



ICG/PTWS XXIX Virtual Meeting
1, 2, 7, & 8 December 2021 2200-2400 UTC

Tsunami Service Provider Report Pacific Tsunami Warning Center

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PTWC Status

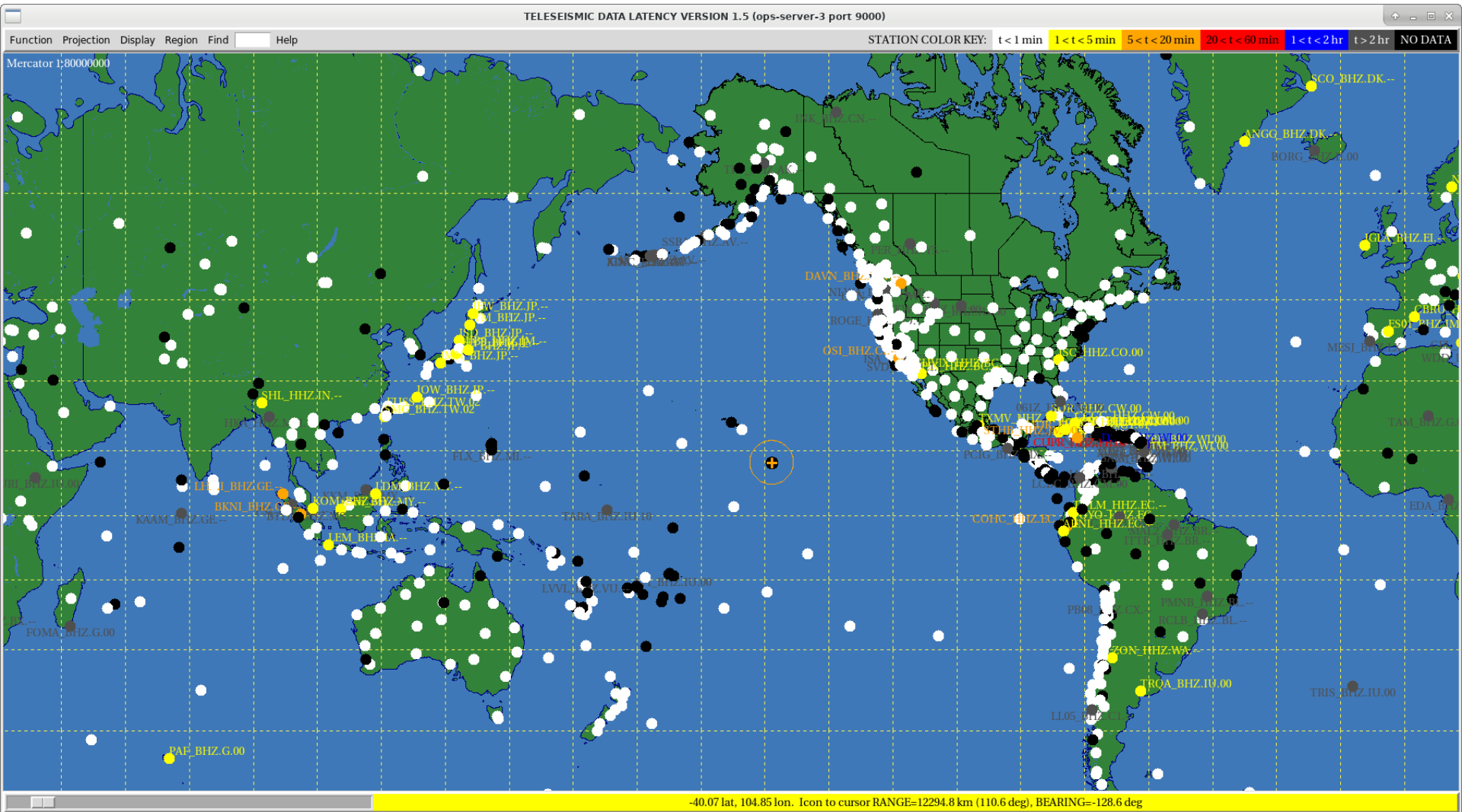
Staffing

- Added an Oceanographer in January
- Added a Geophysicist (GNSS-specialist) in July
- One Geophysicist (Victor Sardina) left in June, another in August
- Two more Duty Scientist positions left to fill
- Added two IT Specialists (one onboard, another to be selected)

