

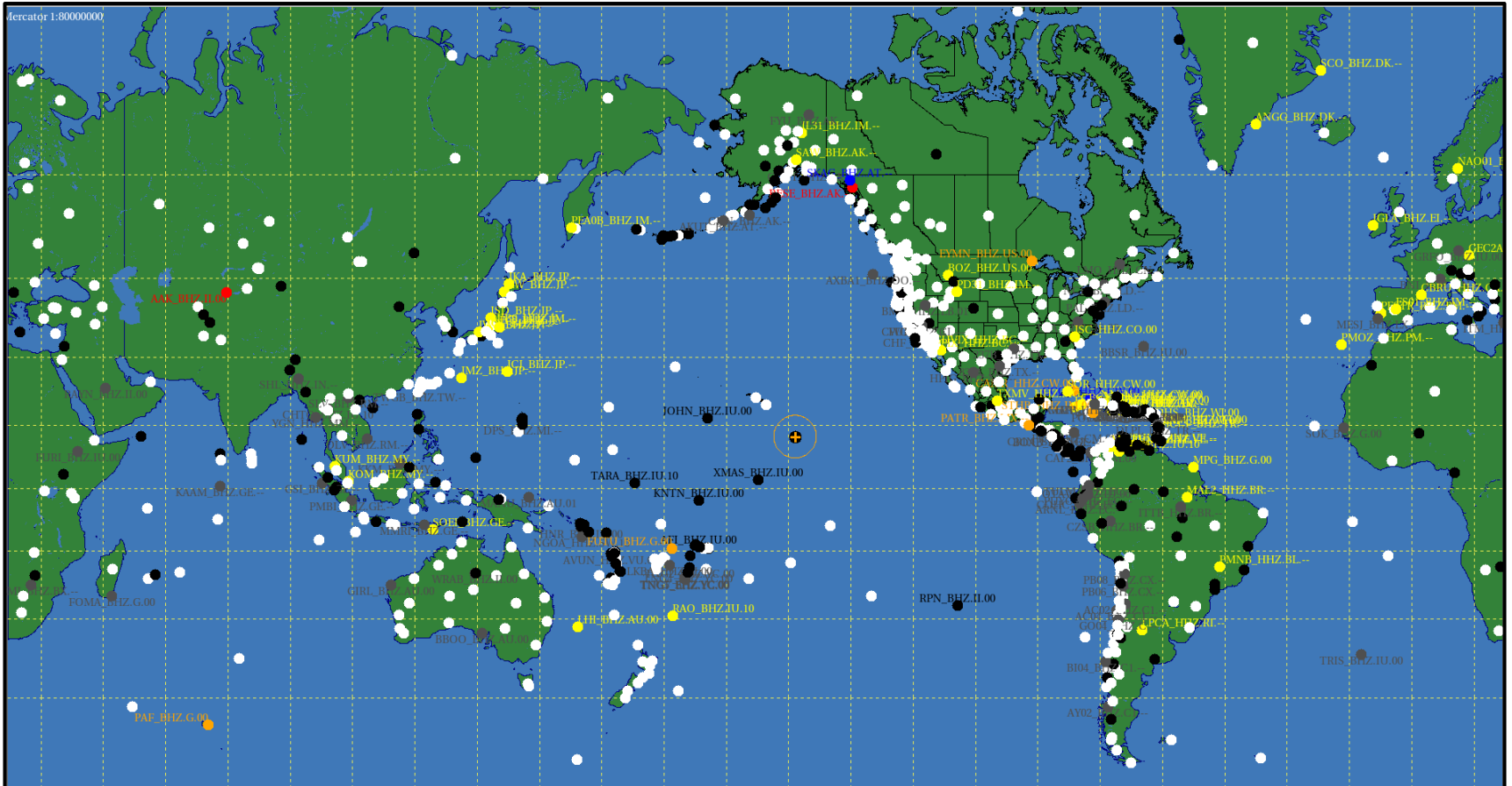


ICG/PTWS-XXX Meeting
12-15 September 2023
Nuku`alofa, Kingdom of Tonga

Tsunami Service Provider Report Pacific Tsunami Warning Center

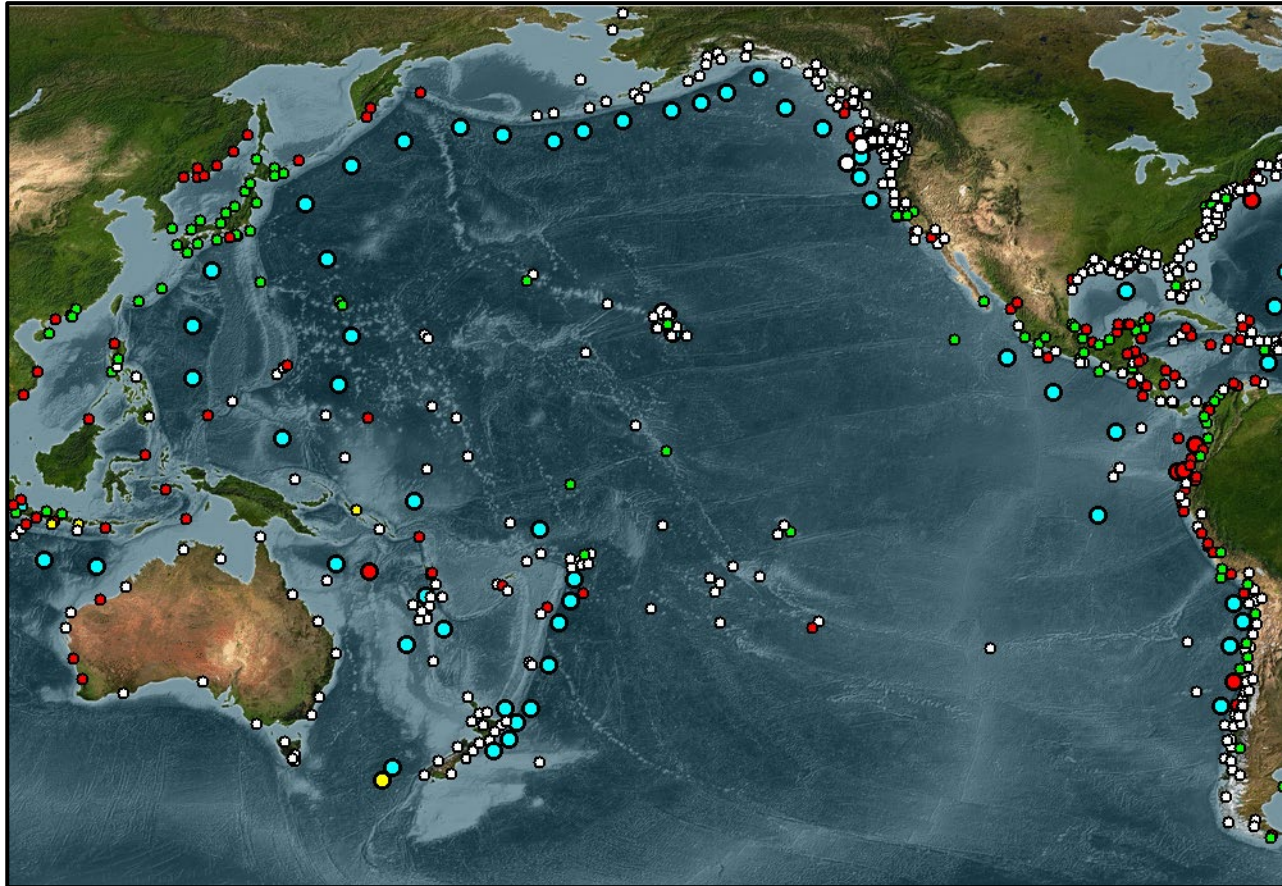
Charles McCreery, Director
NOAA Pacific Tsunami Warning Center
charles.mccreery@noaa.gov

Seismic Network Used by PTWC – 9/5/23



Each dot is a seismic station. At the time of this snapshot, PTWC was receiving digital seismic waveform data from all the white-colored stations within a minute. No data was being received from black-colored stations.

Sea-Level Gauges Monitored by PTWC – 9/3/23



Small dots are coastal sea-level stations. Larger dots are deep-ocean tsunameters (DARTs). At the time of this snapshot, the white and green coastal stations and the blue DART gauges were sending timely data. Red stations were not functioning.

