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Gondwana to Pangea: a detrital zircons tale from NW Iberia

Daniel Pastor-Galán (1), Gabriel Gutiérrez-Alonso (1), J. Brendan Murphy (2), Javier Fernández-Suárez (3), Mandy Hofmann (4), and Ulf Linnemann (4)

(1) Geology department, Salamanca University,, Salamanca, Spain (dpastorgalan@usal.es), (2) Department of Earth Sciences, St. Francis Xavier University, Antigonish, Nova Scotia, Canada,, (3) Departamento de Petrología y Geoquímica, Universidad Complutense and IGEO-CSIC, 28040 Madrid, Spain., (4) Senckenberg Naturhistorische Sammlungen Dresden, Germany

The Cantabrian Zone of NW Iberia preserves a voluminous, almost continuous, sedimentary sequence that ranges from Neoproterozoic to Early Permian in age. Its tectonic setting is controversial and recent hypotheses include (i) passive margin deposition along the northern margin of Gondwana or (ii) an active continental margin or (iii) a drifting ribbon continent. In this paper we present detrital zircon U-Pb laser ablation age data from 13 samples from the Cantabrian Zone sequence ranging from Early Silurian to Early Permian in depositional age, which, together with previously published detrital zircon ages from Ediacaran-Ordovician strata, allow a comprehensive analysis of changing provenance through time.

Laser ablation U-Pb geochronological analysis of detrital zircons in thirteen samples of the Cantabrian Zone of the NW Iberian Variscan belt reveal that this portion of Iberia was part of the northern passive-margin of Gondwana from the Ordovician to Late Devonian, until the onset of collision between Gondwana and Laurentia. Zircon populations in these samples show important similarities with zircons found in coeval detrital rocks from central North Africa. Additionally, the populations found in NW Iberia are coherent with a Saharan source. We suggest that NW Iberia was situated from Ordovician to Late Devonian along the Gondwana northern passive margin close to the paleoposition of central North Africa and Saharan craton. Additionally, the Carboniferous-Permian samples studied record the provenance changes produced during the Variscan collision and basement exhumation, the Cantabrian orocline formation and the subsequent detachment of the lithospheric mantle. The provenance changes reflect major topographic variations due to the afore mentioned processes during Late Devonian to Early Permian times.

Detrital zircon studies are a useful tool that can complement regional syntheses in deducing paleogeographic locations, the occurrence of major tectonic events such as terrane dispersal and amalgamation, and continental collisions, as well as the crustal response to lithospheric-scale processes such as oroclinal buckling and lithospheric delamination.