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Intergovernmental Oceanographic Commission

Agenda 8.2

Working Group 2 - Report and Recommendations

Chair : J Padmanabham(India)

Vice Chairs:

Robert Greenwood (Australia)

Yedi Dermadi (Indonesia)

14th Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS-XIV), Jakarta, 16-19 November 2024

Terms of Reference

Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. Coordinate and strengthen the operational implementation of tsunami detection, warning and dissemination, including for tsunamis generated by non-seismic and complex sources.
2. Support the Tsunami Service Providers (TSPs) delivery of interoperable regional tsunami threat information products to Member States.
3. Support Member States in the development of their national tsunami warning capabilities.
4. Monitor the performance of key observational, warning and communication system components.
5. Support implementation of IOWave Exercises.
6. Identify areas of priority for action following assessments, communications tests, exercises, and real tsunami events.
7. Provide advice on further development of IOC-UNESCO TRRP.
8. Provide advice to the Indian Ocean Tsunami Information Centre (IOTIC) on educational materials about the warning systems and services.
9. In collaboration with IOC-UNESCO IOTIC and IOC-UNESCO Secretariat for ICG/IOTWMS, help strengthen the capacity and capability of Member States.

Membership

Chair: Mr. J Padmanabham (India)

Vice-Chair: Dr Robert Greenwood (Australia)

Vice-Chair: Mr. Yedi Dermadi (Indonesia)

Members:

Ms Adriene Moseley (Australia)

Mr Nagaraja Kumar Masuluri (India)

Dr. Karyono (Indonesia)

Mr Iman Fatchurachman (Indonesia)

Mr Urip Setiyono (Indonesia)

Mr Jean Bernardo Andrianaivoarisoa (Madagascar)

Mr Rina Andrianasolo (Madagascar)

Dr Chai Mui Fatt (Malaysia)

Mr Afiq Zhofri bin Abdul Razak (Malaysia)

Mr Jaifar Al-Busaidi (Oman)

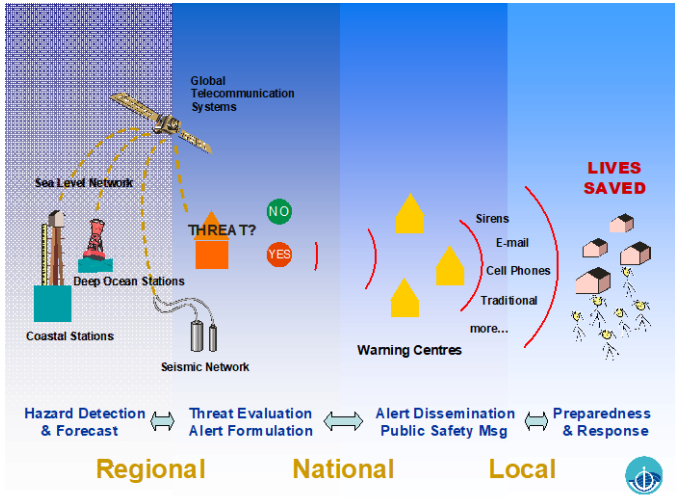
Mr Malik Al-Ghafri (Oman)

Mr Tariq Ibrahim (Pakistan)

Mr Ameer Hyder (Paksitan)