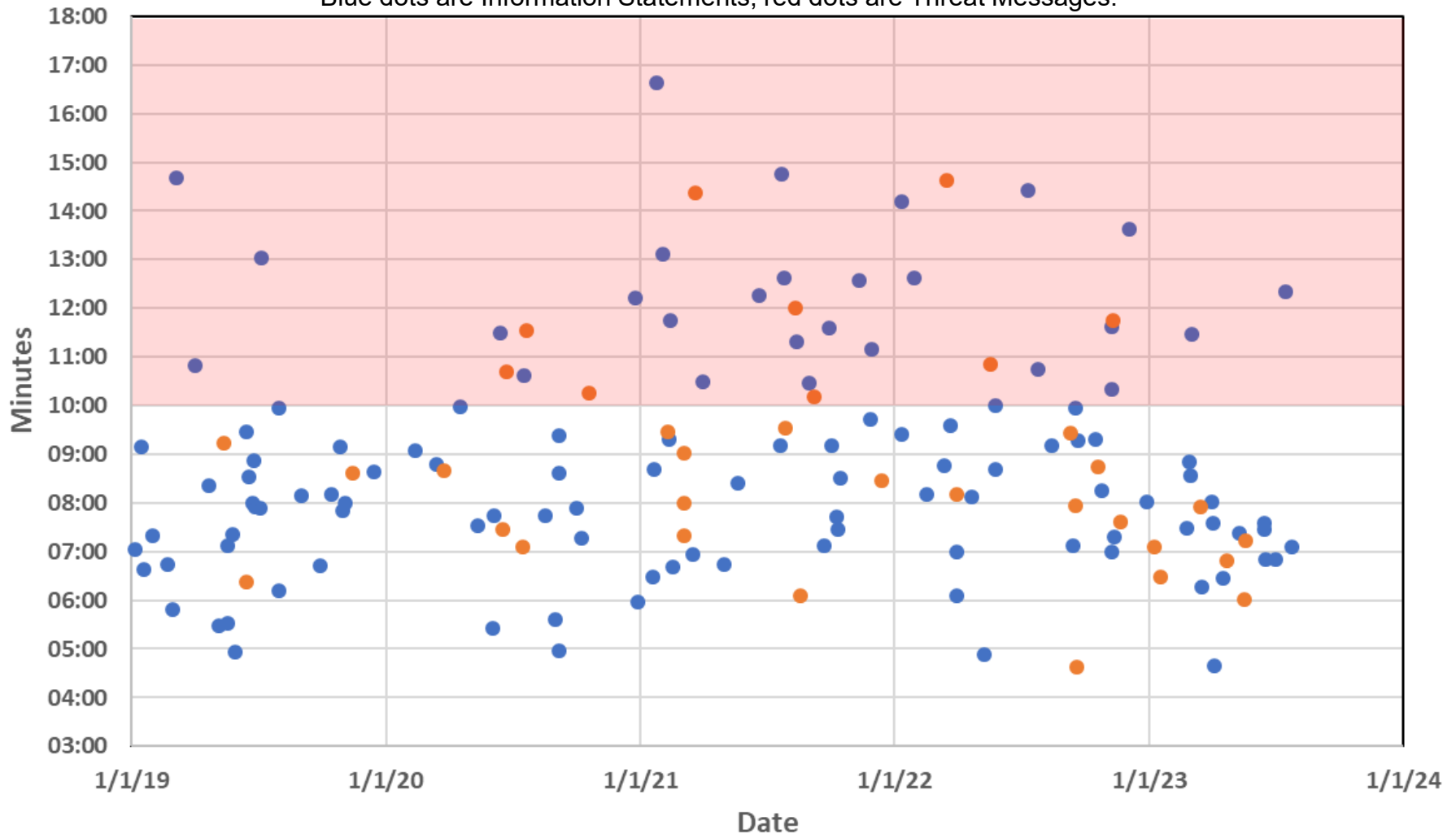
PTWC Message Events since April 2019

- **110 Tsunami Information Statements issued**
- **35 Tsunami Threat Message sequences issued**
 - 13 ended on 2nd message
 - 15 ended on 3rd message
 - 1 ended on 4th message
 - 05/20/23 Loyalty Islands Mw 7.1
 - 1 ended on 5th message
 - 06/23/20 Oaxaca Mexico Mw 7.4
 - 3 ended on 7th message
 - 02/10/21 Loyalty Islands Mw 7.7
 - 09/19/22 Michoacán Mexico Mw 7.6
 - 05/19/23 Loyalty Islands Mw 7.7
 - 1 ended on 12th message after 22 hours
 - 01/15/22 Tonga – HTHH Eruption
 - 1 ended on 20th message after 18 hours
 - 03/05/21 Kermadec Islands Mw 8.1

