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## Improving Tsunami Resilience in Europe — ASTARTE

### ASTARTE aims:

Assessment of generation mechanisms, evaluation of uncertainties, development of new numerical and experimental techniques for propagation, coastal amplification and inundation, networking in detection and warning, and building structural and social resilience against tsunamis by 26 partners from 16 countries.

### ASTARTE SSC Meeting at EGU 2014 in Vienna

The Scientific Steering Committee (SSC) of ASTARTE met for the first bi-annual project meeting at EGU 2014 in Vienna on April 30th. The purpose of the meeting was to review the progress on the project and carry out the planning for the next six months. The meeting was moderated by the Project Coordinator Maria Ana Baptista (IPMA). The Project Management Board as well as the work package leaders (and/or alternate leaders) were all in attendance. The activities of research WPs were presented by M. Meghraoui (WP2), C. Harbitz (WP3), J. Behrens (WP4), D. Fuhrman (WP5), O. Necmioglu (WP6), F. Schindel  (WP7), S. Tinti (WP8), and F. Lavigne (WP9). It was verified that the project was on schedule, with no delay in the deliverables of the first 6 months.

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### Improving Tsunami Resilience in Europe - ASTARTE

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Taking advantage of the opportunity, ASTARTE was also disseminated within EGU 2014 through a presentation entitled "Improving Tsunami Resilience in Europe".

For a complete list of journal publications please see the last page.

### 1st ASTARTE General Assembly in Siracusa, Italy

The 1st ASTARTE General Assembly was held on 16 – 18 October, 2014 in Siracusa, Italy, one of ASTARTE's test sites. The 26 partners from 16 countries gathered to meet and discuss what had been done and what is to be done. The meeting was organized by the University of Bologna and Local Civil Protection. During the first two days of the meeting, the results of each work package as well as their deliverables due for month 12 were presented. Moreover, the participants of each WP had the opportunity to plan their WP activities for the year ahead at the parallel sessions. The meeting was honored by the attendance of Vasily Titov (NOAA – PMEL, USA), and the External Advisory Board of the project: Christa Von Hillebrandt-Andrade (ICG CARIBE, NOAA Caribbean Tsunami Center), Hitomi Murakami (Yamaguchi University, Japan) and  mile Okal (Northwestern University, USA).



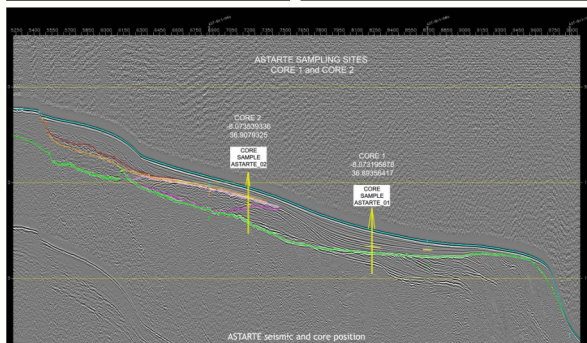
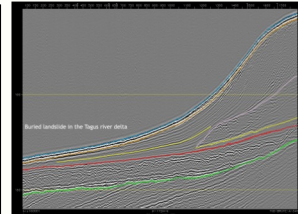
At the third day of the meeting, there was a fieldtrip (guided by A. Smedile and P.M. De Martini, INGV) to the Priolo Salt Pan Natural Oriented Reserve and the Magnisi Peninsula. In Priolo Reserve, an area with fine deposits related to both historical and pre-historical tsunami inundations, the original cores with the tsunami layers were inspected (on the left). In Magnisi Peninsula, the large boulders transported inland by historical tsunami was shown to the participants (on the right).



The meeting was overall well appreciated and received good feedback from the participants. The 2nd ASTARTE General Assembly will be held in Heraklion, Greece (yet another

## ASTARTE #1 Marine Geophysical Survey

A total of 350 km of high resolution multichannel seismic reflection (MCS) lines was acquired during the ASTARTE funded survey, carried out by IPMA, from 19th May to 29th May, 2014, on the continental shelf off-shore Algarve, south Portugal. The survey was carried out using a 18 m long vessel (Xunauta) during daytime hours, with a 200 tip SPARKER array with a 1kj source, 24 channels on a 75m long streamer (active stretch). The objective of the campaign was to survey an area where on-shore tsunami deposits and backwash tsunami deposits were reported off the coast strongly hit by the 1755 Great Lisbon tsunami. The expected vertical and horizontal resolutions after full processing will be, approximately, 20cm and 75cm, respectively. Preliminary processing and interpretation of the seismics allowed the selection for the sites of three gravity cores already collected during the MOWER coring campaign carried out onboard the R/V Sarmiento de Gamboa in October, 2014. Processing and interpretation of high resolution MCS lines acquired in December 2013 revealed the existence of a 10x4x0.02 km landslide in the Tagus delta offshore Lisbon. Preliminary hydro-dynamic modeling showed that the waves generated by this landslide could have hit the coast with waves with maximum heights of 3m.



