«The exercise NEAMWave14, 28-30 October 2014»

Task Team on Tsunami Exercise of the ICG/NEAMTWS

with the contribution of

DG ECHO Emergency Response Coordination Centre of the European Commission

Rabat, 24 September 2014
Exercises in the IOC\(^1\) tsunami programme framework

**Aim:** maintain and increase tsunami preparedness and awareness of coastal communities

**Challenge:** relative infrequency of tsunamis, but widespread impact in case of event (*perception issue*).

**Objectives:**
- *Test and evaluate* communications and standard operating procedures of regional\(^2\) and national tsunami warning systems
- *Maintain* staff familiarity and efficiency for the real event
- *Promote* emergency preparedness at local level
- *Increase* tsunami awareness of communities

1) Intergovernmental Oceanographic Commission of UNESCO
Exercises in the IOC tsunami programme framework

- Caribe Wave 11
- Caribe Wave 13
- Caribe Wave 14
- Neam Wave 12
- Neam Wave 14

Exercise Pacific Wave 08
Exercise Pacific Wave 06
Exercise Pacific Wave 11
Exercise Pacific Wave 13

Indian Ocean Wave 09
Indian Ocean Wave 11
Exercises in the IOC tsunami programme framework (3/4)

Definitions of the UNESCO/IOC – NOAA International Tsunami Information Center

Matching terminologies...
“tabletop/functional exercise” ≈ “command post exercise”
First, very positive and constructive, exercise of the ICG/NEAMTWS

- reference documents to support the exercise planning and conduction (manual, scenario guidelines, evaluation templates,...)

- **4 scenarios**: activity lasted for 2 to 3 hours each day

- **A number of issues were identified** that resulted in a series of **recommendations** regarding:
  - exercise preparation and documentation
  - Exercise conduction
NEAMWave14 exercise objectives

• **Validate and evaluate**
  — issuing and dissemination of tsunami warning messages (CTWP)
  — procedures for countries to receive and confirm the Tsunami Messages (NTWC, TWFP, TNC)

• **Test** the dissemination of the warning messages at national scale (from NTWC/TWFP/TNC to Civil Protection Agency)

• **Assess** the organizational decision making process about public warnings and evacuations at national level

• **Identify** best practices (to be shared) and room for improvements (to be addressed)

• **Test** procedure for international assistance between the European Commission and the participants.
International assistance request and provision

Emergency management activities performed at national level

International assistance request and provision

NEAMWave14 exercise steps

Phase A

detection of event and the timely provision of alert messages

Phase B

Phase C

International assistance request and provision
NEAMWave14 exercise steps

**Phase A**
- **CTWP**
  - Event detection; issuing and dissemination of the alert messages

**Phase B**
- **TWFP/TNC**
  - Confirmation of the Tsunami Messages’ receipt and their forwarding to national CPA, possibly customizing them
- **CPA**
  - National decision making process about response actions and public warnings and evacuations

**Phase C**
- **ERCC**
  - Provision of international assistance upon request of the affected Countries

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1) Candidate Tsunami Watch Provider = TSUNAMI WATCH PROVIDERS
2) Tsunami Warning Focal Point/Tsunami National Contact
3) Civil Protection Agency
4) Emergency Response and Coordination Centre

= TSUNAMI WATCH RECEIVERS
NEAMWave14 exercise scenarios

Instituto Português do Mar e da Atmosfera

Kandilli Observatory and Earthquake Research Institute

CENtre d'Alerte aux Tsunamis

National Observatory of Athens
NEAMWave14 exercise scenarios

• scenarios based on a computer-simulated event

• based on a credible worst-case or a substantially damaging case

• key features:
  — earthquake origin time, location and magnitude
  — 3 plots, describing the characteristics of the wave dispersion:
    • An isochrone chart with arrival time iso-lines.
    • A wave energy plot with maximum wave heights for the entire domain.
    • A map, indicating coastal hazard levels according to the agreed levels.
  — A brief timeline explaining the standard operational procedures applied by the CTWP
  — The complete set of tsunami alert messages that will be issued during the exercise.
  — list of forecast points where arrival times and wave heights are given
NEAMWave14: tsunami alert messages

<table>
<thead>
<tr>
<th>Message Type</th>
<th>Tsunami Wave</th>
<th>Effects on the coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsunami Watch</td>
<td>Tsunami wave height greater than 0.5m and/or tsunami run-up greater than 1m</td>
<td>Coastal inundation</td>
</tr>
<tr>
<td>Tsunami Advisory</td>
<td>Tsunami wave height less than 0.5m and/or tsunami run-up less than 1m</td>
<td>Currents, Bore, recession, damage in harbours, small inundation on beaches</td>
</tr>
</tbody>
</table>

PLUS: **Tsunami Information** is a message issued to advise the NEAM recipients of the occurrence of a major earthquake in the area but with an evaluation that there is no tsunami threat.

