



Modelling the geometry of inverted basins by means of paleomagnetic studies. Examples from the Iberian Ranges and Basque-Cantabrian basin (Northern Spain)

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Paleomagnetic studies are a useful tool to detect tectonic deformation that might cause deflection of paleomagnetic directions. This is evidenced by the most common use of paleomagnetic techniques in global (APWP) and regional tectonics. The application to regional tectonics is based on the properties of paleomagnetic declinations that are very sensitive indicators of rotations about vertical axes. In this work we propose paleomagnetic studies as a useful tool to determine the syn-extensional geometry of inverted basins. To analyse the geometry of syn-extensional deposits in a sedimentary basin, field and subsurface data are necessary. If the sedimentary basin has been inverted, to elucidate the geometry related to its previous extensional stage is a more complex process. This is because many features linked to the extensional regime appear modified or hidden. Palaeomagnetic studies have detected widespread remagnetization related to burial diagenesis. These secondary remanences were acquired during the extensional stage of basins. These paleodirections underwent deflection because of the folding related to the inversion of basin. The analysis of remagnetization directions allow to obtain the tilting of beds at the moment of the acquisition of the overprint, filtering the subsequent compressional deformation. Only when the remagnetization is acquired during the extensional period and before the inversion of the basin is possible to apply this analysis to describe the extensional geometry of an inverted basin. The Iberian ranges and the Basque Cantabrian basin contain several smaller basins with a thick Mesozoic syn-rift series, several thousands meters thick, inverted during Cenozoic compression. Paleomagnetic studies in these areas have demonstrated that most of Jurassic and Cretaceous rocks were remagnetized during the Cretaceous.

Several fold and conglomerate tests indicate that remagnetization was acquired before compressional deformation and post-dates the main extensional stage of basin formation (Tithonian-Albian). Considering this timing, a procedure to interpret the syn-extensional remagnetization directions is proposed to reconstruct the basin geometry of the Cameros Massif (Iberian Ranges) and the western termination of the Basque Cantabrian basin.