Report on Task Team of Establishment of the South China Sea Tsunami Advisory Center (SCSTAC)

Ye Yuan, Ph. D
Acting Director of Tsunami Warning Division,
National Marine Environmental Forecasting Center, China
Review on 1st TT meeting

- Date and Venue
  - Apr 7, 2014 in Hong Kong Observatory

- Membership
  - As indicated in the next slide
Task Team on Establishment of the SCSTAC

Membership
- NWPTAC: Mr. Takeshi KOIZUMI, Mr. Tetsuyuki UEYAMA
- Brunei
  - Dr. Hj. Sidup Hj. Sirabaha (BDMD)
  - Ms. Leong Wai Fong (NSC)
  - Pg Sabli Pg Damit (NDMC)
- China
  - Dr. Ye Yuan, Dr. Dakui Wang, Mr. Zhiguo Xu (NMEFC)
- Indonesia
  - Dr. Wandoono (Vice Chair--BMKG)
  - Mr. Mohamad Taufik Gunawan (BMKG)
  - Mr. Ibnu Sofyan (BIG)
- Malaysia
  - Mr. Muhammad Nazri Noordin (MMD)
- Philippines
  - Dr. Renato Solidum (PHIVOLCS)
- Thailand
  - Mr. Capt. Song Ekmahachai RTN (NDWC)
- Vietnam
  - Dr. Nguyen Hong Phuong (Institute of Geophysics)
  - Mr. Tran Van Chung (Institute of Oceanography)
Requests the SCS WG to develop an inventory of seismic and sea level stations in the South China Sea region that are available for the SCSTAC

Recommends the SCS WG to encourage South China Sea Member States to share more seismic and sea level data with each other

Proposed performance indicators for adoption by the SCS WG with indicator values to be defined by the Task Team before the end of 2014

Recommends that SCSTAC advisory products should comprise text and a suite of graphical products including polygon forecast maps which should be in consistency with the PTWC new enhanced products to avoid potential confusion
Review on 1st TT meeting recommendations

- Recommends that the design of the SCSTAC advisory products and the definition of performance indicator values should be accomplished and submitted for consideration of the SCS WG by the end of 2014
- Dr Wandono (Indonesia) was elected to serve as vice-Chair of the Task Team
- Request the PTWC to nominate a representative to become actively involved in the activities of the Task Team
Activities since 1\textsuperscript{st} TT meeting

- Targeting to accomplish recommendations arisen from 1\textsuperscript{st} TT meeting
  - Research on regional advisory products provided by other TSPs, especially PTWC new enhanced products;
  - Further formulating <Requirements and implementation plan for SCSTAC><Draft Plan on the SCS Tsunami Advisory Products><Survey report on Regional/National Tsunami Warning Criteria and Products>
  - Circulating the documents among TT members at the end of Jan 2015 for comments and advices
  - Japan, Indonesia and WG-SCS Chair Mr. Mok feedback comments before the opening of the 4\textsuperscript{th} WG meeting
  - Part of amendment finished
Review on TT ad hoc meeting in Feb 11

- TT members and representatives from Brunei, China, Indonesia, Philippines, Thailand, Vietnam and NWPTAC attended this ad hoc meeting.
- Dr. Yuan introduced the purpose and the goals of the task team since new representatives joined this time;
- Request Brunei, Philippines to nominate TT members;
- Performance indicators tentatively determined, priority actions for 2015-2016 proposed and Draft plan for the SCS advisory products introduced and pending to further works.
- Comments from TT members were collected.
# Recommendations to WG-SCS

## Performance indicators and according target values

<table>
<thead>
<tr>
<th>Performance indicators</th>
<th>Target values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elapsed time from earthquake to issuance of initial tsunami products with preliminary earthquake parameters</td>
<td>Within 12 minutes</td>
</tr>
<tr>
<td>2. Probability of detection of earthquakes with Mw&gt;=6.0</td>
<td>100%</td>
</tr>
<tr>
<td>3. Accuracy of preliminary earthquake parameters on hypocenter location/magnitude/depth</td>
<td>0.3degree/0.3/&lt;30kms</td>
</tr>
<tr>
<td>4. Elapsed time from EQ to issuance of first bulletin containing tsunami threat info</td>
<td>Within 16 minutes</td>
</tr>
<tr>
<td>5. Accuracy of Estimated Time of Arrival in case of that a tsunami actually is triggered</td>
<td>Within 10% of travel time</td>
</tr>
<tr>
<td>6. Percentage of Member States that timely receive products issued by the SCSTAC</td>
<td>100%</td>
</tr>
<tr>
<td>7. Percentage of time the SCSTAC is operating and able to respond to a tsunami event</td>
<td>100%</td>
</tr>
<tr>
<td>8. Frequency of regular communication tests</td>
<td>Twice a year</td>
</tr>
</tbody>
</table>
The TT recommended the SCSTAC tsunami advisory should comprise text and graphic products including Estimated Time of Arrival, Tsunami Energy Forecast Map, Coastal Forecast Map and Coastal Forecasting Points Table.