IN EACH MESSAGE THE LEVEL OF ALERT IS SPECIFIED FOR EACH FORECAST POINT ALONG THE INTERESTED COASTS
NEAMWave14: tsunami alert messages

**Example from KOERI scenario**

<table>
<thead>
<tr>
<th>T[min]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>EQ Origin Time</td>
</tr>
<tr>
<td>T3</td>
<td>EQ Parameters (mag, lat, lon, depth, origin time)</td>
</tr>
<tr>
<td>T4</td>
<td>Tsunami Assessment based on the decision matrix</td>
</tr>
<tr>
<td>T5</td>
<td>Dissemination of the 1st Message</td>
</tr>
<tr>
<td>T6</td>
<td>Sea-level measurement at AMASRA Station confirms TSUNAMI</td>
</tr>
<tr>
<td>T7</td>
<td>Eye-witness reports on Earthquake Damage</td>
</tr>
<tr>
<td>T15</td>
<td>Dissemination of the 2nd message (ONGOING)</td>
</tr>
<tr>
<td>T27</td>
<td>Eyewitness reports from ZONGULDAK confirm TSUNAMI</td>
</tr>
<tr>
<td>T46</td>
<td>Eyewitness reports from KEFKEN confirm TSUNAMI</td>
</tr>
<tr>
<td>T50</td>
<td>Sea-level measurement at KACIVELI Station confirms TSUNAMI</td>
</tr>
<tr>
<td>T54</td>
<td>Sea-level measurement at SINOP Station confirms TSUNAMI</td>
</tr>
<tr>
<td>T60</td>
<td>Dissemination of the 3rd message (ONGOING)</td>
</tr>
<tr>
<td>T70</td>
<td>Eyewitness reports from EREGLI and AKCAKOCA confirm TSUNAMI</td>
</tr>
<tr>
<td>T104</td>
<td>Sea-level measurement at CONSTANTTA Station re-confirms TSUNAMI</td>
</tr>
<tr>
<td>T110</td>
<td>Dissemination of the 4th message (ONGOING)</td>
</tr>
<tr>
<td>T180</td>
<td>Dissemination of the 5th (message (END))</td>
</tr>
</tbody>
</table>

**Figure 13: The flow chart of message dissemination during NEAMWAVE14**

In each reference scenario you will find all the tsunami alert messages that will be sent during the exercise and their sequence of dissemination.
Western Mediterranean Sea

- Longitude: 8.06
- Latitude: 43.14
- Depth: 10 km
- Magnitude: Mw 6.5
- Slip: 0.59 m
- Strike: 71°
- Dip: 85°
- Rake: 90°
- Half-length: 12.8 km
- Width: 12.44 km
- Shear module: 3.3 E9
Western Mediterranean Sea

<table>
<thead>
<tr>
<th>Message</th>
<th>Theoretical sending time</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$t_0 + 10'$</td>
<td>Message sent 10 minutes after the earthquake occurrence, with earthquake parameters, estimated tsunami arrival times (ETA) and warning levels.</td>
</tr>
<tr>
<td>2</td>
<td>$t_0 + 60'$</td>
<td>Same message, with the first water-heights measured on tide gauges</td>
</tr>
<tr>
<td>3</td>
<td>$t_0 + 180'$</td>
<td>End of alert</td>
</tr>
</tbody>
</table>
Western Mediterranean Sea

Message 2:

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY
GAUGE LOCATION LAT LON TIME AMPL PER

CENT 42.97N 9.35E 0950Z 0.02M 0MN
FIGU 43.48N 6.93E 0948Z 0.02M 0MN

SUPPLEMENT MESSAGES WILL BE ISSUED AS SOON AS NEW DATA AND EVALUATION ALLOWS.
THE TSUNAMI ALERT WILL REMAIN IN EFFECT UNTIL AN END OF ALERT IS BROADCAST.

TSUNAMI EXERCISE MESSAGE NUMBER 002

MOROCCO - RABAT 34.04N 6.84W 1341Z 16 APR ADVISORY

SUPPLEMENT MESSAGES WILL BE ISSUED AS SOON AS NEW DATA AND EVALUATION ALLOWS.
THE TSUNAMI ALERT WILL REMAIN IN EFFECT UNTIL AN END OF ALERT IS BROADCAST.

