

The Late Variscan Fracture Network in N Portugal (NW Iberia): a re-evaluation

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Abstract

The fracture network in N Portugal has been incorrectly used to help deduce the Variscan dynamics of Western Europe. This work shows that the late Variscan network has been in great part reactivated during the Alpine orogeny till present day. The most illustrative case is the N-S to NE-SW fracture system which was dextral during the late stages of the Variscan orogeny and sinistral during the Alpine. Fault rocks and intrusions are clearly different: muscovite, tourmaline, chlorite, high temperature quartz infillings and aplite dykes in Variscan times, and low temperature cataclasites, fault gouge and Mesozoic mafic dykes in younger Alpine times. We proceeded with the isotope dating of the NE system using K-Ar in muscovite. The age of these faults is *ca.* 310Ma, slightly younger than the enclosing porphyroid biotite granite, which is *ca.* 318Ma old. The Variscan dextral NW-SE and N-S to NE-SW fracture systems are conjugates of the sinistral ENE-WSW to ESE-WNW fracture systems. During the Alpine (till present day), the dextral NW-SE system was still reactivated mainly as dextral, the NNE-SSW system as sinistral (opposite to Variscan kinematics), and moderately inclined sinistral ENE-WSW faults as thrusts. In places, the younger rejuvenation is mostly dip-slip with generation of well-developed modern grabens.