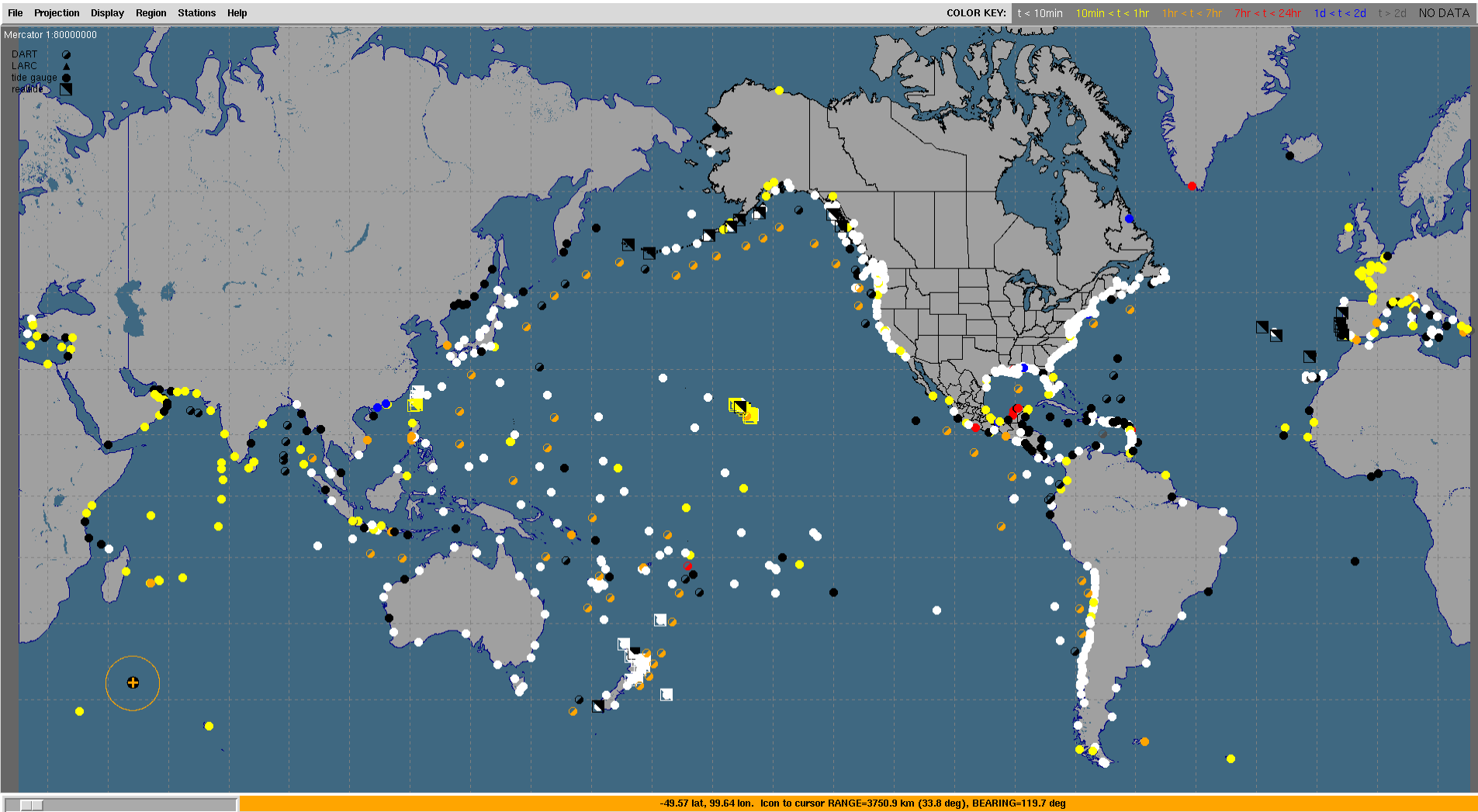
COVID-19 Status

- No one at PTWC has been infected
- PTWC manning center in isolated teams with masks and regular cleaning
- No significant impact to operations so far, but
- Some NOAA/NWS institutional support reduced due to stay home orders
- In-person outreach activities on hold

Current Seismic Network Status



Current Sea-Level Network Status



144 Products for 84 Events: 18 Threats, 66 Information

04/01/2019 – 04/25/2021

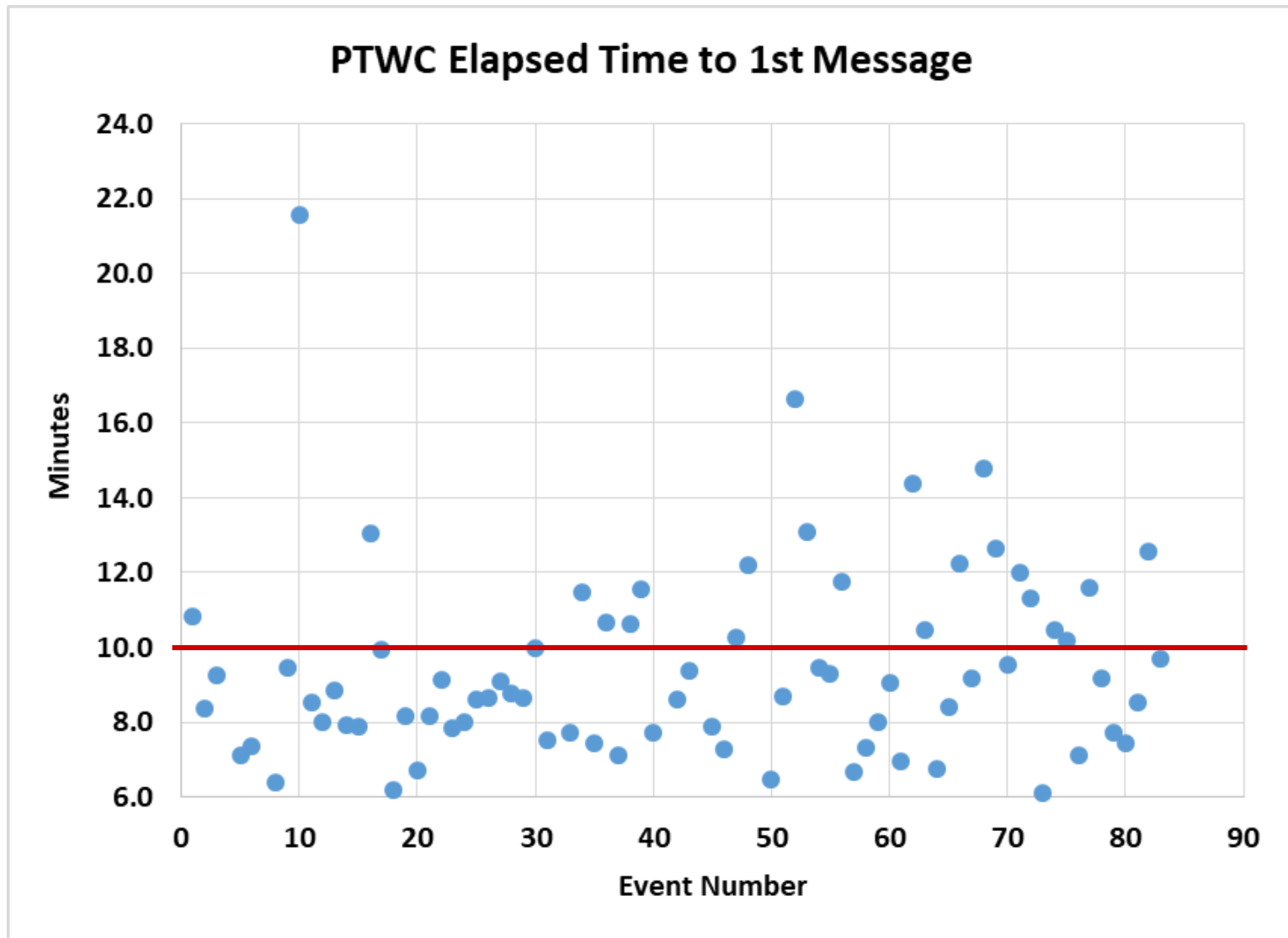
PTWC EARTHQUAKE PARAMETERS				PTWC PRODUCTS		
Origin Time (UTC)	Location	Mw	Depth (km)	Type*	#	Elapse Min
04/02/2019 21:36:00	RAT ISLANDS ALEUTIAN ISLANDS ALASKA	6.5	31	TIB	1	10.8
04/23/2019 05:37:56	SAMAR PHILIPPINES	6.6	86	TIB	1	8.4
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWI	1	9.2
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWS	2	59.1
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWC	3	96.7
05/19/2019 01:23:29	SOUTHEAST OF LOYALTY ISLANDS	6.8	14	TIB	1	5.5
05/19/2019 14:56:49	SOUTHEAST OF LOYALTY ISLANDS	6.7	10	TIB	1	7.1
05/26/2019 07:41:13	NORTHERN PERU	7.5	105	TIB	1	7.3
05/30/2019 09:03:28	EL SALVADOR	6.6	10	TIB	1	4.9
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWI	1	6.4
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWS	2	37.3
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWC	3	59.5
06/16/2019 05:17:16	KERMADEC ISLANDS REGION	6.6	111	TIB	1	9.5
06/18/2019 13:22:21	NEAR THE WEST COAST OF HONSHU JAPAN	6.8	33	TIB	1	21.5
06/19/2019 07:01:41	KERMADEC ISLANDS NEW ZEALAND	6.8	10	TIB	1	8.5
06/24/2019 02:53:40	BANDA SEA	7.5	222	TIB	1	8.0
06/25/2019 09:05:43	KOMANDORSKIYE OSTROVA RUSSIA REGION	6.6	33	TIB	1	8.9
06/28/2019 15:51:30	MARIANA ISLANDS	6.5	460	TIB	1	7.9
07/04/2019 17:33:48	CENTRAL CALIFORNIA	6.5	2	TIB	1	7.9
07/06/2019 03:19:53	CENTRAL CALIFORNIA	7.1	100	TIB	1	13.0
07/31/2019 15:02:34	VANUATU	6.6	167	TIB	1	9.9

