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Backarc basin inversion and subcontinental mantle emplacement in the crust: kilometre-scale folding and shearing at the base of the proto-Alborán lithospheric mantle (Betic Cordillera, southern Spain)

Károly Hidas, Carlos J. Garrido, Booth-Rea Guillermo, José M. Martínez-Martínez, Zotán Konc, Erwin Frets, and Claudio Marchesi

Instituto Andaluz de Ciencias de la Tierra (IACT), CSIC & UGR, Avenida de las Palmeras 4, 18100 Armilla (Granada),

To constrain the latest evolutionary stages and mechanisms of exhumation and emplacement of subcontinental peridotites in the westernmost Mediterranean, we present here a detailed structural study of the transition from granular spinel peridotite to plagioclase tectonite in the western Ronda Peridotite (Betic Cordillera, southern Spain). We show that the plagioclase tectonite foliation represents an axial surface particularly well developed in the reverse limb of a downward facing moderately plunging and moderately inclined synform at the base of the Ronda massif. The fold limbs are cut by several mylonitic and ultramylonitic shear zones with top-to-the-SW sense of shear. After restoring the middle to late Miocene vertical-axis palaeomagnetic rotation and the early Miocene tectonic tilting of the massif, these studied structures record southward directed kinematics. We propose a geodynamic model in which folding and shearing of an attenuated mantle lithosphere occurred by backarc basin inversion during late Oligocene (23–25 Ma) southward collision of the Alborán Domain with the palaeo-Maghrebian passive margin, leading to the intracrustal emplacement of peridotites in the earliest Miocene (21–23 Ma).