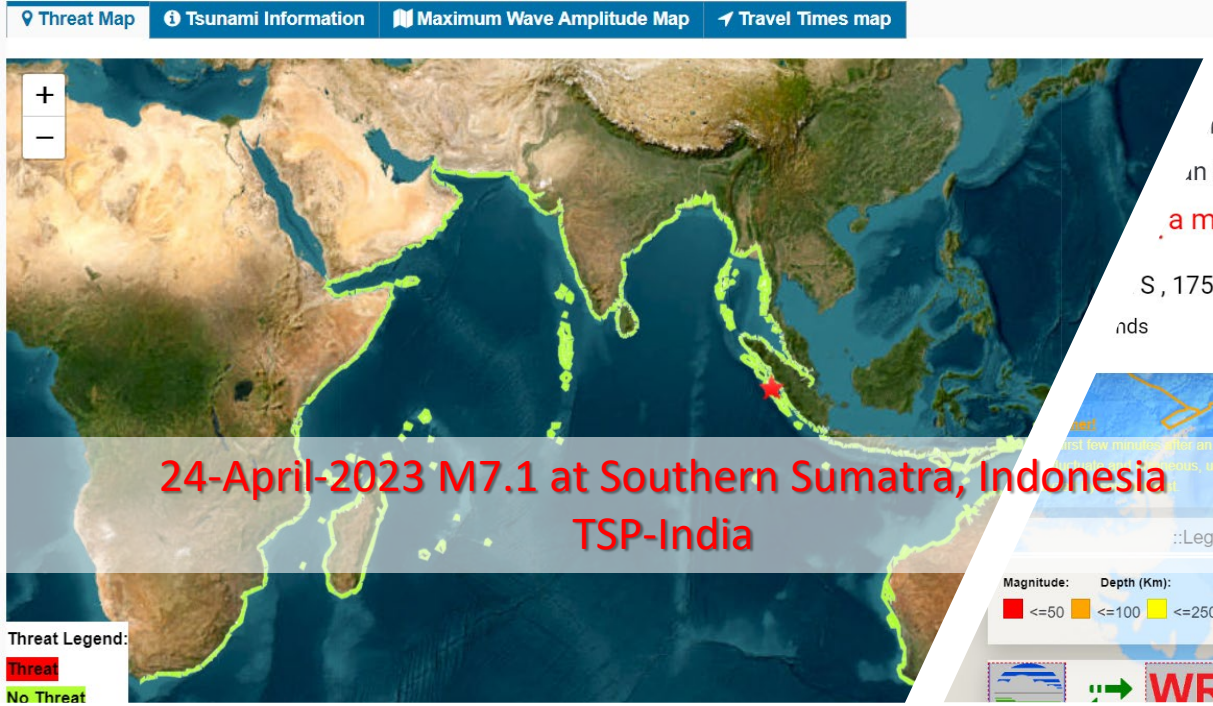
Detection, Warning and Dissemination – Current Status / Highlights

- Under ICG/IOTWMS there are 3 Tsunami Service Providers (TSPs) (Australia, India, Indonesia) to provide tsunami threat information to National Tsunami Warning Centres (NTWCs)
- During the reporting period Indian Ocean witnessed 2 events (M6.8+)
  - (i) 24-April-2023 M7.1 at Southern Sumatra, Indonesia
  - (ii) 21-May-2023 M6.8 at Prince Edward Islands region
- Potential Tsunami Threat information is provided for non-seismic source tsunami, (eg volcanoes) by TSP-Australia. other two TSPs planned to implement.
- Maritime products for NAVAREAs to be trialed and implemented in 2024 by TSPs – TSP-AUSTRALIA & TSP-INDIA are ready for the trail.
- Competency training framework being developed for NTWCs
- TSP operations are ISO compliant: ISO 9001 (Australia & India),ISO 22328-3 (Indonesia)

