



**Probabilistic TSUunami Hazard MAPS for the NEAM
 Region (TSUMAPS-NEAM)**
ECHO/SUB/2015/718568/PREV26
Second Progress Report - 29 April, 2017



1. Table of Contents

2. Project objectives, partnership and expected deliverables..... 1

3. General summary of project implementation process 2

4. Evaluation of project management/implementation process..... 2

5. Activities..... 3

6. Presentation of the technical results and deliverables..... 4

 6.3. Deliverable D4..... 4

 6.4. Deliverable D5..... 4

 6.2. Deliverable D2..... 4

7. Evaluation of the technical results and deliverables 4

8. Follow-up 4

2. Project objectives, partnership and expected deliverables.

Title of the project: Probabilistic **TSU**unami Hazard **MAPS** for the **NEAM** Region. Acronym: **TSUMAPS-NEAM**. TSUMAPS-NEAM is a Prevention Project, Priority 3, External Budget item.

The total duration of the project is **21 months**.

This report considers activities carried out in the second seven-month-long period of the project, i.e. from **01/08/2016** to **28/02/2017**.

Partnership:

INGV	NGI	IPMA	GFZ	METU	UB	NOA	CNRST	INM
Italy	Norway	Portugal	Germany	Turkey	Spain	Greece	Morocco	Tunisia
Member State	Participating State	Member State	Member State	Enlargement	Member State	Member State	Neighbourhood Policy	Neighbourhood Policy

The partnership of the project includes research institutions established in EU countries, as well as in Enlargement and Neighbourhood Policy countries. Geographically, these countries are spread all across the European continent with coastlines facing the North-Eastern Atlantic, the Mediterranean, and connected Seas (NEAM region), thereby bearing significant exposure to potential tsunami hazard. Nonetheless, a thorough probabilistic tsunami hazard assessment (PTHA) is not yet available for the NEAM region. The main general objective of the TSUMAPS-NEAM project is thus to fill this gap by producing the first region-wide long-term homogenous PTHA from earthquake sources and thereby triggering a common tsunami risk management strategy.

The specific objectives of the project are tackled by the following four consecutive actions: 1) design the methodology and produce a state-of-the-art, standardized, and updatable PTHA with full uncertainty treatment; 2) review the entire process with international experts; 3) put into practice the above two points to produce the final PTHA, its online database and maps, and the documentation of the followed procedures; and 4) publicize the results through an awareness raising and education phase, and a capacity building phase. Publicity will be particularly oriented toward Enlargement and Neighbourhood Policy countries.

As of 09/02/2017, with Amendment no. 1 (ref. Ares(2017) 382524) to the Grant Agreement, the project duration has been extended by three months (from 18 to 21). The new deadline

is thus set to 30 September, 2017. Expected deliverables are as follows, with the updated month of delivery indicated in parenthesis:

- D1. First Progress Report (M9) - **DELIVERED**
- D2. Second Progress Report (M16) - **This document**
- D3. Final Technical Report (M23)
- D4. Online Tsunami Hazard Database (M14) - **DELIVERED**
- D5. Tsunami Hazard and Probability Maps (M14) - **DELIVERED**
- D6. Experts' Review and Sanity Check (M18)
- D7. Methods and Data Documentation (M18)
- D8. Project Website (M4) - **DELIVERED**
- D9. Awareness and Education Materials (M16)
- D10. Guidelines and Training Tools (M19)
- D11. Layman's Report (M21)

The PTHA products in the above list of deliverables are meant to serve as a basis for future local and national PTHA efforts and be the first step to include tsunamis in multi-hazard and multi-risk assessments.

3. General summary of project implementation process

The project was conceived as a cascade of activities, starting with the setup of a probabilistic hazard model (Task B), which includes the elicitation of internal and external experts to make critical choices and assign weights to alternative models; integrated with a thorough peer-review process including sanity checks and documentation of the performed calculations (Task C), all accompanied by publicity and dissemination (Task D). Task A is devoted to project management and reporting.

Changes in the time schedule of some deliverables were deemed necessary for ensuring the quality of the products, or for improving them, with respect to the initial plans. In particular, we needed to postpone the final meeting, initially planned to be held in June 2017 in Tunisia, because the Ramadan in 2017 will start on May 27 and finish on June 25. We realized that this would have caused some inconveniences to the logistics of the meeting and decided to change plans. In so doing, we turned this change into an opportunity by accepting the proposal from IOC/UNESCO to organize a general tsunami information meeting back to back with TSUMAPS-NEAM. This could become a meeting much like the IOC/UNESCO meeting held in Morocco in 2014 (<http://unesdoc.unesco.org/images/0023/002305/230519m.pdf>) and also provide information about the NEAMWave17 exercise. A concept note about this meeting is being prepared by all interested parties and will be forwarded to the Tunisia's local authorities in early spring 2017.

Most of the scientific framework, input data and part of the technical platform for the hazard assessment, are based on resources already acquired by partner institutions in previous or concurrent projects (including but not limited to EU-funded projects). Most importantly, part of the work is being carried out in collaboration with the EU FP7 ASTARTE project. Therefore, the efforts to pursue the project-specific objectives mainly rely on human resources (personnel) and the need of frequent meetings and peer-to-peer exchange visits to ensure the collaboration of the various specialists and the coordination of the activities.

