U-Pb SHRIMP zircon dating of high-grade rocks from the Upper Allochthonous Terrane of Bragança and Morais Massifs (NE Portugal): geodynamic consequences

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The Bragança and Morais Massifs are part of the mega-klippen ensemble of NW Iberia, comprising a tectonic pile of allochthonous units stacked above the Parautochthonous Thrust Complex. Those units represent distinct terranes formerly included in the external-most edge of the Gondwana northern margin, but several controversies remain about the geodynamic evolution model; particularly, in what concerns key-features related to the Upper Allochthonous Terrane (UAT). The latter comprises two subunits contacting each other through a major over-thrust zone: the lower subunit, well exposed at Bragança, includes a high-grade metamorphic series (HP-granulites and paragneisses enclosing eclogite lenses), and an intrusive mafic/ultramafic igneous suite (inter-bedded peridotite/pyroxenite layers and various gabbroic rocks), whereas the upper subunit, better preserved at Morais, comprises orthogneisses covered by a relatively thick (flysh-like) meta-sedimentary sequence.

The new SHRIMP data presented for the Bragança and Morais Massifs are compatible with published information reported for Cabo Ortegal and Órdenes Massifs, showing that high-grade rocks experienced significant thermal disturbances within the ≈500-390 Ma time range, although clustering at *ca.* 500-480 Ma, ≈460 Ma and *ca.* 400-390 Ma. The latter period traces the retrograde metamorphism experienced by all high-grade rocks during Variscan times, irrespectively of their nature. The former period should mark an event of pervasive and anomalously high heat-flow synchronous with the emplacement/crystallisation of gabbros and pyroxenites that intrude the continental (lower crust) basement represented by the high-grade metamorphic series. The development of these deep-seated magma chambers is correlative with persistent Lower

Palaeozoic continental rifting recognised in occidental-central orogenic belts of Europe, tracing the opening of the Rheic Ocean and the onset of the Variscan Cycle. Previous deformation events recorded by metamorphic high-grade rocks should be ascribed to an orogenic cycle prior to Variscan, which is compatible with their long-lasting and complex P-T-t evolution, put in evidence throughout structural, textural and thermo-barometric data. Subsequent preservation of the high heat-flow regime is sustained by the opening of Palaeotethys ocean, (*ca.* 470-400 Ma), which corresponds to a back-arc basin of the Rheic. Additional evidence suggests that UAT should have been part of Armorica before its emplacement on top of Iberia after closure of Palaeotethys.