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Seismic images of the Middle to Upper Miocene Alboran magmatic arc

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Multichannel seismic reflection images of the transition between the Alboran and the Algero-Balearic basins show a crustal thickness decrease from west to east from about 5 s Two way Travel Time (TWTT,$\sim$15 km thick) to $\sim$2s TWTT typical of oceanic crust ($\sim$6 km thick). Most crustal thinning occurs gradually without apparent thinning related to faulting, tilted blocks are very scarce and all sampled basement outcrops are volcanic suggesting that the crust was dominantly formed by magmatic processes in the transition between a magmatic arc and a backarc setting, from west to east. The sediments onlapping the igneous basement young from east to west between 12 and approximately 8 Ma in agreement with radiometric dating of volcanic rocks in the region. Minor eastward-directed brittle extension lagged behind oceanic and magmatic-arc crust formation migrating towards the west between the Tortonian ($\approx$10 Ma) and the Upper Pliocene ($\approx$3 Ma), probably following westward slab rollback. Middle to upper Miocene arc and oceanic crust formation at the Alborán and Algero-Balearic basins, respectively, was coeval to core-complex style exhumation of HP-LT rocks formed by Lower Miocene collision in the Betic-Rif margins, manifesting the strong lateral heterogeneity of the Gibraltar arc subduction-collision system; in great measure related with the pre-collisional distribution of oceanic and thinned continental crust among the African and Iberian paleomargins and the Flysch Trough domain in between.