Progress Indian Ocean Tsunami Warning & Mitigation System (IOTWMS)

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Member IOTWMS Steering Group
A presentation to the 27th Meeting of ICG/PTWS, Tahiti, 28 – 31 March 2017
Medium Term Strategy

Three Pillars:
1. Risk Assessment & Reduction
2. Detection, Warning & Dissemination
3. Awareness & Response
Steering Group
- Task Team IOWave16

Only two ICG/IOTWS Working Groups now supporting the 3 Pillars of Medium Term Strategy:

- **WG1** Tsunami Risk, Community Awareness and Preparedness
- **WG2** Tsunami Detection, Warning & Dissemination

New: **NW Indian Ocean Regional WG**
Tsunami Service Providers (TSPs)

- 3x TSPs: Australia, India, Indonesia
- Each TSP covers entire Indian Ocean
- Recognising national SOVEREIGNTY TSPs don’t issue warnings directly for other countries
- Issue inter-operable potential threat information for Tsunami Warning Focal Points (TWFPs) and National Tsunami Warning Centres (NTWCs)
- NTWCs then issue national warnings
- Information available to NTWCs from TSPs via Registered User web sites
TSP methodologies

• **Models:**
  – Australia, MOST, unit source, T2 scenario database
  – Indonesia, TsunAWI (finite element), RuptGen
  – India, TUNAMI-N2, pre-defined ruptures

• **Interoperable products:**
  – threat map
  – energy map
  – travel times (T1, T2, T3, T4)
  – estimated "beach" amplitudes

• **Threat thresholds:**
  – Earthquake: mag >6.5, depth < 100km, undersea and <200km inland of coast
  – Wave amplitude at beach (1m water depth): >0.5m (using GREEN's LAW)
TSP Service Definition Document:


- Last Update: Version 2, 26 March 2015 (at ICG-X). Main changes:
  - Updated Area of Service and Earthquake Source Zone maps
  - Added Bulletin Templates
  - Added TSP KPIs
  - Added 100km max depth for SL2 products and 200km max earthquake distance inland
  - Added sections on Performance Reporting, Event Assessments, Regular Tests
  - Added TSP and NTWC Role Definitions

- Compliance to Version 2 Changes:
  - TSP India compliant since July 2016
  - TSP Australia and TSP Indonesia compliance pending.

- Planned future updates:
  - Earthquake naming; simultaneous events; non-subductive events
  - Revised Event Assessment template
  - Notice to NTWCs ahead of service changes

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Agreed coastal forecast zones
IOTWMS TSP
interoperable products

>1500 Coastal Forecast Points (CFP) for each TSP

Threat Maps:
>350 agreed Coastal Forecast Zones (CFZ)

Warning Thresholds:
Mag >6.5
Amplitude >0.5m

Deep Ocean
IOTWMS Registered User Web Sites
Country specific information
# TSP KPIs 2016

<table>
<thead>
<tr>
<th>TSP</th>
<th>Service Level 1</th>
<th>Service Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EQ Bulletins</td>
<td>Threat / No Threat Bulletins</td>
</tr>
<tr>
<td></td>
<td>Target: 10 mins (% met)</td>
<td>Target: 20 mins (% met)</td>
</tr>
<tr>
<td></td>
<td>Target: 0.3 (% met)</td>
<td>Target: 30 km (% met)</td>
</tr>
<tr>
<td></td>
<td>Target: 30 km (% met)</td>
<td>Target: Factor of 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TSP</th>
<th>KPI 1 ET First EQ Bull</th>
<th>KPI 2 POD IO EQs GE M6.8</th>
<th>KPI 3a EQ Mag</th>
<th>KPI 3b EQ Depth</th>
<th>KPI 3c EQ Location</th>
<th>KPI 4 ET First Threat Bull</th>
<th>KPI 5 POD Tsunami Waves</th>
<th>KPI 6 Tsunami Height Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>13.3 min (13.7%)</td>
<td>100%</td>
<td>0.22 (81.1%)</td>
<td>22.8 (74.0%)</td>
<td>20.1 (76.5%)</td>
<td>18.4 min (71.4%)</td>
<td>n/a*</td>
<td>6.7**</td>
</tr>
<tr>
<td>India</td>
<td>9.7 min (74.3%)</td>
<td>92%</td>
<td>0.17 (81.8%)</td>
<td>23.7 min (33.3%)</td>
<td>n/a*</td>
<td>7.5**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>13.7 min (42.4%)</td>
<td>84%</td>
<td>0.18 (85.7%)</td>
<td>89 min (0.0%)</td>
<td>n/a*</td>
<td>12.4**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
* No events caused threat level tsunami waves
** Average tide gauge observations vs. predictions from 2 March 2016 event. Note that TSP Australia also issued Potential Threat for 6 Dec 2016 North Sumatra mag 6.5 event, but no tsunami waves observed.
TSP Public Information
Earthquake Bulletins on IOC List Server

