U-Pb detrital zircon geochronology of the South Portuguese Zone (southern Iberia): linkages to Avalonia and Meguma

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The South Portuguese Zone (SPZ) comprises the southernmost extent of the European Variscan orogenic belt. This orogen developed by the closure of the Rheic Ocean and culminated in Late Paleozoic continent-continent collision between

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Gondwana and Laurussia during the formation of Pangea. The SPZ is interpreted to have accreted to the Iberian autochthon (part of Gondwana) during the closure of the Rheic Ocean, and to represent a fragment of a plate which was largely destroyed during subduction beneath the Ossa Morena Zone (OMZ). Despite exposure limited to the Upper Devonian – Early Carboniferous, the presence of older crust of unknown age beneath SPZ is indicated by seismic studies and most authors contend that this crust is equivalent to Avalonian or Meguma basement.

U-Pb isotopic data from at total of 260 detrital zircon grains from one clastic sample in the SPZ (PQ quartzite) and three clastic samples in the so-called Pulo do Lobo accretionary complex (PDL) were collected using laser ablation inductively coupled mass spectroscopy. The PDL outcrops along the northern margin of the SPZ. Two samples were taken from a sedimentary mélange within the PDL, one from a quartzite cobble within the mélange and the other from quartzite matrix. A final sample was taken from a polydeformed bedded quartzite unit, structurally beneath the quartzite mélange. Samples from the oldest exposed unit in the SPZ (PQ quartzite) suggest a potential Gondwanan provenance (Neoproterozoic and Paleoproterozoic age clusters) with limited Grenvillian input. Conversely, all samples from the PDL are dominated by Mesoproterozoic zircons with minimal Paleoproterozoic and Archean input. These data suggest that the provenance of the sediments within PDL have a common source that is not the Gondwanan craton or the Upper Devonian clastics of the SPZ, which is difficult to explain with a Gondwanan upper plate and SPZ lower plate subduction scenario. This suggests that current models for subduction beneath the OMZ may need re-interpretation. These data also show neither a clear Avalonian nor Meguma affinity for the Upper-Devonian clastics of the PQ. This implies that either SPZ basement is not genetically related to Avalonia or Meguma, or sediments for the PQ clastics were derived from an alternate source.