The draft SCS advisory products should be finalized and submitted to the next SCS Working Group meeting.

The TT recommended that priority actions in 2015-2016 should be focusing on augmentation of existing monitoring capability, formulation of SOP, finalization of the SCS tsunami advisory products and associated forecasting methodology, as well as identification of dissemination pathways.

The TT requested Brunei, Philippines and PTWC to nominate a representative to serve as a member of the TT.
## Priority actions – EQ & Tsunami Monitoring

<table>
<thead>
<tr>
<th>Proposed Actions</th>
<th>Contributor</th>
<th>Timeline</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification observations gaps and requirements, proposing additional priority stations in areas where coverage is not yet adequate.</td>
<td>TT-SCSTAC</td>
<td>Before Dec 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Developing performance indicators for the SCSTAC</td>
<td>TT-SCSTAC</td>
<td>Before 4th SCS regional meeting in Feb 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Coordinating among the Member States to donate seismic and sea level observation resource</td>
<td>TT-SCSTAC</td>
<td>Before Dec 2016</td>
<td>Ongoing</td>
</tr>
<tr>
<td>In collaboration with MSs to develop methodologies for fast CMT determination</td>
<td>SCSTAC, Member States</td>
<td>Before Dec 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Design-plan for the SCSTWS Website</td>
<td>TT-SCSTAC, Member States</td>
<td>Before Dec 2015</td>
<td>Not started</td>
</tr>
<tr>
<td>Tsunami source inversion algorithm by tsunami buoy records in the SCS</td>
<td>SCSTAC, PMEL/NOAA</td>
<td>Before Dec 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Proposed Actions</td>
<td>Contributor</td>
<td>Timeline</td>
<td>Status</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Survey on the present national and regional tsunami warning/advisory products</td>
<td>TT-SCSTAC</td>
<td>Before Dec 2014</td>
<td>Finished</td>
</tr>
<tr>
<td>Consult with NTWCs and TWFPs to determine appropriate requirements for Tsunami service/products</td>
<td>TT-SCSTAC</td>
<td>Before May 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Developing criteria and operational products</td>
<td>TT-SCSTAC</td>
<td>Draft before Feb 2015; Final version before next meeting</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Develop standard operating procedures for SCSTAC</td>
<td>TT-SCSTAC</td>
<td>Before early 2016</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Finalizing operational numerical models and tsunami propagation scenario database</td>
<td>TT-SCSTAC</td>
<td>Before Dec 2015</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Proposed Actions</td>
<td>Contributor</td>
<td>Timeline</td>
<td>Status</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------</td>
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<td>---------</td>
</tr>
<tr>
<td>Identifying dissemination pathways available to SCSTAC and all MSs</td>
<td>TT-SCSTAC, WG-SCS</td>
<td>Before Dec 2015</td>
<td>planed</td>
</tr>
<tr>
<td>Inventory of TWFPs and NTWCs in the SCS region</td>
<td>WG-SCS, TT-SCSTAC</td>
<td>Before Sep 2015</td>
<td></td>
</tr>
<tr>
<td>Determining dissemination methods to each MSs, and formulating dissemination workplan</td>
<td>TT-SCSTAC</td>
<td>Before next SCS working group meeting in 2016</td>
<td>planed</td>
</tr>
</tbody>
</table>
# The SCS Tsunami Advisory products (SCSTA)

## Criteria

<table>
<thead>
<tr>
<th>Bulletin type</th>
<th>Criteria</th>
<th>Content</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tsunami Information</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only one bulletin</td>
<td>Mag. of 6.0-6.5; or on land; or ≥100km depth</td>
<td>EQ parameters and statement of ‘No tsunami threat’</td>
<td>5-10 mins</td>
</tr>
<tr>
<td>Only one bulletin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unless minor waves observed and should be reported</td>
<td>Mag. of 6.6-7.0</td>
<td>EQ parameters and statement of ‘No tsunami threat’</td>
<td>5-10 mins</td>
</tr>
<tr>
<td><strong>Tsunami Threat Message</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulletin with quantitative forecast</td>
<td></td>
<td>EQ parameters and quantitative forecasts on threat level and ETA</td>
<td>10-15 mins</td>
</tr>
<tr>
<td>Supplementary with observations</td>
<td></td>
<td>EQ parameters, quantitative forecast and tidal gauge observations</td>
<td></td>
</tr>
<tr>
<td>Final bulletin</td>
<td></td>
<td>Statement of ‘No tsunami confirmed or threat passed’</td>
<td>2 hrs after hazardous waves or no significant tsunami observations</td>
</tr>
</tbody>
</table>
The SCS Tsunami Advisory products (SCSTA)

