Tsunami Early Warning in the Eastern Mediterranean, Aegean and Black Sea

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ABSTRACT

A National Tsunami Warning Centre in Turkey (NTWC-TR) established at the Kandilli Observatory and Earthquake Research Institute (KOERI) under the ICG/NEAMTWS (The Intergovernmental Coordination Group for the Tsunami Warning System in the North-eastern Atlantic, the Mediterranean and connected seas region) initiative is operational since January 2012 based on MOD1 Tsunami Scenario Database and TAT (Tsunami Analysis Tool) received from EC-JRC through a collaborative agreement. NTWC-TR is also acknowledged as a Candidate Tsunami Watch Provider within NEAMTWS. The Centre is relying on a system on systems embodying seismic and sea-level monitoring, tsunami modeling, message dissemination systems, preparedness and mitigation activities. Considerable improvement on the seismic and sea-level network has been achieved; the communication infrastructure at KOERI has been upgraded and now includes its own GTS system. Further improvement of the Tsunami Warning System at the NTWC-TR will be accomplished through KOERI’s cooperation with EC-JRC and METU to improve the scenario database and through participation in the FP-7 Project TRIDEC focusing on new technologies for real-time intelligent earth information management to be used in Tsunami Early Warning Systems.

KEY WORDS: Tsunami; Early Warning; Turkey; Mediterranean; NEAMTWS; JRC; TRIDEC

INTRODUCTION

The purpose of this paper is to inform the reader on the Tsunami Warning Center in Turkey (NTWC-TR) being established at Kandilli Observatory and Earthquake Research Institute (KOERI), covering Eastern Mediterranean, Aegean, Marmara and Black Seas. The centre is responsible to assess the tsunamigenic potential of an earthquake and inform the civil protection authority (CPA) by issuing a message and updating it based on sea-level measurements and/or refined calculations where appropriate. Moreover, the centre is also involved in the development of educational, awareness and preparedness materials related to the tsunami hazard.

Turkey is a country with a history of devastating earthquakes, and has also been affected by tsunamis in its past. Today, a possible tsunami affecting the Turkish coasts may result in considerable impact, especially considering the densely populated coastal areas, economic activity, infrastructure and harbours in the coastal zones. More than 30 sunken ships found in Theodosius Harbour during the construction of the Marmaray Rail-Tube Tunnel at Yenikapi location of Istanbul. The sedimentary sequence discovered at archaeological excavations at the same site contains significant records of sea level change due to various reasons, among which the content of one layer suggest an abrupt event (Algan, et. al.), which was interpreted as a tsunami event caused by the AD 553 Istanbul earthquake, (Perincek et al., 2007). In the Aegean and Eastern Mediterranean, volcanic eruption, such as the one in Santorini in around 1600 B.C, was also an important tsunami source, resulting in the destruction of the Minoan culture of the Bronz Age and even affecting the Levantine. A strong earthquake in 1956 generated a tsunami in the Aegean Sea (Soloviev, et. al, 2000) and two third of the towns were destroyed and thousands of inhabitants were killed in Antiochia after a destructive earthquake on 13 August 1822, where tsunami was observed in Beirut, Iskenderun and on the Island of Cyprus (Karnik, 1971; Soloviev et. al, 2000). The list of tsunamigenic events in the regions surrounding Turkey is not limited to those mentioned above naturally, but the assessment of the tsunami hazard based on historical studies is beyond the scope of this paper.

DECISION SUPPORT SYSTEM OF NTWC-TR

Fig. 1: Decision Support System of NTWC-TR starts with the determination of earthquake parameters to assess the tsunami potential, supported with a tsunami scenario database and sea-level observations.