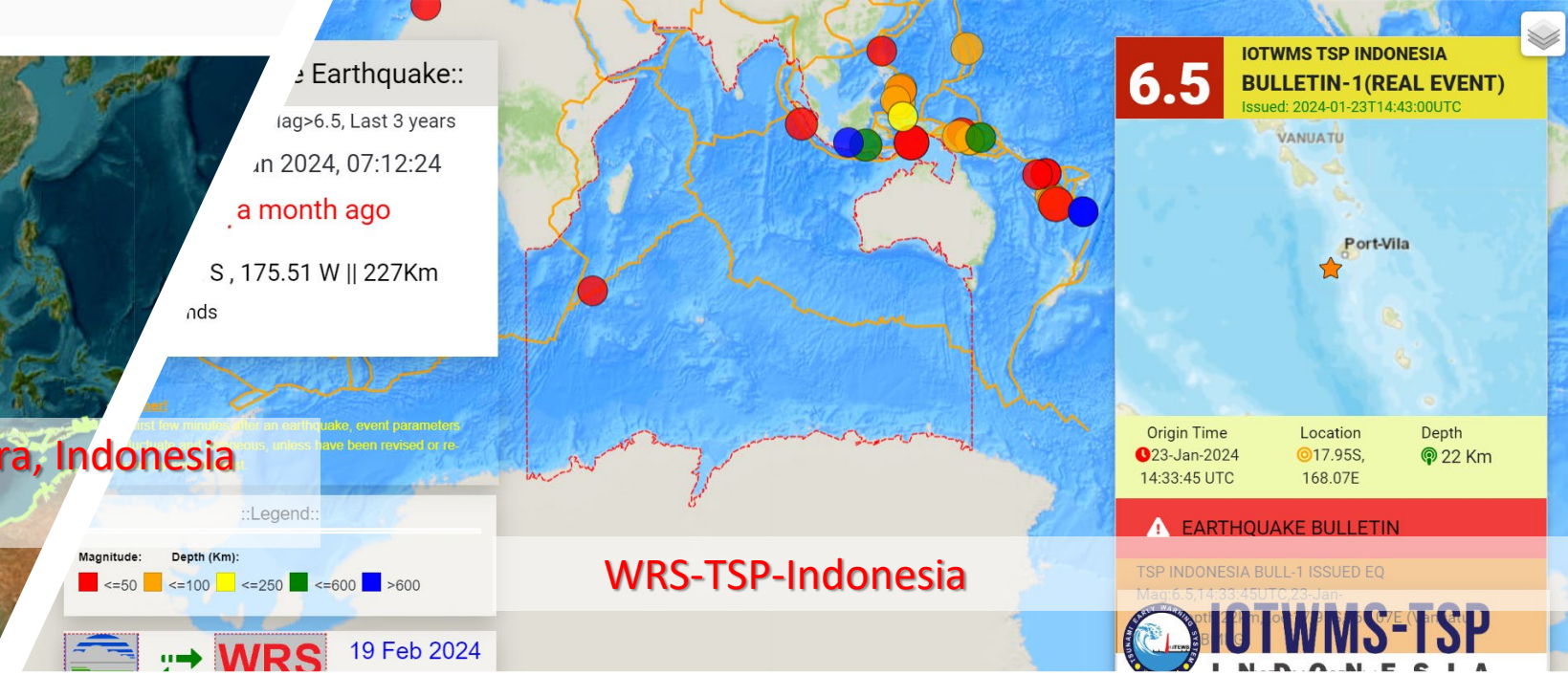


Significant events(Seismic IO6.8M+ & Non-Seismic) during Intersessional Period

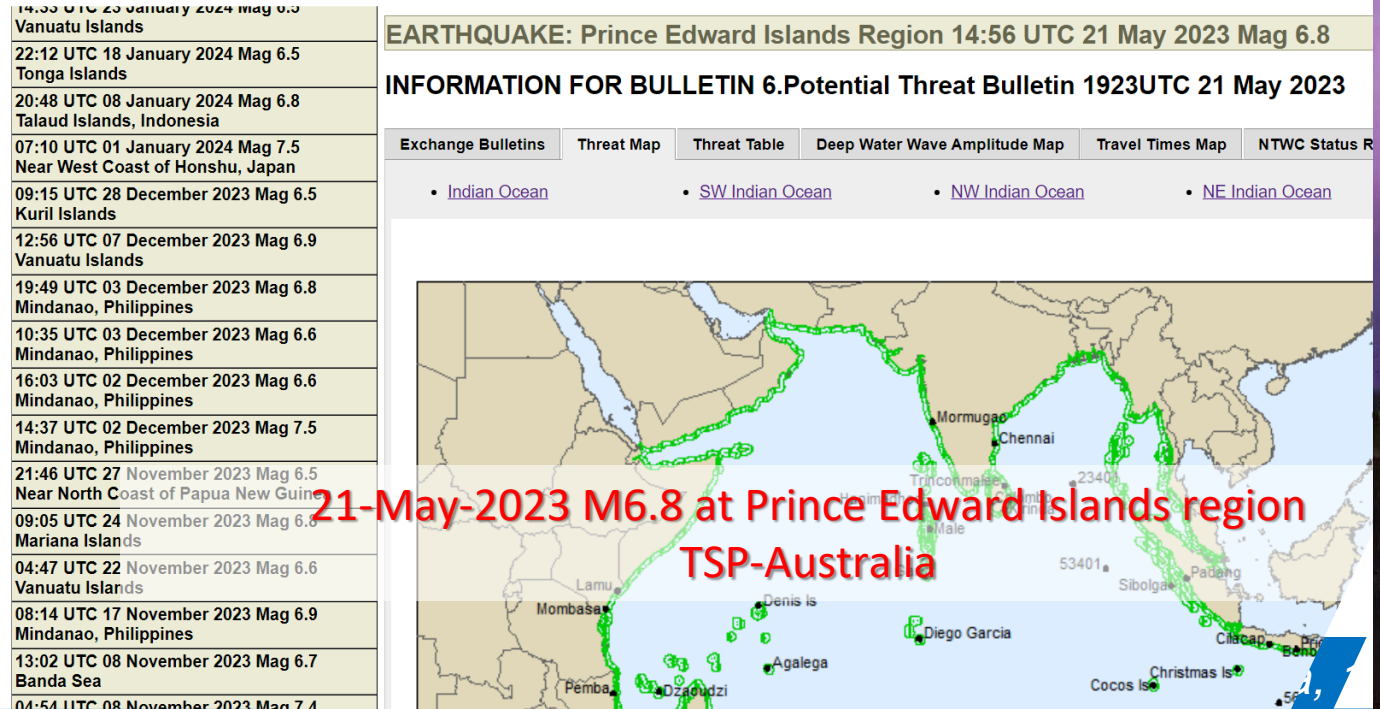
Type of Event	Date &Place	MW	Centre	Remarks
Seismic	21/05/2023 Prince Edward Region	6.8	TSP-Australia	07 bulletins issued: 1 EQ bulletin (Type-I), 5 Tsunami potential Threat bulletins (Type-II) , and 1 Final bulletin (Type-IV).
Seismic	24/04/2023 Southern Sumatra, Indonesia	6.9	TSP-Australia	Issued only Type-I (EQ Information)
		6.8	TSP-India	Issued Type-I bulletin ; Type-II bulletin with no threat to Indian Ocean Region
		7.3	TSP-Indonesia	Issued only Type-I (EQ Information).
Non-Seismic (Volcano)	29 /04/2024 Talaud islands, Indonesia	na	TSP-Australia	TSP-Australia issued a no-threat bulletin for the volcanic eruption at Ruang(2.31N, 125.36E) and demonstrated operationally issuing the bulletin. The event occurring in the Pacific Ocean.



