



Monitoring microseismicity at the Princes Islands segment of the North Anatolian Fault Zone: Recent results from the PIRES network

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The North Anatolian Fault Zone (NAFZ here after) below the Sea of Marmara represents a ‘seismic gap’ where a major earthquake is expected to occur in the near future. This segment of the fault is located between the 1912 Ganos and 1999 Izmit ruptures and is the only NAFZ segment that has not ruptured since 1766. To monitor the microseismic activity at the main fault branch offshore of Istanbul below the Çinarcık Basin (ÇB) a permanent seismic array (PIRES) was installed on the Princes Islands, at a few kilometer distances to the fault. PIREs recordings are combined with data from local permanent stations of the Turkish network (KOERI) and the ARNET seismic network on the Armutlu peninsula in order to get the best available azimuthal control for the target area. As a result we obtain a well-resolved hypocenter catalog of microseismicity allowing us to identify the seismically active structures and their role in local seismotectonic setting. Analysis of data covers the time period 2006-2009 and allowed resolving the existence of two major fault branches beneath the ÇB providing insight into the separation of seismically active from inactive segments along the eastern part of the Marmara seismic gap. Spatiotemporal analysis of microearthquakes based on well-constrained hypocenters is performed to understand the interaction between the sub-segments of the NAFZ along the ÇB. The results show that the seismicity generally tends to cluster slightly off the main fault, probably along splay faults. This probably means that the main fault is locked and the slip is transferred to the secondary structures which might be due to the major NAFZ branch approaching a late stage of the seismic cycle.