Key Performance Indicator – Elapsed Time

Elapsed Time to Initial Product - Information and Threat

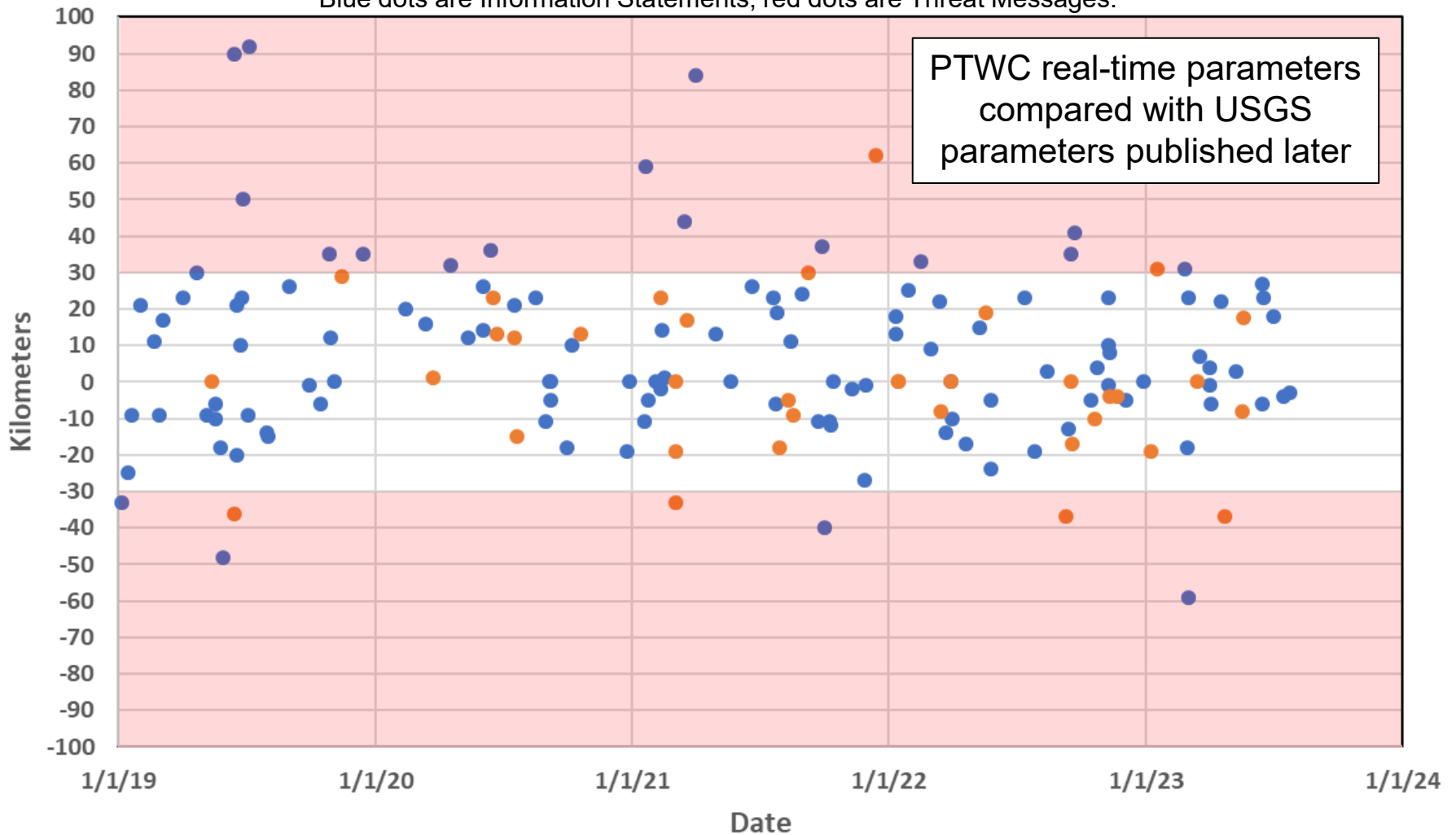
Blue dots are Information Statements, red dots are Threat Messages.



