



Augmenting the resolution of five years seismic catalogue of the low-angle Alto-Tiberina normal fault in Central Italy

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The Alto-Tiberina fault (ATF), located within the Umbria-Marche region in Central Italy, is a low-angle dipping fault plane that shows both a seismic and an aseismic behavior (creeping). Although in the last years only moderate earthquakes have been recorded in correspondence of the high-angle synthetic and antithetic faults located in the fault hanging wall, some studies suggest that a strong earthquake ($M > 6.5$) can be generated in correspondence of a locked volume in the northern part of ATF fault plane.

The aim of this work, in the framework of the project “Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe” (SERA), is to obtain a detailed seismic catalogue on the ATF to better define the seismic/aseismic patches and possible interactions with the shallower seismicity in the high-angle synthetic and antithetic faults.

The spatio-temporal distribution of microseismicity from 2010 to 2014 along the ATF has been analyzed project by using a template matching algorithm that allows augmenting the detected earthquakes of a factor 10, and decreasing of 1-1.5 degrees the completeness magnitude.

An input catalogue of 3680 events located along the ATF fault plane and the waveforms from 20 seismic stations of the Alto-Tiberina near fault observatory (TABOO) are considered. To avoid including events out of the low-angle ATF plane, after the template matching process, an accurate validation procedure has been applied by using a statistical analysis of detection parameters.

From a time-space analysis of the new catalogue we observe that during the Pietralunga (2010), Città di Castello (2013) and Gubbio (2013-2014) sequences ($M_{Wmax} = 3.9$) that occurred in the shallow crust, the ATF in-plane seismicity increases at the bottom of the synthetic and antithetical faults intersecting the ATF low-angle main fault plane.

Furthermore, it is interesting to note that a microseismicity swarm on ATF Fault plane anticipate of about 1 month the occurrence of Città di Castello sequence in 2013. In addition, along-strike seismic migrations are observed during the entire analyzed time period and in particular before the Gubbio sequence in 2013, in proximity of its nucleation area.