Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01501, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01501
EGU General Assembly 2008

Microseismicity along a weak low-angle normal fault: the Alto Tiberina Fault case study (northern Apennines, Italy).

L. Chiaraluce
Centro Nazionale Terremoti, INGV – Roma, Italy.

Seismological evidence is clearly related to the activity of a major low angle normal fault (15° dip) located in the Northern Apennines, Italy - the Alto Tiberina Fault (ATF). Hundreds of earthquakes with $M_L \geq 3.1$ have been located defining a nearly planar, 500 to 1000 m thick fault zone, with an along-strike length of 60 km and down-dip width of 40 km that cross-cuts the upper crust from 4 km down to 16 km depth. The normal fault is oriented at high angles ($\sim$75°) to the maximum vertical principal stress and coincides with the geometry and location of the southern portion of the ATF as derived independently from geological observations and interpretations of depth-converted seismic reflection profiles. In the hangingwall volume, the seismicity distributions delineate the geometry of contemporaneous minor synthetic and antithetic normal faults (4-5 km long) that sole into the underlying detachment. On the contrary, the fault footwall is aseismic. The ATF related seismicity shows a nearly constant rate of earthquake production, with about 3 events per day of $M_L \leq 2.3$ homogeneously distributed over the entire fault surface and a higher *b*-value (1.06) with respect to that inferred for the seismicity located in the fault hanging-wall (0.85) which is characterized by a higher rate of seismicity. In the Alto Tiberina fault zone clusters of earthquakes are observed that have the peculiarity to occur with relatively short time delays, rupturinging the same fault patch.

An interpretative model is proposed in which the weak fault zone rheology is able to absorb crustal extension mostly by aseismic slip whilst micro-earthquakes occur in patches where fluid overpressure may trigger short-lived frictional instabilities.