Key Performance Indicator – EQ Depth

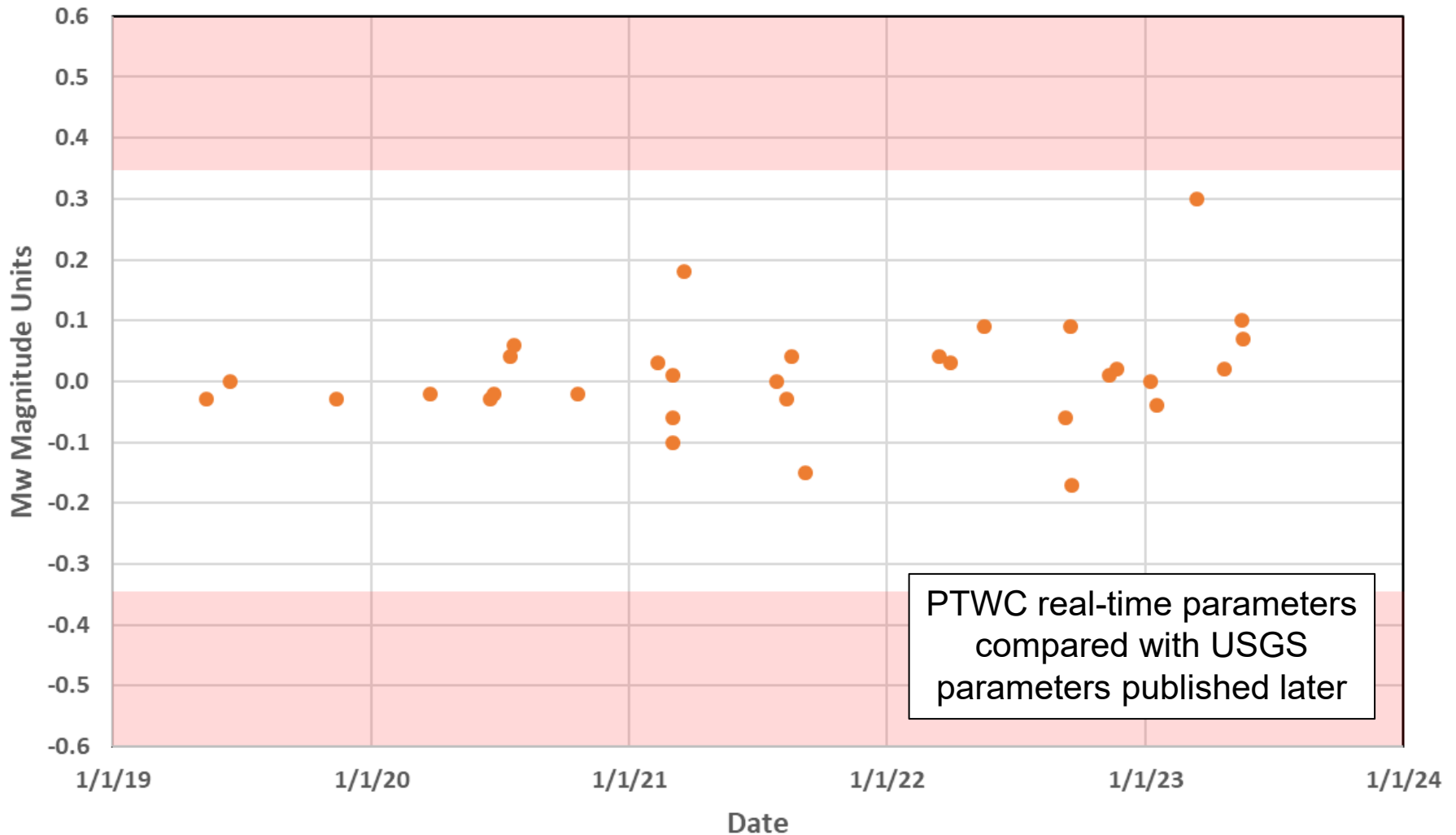
Hypocenter Depth Error - Initial Product - Information and Threat

Blue dots are Information Statements, red dots are Threat Messages.



Key Performance Indicator – Mw from WCMT

Magnitude Error - Threat Only - Mw Based on CMT



From ICG/PTWS-XXVI in 2015

The **ICG confirmed** that the mechanism to address proposed changes to the PTWC Enhanced Products for PTWS is the intersessional Task Team on Enhancing Products and **reaffirmed** that any change to the products should be informed to all Member States by Circular Letter three months in advance of implementing the changes.

The **ICG decided** that to avoid misunderstandings the words “No threat” should be indicated for all countries with inundation below 0.3 metres, and the list of countries falling under this category should be removed from the message.

Summary of Proposed Text Product Changes

- **In initial threat messages, prior to having a quantitative forecast, alphabetize the list of countries and territories with a possible tsunami threat.**
- **Organize the list of expected times of arrival (ETA) of the first tsunami wave by country or territory.**
- **Organize the list of observed tsunami wave maximum amplitudes by country or territory.**
- **Include an indicator for the type of measurement made on each gauge.**
- **Remove the forecast category label “less than 0.3 meters” and replace it with the label “no threat”.**

Possible Tsunami Threat - Current

TSUNAMI THREAT FORECAST

* HAZARDOUS TSUNAMI WAVES FROM THIS EARTHQUAKE ARE POSSIBLE
WITHIN THE NEXT THREE HOURS ALONG SOME COASTS OF

TONGA... NIUE... AMERICAN SAMOA... SAMOA... WALLIS AND
FUTUNA... KERMADEC ISLANDS... TOKELAU... COOK ISLANDS...
FIJI... TUVALU... KIRIBATI... NEW ZEALAND AND HOWLAND AND
BAKER