24-April-2023 M7.1 at Southern Sumatra, Indonesia
TSP-India



WRS-TSP-Indonesia



21-May-2023 M6.8 at Prince Edward Islands region
TSP-Australia

Working Group -2 : Progress

1. **Publish, advertise, and implement the updated IOTWMS TSP Service Definition Document (Version 5) and request the TSPs to conform to it. (Secretariat, TSPs); The Version 5 of the SDD has the following the major changes in the SDD-V5**

Added an explicit statement that TSPs can issue a Level 2 bulletin if there is a threat to the Indian Ocean from earthquake outside the Indian Ocean source zone, even if the magnitude is less than M8.0. This addressed a request to WG2 from the ICG/IOTWMS XII.
Marked any earthquake magnitude change as "Updated", not "Revised" to minimise chance of mistaking 'revised' as 'arbitrary'. This addressed a request to WG2 from the ICG/IOTWMS XII.
Added a requirement to produce a new TSP product to NAVAREA Coordinators for their issuing navigational warnings to ships. Product templates and examples are also added.
Updated the KPI reporting threshold from M6.5 to M6.8 in USGS final solution. This is to improve reporting consistency without compromising reporting standards.
Defined explicitly those traffic light reporting thresholds of 'on target/near target/missing target' to improve clarity of the performance reporting.
Expanded the TSP services (not mandatory but on best effort and voluntary basis) to handle non-seismic and complex tsunami sources to meet increasing demands.

2. **Update the NTWC User Guide in accordance with the updates to the TSP Service Definition Document (Secretariat, TSPs);** - Under progress

3. **Maintain the NTWC User Guide and TSP Service Definition Document (Secretariat, WG-2 Chair & Vice-chairs);** - on going

4. **Implement further the TOWS-WG request on TSP messages for the maritime community and Secretariat to obtain contacts for NAVAREA operators (TSPs, Secretariat);** -- TSP-Australia & TSP-INDIA are ready to trail the service. Need to get subscribers and establish a procedure for contacting NAVAREA coordinators and maintaining their details, which we propose adding to the NTWC/TWFP Contact Database. (Secretariat) (2&3: before upcoming COMMS Test)

