



Seismic swarms piercing through the seismogenic zone in moderately stressed upper crust of NW Iberia

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The distribution of several hundred seismic events of small magnitudes (<4) has been studied in an area that covers most of NW Iberia. In profile the events appear distributed in a layer that defines a thick upper crust: the base of the seismogenic zone is located at around 20 km depth. In map view, they are relatively widespread. Some of the events are aligned following small faults at the surface. However, the most significant feature is the presence of several earthquake swarms. These swarms have a tubular or pipe-like shape from the surface to around 12-15 km in depth, where they merge with background seismicity. The earthquake swarms predominantly develop in small continental tertiary basins, and in the same basins are found frequent low to medium temperature springs.

The Iberian Peninsula is currently under north-south compression. In NW Iberia this is reflected in the recent geological record by the development of minor conjugate sub-vertical fault systems striking NW-SE and NE-SW. The scattering of the seismicity indicates that the convergence and stresses associated are not sufficient to produce strain localization in discrete crustal-scale faults, so that stresses are relaxed in a number of small fractures distributed in the region.

Lack of major heat flow anomalies that may be associated with intrusions suggests the migration of fluids through the upper crust following the intersection between the sub-vertical conjugate faults as the likely mechanism to explain the geometry of earthquake swarms and their distribution.