TECTONIC EFFECTS OF ISOSTATIC RECOVER IN MOUNTAIN BELTS: NATURAL EXAMPLE AND EXPERIMENTAL MODELLING

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Abstract: To justify the title of this abstract, we will have to describe the natural example, and then demonstrate that it can be the result of laterally confined isostatic recover. To do this, we will have to show that it was confined, that geometry and kinematics of the late Variscan structures are compatible with a stress field induced by laterally confined isostatic recover, and that the structures developed during crustal uplift. The Iberian Variscan orogen is characterized by a conspicuous palaeogeographic, structural and metamorphic arch-shaped zonation, striking approximately NW-SE in NE Portugal. The central part of this zoned structure is occupied mostly by outcropping granitoids that represent the isostatically recovered roots of the Variscan chain in Iberia. The late Variscan record in NW Iberia is characterized by: (1) post-collisional intrusion of granitoids that has been dated between 295 and 270Ma by Dallmeyer *et al.* (1998). Because Pangaea break up in the studied area was at a high angle to the NW-SE striking of the mountain belt, and will only take place sometime prior to c. 200Ma (the age of evaporites that lie on top of Triassic red conglomerates), it is clear that isostatic recover took place in laterally confined space; (2) folding at regional and mesoscopic scale, open and upright (locally tighter and overturned), most commonly devoid of cleavage; (3) shear zones that are mostly near-vertical, with most common mean strikes clustering around azimuths 20 (dextral kinematics), 60 (sinistral), 90 (sinistral), 120 (sinistral), and 145 (dextral). Less common but persistent are transcurrent shear zones with azimuths 0 (dextral) and 45 (dextral). The deduced orientation of the maximum compressive stress is identical for both folds and shear zones, and is approximately NE-SW; this stress field can clearly be the result of confined isostatic recover of a NW-SE striking mountain belt. The NNE shear zone system is the best studied and records early C-S fabrics that have developed under average P-T conditions of 3-5 kbar and 450-500°C. The subsequent evolution of these structures records the progressive transition to a cooler and more brittle deformation, responsible for the generation of (proto)-mylonite rocks that occurred in crustal levels of moderate depth (8-10 km) under temperatures ranging from 300 to 350°C and global pressures lower than 3 kbar. This cooling and decompression is surely related to crustal uplift, most probably isostatic recover, which includes the emplacement period of post-collisional granitoids (c. 295-270Ma). Because of confined isostatic recover, we have, in the very same rock, ductile shear zones (developed in depth during the early stages of isostatic recover) together with brittle shear zones developed later when the rock was cooler due to uplift. Deformation close to the core of the mountain chain must be dominated by the effects of rising granitic bodies (diapirs), but, away, the effects of confined isostatic recover must prevail. What is presently sub-horizontal, may have been steeper dipping prior to isostatic recover. For instance, early inwards steeper dipping thrusts become flat-lying because their roots are exhumed. The unusually great amount of granites in the core of the Iberian Variscan belt could be the result of slower post-collisional crustal relaxation due to confined isostatic recover.

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