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Tectonic control for evaporite formation in the Eastern Betics

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Tectonic uplift and sea level lowering are two proposed mechanisms to explain the development of thresholds in front of the widespread evaporite basins of the circum-Mediterrranean region during the Miocene. Here we present a multi-disciplinary approach to the continuously marine sequences of the Murcia-Cartagena basin to investigate which mechanism is responsible for the Tortonian evaporites of the Eastern Betics. First we develop a high-resolution chronology for the Venta de la Virgen section by integration of biostratigraphic, magnetostratigraphic and isotopic dating results. Next we construct paleobathymetry and geohistory curves for this section and the Abad composite of the Sorbas basin. We show that the apparent differential vertical motions between the two sections cannot be explained by sea level change but only by local tectonics. The Murcia-Cartagena basin shows significant tectonic uplift during the late Tortonian and early Messinian, while the neighboring Fortuna basin was rapidly subsiding. We conclude that tectonic activity on the Alhama de Murcia Fault was responsible for the emergence of a threshold that finally led to evaporite formation in the Fortuna basin.