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Paleomagnetism as a marker of synfolding rotation. Example of the dome de Barrôt (subalpine massif, SE France)

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Structural inheritage mainly control the axis trend of folds generated during a compressional event. The Mesozoic sedimentary cover surrounding the so-called E-W antiform "Dôme de Barrôt" is particularly folded and thrusted. South of the Permian Barrôt Massif, folds axis are E-W in the sedimentary cover. These fold axis seem to be formed during a N-S shortening event whereas, to the north and inside the Barrôt Massif, the folds and the pervasive deformation characterise a NE-SW shortening event while no rotation has been evidenced. The study of the deformation suggest two distinct tectonic events, compression N-S and NE-SW. Locally no chronological evidences have been observed.

Initially, we led a paleomagnetic and anisotropy of magnetic susceptibility (AMS) studies in order to determine the extent of the vertical axis rotation during the emplacement of the Castellane and Nice fold and thrust belts. We focused a part of our investigation around the Barrôt Massif because it is made of favourable facies allowing paleomagnetic measurements. Sixteen sites were sampled, 5 in the Permian red-bed and 9 in the Meso-Cenozoic sedimentary cover.

The preliminary AMS analysis reveals a N040°E syn-metamorphic shortening direction in the basement Permian Barrôt Massif and a N010°W shortening direction ante-folding in the Mesozoic sedimentary cover. These results could be explained by the two regional compressive phases: (1) a NE-SW compression during the Oligocene and (2) a N-S compression during the Miocene.

However, the paleomagnetic results suggest a synfolding $56.5° \pm 12.1$ anticlockwise rotation for a part of the Mesozoic sedimentary cover south of the Barrôt Massif, while there is no rotation for the basement. The synfolding rotation of the sedimentary cover occurred on the Permian Barrôt Massif thanks to the decoupling allowed by the Triassic gypsum layer. The chronology of the magnetization and of the AMS shortening relative to the folding, allow us to correct the AMS shortening directions. After paleomagnetic correction, the AMS shortening trend is rather around N050°E which is similar to the shortening direction recorded by the Permian layers, which rather suggests that E-W trending folds around the current Barrôt Massif were initially formed during the first NE-SW Oligocene compressive event.

We discuss the hypothesis (1) of only one NE-SW compression for generating these folds taking account of the N105° trending Gourdan inherited normal fault (e.g. this fault bounds the Tethyan basin to the North from a calcareous platform to the South) which would control the final trend of the folds; and (2) of the importance of the exhumation of the Barrôt Massif by a blind deep-seated thrust during a N-S compression which could be solely responsible of the vertical axis rotation of pre-existing NW-SE trending folds.