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Burdigalian to Tortonian WSW opening of the westernmost Algerian basin driven by a narrow slab rollback and slab tear

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The eastern Alboran basin and its transition to the Algerian basin is a key area in the Mediterranean realm : indeed, controversial kinematic and geodynamical models are debated there.
Combining a new chronostratigraphic chart of the Alboran and Algerian basins based on well data, deep seismic sections, and potential field data, we propose a new tectonic evolution of the westernmost Algerian basin and its transition with the Alboran domain. From Burdigalian to Tortonian times, a WSW-directed extensional tectonic phase has shaped a stretched continental crust with typical tilted blocks along $\sim$100 km, followed by the emplacement of an oceanic-type crust in the Algerian basin. This event is assumed to result from the WSW-directed migration of the Alboran terrane driven by a narrow slab rollback, suggesting a minimum westward displacement of $\sim$200 km. At the southern foot of the Algerian basin, the continent-ocean transition is sharp and may result from the westward propagation of a slab tear at depth, forming two segments of STEP (Subduction-Transform Edge Propagator) margins. Our results support models of intense shear tractions at the base of an overriding plate governed by slab rollback-induced mantle flow.
Finally, Messinian salt tectonics affected overlying deposits until today. From late Tortonian to Quaternary, a dominantly transpressive tectonic episode linked to the Africa-Iberia convergence post-dates previous events, deforming the whole margin and presently representing a tectonic inversion of the margin, as assumed to feature a case of incipient subduction.