



Shallow sub-surface structure of the 6th April 2009 Mw 6.3 L'Aquila earthquake fault zone at Paganica, investigated with Ground Penetrating Radar.

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The shallow sub-surface structure of the 6th April 2009 Mw 6.3 L'Aquila earthquake fault zone at Paganica has been investigated with Ground Penetrating Radar to investigate how the surface rupture relates spatially to previous surface displacements during the Holocene and Pleistocene. The discontinuous surface rupture stepped between en-echelon/parallel faults within the overall fault zone that show clear Holocene/Pleistocene offsets in the top c. 10 m of the sub-surface. Some portions of the fault zone that show clear Holocene offsets were not ruptured in 2009, having been bypassed as the rupture stepped across a relay-zone onto a fault across strike. The slip vector azimuth, defined by opening directions across surface cracks, remained constant between 210-228° across the zone where the rupture stepped between faults. We interpret maximum vertical offsets of the base of the Holocene summed across strike to be <4.5 metres, which if averaged over 15 kyrs, gives a maximum throw-rate of 0.3 mm/yr, similar to a published value of 0.4 mm/yr for a minimum slip-rate implied by offsets of Middle Pleistocene tephra. The Paganica Fault, although clearly an important active structure, is not slipping fast enough to accommodate all of the 3-5 mm/yr of extension across this sector of the Apennines; other neighbouring range-bounding active normal faults also have a role to play in the seismic hazard.