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Sedimentary record of the amalgamation and break-up of Pangaea: U-Pb detrital zircon geochronology and provenance of Carboniferous–Triassic siliciclastic rocks, SW Iberia

M.F. Pereira¹, M. Chichorro², G. Gutiérrez-Alonso³, C. Gama⁴, K. Drost⁵,
C. Ribeiro⁴, L. Albardeiro¹, M. Hofmann⁶ and U. Linnemann⁶

¹*IDL, Departamento de Geociências, ECT, Universidade de Évora, Portugal*

²*CiCEGE, Departamento de Ciências da Terra, Universidade Nova de Lisboa, Portugal*

³*Departamento de Geodinámica, Universidad de Salamanca, Spain*

⁴*CGE, Departamento de Geociências, ECT, Universidade de Évora, Portugal*

⁵*Department of Geosciences, University of Tübingen, Germany*

⁶*Senckenberg Naturhistorische Sammlungen Dresden, Germany*

In SW Iberia there is a basal unconformity where Triassic sandstones overlie previously deformed Carboniferous turbidites. This important stratigraphic boundary records the transition from the final stages of Pangaea's amalgamation to the initial stages of break-up. U-Pb dating of detrital zircon from Carboniferous greywackes of the South Portuguese Zone and Triassic sandstones of the Algarve and Alentejo basins was carried out to conduct a study of sedimentary provenance. The radiometric ages obtained by LA-ICP-MS show that most of the samples have common age spectra which are typical of North Gondwana sources: Archean and Paleoproterozoic ages characteristic of the West African craton, Neoproterozoic ages associated with Cadomian and Pan-African orogenies, and Cambrian ages related to the intra-continental rifting of North Gondwana. The only exception is a Visean immature greywacke that was probably derived from Devonian magmatic arcs related to the Variscan orogeny. Very rare pre-Devonian zircons indicate faint contributions from recycled sediments. In contrast the Serpukhovian to Moscovian greywackes are derived from felsic mature source rocks and include Proterozoic and Paleozoic detrital zircons suggesting recycling of an old basement. They also include Ordovician and Silurian detrital zircons, the ages of which have no correspondence in North Gondwana, and thus indicate an external source (Laurussia?). U-Pb ages younger than Ordovician are significant in the Triassic sandstone of the Alentejo basin and resemble the zircon populations of the Serpukhovian to Moscovian greywackes from the South Portuguese Zone. U-Pb ages younger than Neoproterozoic are poorly represented in the zircon population of the Triassic sandstone from the Algarve basin, which rests unconformably upon Moscovian turbidites, pointing to Upper Devonian quartzites of the South Portuguese Zone as probable sources, since they are dominated by Precambrian detrital zircons. These differences occurring in the Triassic basins suggest that detrital zircon populations could be derived from two independent sources and paleo-drainage systems due to complex crustal-block extension architecture.

North meets South