* TIB=Info Stmt; TIS=Info Suppl; TWI=Tsu Watch Initial; TWS=Tsu Watch Suppl; TWC=Tsu Watch Final

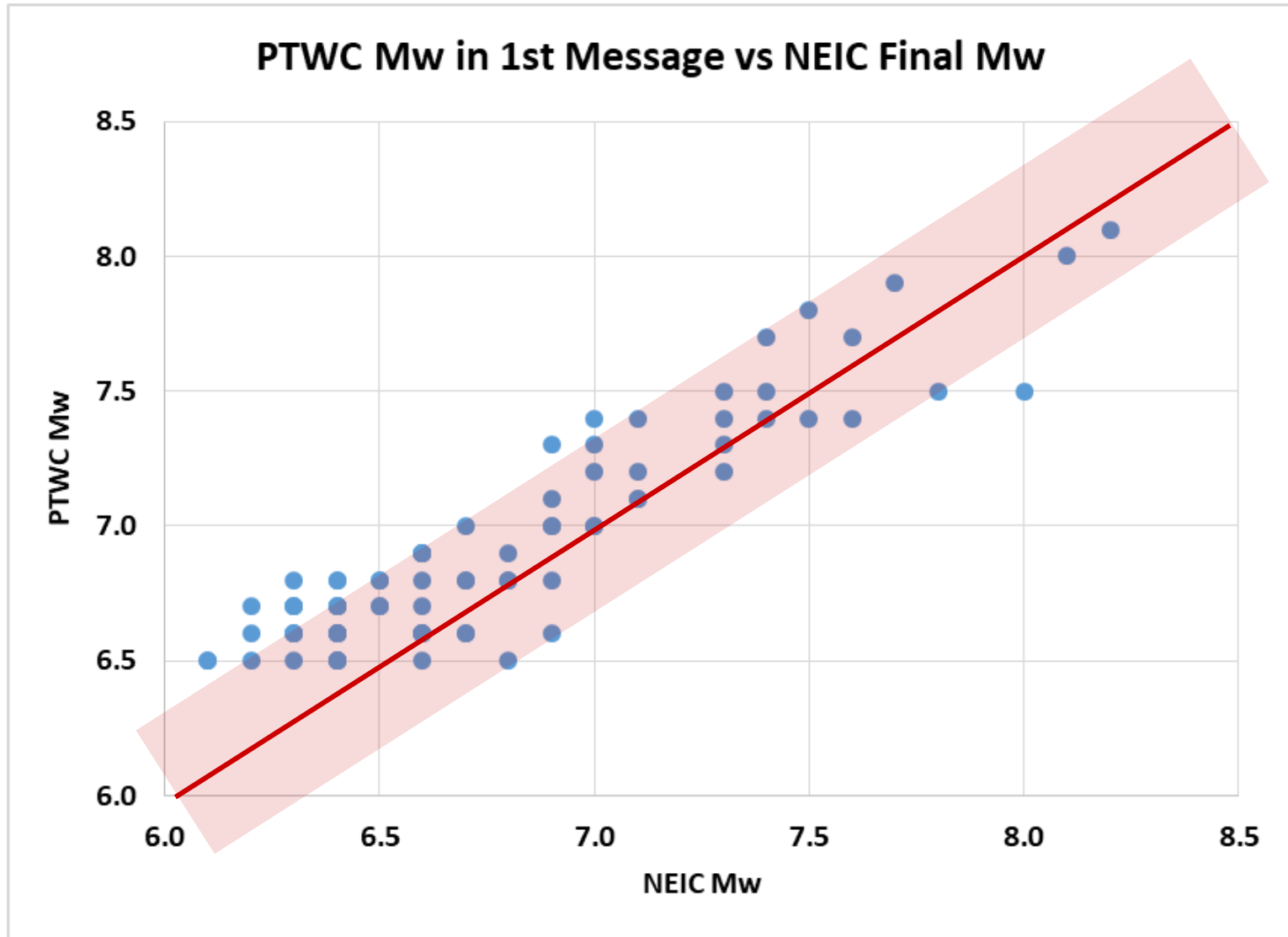
Message Events – Key Performance Indicators

