



Late-orogenic doming of the Névado-Filabride complex as the cause of SE Betic basins formation

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The Betic Cordillera (southern Spain) provides one of the clearest examples of late-orogenic large-scale extensional collapse. In this context, evolution Neogene basins extensively covering the Alpine internal zones are however discussed, interpreted so far from pull-apart basins (Sanz de Galdeano and Vera 1992; Montenat and Ott d'Estevou, 1999; Poisson *et al.*, 1999) to purely extensional basins (Mora, 1993; Vis-sers *et al.*, 1995). This study is based on a detailed field work combining sedimentology, sequence stratigraphy analysis and structural geology on both cover and metamorphic basement. This approach permits us to compare both results to shed light on the genesis of the eastern Betic basins.

Based upon the most complete sections across the Huércal-Overa and the Tabernas basins, this work permits to establish: (i) a detailed sedimentary pattern with flow directions and clast provenance (ii) an asymmetric infill of the basin with south moving depocenter axis through time (iii) accommodation/tectonic subsidence curves which highlight several key-points of the basin evolution and the amount and timing of vertical motion. According to our age model, the basins formed at around 11,8 Mys and were an active depocenter until 7,4 Ma. We then link (iv) these results with the activity of the dense network of normal faults (paleostress tensors on 77 micro-tectonic sites) affecting both the basin and its margins with clear syn-tectonic characteristics. The confrontation of these two approaches reveals a mutual consistency. We found, a NNE-SSW dominant extensional field stress affecting the region from the first deposited sediments to uppermost-Tortonian strata consistent in time and geometry with the fast and important subsidence of the basin.

Cooling ages to near surface temperatures on zircon and apatite from (Johnson *et al.*, 1997) occurred in the Sierra de los Filabres at from 12 to 9 Ma. These ages, as already pointed out by (Martínez-Martínez *et al.*, 2002) indicate the last increments of extensional deformation on the Filabres detachment. In other terms, final exhumation of the Nevado-Filabride metamorphic rocks was still active at this period accommodated by N-S tectonic denudation. The basin subsidence well records the related downward motion of the hanging wall unit of the detachment and is then well integrated in the regional late-orogenic extensional processes. Thus, our structural study reveals the organisation of the deep structure of the basin reminds a half graben structure. We then propose that the major normal faults bend down on the Filabres detachment outcropping south, along the metamorphic domes. We then propose (v) the causal effect between superficial extensional activity with basin formation and the motion on the detachment fault which synchronously permits the Nevado-Filabride rocks to exhume.

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