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The Eastern delta-fan deposits on the Granada Basin as tectonic indicators of the Sierra Nevada uplift (Betic Cordillera, South Spain)

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A geological mapping in detail of the Eastern sector of the Granada Basin (South Spain) reveals two different groups of Gilbert delta-fans related to the Sierra Nevada uplift. The first group, in the southern part and with a surface of 6 km2, has three major coarsening-upward sequences. They are composed of very coarse deposits, those of conglomerates, sands and silts. Progradational strata units to the basin have been observed. The dominantly fluvial facies association has locally developed shallow marine foreset deposits (partially with reef colonization) as well as topset red soils (Dabrio, et al., 1978; Braga et a., 1990; García-García, et al., 1999) . All the sequences are discordant over marine facies (calcarenites) dated over 8,26 Ma (Late Tortonian).

The second group, in the northern part and with an extension of 12 km2, has similar characteristics, but some of the boulders have ostreids and lamellibranchs species which reveal their former position in a previous marine environment. The Sierra Nevada uplift caused the remobilization of these boulders, being transported by debris-flow inside the
delta-fan bodies (García-García, et al., 2006). The dating of ostreids shells with Sr techniques reveals ages over 7,13, 6,61 and 5,45 Ma, from the lower to the upper delta-fan deposits, which are related to the three main sequences observed and with three major tectonic pulses during the Late Miocene. These interpretations are in agreement with apatite fision-track studies carried out in some boulders of these coarse delta-fan deposits (Clark and Dempster, 2013). They reveal a detailed record of Neogene denudation from the Sierra Nevada basement and with uplift periods between 5,45Ma- 2 Ma. The latest pulses affected the delta-fan sediments given rise to new fan systems in the Granada Basin (Alhambra Formation).
The thoroughly study of the Miocene delta-fan sediments allows us to conclude that they were related to a sin-sedimentary tectonic activity linked to the Sierra Nevada uplift and with original NE-SW normal left-lateral fault system associated with a compatible ESE-WNW normal fault system. The asymmetrical morphologies of the two delta-fan bodies confirm this configuration as tectonic induced deposits.

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