Possible Tsunami Threat – Alphabetical

TSUNAMI THREAT FORECAST

* HAZARDOUS TSUNAMI WAVES FROM THIS EARTHQUAKE ARE POSSIBLE
WITHIN THE NEXT THREE HOURS ALONG SOME COASTS OF

AMERICAN SAMOA... COOK ISLANDS... FIJI... HOWLAND AND
BAKER... KERMADEC ISLANDS... KIRIBATI... NEW ZEALAND...
NIUE... SAMOA... TOKELAU... TONGA... TUVALU AND WALLIS AND
FUTUNA

Tsunami ETAs – Current

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITH A POTENTIAL TSUNAMI THREAT. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	REGION	COORDINATES	ETA (UTC)
HOLEVA	TONGA	18.6S 173.9W	2135 08/22
NIUE ISLAND	NIUE	19.0S 170.0W	2135 08/22
NUKUALOFA	TONGA	21.0S 175.2W	2143 08/22
NIUATOPUTAPU	TONGA	15.9S 173.8W	2154 08/22
PAGO PAGO	AMERICAN SAMOA	14.3S 170.7W	2156 08/22
APIA	SAMOA	13.8S 171.8W	2209 08/22
WALLIS ISLAND	WALLIS AND FUTUN	13.2S 176.2W	2221 08/22
RAOUL ISLAND	KERMADEC ISLANDS	29.2S 177.9W	2230 08/22
NUKUNONU ISLAND	TOKELAU	9.2S 171.8W	2240 08/22
PUKAPUKA ISLAND	COOK ISLANDS	10.8S 165.9W	2243 08/22
FUTUNA ISLAND	WALLIS AND FUTUN	14.3S 178.2W	2244 08/22
RAROTONGA	COOK ISLANDS	21.2S 159.8W	2253 08/22
SUVA	FIJI	18.1S 178.4E	2319 08/22

Tsunami ETAs – Organized by Country

ESTIMATED TIMES OF ARRIVAL

* ESTIMATED TIMES OF ARRIVAL -ETA- OF THE INITIAL TSUNAMI WAVE FOR PLACES WITH A POTENTIAL TSUNAMI THREAT. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	COORDINATES	ETA (UTC)

TONGA		
HOLEVA	18.6S 173.9W	2135 08/22
NUKUALOFA	21.0S 175.2W	2143 08/22
NIUATOPUTAPU	15.9S 173.8W	2154 08/22
NIUE		
NIUE ISLAND	19.0S 170.0W	2135 08/22
AMERICAN SAMOA		
PAGO PAGO	14.3S 170.7W	2156 08/22
SAMOA		
APIA	13.8S 171.8W	2209 08/22
WALLIS AND FUTUNA		
WALLIS ISLAND	13.2S 176.2W	2221 08/22
FUTUNA ISLAND	14.3S 178.2W	2244 08/22

Tsunami Observations – Current

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE MAXIMUM TSUNAMI HEIGHT IS MEASURED WITH RESPECT TO THE NORMAL TIDE LEVEL.

GAUGE LOCATION	GAUGE COORDINATES		TIME OF MEASURE	MAXIMUM TSUNAMI HEIGHT	WAVE PERIOD
	LAT	LOE	(UTC)		(MIN)
BETIO TARAWA KI	1.4N	172.9E	0128	0.94M/ 3.1FT	28
OWENGA CHATHAM NZ	44.0S	176.4W	0122	0.58M/ 1.9FT	28
DART 01005	26.7S	164.0E	0119	0.08M/ 0.3FT	16
LITZLITZ VU	16.1S	167.4E	0122	0.57M/ 1.9FT	18
LUGANVILLE VU	15.5S	167.2E	0119	0.74M/ 2.4FT	28
NUMBO NEW CALEDONIA	22.2S	166.4E	0110	0.55M/ 1.8FT	26
PALMYRA ISLAND US	5.9N	162.1W	0109	0.51M/ 1.7FT	28
CHRISTMAS KI	2.0N	157.5W	0110	0.78M/ 2.6FT	26
HIENGHENE NEW CALED	20.7S	164.9E	0108	0.42M/ 1.4FT	22
THIO NEW CALEDONIA	21.6S	166.2E	0104	0.73M/ 2.4FT	28
RANGIROA PF	14.9S	147.7W	0104	1.57M/ 5.2FT	24

Tsunami Observations – Organized by Country

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE TYPE OF MEASUREMENT OF MAXIMUM TSUNAMI AMPLITUDE IS INDICATED WITH THE FOLLOWING TYPE CODE.