PTWC EARTHQUAKE PARAMETERS				PTWC PRODUCTS			USGS PARAMETERS		
Origin Time (UTC)	Location	Mw	Dep km	Type	#	Elapsed Time 10 min	Δ Mw 0.3	Δ Dep (km) 30	Δ Loc (km) 30
04/02/2019 21:36:00	RAT ISLANDS ALEUTIAN ISLANDS ALASKA	6.5	31	TIB	1	10.8	0.1	23	20
04/23/2019 05:37:56	SAMAR PHILIPPINES	6.6	86	TIB	1	8.4	0.2	30	16
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWI	1	9.2	0.1	0	20
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWS	2	59.1	0.1	0	20
05/14/2019 12:58:26	NEW BRITAIN REGION PAPUA NEW GUINEA	7.7	10	TWC	3	96.7	0.1	0	20
05/19/2019 01:23:29	SOUTHEAST OF LOYALTY ISLANDS	6.8	14	TIB	1	5.5	0.5	-6	19
05/19/2019 14:56:49	SOUTHEAST OF LOYALTY ISLANDS	6.7	10	TIB	1	7.1	0.4	-10	11
05/26/2019 07:41:13	NORTHERN PERU	7.5	105	TIB	1	7.3	-0.5	-18	10
05/30/2019 09:03:28	EL SALVADOR	6.6	10	TIB	1	4.9	0.0	-48	15
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWI	1	6.4	0.1	-36	78
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWS	2	37.3	0.1	-36	78
06/15/2019 22:54:55	KERMADEC ISLANDS REGION	7.4	10	TWC	3	59.5	0.1	-36	78
06/16/2019 05:17:16	KERMADEC ISLANDS REGION	6.6	111	TIB	1	9.5	0.3	90	95
06/18/2019 13:22:21	NEAR THE WEST COAST OF HONSHU JAPAN	6.8	33	TIB	1	21.5	0.4	21	5
06/19/2019 07:01:41	KERMADEC ISLANDS NEW ZEALAND	6.8	10	TIB	1	8.5	0.4	-20	53
06/24/2019 02:53:40	BANDA SEA	7.5	222	TIB	1	8.0	0.2	10	23
06/25/2019 09:05:43	KOMANDORSKIYE OSTROVA RUSSIA REGION	6.6	33	TIB	1	8.9	0.2	23	4
06/28/2019 15:51:30	MARIANA ISLANDS	6.5	460	TIB	1	7.9	0.1	50	58
07/04/2019 17:33:48	CENTRAL CALIFORNIA	6.5	2	TIB	1	7.9	0.1	-9	15
07/06/2019 03:19:53	CENTRAL CALIFORNIA	7.1	100	TIB	1	13.0	0.0	92	40