• **Issue:** IOTWMS TSPs monitor and report on earthquakes mag >8.0 in neighbouring oceans, which may generate tsunamis that may enter and threaten the Indian Ocean. When IOTWMS TSP bulletins on IOC List Server advised "No Threat" this caused confusion for other ocean regions reporting threats in their basins.

• **Resolved:** IOTWMS TSP have included wording agreed at TOW-WG to highlight "No Threat" applies to Indian Ocean only.

Earthquake Source Zone for IOTWMS
Standard Operating Procedure (SOP) Training Workshops

- Held annually at one of the three TSPs
- Involve reps from NTWCs, DMOs, and sometimes media
- Empower NTWC representatives to train fellow NTWC staff
  - Educate on TSP systems and products
  - Run desktop exercises using new information, bulletins, web sites….
- DMOs and media educated on types of products and how to interact with NTWCs and how best interact with NTWCs
Exercise IOWAVE16

- All 24 IOTWMS Member States participated in Exercise IOWave16 (same as for IOWave14)
- 12 of the Member States carried out community level evacuations (only 2 Member States in IOWave14)
- 22 of the 24 Member States submitted exercise evaluation responses
IOWAVE16 Exercise – Sept 2016

Sumatra Scenario:

Makran Scenario:

Deep Ocean Max Amplitude Map

Coastal Forecast Zone Threat Map
Partnerships with other stakeholders

In Iran, Timor Leste, and Kenya, local NGOs and the Red Cross facilitated the community evacuations. The media and private sectors were involved in disseminating early warning and raising the awareness of the local communities. The UNISDR facilitated participation of independent observers in India and Seychelles during the IOWave16.

Working with local governments to save lives

In Indonesia, the BMKG (Agency for Meteorology, Climatology, and Geophysics of Indonesia) as the NTWC coordinated closely with the BNPB and BPBD (the National and Local Disaster Management Authority) to mobilise 4,800 people in ground evacuation simulation.

In India, state and provincial governments were working closely with the Indian National Centre for Ocean Information Services (INCOIS) in simulating the evacuation of over 40,000 people.

Participation of children and schools

Education has proven to save children’s lives and others. In Oman, schools from 4 provinces evacuated to their school’s roof as safe haven, in Comoros, school children participated at the beach; while in Indonesia hundreds of them joined the evacuation to the multistorey evacuation shelters.

Engaging the tourism industry

In Mauritius, 25 hotels participated in the exercise and in Iran, tourists at the beach took part in the exercise after they heard the warning from sirens and speakers. Tourism industry as an important economic pillar in many Indian Ocean countries, play its role in promoting tsunami awareness and preparedness.

