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Precisions on the structure of the Basque Arc (western Pyrenees, Spain): preliminary results from magnetic fabrics from the Biscay Synclinorium

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The Mesozoic Basque-Cantabrian basin (western Pyrenees) was inverted during the Alpine Orogeny in late Cretaceous-Eocene times. The central sector of the basin, the Basque Arc is characterized by the existence of large folds (80 km long) that outline an arc. This study focuses on the interpretation of AMS fabrics in rocks from the Biscay Synclinorium, a major fold system of the Basque Arc that verges to the NE, with sub-horizontal, N110˚E trending axes and axial planes striking to N110˚E and dipping steeply to the SW (Calvo-Rathert et al., 2007). The aim of this contribution is characterize the deformation around the Biscay Synclinorium. For this reason we combined fieldwork with magnetic fabric analysis of 95 cores in Upper Cretaceous sedimentary rocks of the Biscay Synclinorium. 68 cores come from the Calcareous formation (marls, sandy limestones and limestones of Cenomanian to Campanian age) that makes part of the northeastern limb of the synclinorium and the remaining 27 cores from the Detrital-calcareous flysch (a multilayer sequence with sandy limestones and marls of Maastrichtian age) that crops out in the synclinorium core (Garrote et al., 1991). In the Upper Cretaceous Calcareous formation there is a penetrative cleavage that mainly strikes to N110˚E dipping 50˚ to 60˚ to the SW (S_1). In the Detrital-calcareous flysch of the core, the best-preserved planar structure is the bedding and only locally an axial planar cleavage is observed. Intersection lineations are sub-horizontal and N110˚E-trending.

The measurements of the magnetic susceptibility provide low k values ranging between 99x10^{-6} and 403x10^{-6} SI. The anisotropy of the magnetic susceptibility, P, reaches values of 1.213, pointing to the overprinting of tectonic deformation on primary magnetic fabrics of sedimentary origin. The magnetic foliation shows a fairly uniform arrangement that is nearly coincident with the dominant planar structures of the rocks, S_0 or S_1in the core and the limb of the synclinorium respectively. The magnetic lineation, instead, yields complex patterns, as evidenced by the finding of two main sets of magnetic lineations: 1) weakly plunging N110˚E-trending lineations; 2) steeply plunging N200˚E-trending lineations. In both cases the magnetic fabric reflects a tectonic origin but with different geological meaning. The first set, dominant in the core of the synclinorium, is characterised by magnetic lineations parallel to the intersection lineation between S_0 and S_1. In contrast, the other set come from sites located along the limb of the synclinorium, where lower deformation would be expected. However, owing to the steep plunging of the magnetic lineation and to fact that the highest P values are obtained along this limb, we consider that the second set of magnetic fabrics reflects the existence of a major shear zone at the regional scale, with a top-to-the-NE motion, that has remained unknown until now.

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