

New Directions in Seismic Hazard Assessment Through Focused Earth Observation in the MARMARA SuperSITE – Project Achievements

Nurcan Meral OZel (1), Öcal Necmioğlu (1), Semih Ergintav (3), Oğuz Ozel (4), Paolo Favali (2), Pascal Bigarre (5), Ziyadin Çakır (6), Sinan Ozeren (6), Louis Geli (7), John Douglas (8), Hideo Aochi (8), Remy Bossu (9), Can Zülfiyar (1), Karin Şeşetyan (1), and Mustafa Erdik (1)

(1) Kandilli Observatory and ERI, Bogazici University, Geophysics, Istanbul, Turkey (ozeln@boun.edu.tr), (2) INGV, Italy, (3) Tubitak, Turkey, (4) Istanbul University, Turkey, (5) INERIS, France, (6) Istanbul Technical University, Turkey, (7) IFREMER, France, (8) BRGM, France, (9) EMSC, France

The MARSite Project, which started in November 2012, funded by the EC/ FP7-ENV.2012 6.4-2 (Grant 308417) identifies the Marmara region as a ‘Supersite’ within European initiatives to aggregate on-shore, off-shore and space-based observations, comprehensive geophysical monitoring, improved hazard and risk assessments encompassed in an integrated set of activities. MARSite aimed to harmonize geological, geophysical, geodetic and geochemical observations to provide a better view of the post-seismic deformation of the 1999 Izmit earthquake (in addition to the post-seismic signature of previous earthquakes), loading of submarine and inland active fault segments and transient pre-earthquake signals, related to stress loading with different tectonic properties in and around Marmara Sea.

This presentation provides an overview of the achievements of MARSite which aimed to coordinate research groups ranging from seismology to gas geochemistry in a comprehensive monitoring activity developed in the Marmara Region based on collection of multidisciplinary data to be shared, interpreted and merged in consistent theoretical and practical models suitable for the implementation of good practices to move the necessary information to the end users in charge of seismic risk management of the region. In addition, processes involved in earthquake generation and the physics of short-term seismic transients, 4D deformations to understand earthquake cycle processes, fluid activity monitoring and seismicity under the sea floor using existing autonomous instrumentation, early warning and development of real-time shake and loss information, real- and quasi-real-time earthquake and tsunami hazard monitoring and earthquake-induced landslide hazard topics are also covered within MARSite. In particular, achievements and progress in the design and building of a multi-parameter borehole system consisting of very wide dynamic range and stable borehole (VBB) broad band seismic sensor, with incorporated 3-D strain meter, tilt meter, and temperature and local hydrostatic pressure measuring devices would be reported. Progress has been marked on photogeological analysis of DInSAR temporal series and of space multispectral/hyperspectral image data, an important geophysical field survey of one of the most important landslides that yielded a refined geological engineering model, numerical dynamic modelling of this and installation of a real-time monitoring system in the field.

We improved the existing earthquake early warning and strong motion networks and they are mostly integrated. The early warning signals extend to the critical infrastructure’s of Marmara Region like as natural gas distribution line IGDAS and transportation line MARMARAY).

The project reached the following goals: intensive monitoring infrastructure have been installed, data sharing among the partners and researchers even the out of the Marsite project have been successfully realized, more than 70 articles ,reports, presentations have been already issued (or published) and presented by 18 partners institutions.