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DOWNHOLE SEISMIC MONITORING IN THE ISTANBUL/EASTERN SEA OF MARMARA REGION: RECENT RESULTS FROM THE ICDP-GONAF PROJECT

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The North Anatolian Fault Zone (NAFZ) below the Sea of Marmara represents a ‘seismic gap’ where a major earthquake is expected to occur in the near future. The Marmara segment of the NAFZ is located between the 1912 Ganos and 1999 Izmit ruptures and is the only segment that has not ruptured since 1766. The ICDP-GONAF project (Geophysical Observatory at the North Anatolian Fault; www.gonaf.de) involves the installation of a high-resolution borehole seismic observatory at the NAFZ consisting of several 300m deep vertical boreholes in the broader Istanbul / eastern Sea of Marmara region to monitor the Princes Islands segment at the transition from the ‘seismic gap’ to the recent 1999 Izmit rupture. GONAF is an international collaboration and co-funded by the International Continental Scientific Drilling Programme (ICDP), GFZ Potsdam and the Disaster and Emergency Management Presidency in Ankara/Turkey (AFAD). Further principal partners are IESE/New Zealand, JAMSTEC/Japan, MIT and UNAVCO/both US,. The principal scientific objective of GONAF is to study physical processes acting before, during and after the expected M>7 earthquake along the Princes Islands segment by long-term monitoring microseismic activity at significantly reduced magnitude detection threshold and improved hypocentral resolution. By the end of 2013 three GONAF boreholes were successfully implemented and arrays of borehole seismometers were installed for permanent operation. Vertical 1Hz seismometers at 75m spacing as well as several different 3-component borehole seismometers at 300m depth are installed and are completed by a set of surface sensors. The benefit of seismic waveforms recorded at depth in a low-noise environment is shown and first results of microseismic activity along the Princes Islands segment are presented and will be discussed in the seismotectonic context.

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