4. Evaluation of project management/implementation process

The cooperation between and among the institutions forming the core group has been very fruitful and seamless. Likewise was the ongoing collaboration with other projects. It is to be noted that the ASTARTE EU FP7 project, from which much of the theoretical framework for

TSUMAPS-NEAM is borrowed, has been extended to April 2017. The extension and rescheduling of some activities have been better aligned with ASTARTE. TSUMAPS-NEAM will contribute to some ASTARTE deliverables and participate in the final ASTARTE Meeting in April 2017. This augmented collaboration between the two projects will produce mutual benefits. TSUMAPS-NEAM is also following the development of the Global Tsunami Model organization (GTM; <http://www.globaltsunamimodel.org/>). It should be noted that GTM has been endorsed by UN-ISDR and GFDRR in the spirit of the Sendai Framework for Disaster Reduction (2015-2030). The collaboration with the GTM is being pursued by participating at GTM meetings and promoting TSUMAPS-NEAM as an incubator for future initiatives, and make the EU being one of the main players in the international effort toward the creation of global standards and good practices for tsunami hazard assessment and risk mitigation.

The project management has had to address the cooperation with institutions and individuals that have had only limited previous collaboration in EU projects. To this end, the organized meetings have been an excellent way to deal with this issue and strengthened the collaborative attitude of all partners toward a common goal. The administrative issue with CNRST mentioned in the previous report has been solved. CNRST has appointed Dr Sabah Benchekroun as the new responsible in charge (as of communication of 01/12/2016). The CNRST contribution to the project has been reconsidered and incorporated into ongoing activities with focus on Task D.

5. Activities

The progress in each task has been checked by reaching several milestones, which coincide with five major meetings.

- 1) At the Dissemination Meeting, held in Oslo, Norway, on 31/08-03/09/2016, two key aspects for deliverables D4 and D5 were set: a) tsunami hazard metrics and amplification factors; b) technical aspects for displaying hazard curves and maps.
- 2) The EWS Experts Group Meeting, held in Brussels, on 22/09/2016, was an opportunity to present and discuss the potential interconnections with other organizations and projects of the EU civil protection system.
- 3) The ICG/NEAMTWS Meeting, held in Bucharest, Romania, on 26-28/09/2016, was the first dissemination meeting planned by the project. It was meant to establish a connection between the hazard products and the NEAMTWS activity.
- 4) The GTM Meeting, held in San Francisco, USA, on 10/12/2016, reinforced the connection with the networking activity of the GTM organization. In this respect, the TSUMAPS-NEAM project qualifies as a pilot program toward new standards of tsunami hazard assessment.
- 5) The AGU Fall Meeting, held in San Francisco, USA, on 11-16/12/2016, was the ideal venue for disseminating the project scientific products and interface with the scientific community at large.

This period of the project was mainly dedicated to developing the preliminary hazard model and the preparation of deliverables D4 and D5. The content of these deliverables is disclosed to all project partners, and progressively to the reviewers, some end users, and the Commission. We expect feedback from all these actors, and then update these deliverables accordingly before their final publication, open to anyone, at the end of the project.

Activity has proceeded on all other tasks. Importantly, the data of the elicitation experiment carried out during the Athens meeting (29/06-01/07/2016) have been analysed. The results of this elaboration will serve to set the weights to the model alternatives. The documentation for the formal review is under preparation and will be distributed to the reviewers in the early

spring 2017. The awareness and education materials related to the use of online maps is being drafted while the web site is developed.

As part of the monitoring of activities, the main milestone was the ICG Meeting in Bucharest for the start of the publicity activity. The good impact of the project results from the positive comments from the ICG and the proposal of IOC-UNESCO to organize together the meeting in Tunisia. As for the latter, a concept note of the meeting will be prepared in February 2017.

6. Presentation of the technical results and deliverables

Below is a short description of each of the new results delivered as part of the second reporting period. Both deliverables D4 and D5 are made accessible through an interactive graphical user interface on a dedicated web site. The website will remain password protected until the end of the project to prevent the misuse of preliminary results by occasional users. This will allow for better incorporating the external experts' evaluations and recommendations into the final hazard model while leaving the Commission ample time to familiarize with these results well ahead of the project conclusion.

6.3. Deliverable D4

D4 is composed by a database of tsunami hazard curves calculated at pre-defined Points Of Interest (POIs). Each curve expresses the probability of exceeding a given level of Maximum Inundation Height (MIH) at the POI. POIs are distributed as follows: 137 in the Black Sea, 1130 in the Mediterranean Sea, and 1076 in the North-east Atlantic Sea. The average spacing between POIs is c. 20 km. The overall database is produced in XML format and queried by D5.

6.4. Deliverable D5

D5 is composed by the Hazard Map and the Probability Map. The maps are obtained by selecting a design probability on the hazard curve and plotting the corresponding tsunami level, and by selecting a tolerance level on the hazard curve and plotting the corresponding probability of exceedance, respectively. Each POI is thus coloured according to a scalable colour legend. By mouse clicking any point on the map, the nearest POI is selected and the hazard curve displays in a balloon. Users can also select/deselect hazard curve percentiles and download the selection as a raster image (PNG) or the data as a text file (CVS).

6.2. Deliverable D2

This deliverable corresponds to the second progress report and coincides with this document.

7. Evaluation of the technical results and deliverables

The current results and the feedback received from stakeholders and end users who participated at the organized meetings are encouraging. One of the main strengths of this effort is the involvement of the international community in a participatory manner. The realization of the first tsunami hazard map, although in a preliminary release, is ready for demonstrations to potential users. Particular care is being devoted to a clear presentation of the tsunami hazard metrics adopted, the communication of the inherent limitations of the hazard maps and the uncertainties involved, and the prevention of potential misuse of the hazard products.

8. Follow-up

The follow-up measures envisaged in the project are pursued as originally planned. An additional effort is being made by attentively following the development of the Global Tsunami Model network and the EPOS-Seismology project (<https://www.epos-ip.org/tcs/seismology>).