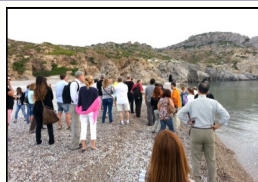
## The ASTARTE Balears Cruise



The ASTARTE Balears cruise, organised and led by CRG Marine Geosciences of the University of Barcelona (UB), took place on July 11–21, 2014 onboard R/V Francisco de P. Navarro in southern Mallorca (Balearic Islands, Spain). The scientific team was composed by six researchers from the University of Barcelona and a researcher from the Spanish Institute of Oceanography (IEO), to which the vessel belongs. The objectives of the cruise were (1) to evaluate the presence of tsunami impact evidences in the seafloor in front of the coastal strip between Colònia Sant Jordi and Cala Santanyí, and between the coastline and the isobath of 50 m; and (2) to extend such evaluation to deeper areas and the region surrounding Cabrera Islands. In order to achieve these objectives, the survey included very high resolution swath bathymetry mapping and sub-bottom seismic reflection profiles complemented by grab sampling from groundtruthin purposes.

Total distance navigated during the cruise was 1,658 nautical miles, mapping in great detail more than 420 km<sup>2</sup> of the seafloor between Colònia Sant Jordi and Cala Santanyí, including Cabrera Islands. Geophysical and sedimentological data will allow characterizing the submerged geomorphology of Colònia Sant Jordi test site, which is exposed to earthquake-generated tsunamis from North Africa. The newly acquired bathymetric dataset will be integrated with equally high-resolution topographic data along the coast, thus providing the basis to improve the accuracy of tsunami propagation models together with vulnerability and risk analysis.

## International Workshop on Mega Earthquakes and Tsunamis in Subduction Zones



The International Workshop on Mega Earthquakes and Tsunamis in Subduction Zones: Forecasting Approaches and Implications for Hazard Assessment was held from 6th to 8th October, 2014, in Rhodes Island, Greece, with the participation of experts, young scientists and representatives of international organizations from around the globe. The ASTARTE project was introduced to the audience of the workshop through a presentation by Maria Ana Baptista.

## Announcements

ASTARTE is on social media! You can follow our Facebook page and join the LinkedIn group from the links <https://www.facebook.com/astartefp7> and <https://www.linkedin.com/groups/ASTARTE-8162283>, respectively.



## ASTARTE Smartphone Application



In the aftermath of natural disasters, members of the affected communities are often the *de facto* first responders. Local volunteers can respond quickly, are strongly motivated, and have the necessary ground knowledge. However, their search and rescue efforts may be misdirected in the absence of information about the location and status of victims. In this respect smartphone applications have an important role in providing rapid and widespread information sharing and dissemination. The ASTARTE Smartphone Application (FIND) is a system that gathers data from smartphones in affected areas, even when the regular communication infrastructure fails, and aggregates it in a web interface for visualization. For each individual, FIND-Map shows location traces and activity indicators. The information can be explored by selecting time-frames and/or applying filters over activity indicators. The first version of ASTARTE smartphone application was presented at the 20th Conference on Collaboration and Technology (CRIWG 2014, 7–10 Sept) in Santiago, Chile. The contribution briefly described the design of FIND and introduced the visualization tool FIND-Map.

## What is going on?

**September 23– 24, 2014**

Regional Workshop on Tsunami Warning and Emergency Response for the North-Eastern Atlantic, Mediterranean and connected seas (NEAMTWS), in Rabat, Morocco (<http://ioc-unesco.org>)

**October 6 - 8, 2014**

International Workshop on Mega Earthquakes and Tsunamis in Subduction Zones: Forecasting Approaches and Implications for Hazard Assessment, in Rhodes Island, Greece (<http://www.gein.noa.gr/metsz/>)

**October 16 - 18, 2014**

1<sup>st</sup> ASTARTE General Assembly, in Siracusa, Italy

## Upcoming Events

**11-14 November 2014**

The 11th Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS-XI), in Nicosia, Cyprus (<http://www.ioc-unesco.org/>)

**24-25 November 2014**

The Indian Ocean Tsunami Warning and Mitigation System 10 years after the Indian Ocean Tsunami: Achievements, Challenges, Remaining Gaps and Policy Perspectives, in Jakarta, Indonesia (<http://www.ioc-unesco.org>)

