



## **Insights on the seismogenic layer thickness from the upper crust structure of the Umbria-Marche Apennines (Central Italy)**

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The continental crust is usually subdivided into an upper brittle and a lower ductile part on the basis of geophysical data like heat flow, Bouguer anomaly and seismic tomography. However, still within the brittle crust, different deformation mechanisms occur: the majority of shallow seismicity occurs within the upper part of the brittle crust (seismogenic layer), while the lower part, though elastic, does not deform seismically. The definition of the depth of the seismogenic layer within the brittle field can be made by identifying important lithological/structural boundaries within the upper crust stratigraphy. Here we present a reconstruction of the subsurface geology of the Northern Apennines in Central Italy down to about 12 km where most of the shallow extensional seismicity occurs. We interpreted three reprocessed seismic reflection profiles, crossing the area where the 1997-98 Umbria-Marche earthquake occurred, with a maximum magnitude  $M=5.9$ . Matching the interpretation of the seismic profiles with detailed surface mapping, we obtained an improved image of the subsurface structural setting of the seismogenic zone, reconstructing the 3-D geometry of the top basement of the area. The comparison of the subsurface structural setting with the distribution of the 1997-98 seismicity (accurately located by local networks) shows that the seismicity cut-off corresponds to the top of the phyllitic basement. The shallow seismicity hence affects only the upper portion of the "brittle" crust, as defined by heat flow analysis and other geophysical surveys of the area.