H - HALF THE MAXIMUM CREST-TO-TROUGH OR TROUGH-TO-CREST

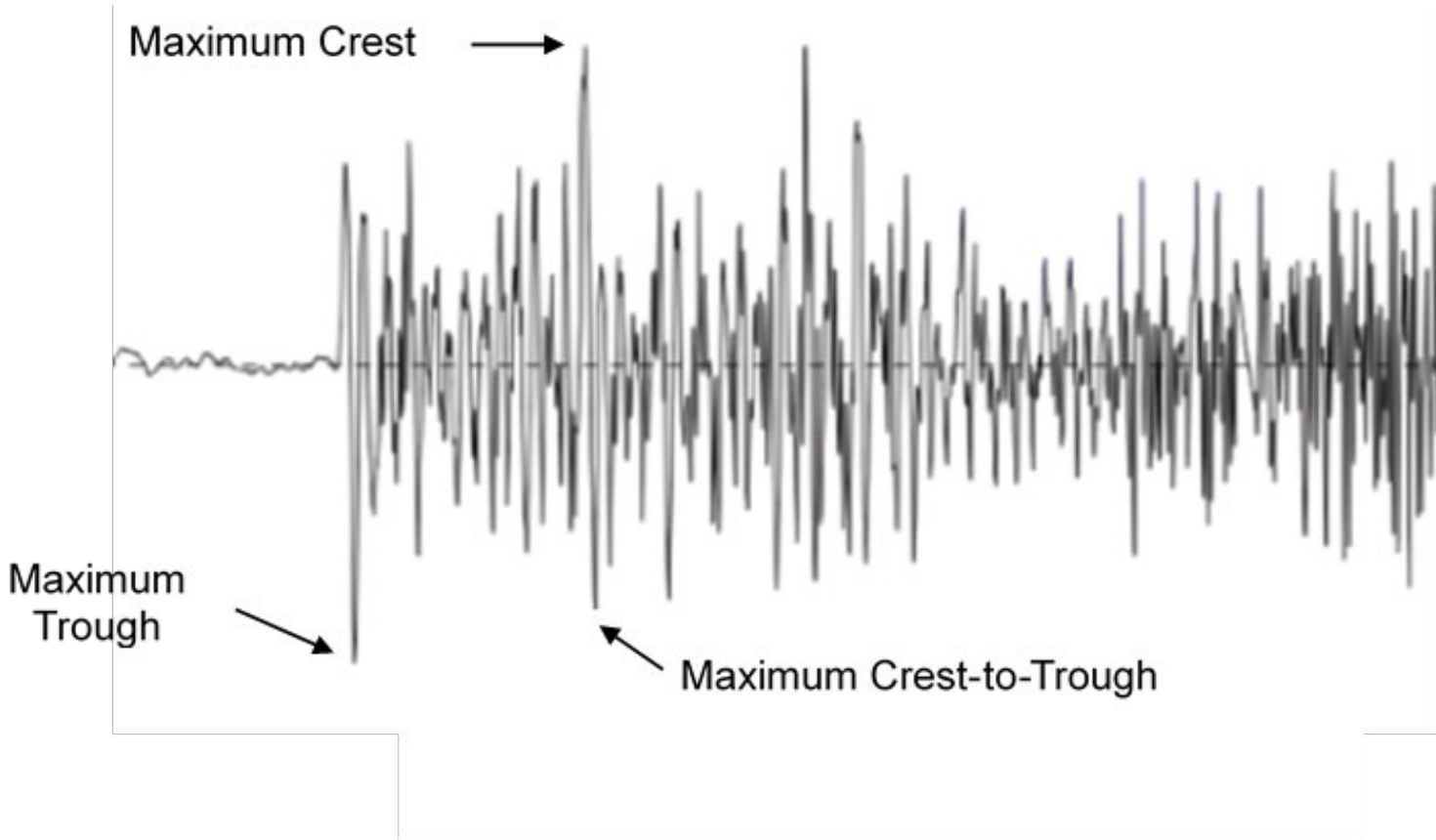
C - MAXIMUM CREST RELATIVE TO THE NORMAL TIDE LEVEL

T - MAXIMUM TROUGH RELATIVE TO THE NORMAL TIDE LEVEL

GAUGE LOCATION	GAUGE COORDINATES		TIME UTC	MAXIMUM AMPLITUDE		WAVE PERIOD (MIN)
	LAT	LON		(M/FT)	TYPE	

KIRIBATI						
BETIO TARAWA	1.4N	172.9E	0128	1.88/ 6.2	H	20
CHRISTMAS	2.0N	157.5W	0110	1.56/ 5.1	C	22
KANTON	2.8S	171.7W	2345	1.25/ 4.1	H	18
NEW_ZEALAND						
OWENGA CHATHAM	44.0S	176.4W	0122	1.15/ 3.8	T	23
KAIKOURA	42.4S	173.7E	0050	0.60/ 2.0	H	19