**15-19 December, 2014**

American Geosciences Union Fall Meeting, in San Francisco, USA (<http://fallmeeting.agu.org/2014/>)

**14-18 March, 2015**

UN World Conference on Disaster Risk Reduction, in Sendai, Japan (<http://www.wcdrr.org/>)

**22-23 March, 2015**

The regional conference Reducing Tsunami Risk in the Western Indian Ocean, in Muscat, Oman (<http://www.ioc-tsunami.org>)

**23-27 March, 2015**

4th International Tsunami Field Symposium – Science, Technology, and Disaster Mitigation, in Phuket, Thailand (<http://www.geo.sc.chula.ac.th/itfs2015/index.html>)

**12-17 April, 2015**

European Geosciences Union (EGU) General Assembly 2014, in Vienna, Austria (<http://www.egu2015.eu/>)

## Survey on Tsunami preparedness skills and attitudes

Within the scope of WP 9: Building Tsunami Resilient Societies, the aim of Task 9.2 is to assess the preparedness skills, including risk perception and attitudes of the tsunami risk among local authorities and inhabitants. For this purpose, a questionnaire was prepared by CNRS (the task leader) and made available in several languages. More particularly, assessment of the questionnaire results allows: (1) to estimate how people consider the tsunami risk (multi-risk approach), how they are aware of the tsunamis recurrence and sources (links with WP2 and 3) and how they have react in the past or would react in the future facing a tsunami threat; (2) estimate the needed level of customization and their modalities for awareness and preparedness material in each studied community; and to (3) provide data for agent-based evacuation modeling (e.g. age, reactivity, admissibility of an evacuation).



## Project deliverables

Deliverable No	Deliverable title	WP	Delivery date	Partner in charge
D5.3	Lessons from recent tsunamis impact on coastal and marine structures and coastal utilities, and performance of mitigation strategies	5	Month 12	METU
D6.4	Database of the existing Tsunami Early Warning relevant infrastructure in the NEAM Region	6	Month 12	NOA
D6.6	Report on the integration of submarine sensor data	6	Month 12	BOUN
D9.7	Report on preparedness skills, resources and attitudes within the communities	9	Month 12	CNRS
D10.5	Smart phone application (first release)	10	Month 12	FFCUL
D10.34	ASTARTE Newsletter	10	Every 6 months	METU
D8.8	Tsunami hazard assessment methods: application in the NEAM region and in the ASTARTE test sites	8	Month 13	UNIBO
D2.9	Recurrence rate of tsunamis of earthquake, volcanic and landslide origin	2	Month 14	CNRS
D5.10	Interaction of the tsunami with the seabed; implications for wind farms, aquaculture, coastal ecosystems and marine protected areas	5	Month 15	DTU

## Publications

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- González-Riancho, P., Aliaga, B., Hettiarachchi, S., González, M., and Medina, R. (under revision) A contribution to the selection of tsunami human vulnerability indicators: conclusions from tsunami impacts in Sri Lanka and Thailand (2004), Samoa (2009), Chile (2010) and Japan (2011). *Nat. Hazards Earth Syst. Sci.* (nhess-2014-249).
- González-Riancho, P., Aguirre-Ayerbe, I., Aniel-Quiroga, I., Abad, S., González, M., Larreynaga, J., Gavidia, F., Gutiérrez, O. Q., Álvarez-Gómez, J. A., and Medina, R. (2013) Tsunami evacuation modelling as a tool for risk reduction: application to the coastal area of El Salvador. *Nat. Hazards Earth Syst. Sci.*, 13, 3249–3270, DOI: 10.5194/nhess-13-3249-2013.
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- Silva, A. et al. (2014) LOST-Map: A Victim-Sourced Rescue Map of Disaster Areas. *Proceedings of the 20th International Conference on Collaboration and Technology (CRIWG 2014)*.
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- Valle, B. L., Okal, A. E., Kalligeris, N., Melilla, L., Findikakis, A. N., and Synolakis, C. E. (2014) Plausible Megathrust tsunamis in the eastern Mediterranean Sea. *ICE Proceedings, Engineering and Computational Mechanics*, Vol.167, Issue EM3, pp.99–105.
- Yalciner, A.C., Zaytsev, A., Aytore, B., Insel, I., Heidarzadeh, M., Kian, R., and Imamura, F. (2014) A possible submarine landslide and associated tsunami at the Northwest Nile Delta, Mediterranean Sea. *Oceanography*, 27(2):68–75, DOI: 10.5670/oceanog.2014.41.

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