Geohazard Monitoring Studies of ESONET Marmara-DM Project in the Sea of Marmara

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Abstract

The Sea of Marmara (SoM) is located on the North Anatolian Fault (NAF), a major transform plate bounday between the Eurasian and Anatolian plates. It is characterized by fast deformation rates (25 mm/a horizontal and 5-6 mm/a vertical), high seismic activity and steep slopes (10-29°). As a consequence it is prone to high geohazard risks, including earthquakes, submarine landslides and associated tsunamis. Its oceanographic setting between the Mediterranean and the Black Sea with shallow sill depths at the Çanakkale and İstanbul Straits have been the cause of bottom-water hypoxia during initial stages of the marine transgressions. The most active northern branch of the NAF crosses the SoM in an east-west direction and consitutes a seismic gap that is expected to create one or more large (M>7) earthquakes in the next 30 years. Historical records reveal that more than 30 tsunami events occurred in the past two millennia in the SoM, with heights up to about 6 m in the coastal areas. Most tsunamis in the SoM have been mainly associated with submarine landslides triggered by large earthquakes. However, the normal faulting south of the Çınarcık Basin might have also caused tsunamis.

The SoM has been selected as an important node of the EC FP6 funded *European Seas Observatory Network of Excellence* (ESONET NoE) project, because of its geotectonic setting with various geohazard risks and interesting oceanographic setting. The ESONET NoE is presently funding studies under the *ESONET Marmara Demonstration Mission (Marmara-DM)* project that has already contributed immensely to our knowledge about the geographic

distribution, composition and origin of the fluids venting from the active faults, relations between fluids and seismic activity, and the deep benthic life associated with the fluid activity beneath the SoM. One of the most important objectives of the ESONET Marmara-DM project is to determine the optimum parameters and locations for permanent seafloor observatories for earthquake monitoring in the Sea of Marmara. The main results and future monitoring activities of the *ESONET Marmara-DM* project will be presented.