



Towards Establishment of Permanent Multidisciplinary Seafloor Observatories in the Sea of Marmara

M. Namik Cagatay (1), Naci Gorur (1), Louis Geli (2), Pierre Henry (3), Yves Auffret (2), Luca Gasperini (4), Paolo Favali (5), Gunay Cifci (6), Giuseppe Etiope (6), Giuditta Marinaro (6), and the ESONET Marmara-DM Team

(1) ITU, EMCOL, Faculty of Mines, Geological Engineering Department, Istanbul, Turkey (cagatay@itu.edu.tr, 90 212 285680), (2) IFREMER, Brest, France, (3) CNRS, CEREGE, Aix and Provence, France, (4) CNR, ISMAR, Bologna, Italy, (5) INGV, Rome, Italy, (6) DEU, IMST, Izmir, Turkey

The Sea of Marmara (SoM) is located on the North Anatolian Fault (NAF), a major transform plate boundary between the Eurasian and Anatolian plates. The SoM region is characterized by fast deformation rates (25 mm/a horizontal and 5-6 mm/a vertical), high seismic activity and steep slopes (10-29°). The most active northern branch of the NAF crosses the SoM in an east-west direction and constitutes 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 55 large ($M_s > 6.8$) earthquakes and 30 tsunami events occurred in the past two millennia in the SoM. Most tsunamis in the SoM were probably associated with submarine landslides triggered by large earthquakes. However, the normal faulting south of the Çınarcık Basin might have also caused tsunamis. The SoM is therefore prone to high geohazard risks, including earthquakes, submarine landslides and associated tsunamis.

The SoM is also interesting in terms of its oceanographic setting between the Mediterranean and the Black Sea. It is characterized by two-layer flow system with a permanent halocline at -25 m. Because of the shallowness of its two outlets (Istanbul and Canakkale Straits) the lower layer waters have restricted circulation and low (1-3 mg/L) oxygen levels. This, together with intense and risky maritime traffic and large input of industrial and municipal pollutants from its drainage area and the Black Sea, makes the SoM environmentally sensitive.

The SoM has been selected as an important node of the EC FP6 funded European Seas Observatory Network of Excellence (ESONET NoE) and EC FP7 European Seafloor Observatory infrastructure preparatory phase (EMSO-PP) projects, because of its geotectonic setting with various geohazard and environmental risks and interesting oceanographic setting. The ESONET NoE project 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.

Its high tectonic activity with geohazard risk, as well as its special oceanographic setting as a gateway between the Mediterranean and Black Seas, makes the SoM a natural laboratory for multidisciplinary seafloor observations for geohazard, oceanographic and environmental monitoring. Seafloor observatories in the SoM would therefore offer the earth and ocean scientists to study multiple, interrelated processes over time scales ranging from seconds to decades. An observatory set up with optimized seafloor locations, observatory design and sensors for the SoM will be presented as part of a proposal.