European Mineralogical Conference
Vol. 1, EMC2012-384, 2012
European Mineralogical Conference 2012

Pangea break up recorded by U-Pb ages of detrital zircons: The Permo-Triasic series of the Iberian Ranges

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The provenance of the Permo-Triassic series of the Talayuelas anticline (Iberian Ranges) have been studied using U-Pb geochronology (LA-ICP-MS) of detrital zircons. These intracontinental siliciclastic series were formed by extensive sandy braided fluvial systems associated with ephemeral-lake deposits and aeolian sediments, with paleocurrents suggesting constant NW-SE transport directions. The detrital zircons of six samples ranging in age from the Upper Permian (Lopingian) to the Middle Triassic (Anisian) were studied, performing age calculations, concordia diagrams and binned frequency histograms. Upper Permian reddish sandstones from the Upper Alcotas Formation (Lopingian) contain a dominant Variscan zircon population (290-360 Ma), which indicates source areas located in the axial zone of the Variscan belt, in the core of the Ibero-Armorican arc. However, in the Lower Triassic sandstones of the Cañizar Formation (Olenekian) the Variscan zircon population is almost completely replaced by Cadomian zircons (520-750 Ma), with also important Avalonian (390-520 Ma), Mesoproterozoic (900-1750 Ma), Eburnian (1.78-2.35 Ga) and Archaean (>2.4 Ga) zircon populations. This detrital zircon content now suggests source areas located more to the NW, in the Avalonian microcontinent, although a limited supply coming from the southern part of Laurentia can not be ruled out. Finally, in the Middle Triassic (Anisian) the source areas returned to the Variscan axial zone, as the Variscan zircon population is again highly dominant during this period. The changes detected in the source areas of the Permo-Triassic series are related to the development and propagation of the Iberian rift, one of the large extensional structures which determined the generation of the sedimentary basins and finally caused the break-up of Pangea. The methodology followed in this paper is very useful to understand the generation and evolution of these intracontinental basins, and also the relationships between the different rift systems generated in the North Atlantic realm during the Permo-Triassic times.