

ABSTRACT

The Variscan ophiolites in southern Iberia occur both as a thin belt along the boundary between the Ossa-Morena (OMZ) and South Portuguese Zones (SPZ) (Beja-Acebuches ophiolite) and as dismembered, scattered allochthonous klippen on top of lower Palaeozoic sequences within the internal areas of the OMZ. The Beja-Acebuches ophiolite corresponds to a thin amphibolite-serpentinite belt displaying internal lithological organisation including, from bottom to top: metaperidotites (harzburgitic/dunitic) and cumulate pyroxenites, flaser gabbros with trondhjemitic intrusions, amphibolites (locally derived from a sheeted dike complex) and fine-grained greenschists (locally preserving pillowed structures). Deformation structures result from three main deformation phases: D_1 (early Devonian) corresponds to high-temperature ophiolite obduction towards N-NE, D_2 (middle Devonian) is related to retrogression during transpressive sinistral shearing to WNW, and finally, D_3 is a more brittle event, and involved sinistral south-westwards thrusting reactivating D_2 structures. The ophiolite is bounded to the north by a thrust that brought OMZ infra-crustal rocks over the ophiolitic sequence; towards the south the ophiolitic complex has been thrust over the SPZ units and is unconformably overlain by a late Devonian flysch sequence. The Beja-Acebuches amphibolites were originally tholeiitic gabbros/dolerites/basalts displaying considerable geochemical variations that range from MORB-type to those transitional to arc tholeiites, suggesting derivation from a back-arc basin oceanic crust.

The internal ophiolitic klippen were emplaced contemporaneously with the obduction of the Beja-Acebuches ophiolite. They comprise small, dismembered tectonic slices that were imbricated within a high-pressure (eclogite/blueschist), early Palaeozoic passive continental margin sequence, and then thrust onto the OMZ. The high-pressure metamorphism was polyphase; early (pre- to syn- D_1) eclogite recrystallization is interpreted as reflecting type-A subduction and initial D_1 -thrusting; late blueschist facies overprinting corresponds to tectonic imbrication related to the nappe emplacement. Ophiolite geochemistry displays wide variations in incompatible element fractionation, ranging from N-MORB type LREE-depleted to LREE-enriched T/P-MORB; contrasting with similar lithologies from the Beja-Acebuches ophiolite, the orogenic (island arc-like) characteristics were not detected in these internal ophiolitic occurrences. The contrasting characteristics of the Ossa-Morena ophiolite types are reminiscent of those already described from other ophiolite belts and suggest that they probably represent different oceanic basins.