Tsunami Observation Types



Tsunami Observations – Measurement Type

TSUNAMI OBSERVATIONS

* THE FOLLOWING ARE TSUNAMI WAVE OBSERVATIONS FROM COASTAL AND/OR DEEP-OCEAN SEA LEVEL GAUGES AT THE INDICATED LOCATIONS. THE TYPE OF MEASUREMENT OF MAXIMUM TSUNAMI AMPLITUDE IS INDICATED WITH THE FOLLOWING TYPE CODE.

H - HALF THE MAXIMUM CREST-TO-TROUGH OR TROUGH-TO-CREST

C - MAXIMUM CREST RELATIVE TO THE NORMAL TIDE LEVEL

T - MAXIMUM TROUGH RELATIVE TO THE NORMAL TIDE LEVEL

GAUGE LOCATION	GAUGE COORDINATES		TIME UTC	MAXIMUM AMPLITUDE		WAVE PERIOD (MIN)
	LAT	LON		(M/FT)	TYPE	

KIRIBATI						
BETIO TARAWA	1.4N	172.9E	0128	1.88/ 6.2	H	20
CHRISTMAS	2.0N	157.5W	0110	1.56/ 5.1	C	22
KANTON	2.8S	171.7W	2345	1.25/ 4.1	H	18
NEW ZEALAND						
OWENGA CHATHAM	44.0S	176.4W	0122	1.15/ 3.8	T	23
KAIKOURA	42.4S	173.7E	0050	0.60/ 2.0	H	19

Lowest Forecast Category - Current

- TSUNAMI THREAT FORECAST

* TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

MEXICO.

* TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

AMERICAN SAMOA... ANTARCTICA... COOK ISLANDS... ECUADOR...
EL SALVADOR... FIJI... FRENCH POLYNESIA... GUATEMALA...
KIRIBATI... NEW ZEALAND... SAMOA... TOKELAU... TUVALU...
VANUATU... AND WALLIS AND FUTUNA.

* TSUNAMI WAVES ARE FORECAST TO BE **LESS THAN 0.3 METERS ABOVE THE TIDE LEVEL** FOR THE COASTS OF

AUSTRALIA... CHILE... CHINA... CHUUK... COLOMBIA... COSTA
RICA... GUAM... HAWAII... HONDURAS... HOWLAND AND BAKER...
INDONESIA... JAPAN... JARVIS ISLAND... JOHNSTON ATOLL...
KERMADEC ISLANDS... KOSRAE... MALAYSIA... MARSHALL
ISLANDS... MIDWAY ISLAND... NAURU... NEW CALEDONIA...

Lowest Forecast Category - Proposed

- TSUNAMI THREAT FORECAST

* TSUNAMI WAVES REACHING MORE THAN 3 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE ALONG SOME COASTS OF

MEXICO.

* TSUNAMI WAVES REACHING 0.3 TO 1 METERS ABOVE THE TIDE LEVEL ARE POSSIBLE FOR SOME COASTS OF

AMERICAN SAMOA... ANTARCTICA... COOK ISLANDS... ECUADOR...
EL SALVADOR... FIJI... FRENCH POLYNESIA... GUATEMALA...
KIRIBATI... NEW ZEALAND... SAMOA... TOKELAU... TUVALU...
VANUATU... AND WALLIS AND FUTUNA.

* TSUNAMI WAVES ARE FORECAST TO BE **NO THREAT** FOR THE COASTS OF

AUSTRALIA... CHILE... CHINA... CHUUK... COLOMBIA... COSTA
RICA... GUAM... HAWAII... HONDURAS... HOWLAND AND BAKER...
INDONESIA... JAPAN... JARVIS ISLAND... JOHNSTON ATOLL...
KERMADEC ISLANDS... KOSRAE... MALAYSIA... MARSHALL
ISLANDS... MIDWAY ISLAND... NAURU... NEW CALEDONIA...



ICG/PTWS-XXX Meeting
12-15 September 2023
Nuku`alofa, Kingdom of Tonga

Thank You

Charles McCreery, Chair
NOAA Pacific Tsunami Warning Center
charles.mccreery@noaa.gov