report	E only
129.	<i>In preparation</i>	
130	<i>In preparation</i>	
131	Exercise Pacific Wave 2017. A Pacific-wide Tsunami Warning and Enhanced Products Exercise, 15-17 February 2017. Volume 1: Exercise Manual	E only