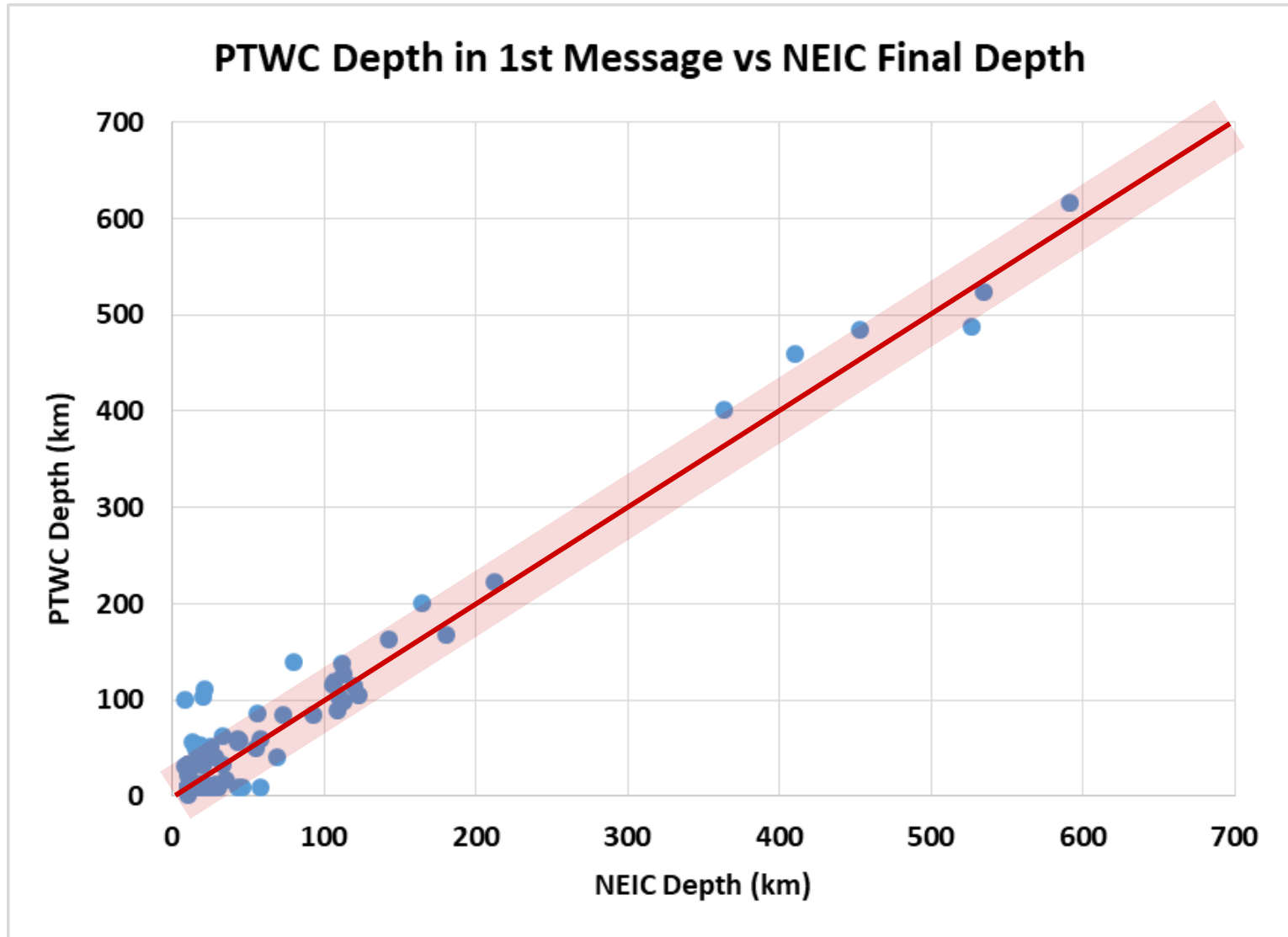
Timeliness of 1st Message



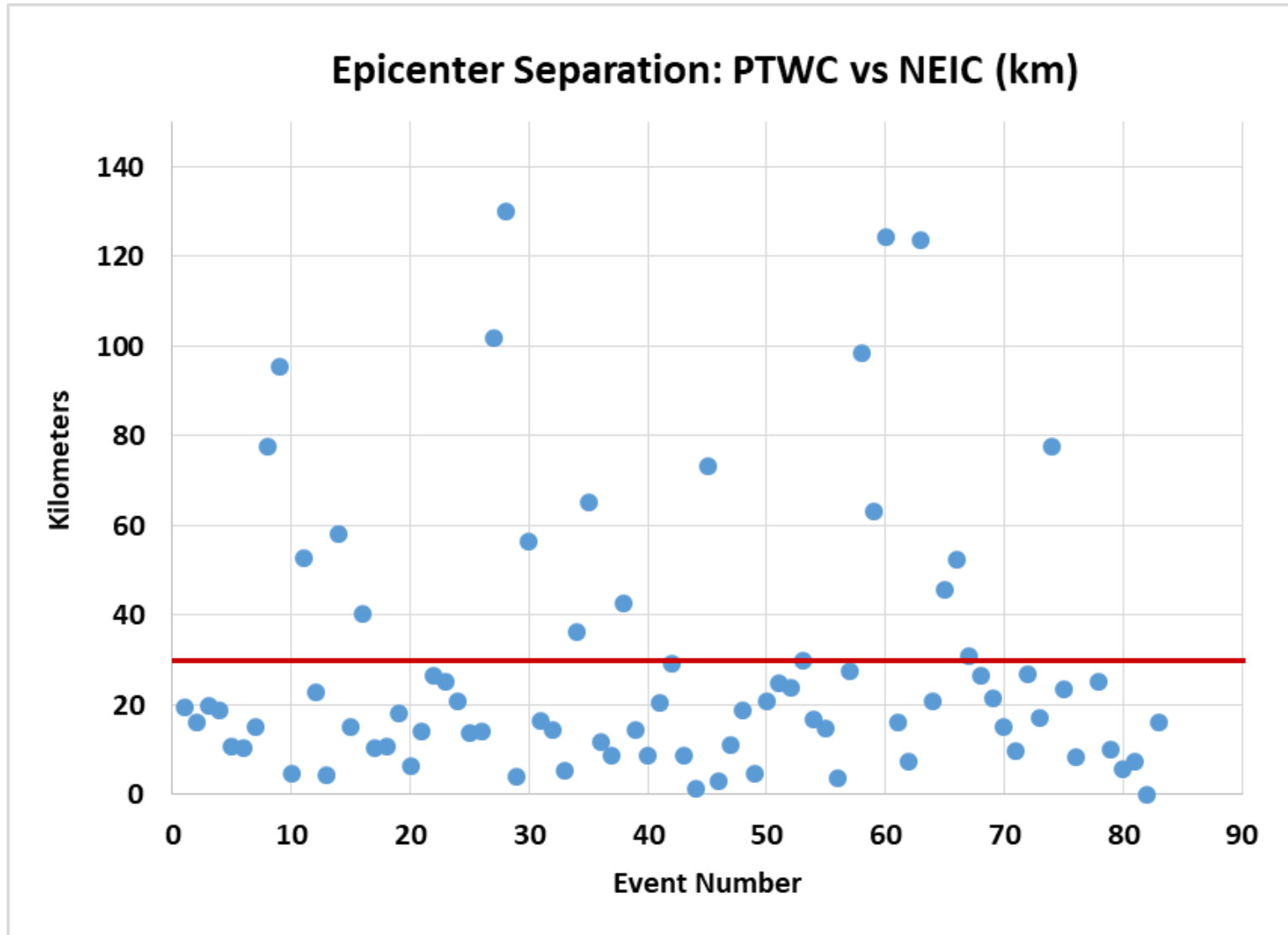
Earthquake Mw Accuracy (1st Message)



Earthquake Depth Accuracy (1st Message)



Epicenter Location Accuracy (1st Message)

