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Fault rocks and veins formation in the crystalline Palaeozoic basement of the N margin of the Littoral Chain (Catalan Coastal Ranges, NE Spain)

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The Littoral Chain corresponds to a horst of NE-SW direction formed during the Neogene extension which in the studied area (Collserola-Montnegre massif) is mainly composed by Paleozoic materials. At the northern margin the horst limits with the Vallès basin which is infilled by Miocene detrital materials. In the Forques Hill, two km to the est of Martorell, an excellent outcrop of Ordovician phyllites summarise an spread tectonic evolution from Hercynian to Neogene deformation. This work evaluates the behaviour of phyllites during the Hercynian ductile deformation and later during the fragile Mesozoic and Neogene tectonics. The weakness of these rocks together with the situation very close to the Vallès Fault favour that this area concentrates many deformation structures related to extensional tectonics, such as veins, cataclasites and gouges.

Phyllites present a pervasive regional hercynian foliation oriented WNW-ESE and dipping moderately to the NNE; a huge amount of quartz veins, up to 20% of the rock volume, were injected during and immediately after the main foliation development.

Two groups of fractures cutting the phyllites can be distinguished in the field according to the fault rock products, the vein infilling, the orientation and the geometry.

The first one corresponds to Mesozoic fractures that have a NE-SW trend and dip indistinctly to the NW or SE, in a conjugate system. They are characterized by the formation of a broad zone of 0,2 m up to 1,5 m formed either by cataclasites or en echelon veins that indicate a normal movement. The cataclasites are cohesive greenish rocks, with 50% of clasts of wall rock from mm to dm in size. Neoformed minerals in the matrix are chlorite - albite - barite $\pm$ titanite and rutile. Veins are white to pinkish in colour and two types of infill have been identified: albite – chlorite – iron oxides$\pm$ rutile and dolomite – chlorite.

The second group belongs to Neogene fractures which although similar orientation than those of Mesozoic age, they commonly display a fan-like geometry. Though present, rarely Neogene fractures dip towards the SE in this area. Neogene faults form discrete planes or develop a greyish fault gouge constituted by quartz – muscovite – chlorite – albite, the same mineral paragenesis than the wall rock.

Millimetric width calcite veins clearly cut the Mesozoic fractures but the relation with Neogene fractures are still unclear.