Working Group -2 : Progress

5. **Provide training subject to resources including: (Secretariat, TSPs) – On going**
   a) Awareness on tsunamis generated by non-seismic and complex sources -
   b) An additional one-day session on Tsunami Warning Centre and Seismic Network Operations as part of all future Standard Operating Procedure (SOP) training (Dr Karyono with support from TSPs, Secretariat); - On going by TSPs
   c) Support to increase the capacity for analyzing real-time seismic and sea level data for tsunami threat (TSPs, Secretariat);
   d) On job trainings for the Indian Ocean Member States (Secretariat and IOTIC to assist the TSPs); - On going
   e) Capacity support for NTWCs in tsunami modeling to support generation of threat forecast (Secretariat, IOTIC, TSPs); Provide training subject to resources including:
6. **Identify sea level observations that are not available on the IOC sea level station monitoring facility and update the IOC on the data feeds (NTWCs, TSPs); -** encourage the use of inaTNT for the additional sea level data in the IO region**.** This activity will be undertaken post-CATP-2024 survey. A section on sea level data availability as one metric in COMMS test reports.
7. **The Secretariat to work with the IOC Sea Level Facility to identify reliable tide gauge stations with fast transmission rates (Secretariat);** - On Going
8. **Assist the Secretariat in maintaining the database of seismic and sea-level reporting stations for the IOTWMS (Secretariat, WG-2 members);** --On Going

Working Group -2 : Progress

10. **Contribute to the conduct of ocean-wide exercise (IOWave23) and 6 monthly IOTWMS Communication Tests and prepare reports of each test in conjunction with the Secretariat (TSPs, NTWCs; Secretariat); - on going**

✓Supported the IOWave23 throughout the pre/during/post stages.

✓Conducted 3 comms tests (Dec 2022, Jun 2023,June 2024) with issues captured in each comms test report and followed up (where practically possible).

11. **Encourage the NTWCs of Member States to increase the frequency of tabletop or similar tsunami warning exercises to review and test SOPs and reduce the potential for complacency among countries that have not experienced a recent tsunami event (NTWCs);** - On going

12. **TSP Australia to share the outcomes of the Australian warning system currently in development with respect to the multi-hazard early warning approach or system for mutual benefits (to be led by Robert Greenwood) and take this up for wider consideration across all ICGs (TT TWO representatives from Indian Ocean);** - TBD

13. **Assist WG-3 with the SOP training workshops on IOC-UNESCO Tsunami Ready Recognition Programme (TSPs);** **WG2 has supported the Wg3 to conduct the below workshops & trainings. – on going**

✓01Jun -ICG/IOTWMS : Eastern Indian Ocean Member State Preparation Meeting for SOP Workshop

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✓03-06 Jul -ICG/IOTWMS : Western IO Member States Training Workshop on SOPs for NTWCs and DMOs (Hybrid)

✓10-13 Jul -ICG/IOTWMS : Eastern IO Member States Training Workshop on SOPs for NTWCs and DMOs(Hybrid)

✓07-08 Aug - ICG/IOTWMS : North-West Indian Ocean SOP Hybrid Training Workshop

Working Group -2 : Progress

14. **Establish a work mechanism between NTWCs and TSPs to solve communication issues (i.e. non-receipt of messages) and re-examine the need for fax (TSPs, Secretariat);** - Secretariate issued the IOC Circular Letter 3006 on October 08,2024

15. **Consider having the TSPs send an SMS/email notification whenever there are tsunami product updates**

    -The requirement was already met. 3 TSPs are sending the SMS/Email notifications for any new bulletins issued. Closed

16. **Encourage NTWCs to conduct a risk assessment of upstream tsunami warning including dissemination of tsunami warnings, reliable resources, etc. (for example, SWOT analysis: strengths, weaknesses, opportunities, threats) (TSP Australia, Secretariat);** - TBD.

17. **In regard to tsunamis generated by non-seismic and complex sources (e.g. volcanoes, landslides, splay-faulting, meteotsunami, onshore earthquakes, mud volcanos):**

    a) Extend the TSP services to include tsunamis generated by non-seismic and complex sources (TSPs); - Ongoing

    b) Investigate methods of detection and threat assessment of non-seismic and complex source tsunami events in coordination with TOWS-WG TTTWO,

    c) Prepare an atlas of known sources, and – in progress (India)

    d) Conduct an online workshop on non-seismic and complex source tsunami events -to be included as a part of the SOP workshops in future.