- **TEXT Message**

<table>
<thead>
<tr>
<th>Sections</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMO HEADER</td>
<td></td>
</tr>
<tr>
<td>BULLETIN HEADER</td>
<td>Serial number, issuance agency and time</td>
</tr>
<tr>
<td>HEADLINE</td>
<td>Coverage</td>
</tr>
<tr>
<td>EQ INFO</td>
<td>Preliminary earthquake paras</td>
</tr>
<tr>
<td>EVALUATION</td>
<td>Qualitative statement</td>
</tr>
<tr>
<td>TSUNAMI AMPLITUDE AND ETA FORECASTS</td>
<td>Coastal Forecasting Points Table</td>
</tr>
<tr>
<td>RECOMMENDED ACTIONS</td>
<td></td>
</tr>
<tr>
<td>UPDATES</td>
<td>Bulletin schedule</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION</td>
<td>Website and contact info</td>
</tr>
</tbody>
</table>
The SCS Tsunami Advisory products (SCSTA)

- Tsunami Energy Map and TTT

**SCSTAC Tsunami Maximum Amplitude**
This map should not be used to estimate coastal tsunami amplitudes or impacts Deep-ocean amplitudes are usually much smaller than coastal amplitudes.

**SCSTAC Tsunami Travel Time**

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**Earthquake**
- Lat: 18.4
- Lon: 119.3
- Depth: 25 km
- Mw: 8.8

**Earthquake Mechanism:**
- Maximum Amplitude (m)
  - 19.10
  - 1.00
  - 0.75
  - 0.50
  - 0.25
  - 0.10
  - 0.05
  - 0.01
  - 0.00

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**Earthquake**
- Lat: 18.4
- Lon: 119.3
- Depth: 25 km
- Mw: 8.8

**Earthquake Mechanism:**
- Travel Times (hours)
  - 16
  - 12
  - 8
  - 4
  - 0
The SCS Tsunami Advisory products (SCSTA)

- Coastal Forecasting Map

SCSTAC Coastal Tsunami Maximum Amplitude

Actual amplitudes at the coast may vary from forecast amplitudes due to uncertainties in the forecast and local features.
The SCS Tsunami Advisory products (SCSTA)

- Coastal Forecasting Points Table

![Map showing coastal forecasting points](image-url)
Comments received from TT members

- **Comments on <Requirements and Implementation plan>**

1. Terminology: replacement of ‘Warning Center’ with ‘Tsunami Service Provider’ (Tsunami Glossary)
2. ‘Warning Products’ should be replaced with ‘Advisory Products’;
3. Information sharing platform is no longer a necessity since the 3rd WG meeting encourage MSs to share information via global networks in terms of cost efficiency.
4. Performance indicators and their target values should be determined taking feasibility and user requirement into account;
5. Asking MSs to determine whether a final bulletin is preferred or required.
6. SOP determines the success of a TWS, thus SOP should be elaborated in the documents;
7. Editorial amendments
Comments received from TT members

- Comments on <Tsunami Advisory Products>

1. AoR should be replaced with AoS;
2. Ask the SCS countries regarding their preferences to Final bulletin.
3. It is recommended to consider adopting a higher magnitude threshold for issuing tsunami advisories for tsunamis from the outside;
4. Graphical Products should be confined only inside the SCS region based on the concept of AoS at each TSP. Note that PTWC’s graphical products and draft NWPTAC’s graphical products also depict tsunami forecast only in their own AoSs;
5. SMS could be adopted as one of the pathways to deliver the SCSTAC products;
Comments received from TT members

- Comments on < Tsunami Advisory Products >

6. AoS of the SCSTAC should be illustrated clearly;
Comments received from TT members

- Comments on < Tsunami Advisory Products >

7. Coastal forecasting points should be further augmented pending each MSs submitting its preferred forecasting points;
Thank You

Ye Yuan, Ph. D
Acting Director of Tsunami Warning Division,
National Marine Environmental Forecasting Center, China