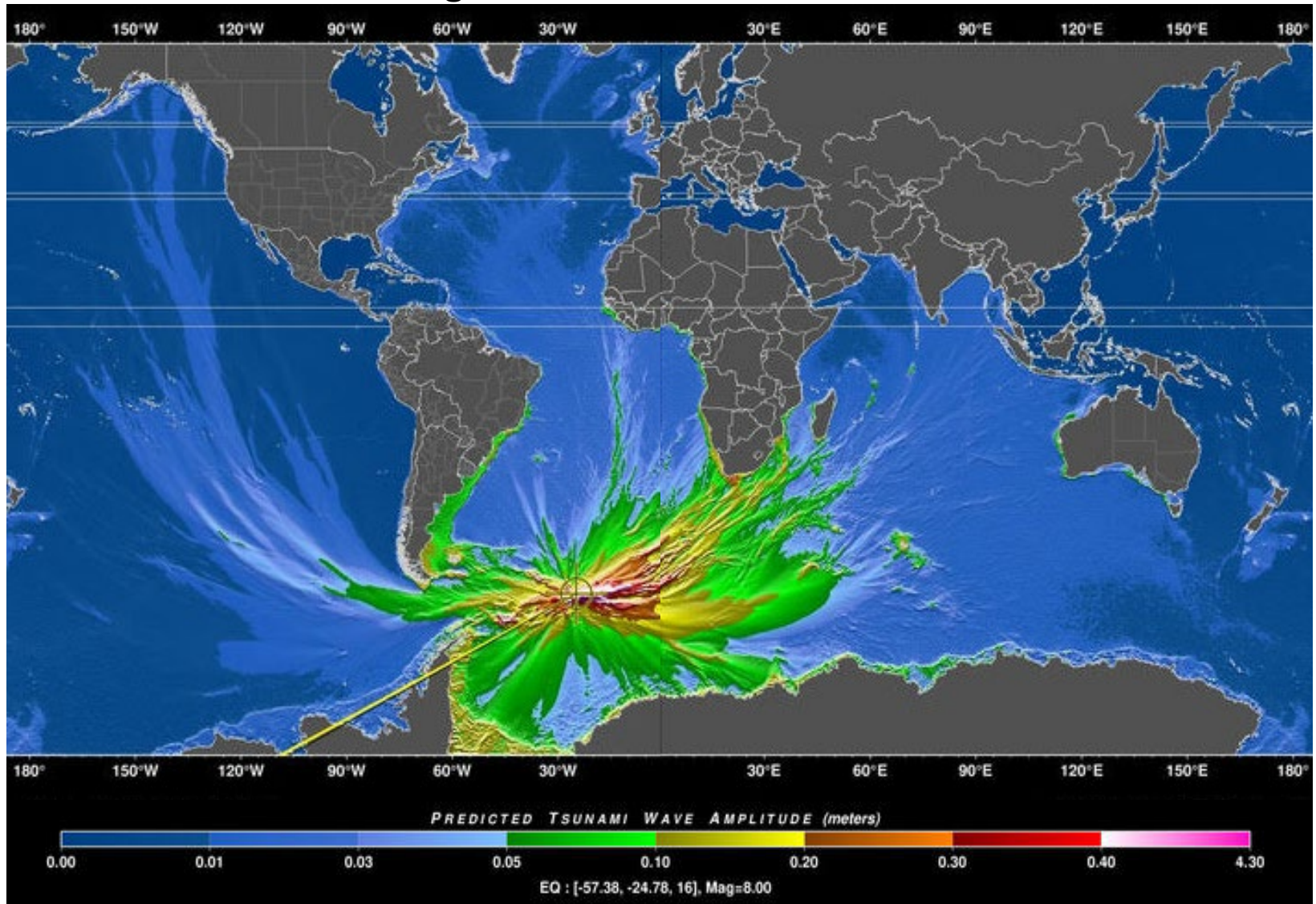


PTWC Outages with U.S. NTWC Backup

- 5/7/20 0100Z – 5/11/20 1900Z (90 hours): Building closed for pipe leak
- 7/26/20 1900Z – 7/27/20 1900Z (24 hours): Hurricane Douglas
- 9/28/20 0600Z – 9/28/20 0900Z (3 hours): Comm Circuits Maintenance

