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# Extensional transfer faults versus transcurrent faults in the eastern Betics, an example from the Sorbas basin (SE Spain)

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The eastern Betic Neogene to Quaternary basins occur in synclines among E/W- to ENE/WSW-elongated antiformal ridges that are related to or cut by large scale transcurrent faults. Both folds and transcurrent faults developed in response to NW-SE to N-S convergence between Africa and Iberia. Thus, most literature in the area has related this transcurrent regime with the origin and evolution of the southestern Betic basins. However, recent work has shown the great importance of extensional tectonics in the development and evolution of these basins during the Miocene. The HP-LT metamorphic basement was exhumed at the footwall of extensional brittle-ductile detachments that markedly attenuated the previous pile of Alboran domain metamorphic units during the middle to late Miocene. Subsequently, the antiformal ridges and associated strike-slip and reverse faults were formed during latest Miocene to Quaternary N/S to NNW/SSE shortening regime.
We have carefully mapped an area in the western termination of Sierra Cabrera in the southeastern Betics, analyzing the segmentation, age and linking relationships between brittle fault segments. We identified an important normal fault system that was active during the Tortonian producing NE-SW directed extension. Normal faults in this system show hard linkage relationships with E-W to N70ºE oriented vertical strike-slip and oblique-slip faults that show both dextral and sinistral kinematics, which we have interpreted as transfer faults that link segmented extensional faults.
During later transcurrent deformation, active since the latest Tortonian until present, new strike-slip N50ºE to N10ºE sinistral and N100º to 120ºE dextral faults formed that cut the aforementioned structures. In others cases the previous transfer faults show a positive tectonic inversion, working like reverse faults. The transcurrent or reverse reactivation of fault segments of the extensional system is related with their strike with respect to the maximum principal stress axis trend. Indeed, in a latest N/S and NNW/SSE Neogene to Quaternary shortening regime, E-W to N70ºE transfer faults striking near 90º respect to the main shortening axis should be reactivated as reverse faults. Thus, in the eastern Betics, many strike-slip faults interpreted as transcurrent in origin, represent extensional transfer faults or folded extensional detachments produced during the Miocene extensional regime. Extension had a more important tectonic role in the history of eastern Betics than previously considered.