Geophysical Research Abstracts
Vol. 13, EGU2011-2273, 2011
EGU General Assembly 2011

Structural evolution of the Sierras Interiores between the Aragon and Tena valleys (south pyrenean basin, central Pyrenees)

Lidia Rodriguez, Julia Cuevas, and Jose Maria Tubía
Universidad del País Vasco, Facultad de Ciencia y Tecnología, Departamento de Geodinámica, ap. 644 - 48080 Bilbao, Spain(lidia.rodriguez@ehu.es/+34 946012470)

This contribution focuses on the structure of the Sierras Interiores, the innermost and E-trending mountain system of the South Pyrenean Zone (SPZ) in northern Spain. The overall structure of the SPZ is dominated by thin-skinned tectonics with south-directed thrusts commonly detached along Triassic beds (Seguret 1972). In the studied region of the Sierras Interiores, between the Tena and Aragon Valleys, a stratigraphic lacuna was developed from Triassic to Late Cretaceous times. Because of this, 170 metres of Late Cenomanian to Early Campanian massive limestones rest discordantly over the Paleozoic sequence of the Axial Zone. Above these limestones are the Marboré sandstones, a thick (400-600 metres) formation of Campanian to Maastrichtian age which is composed of marly sandstones, sandy limestones and sandstones with dolomitic cement showing a brownish tone. Finally, there are 130 to 230 metres of massive and light-coloured limestones of Paleocene age.

We have identified a deformational sequence with three main stages: 1) Thrust sheets with E-trending ramps were formed initially, from which more than 1 to 1.5 km of southward displacement can be established. Many thrust faults use the Marboré sandstones as detachment level. They are easily recognizable due to the strong contrast between the brownish Marboré Sandstones and the light-coloured Paleocene limestones of the footwall blocks. There also are, however, deeper thrusts that duplicate the basal Cenomanian limestones. 2) In a second step, asymmetric angular folds were generated, deforming the previous thrusts. The folds display horizontal and WNW-ESE trending axes, develop a N-dipping axial plane cleavage and have at least 500 m of wavelength. The thrust sheets duplicating the Marboré sandstones or the Cenomanian limestones are probably coeval, since they are both folded. 3) Finally, a second generation of minor thrust sheets is locally developed along the flat flanks of the folds. These structures, which accommodate the shortening of the late Pyrenean compression, are also detached along the Marboré sandstones.

Previous works on other sectors of the Sierras Interiores have described a complex thrust-fold system in a piggy-back sequence and interpret the south-verging folds as fault-propagation folds related to the propagation of the Gavarnie nappe (Labaume et al., 1985; Teixell, 1992). The main differences between our results and such interpretations are the recognition of a second thrusting event younger than the folding and the consideration of the asymmetric folds as the evidence of a shortening event independent of any thrusting event instead of being coeval structures (fault-propagation folds). Besides, the limited displacement of the Marboré sandstones seems to indicate that they cannot be longer regarded as a main detachment level at the regional scale.

The structural evolution proposed here modifies the thinking about the basin dynamics in the South Pyrenean flysch, because the Sierras Interiores mark the poorly documented northern border of the turbiditic foreland basin that advanced progressively southwards from Early Eocene time as a result of the migration in the deformation front and that appears to have been the most active one in the flysch basin.

Labaume, P., Séguret, M. and Seyve, C., 1985. Tectonics, 4, 661-685.
Seguret, M., 1972, Ph D. Thesis, USTLA, Montpellier, 155 p.
Teixell, A., 1992, Ph D. Thesis, Barcelona, 252 p.