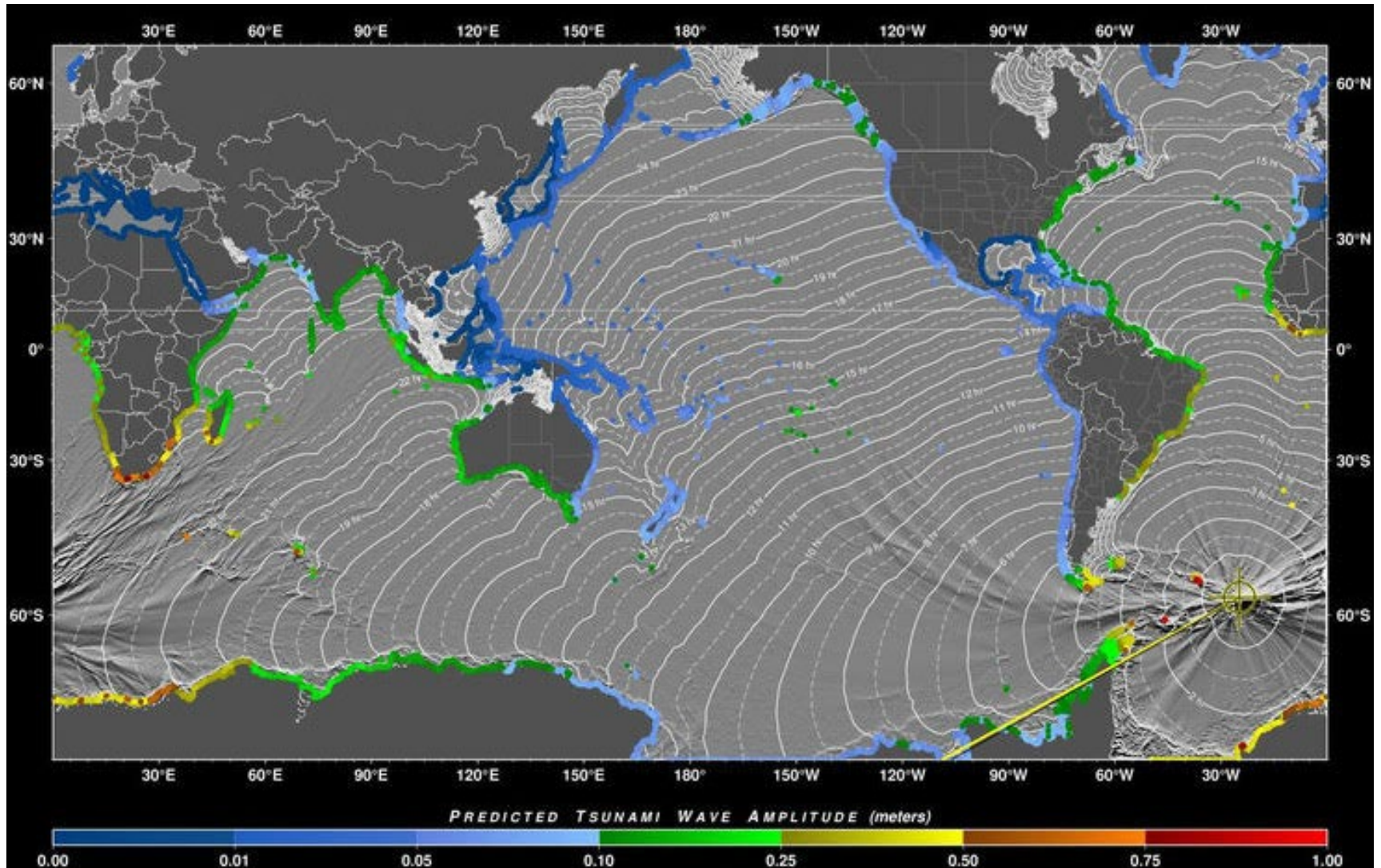
8/12/21 Mw = 8.1 South Sandwich Islands

No PTWS Threat Message or Information Statement



8/12/21 Mw = 8.1 South Sandwich Islands

No PTWS Threat Message or Information Statement



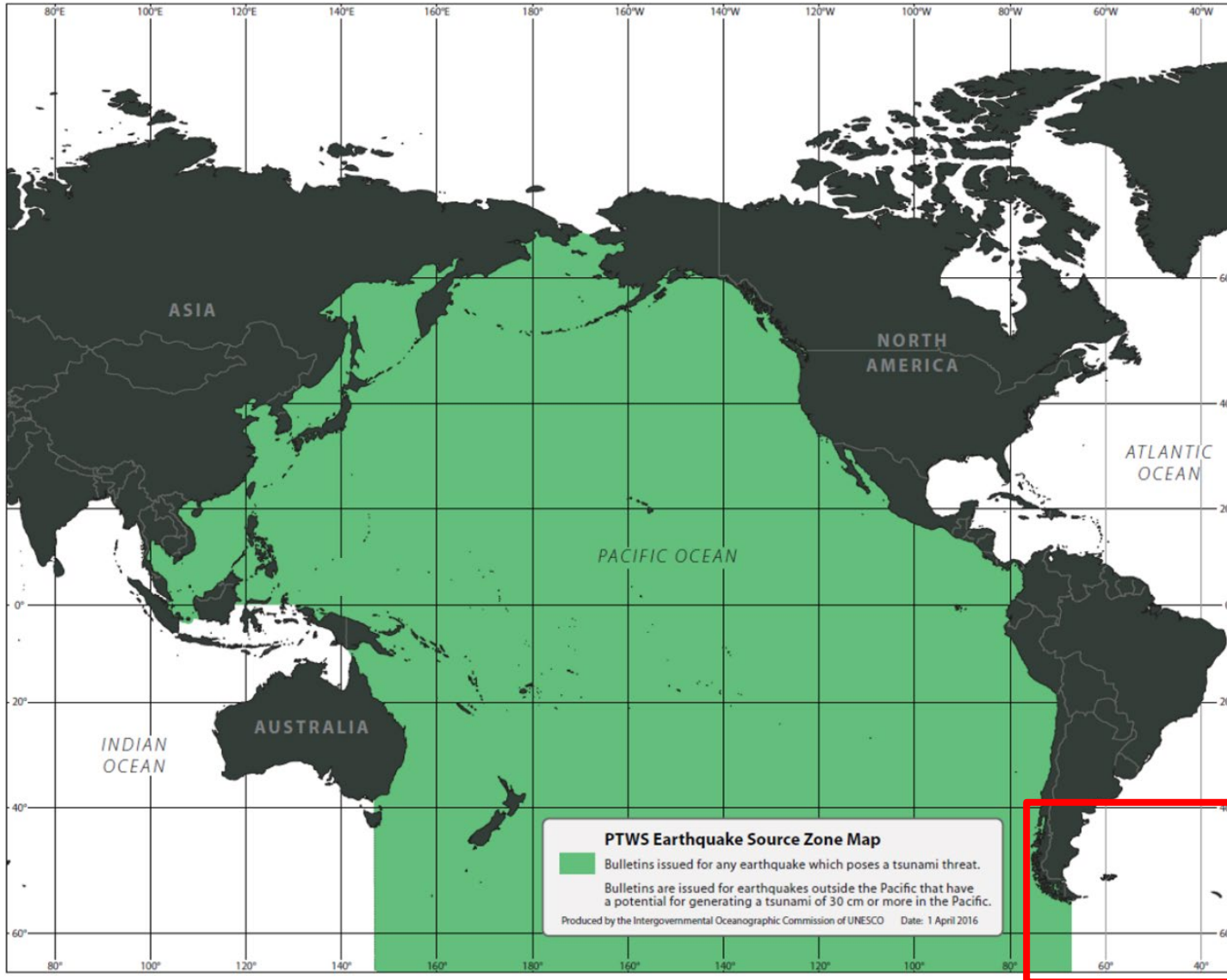
Issues With This Event

- **Complex Source – 2 earthquakes about 2.5 minutes apart?**
- **Preliminary Mw was a significant underestimate**
- **Only one nearby coastal station – no deep-ocean stations**
- **PTWC issued an Information Statement for the CARIBE-EWS, but the only covered potential tsunami threat was Chile and Antarctica in the PTWS**
- **No TWS for the southern Atlantic**
- **If a similar event occurred near a vulnerable coast the resulting no warning or under-warning could have dire consequences**
- **Sample Pacific Amplitudes**
 - **0.09m in Puerto Williams, Chile**
 - **0.17m in Hawaii**
 - **0.19m in Alaska**
 - **0.20m in California**

Recommendations

- **Identify and implement techniques to more quickly recognize and properly characterize the earthquake and tsunami threat (there will be a special session at Fall 2021 AGU Meeting)**
- **Include the South Sandwich Islands seismic zone in the PTWS source region.**

Modify PTWS Earthquake Source Map



Unscheduled Communication Test Results

COUNTRY	TWFP OR NTWC OR ALTERNATE	PAST	Nov 09 TEST
AUSTRALIA	AUSTRALIA - JOINT AUSTRALIAN TSUNAMI WARNING CENTER (JATWC)	OK	OK
	AUSTRALIA - BUREAU NATIONAL OPERATIONS CENTRE (BNOC), BUREAU OF METEOROLOGY (BOM)	OK	
	AUSTRALIA - CHAIR, AUSTRALIA NEW ZEALAND EMERGENCY MANAGEMENT COMMITTEE (ANZEMC) AUSTRALIAN TSUNAMI ADVISORY GROUP (ATAG)	OK	
BRUNEI DARUSSALAM	BRUNEI DARUSSALAM - BRUNEI METEOROLOGICAL SERVICE	OK	
CAMBODIA	CAMBODIA - MINISTRY OF WATER RESOURCES		
CANADA	CANADA - MINISTRY OF PUBLIC SAFETY AND SOLICITOR GENERAL		
	CANADA - CANADIAN HYDROGRAPHIC SERVICE, PACIFIC REGION - FISHERIES AND OCEANS CANADA / GOVERNMENT OF CANADA		
CHILE	CHILE - HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE OF THE CHILEAN NAVY, SHOA	OK	OK
	CHILE - NATIONAL DISASTER MANAGEMENT OFFICE		OK
	CHINA - NATIONAL TSUNAMI WARNING CENTER		
CHINA	CHINA	OK	
	CHINA - HONG KONG OBSERVATORY	OK	OK
COLOMBIA	COLOMBIA - DIRECCION GENERAL MARITIMA	OK	OK
	COLOMBIA - COMISION COLOMBIANA DEL OCEANO		
COOK ISLANDS	COOK ISLANDS - COOK ISLANDS METEOROLOGICAL SERVICE	OK	OK