TSUNAMI EXERCISE MESSAGE NUMBER 001
## North Atlantic scenario

<table>
<thead>
<tr>
<th>Time</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>Earthquake occurs</td>
</tr>
<tr>
<td>T0+4m</td>
<td>Initial earthquake parameters (hypocenter and MW) computed: mag 8.5; depth: 19 km</td>
</tr>
<tr>
<td>T0+5m</td>
<td>First evaluation of possible tsunami impact (DM); Issue of first message (#1)</td>
</tr>
<tr>
<td>T0+39m</td>
<td>Confirmation of tsunami on the first tide-gauge, Lagos, Portuguese mainland SW coast;</td>
</tr>
<tr>
<td>T0+43m</td>
<td>Issue of suppl. message (#2)</td>
</tr>
<tr>
<td>T0+44m</td>
<td>Tsunami wave arrival to Sines tide-gauge</td>
</tr>
<tr>
<td>T0+46m</td>
<td>Tsunami arrival to Cascais tide-gauge</td>
</tr>
<tr>
<td>T0+60m</td>
<td>Issue of suppl. message (#3)</td>
</tr>
<tr>
<td>T0+1h07m</td>
<td>Tsunami wave arrival to Funchal tide-gauge, Madeira Islands</td>
</tr>
<tr>
<td>T0+1h09m</td>
<td>Tsunami wave arrival to Casablanca tide-gauge, Morocco</td>
</tr>
<tr>
<td>T0+1h13m</td>
<td>Tsunami wave arrival to Huelva tide-gauge, Spain</td>
</tr>
<tr>
<td>T0+2h</td>
<td>Issue of suppl. message (#4)</td>
</tr>
<tr>
<td>T0+2h05m</td>
<td>Tsunami wave arrival to Santa Maria tide-gauge, Azores Islands</td>
</tr>
<tr>
<td>T0+3h*</td>
<td>Issue of end-tsunami message (#5)</td>
</tr>
</tbody>
</table>
### NEAMWave14 scenarios and timing

<table>
<thead>
<tr>
<th>Scenario</th>
<th>28/10/14 morning</th>
<th>28/10/14 afternoon</th>
<th>29/10/14 morning</th>
<th>29/10/14 afternoon</th>
<th>30/10/14 morning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Mediterranean scenario (CENALT(^1))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Sea scenario (KOERI(^2))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North East Atlantic scenario (IPMA(^3))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Mediterranean scenario (NOA(^4))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Phase C</td>
</tr>
</tbody>
</table>

- Phase A and B

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1) CENtre d’ALerte aux Tsunamis
2) Kandilli Observatory and Earthquake Research Institute
3) Instituto Portugues do Mar e da Atmosfera
4) National Observatory of Athens
NEAMWave14 exercise: focus on Phase B

Why it is important to implement a phase B?

- To move from an **early warning** approach toward an **early action and response** one
- To develop an **end-to-end management system** of tsunami events (regional, national, local level)

NEAMWave12, phase B:

- **5 Member States** (Croatia, Denmark, Germany, Portugal, Turkey)
- from NEAMWAVE12 evaluation: “**The level of CPA participations is less then expected / desired**”

Different levels of commitment possible in order to implement a phase B at national scale

Possibility of bilateral interaction in preparatory phase with Italian and French civil protections.
Exercises types

Definitions of the UNESCO/IOC – NOAA International Tsunami Information Center
NEAMWave14 exercise: HOW TO PARTICIPATE

• Application form to be to IOC Secretariat

• Preparatory actions to participate: see exe manual + contact TT-TE Co-Chairs for support/suggestions/questions if needed

• Exercise conduction: helpdesk available (email; landline)

• Exercise evaluation:
  o ANNEX 6. Phase A Evaluation Questionnaire – CTWP
  o ANNEX 7. Phase A Evaluation Questionnaire – NTWC/TWFP/TNC
  o ANNEX 8. Phase B Evaluation Questionnaire – CPA within 30 days after ex.
  o ANNEX 9. Phase C Evaluation Questionnaire – CPA within 30 days after ex.
Exercise documents: where to download

http://neamtic.ioc-unesco.org/neamwave12
Exercise documents: where to download
http://neamtic.ioc-unesco.org/neamwave12

- Exercise manual
- Application form to participate into the exercise
- Exercise scenarios
Questions?
Thank you for your attention