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Spatial and temporal relations of the ophiolites and the metamorphic soles along the Tauride belt, Turkey

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The Tauride belt ophiolites were generated above an intra-oceanic subduction zone and emplaced in the Late Cretaceous over the Tauride carbonate platform. The Tauride ophiolites are underlain by well-preserved metamorphic soles that have a constant structural position between the ophiolitic mélange, below and harzburgitic mantle tectonites, above. The dynamothermal metamorphic soles display a typical inverted metamorphic sequence, grading from amphibolite facies directly beneath the highly sheared harzburgitic tectonite to greenschist facies close to the melange contact. They display variable structural thickness (up to 500 m). The metamorphic soles beneath the Tauride ophiolites are interpreted to relate to the initiation of subduction and emplacement processes. The metamorphic soles are intruded by isolated post-metamorphic diabase dikes, derived from island arc tholeiitic magmas. In some places along the Tauride belt (Koycegiz and Pozanti-Karsanti regions), the contact between the metamorphic sole and the overlying serpentinized harzburgites is characterized by a 1.5-2 m thick zone of sheared serpentinized harzburgitic mantle tectonites, intercalated with amphibolites. These lithologies are cut by thick mafic dikes (7-8 m thick, individually) which postdate intraoceanic metamorphism and high-temperature ductile deformation. This contact is interpreted as an intra-oceanic decoupling surface along which volcanics in the upper levels of the down-going plate were metamorphosed to amphibolite facies and accreted to the base of the hanging wall plate. The geochemistry of the metamorphic sole amphibolites suggests their derivation from different geochemical environments; i.e. seamount-type alkaline basalts, mid-ocean ridge basalt (MORB) and island arc basalts. Zircon and rutile separates from the crustal rocks (gabbro and diabase) and from the metamorphic soles of the Tauride ophiolites have been dated by U-Pb SIMS (Edinburgh University) and LA-MC-ICP-MS (ETH Zurich) techniques. The available geochronological data from the magmatic and metamorphic rocks appear to overlap in time. This suggests that oceanic subduction-related melts were generated coevally with the onset of intra-oceanic subduction in a Late Cretaceous Neotethyan oceanic basin. This work was financially supported by the Scientific and Technical Research Council of Turkey (TUBITAK) with project number 113Y412.