Working Group -2 : Progress

18. Share information on possible new tsunami-detection technologies such as pressure sensors attached to undersea communications cables (WG-2 members & NTWCs); - on going
19. Request Member States to review TSP bulletin dissemination details annually and advise of updates (Secretariat).
20. To support and contribute on the Capacity Assessment of Tsunami Preparedness in the Indian Ocean Report which is under way. – WG2 contributed to the recent CATP-2024.

Other WG2 Updates

- Held WG2 intersessional meetings 2022, online WG2 meetings in 2023.
- Global tsunami coordination
  - Supported the yearly global tsunami coordination meetings of TOWS-WG and its Task Team Tsunami Watch Operations
  - Supported the Ad Hoc Team on Tsunamis Generated by Volcanoes through surveys.
  - Contributed to the harmonised global performance framework and questionnaires

2. Challenges/Gaps in Tsunami Detection Warning and Dissemination

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- Challenge to sustain the seismic and sea level networks/observing systems
- Major challenge to enable free and full data sharing of real-time observations .
- Challenge to sustain research and development efforts that
  - update or expand the pre-computed scenario database to real-time tsunami modelling capabilities, that
  - develop auto-alerting capability and improve use of real-time observations including new/emerging technologies such as GNSS and SMART cables, and that
  - provide scientific basis for impact-based forecasts and warnings.
- Insufficient inter-agency coordination and cooperation, which reduced wider reach of warnings, and the timely and appropriate emergency response.
- Integrated Multi-hazard approach remains largely a concept unless coordinated at each Members states.
- Major challenge to provide timely and accurate tsunami detection and warning to near-field tsunami, and non-seismic and complex tsunami.

3. WG2-Recommendations:

- **Recommendation 1:** TSPs to trial dissemination of maritime bulletins to respective NAVAREA operators in the Area of Service (AoS) for the upcoming communication test and for full operational implementation in 2025.
- **Recommendation 2:** To release the ICG/IOTWMS SDD Version 5 formally for the adoption by TSPs.
- **Recommendation 3:** Develop a Standard Operating Procedure (SOP) document specifically for addressing non-seismic tsunami sources, focusing on Tsunami-Generating Volcanic Events (TGVEs).
- **Recommendation 4:** Organize online webinar for ICG/IOTWMS involving relevant Volcano Observatories and Volcanic Ash Advisory Centres (VAACs). These webinars will brief participants on the report Monitoring and Warning for Tsunamis Generated by Volcanoes (IOC/2024/TS/183) and its recommendations, highlight the associated hazards and vulnerable Member States, and initiate partnerships between TSPs, NTWCs, Volcano Observatories, and VAACs.
- **Recommendation 5:** Develop a digital, web-enabled atlas of known TGVs and other non-seismic tsunami sources, offering easy access and information for NTWCs.
- **Recommendation 6:** Consider performing exercises outside of working hours, in particular during the night, but being careful to take into consideration difficulties and possible issues of involving the public in night-time drills.
- **Recommendation 7:** Optimal sea level and seismic network design for the Area of Service (AoS) and work with Member States to fill identified gaps, including the strategic and coordinated submission of projects to the UN Ocean Decade and potential funding sources for support.

Changes and Clarifications to Performance Reporting

	Service Level 1 EQ Bulletins (Change to report Mag 6.8 and above in all source zones)					Service Level 2 Threat / No Threat Bulletins			General
TSP	KPI 1 ET First EQ Bull Target: 10 mins (% met)	KPI 2 POD EQs Target: 100%	KPI 3 EQ Mag Target: 0.3 (% met)	KPI 4 EQ Depth Target: 30 km (% met)	KPI 5 EQ Location Target: 30 km (% met)	KPI 6 ET First Threat Bull Target: 20 mins (% met)	KPI 7 POD Tsunami Waves Target: 100%	KPI 8 Tsunami Height Accuracy Target: Factor of 2	KPI 9 False / Incorrect Bulletins Issued Target: 0
Meets Target	<10 min	100%	<0.3	<30 km	<30 km	<20 min	100%	50-200%	0
Near Target	10-15 min	90-100%	0.3-0.45	30-45 km	30-45 km	20-30 min		25-50% or 200-400%	1
Misses Target	>15 min	<90%	>0.45	>45 km	>45 km	>30 min	<100%	>400% or <25%	2+

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THANK YOU