Reaching to the most at-risk

In Seychelles, 133 elderly residents and 40 mentally ill patients were involved during IOWave16. This demonstrated that children, pregnant women, elderly people, people with disabilities are more at-risk and require specific measures in tsunami simulation exercises.
Tsunami Risk, Community Awareness & Preparedness Activities

1. Conducting a **baseline assessment survey** on each Member State's tsunami preparedness
2. Conducting integrated **capacity development workshops**
3. **Implementing Tsunami Ready** in the Indian Ocean region
4. Enhancing community **participation in future IOWave exercises**
5. Aligning activities with **World Tsunami Awareness Day** to increase community awareness and preparedness
6. Setting up of inter-sessional task team for **updating the questionnaires** for baseline assessments, future IOWave exercises and ICG member-state national reports and conducting the baseline assessment

Furthermore, WG1 investigated collaborative opportunities with other organisations (e.g. UNESCAP, UNISDR, RIMES, GIZ) to implement tsunami preparedness initiatives in the Indian Ocean region
Community Awareness & Preparedness: Recent collaborative activities with UNESCAP

- Project on “Communicating the effects of the 1945 Makran tsunami to increase awareness and preparedness of tsunami hazards in the Makran region” – completed June 2015

- Project on “Enhancing Tsunami Risk Assessment and Management, Strengthening Policy Support and Developing Guidelines for Tsunami Exercises in Indian Ocean Countries” - completed June 2016

- Building Knowledge and Awareness to Enhance Tsunami Preparedness in NW Indian Ocean Coastal Communities – Submitted for funding and currently being revised
Community Awareness & Preparedness: Recent collaborative activities with UNESCAP

- Regional Workshop on Training Modules for Tsunami Exercises Policy, Jakarta, Indonesia: 15-17 June 2015 (Myanmar, Timor Leste, Bangladesh)


Prof. Hettiarachchi presented a copy of the UNESCO/IOC Guideline on Tsunami Risk Assessment and Mitigation for the India Ocean (No 52 Revised Edition, 2015) to Madame Irina Bokova
IOTIC Activity reports

- Developed communication materials
- Supported UNESCAP projects and proposal development
- Conducted Post-Event Assessment of the Performance of the Indian Ocean Tsunami Warning and Mitigation System
- Supported the ICG/IOTWMS SOP Training/Workshops
IOTIC Activity reports

• Building Model Disaster Resilient Cities in Indonesia: Tsunami Hazard
  – Capacity building and development of Standard Operating Procedures for Tsunami Warning Chain for the Moluccas Province, Ambon City, Pandeglang District and Local broadcasting media.
  – “Tsunami in 3 Villages - Remembering 1950 Tsunami Ambon”, education, preparedness and awareness materials for Ambon City and the surrounding area, based on 28 eyewitness stories.
  – Tsunami education and preparedness animation videos
    • Tsunami Early Warning System.
    • Tsunami Preparedness.
    • Tsunami Evacuation.
    • Strategies in surviving tsunamis.
    • Tsunami Early Warning Chain for Local Government.
IOTIC Activity reports

• Exercise IOWave16 support
• WTAD - Lessons Learnt Workshop on Community Participation Exercise IOWave16, Bandung, 5-6 December 2016
IOTIC Activity reports
September 2015 – December 2016

• Support to Indian Ocean Small Island Developing States and African Coast developing countries
  – Seychelles 7 – 11th March 2016: Regional Training/Workshop on Coastal Hazard Assessment and Mitigation.
Summary

- **Successes of greater focus on last mile**, especially involving more communities in education and awareness activities, tested by highly **successful exercises such as IOWAVE16**… including community evacuations and **sharing of best practices**.
- The projects and benefits possible due to active **Indian Ocean Tsunami Information Centre (IOTIC)** and support of extra-budgetary funds in capacity building and **coordination by IOC Secretariat**
- **Annual training** on use of operational tsunami threat information provided by designated Tsunami Service Providers (TSPs) to National Tsunami Warning Centres (NTWCs), Disaster Management Offices (DMOs) and the media.
- **Ongoing requirements for technical enhancements** in tsunami forecasting to facilitate effective community responses.
- **Benefits and progress towards performance monitoring** for all elements, including links to Sendai Framework reporting
Please check ….IOTIC web site for further information:
http://iotic.ioc-unesco.org/

Thank You!

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