Potential relationships between short duration events and seismicity observed during the Marsite deployment

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Abstract

Short duration events (SDEs) are atypical seismic signals observed on the seafloor in various geodynamical settings around the world. Through direct and indirect evidences, they were associated with fluid emissions close to the seafloor. Interesting correlations between SDE activity and seismicity were also observed in the Sea of Marmara. In the Tekirdag Basin, SDE backazimuths readjusted to a specific direction just before and after the Mw 5 earthquake on July 25, 2011.

In the present study, we focus on the Central Basin of the Sea of Marmara, where the North Anatolian Fault has recently been associated with aseismic deformation and surface sediment pore pressure variations. We then analyze 12 months of continuous seismological data from the Marsite deployment, with 3 broad-band seismometers of the INGV and piezometers from IFREMER.

After applying the STA/LTA detection algorithm to the seismological data, we obtained thousands of SDEs for each station. On two different stations, two small increases in SDE number are observed with specific backazimuths, one preceding (_˜10 days) and one immediately following the Mw 4.8 earthquake on November 27, 2013. These two SDE crises could be explained by different responses of the coupled fluid-fault-sedimentary system in the Sea of Marmara. The SDEs detected using STA/LTA will also complement an existing SDE dataset, which we will use to train a machine learning algorithm to improve the SDE detection.

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