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Retracing the Africa-Eurasia convergent boundary in the western Mediterranean based on seismic, geodetic and tectonic data

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In the western Mediterranean, the subduction of the Tethyan ocean has progressively come to an end, following the intervening continent-continent collision. Compressional deformation connected with the ongoing Africa (AF) – Eurasia (EU) convergence has therefore progressively resumed mostly along the southern passive margins of the Mediterranean back-arc basins. The use of geodetic, seismological, and pre-existing tectonic data recorded between the Gulf of Cadiz and the Ionian Sea helps to trace this nascent AF-EU boundary and constrain its kinematics. Based on these data, this plate boundary is detected, kinematically defined, and compared with the previously identified boundaries in the same region. The nascent boundary is articulated and formed by variably oriented inherited structures. It is characterized by a discrepancy between the general motion of Africa with respect to Eurasia and the local contractional/compressive axes deduced from geodetic and seismic data. The oblique convergence along the nascent boundary matches that recorded in other instances of subduction initiation elsewhere, but the average convergence rate equal to 5 mm/yr in the Mediterranean seems currently too small for such a subduction initiation. Based on the assumption of a future northward tectonic vergence (i.e., Eurasian foreland), the Tyrrhenian, Algerian, and Betic salients, the Oran and Fès recesses, and the Ionian, Trans-Alboran, and Gibraltar transfer zones are identified along the nascent boundary. The latter zones connect salients and recesses through strike-slip displacements. The Algerian offshore hosts a long segment of the boundary characterized by locally increased seismic rate and actual northward vergence that would suggest this area being the first nucleus of subduction initiation in the western Mediterranean.