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Gravity gliding and spreading in a compressional setting: the example of the Algerian margin

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The Algerian margin, located in the Western Mediterranean basin, is reactivated in compression since 8 My due to the convergence between Africa and Eurasia, and is nowadays subjected to a N45W compression of several mm/y (Jolivet et al., 1995; Noquet et Calais, 2004). While the reactivation is attested by GPS measurements and destructive seismic events, such as the earthquake of Boumerdes in 2003 (M 6.8), the visualization in the seismic data of the deep structures is made difficult by the presence of a thick Messinian salt layer. The seismic reflection profiles acquired on the Algerian margin during the "Maradja I" oceanographic survey (2003) highlighted the presence of north-verging thrusts offshore Algiers (Déverchère et al., 2005; Domzig et al., 2006), as well as the peculiar geometry of the Messinian salt layer (Lofi et al., 2011, Obone Zue Obame, 2011).

Between 2 and 4° East, the margin presents particularly complex salt structures, partly associated to the uplift of the plateau as a consequence of the crustal convergence (Déverchère et al., 2005; Domzig et al., 2006). One of the consequences of the uplift of the plateau is the dipping of the base salt horizon towards W to NNW. Moreover, from the analysis of the seismic reflection profiles, the presence of early (syn-UU) salt movement in the profiles parallel to the margin is clear, while the profiles perpendicular to the margin show compressional features mostly active during the Pliocene to Quaternary period.

From the observation of the natural example, and from the comparison with different analogue models, we conclude that offshore Algiers we find the major salt structures and minibasins formed through salt spreading, while the area offshore Boumerdès is characterized by gravity gliding due to the uplifted plateau. Although from this point of view the N-S compressional tectonics favors gravity gliding through the plateau uplift, on the other hand it influences the salt structure development direction, which present a mainly E-W development and a minor and delayed N-S one. A partial influence of the sedimentary body from Algerian rivers on the position of the major salt structures is inferred.