PTWC Continuing Enhancement Efforts

GNSS Data & Analyses - More Rapid/Accurate Source Characterization

- Project moved to PMEL for Research to Operations (2-3 years out)
- Monthly review of progress (NOAA, NASA, Academia)

Regional CMT for EQ Mechanism in 10-15 min

- Results have been very good. Now looking at quality control parameters

Common Message Code for PTWC and USNTWC

- Original project not successful, but efforts still underway
- Benefit is seamless backup between centers

SIFT Enhancements

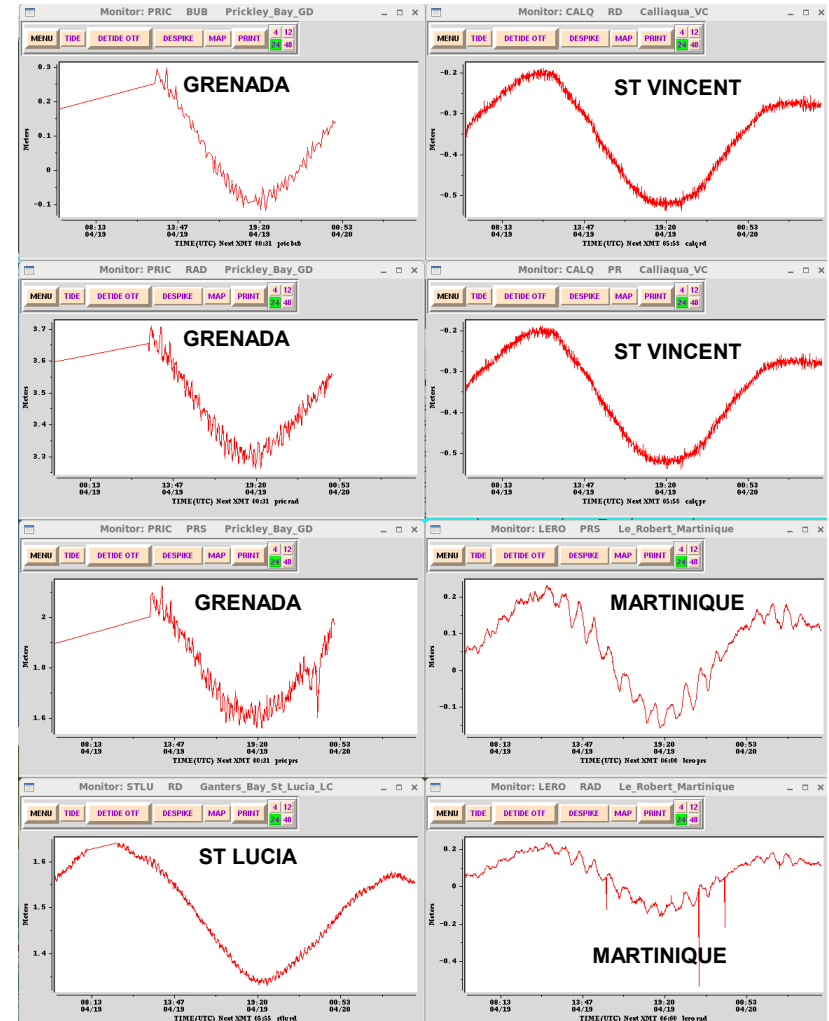
- Smaller unit sources
- Unit sources will be computed “on-the-fly” to cover

Training Video for CARIBE-EWS TSP Products

- ITIC has created a training video describing the PTWC products – what they are, what they mean, and how to use them.

La Soufriere Response Since 4/9/21 Eruption

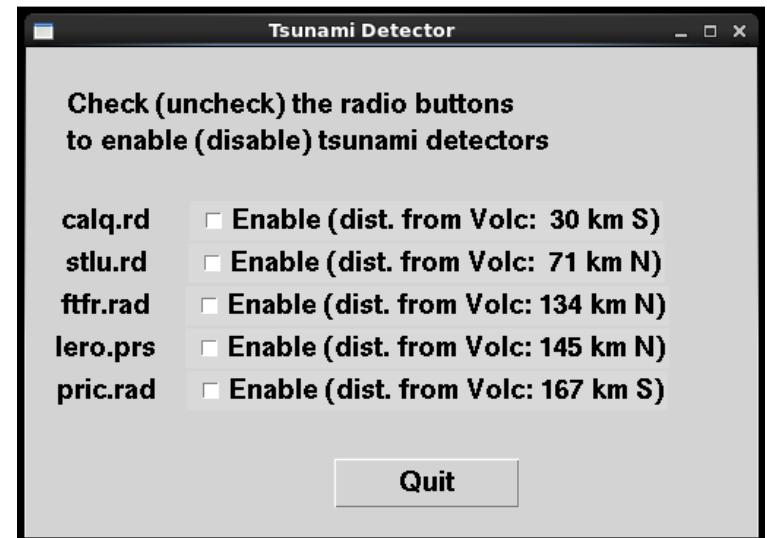
- Began monitoring nearby sea level gauges
- Coordinated with SRC and Task Team on Volcano Sources
- Reviewed CaribeWave19 Exercise for Kick-em-Jenny
- Advised all TNCs, TWFPs and NTWCs of potential threat and PTWC response to alert Member States
- Wrote software and procedures for PTWC Duty Scientists to generate and disseminate products if tsunami detected.
- Wrote and implemented software for simple tsunami detector for this event



Simple Tsunami Detector for La Soufriere

- Removes tide signal using tidal components
- Detects based on amplitude threshold (0.2m for Calliaqua, 0.3m for the rest)
- Back-tested for 480 days to determine false alarm rate.
 - 6 detections at St. Vincent
 - 2 detections for St. Lucia
 - 47 detections for Grenada
 - 316 detections for Martinique
- Detector is connected to PTWC paging system to alert Duty Scientists upon detection.

GUI to enable/disable detector





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Thank You

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NOAA Pacific Tsunami Warning Center
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