



Impact of 100 Ma-long tectonic history on the finite strainfield of the western French Massif Central: implications on the exhumation of HP rocks and Variscan geodynamics

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The French Massif Central (FMC) forms the hinterland of the west-European Variscan belt and was subject to numerous tectonic and metamorphic events from Devonian to Permian times. The accreted tectonic units belonging to Gondwana and Laurussia were variably involved in subduction, nappe stacking and syn- to post-orogenic extension. Besides, plutons and migmatites showing syn-collision crust melting are very common in the Variscan belt. Such orogenic evolution implies that the resulting finite structure likely reflects the interference between fabrics formed at different stages of the orogenic cycle with different degrees of overprinting, depending on e.g. the spatial strain gradients, lithologies, structural level or partial melting grade.

We present a model of finite strainfield of the western FMC based of the analysis/interpolation of ductile and brittle fabrics, at regional to local scale, using geostatistics. Ductile fabrics within autochthonous units and syn-collisional plutons are poorly disturbed and reflect the transition from syn-thickening to extensional lateral flow of the partially molten mid-lower crust. In contrast, allochthonous units are affected by numerous perturbations including polyphased ductile shearing, folding and faulting inducing local bloc tilting and rotations. Taking into account the overprint of late tectonic events, we show that early fabrics related to High Pressure metamorphism or nappes' stacking have suffered intense reorientations. The finite trend of the related lineations L1 must be treated with extreme caution and may not reflect the original direction of stretching and shearing that occurred during the initial compressional stages. Taking into account i) the spatial distribution and amount of reorientation of these D1 fabrics and ii) the deconvolution of these disturbances, we propose that:

- The high dispersion of lineation trend can be simply explained by passive rotations, during late isoclinal folding, rather than two superposed tectonic phases, as previously inferred.
- The allochthonous units formed one single tectonic unit.
- This D1 event looks related to the exhumation of the subducted continental crust due to partial melting
- The formation of Variscan orogenic prism in western FMC only results of continuous south-directed thrusting rather than a switch from NE-SW to NW-SE thrusting.