



## **Unraveling terrane sources of synorogenic basins: provenance analysis of Late Devonian-Carboniferous siliciclastic rocks from SW Iberia (Variscan belt)**

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The tectonic evolution of an active margin implies the subduction of oceanic lithosphere, formation of magmatic arcs, gradual processes of the bringing together of continental blocks (which may include several terranes), their collision and the resultant building of orogenic belts. Simultaneously, erosion of materials deriving from terrane sources that are emerged (e.g., magmatic arc and/or inner regions of continents with mountain ranges) are usually intense, resulting in deposition in synorogenic basins.

During the assembly of Pangea, the Carboniferous continental collision between Laurussia and Gondwana that followed the closer of the Rheic Ocean was responsible for the development of the Appalachian-Variscan belt. The subduction of this ocean began after the Early Devonian closure of the Iapetus Ocean, and its destruction took place by the end of the Devonian.

The terranes capable of sourcing sediments dispersed on both sides of the Rheic suture located between the two main continental blocks that made up Pangea can be traced in the SW Iberia Variscan belt along the complex contact between the Ossa-Morena (OMZ- Gondwanan side) and the Pulo do Lobo and South Portuguese (PLZ and SPZ- Laurussian side) zones. Variscan synorogenic marine sedimentation is well preserved in SW Iberia, and includes Early Carboniferous strata in the OMZ, Late Devonian-Early Carboniferous strata in the PLZ, and Late Devonian to Late Carboniferous strata in the SPZ. In the Nova Scotia Appalachian belt, terranes inferred to lie west of the Rheic suture (Laurussian side) include West Avalonia and the more outboard Meguma.

A comparative study between the detrital zircon age populations of the Late Devonian-Carboniferous siliciclastic rocks of SW Iberia and those of the pre-Variscan siliciclastic strata of the Gondwanan- and Laurussian-side terranes from SW Iberia and Nova Scotia was performed to test sedimentary recycling using the Multi-Dimensional Scaling diagrams (MDS in ISOPLOT-R, by Pieter Vermeesch).

The results of the provenance analysis of the detrital zircon populations of the Late Devonian-Carboniferous strata of SW Iberia enable direct discrimination of competing sediment Laurussian-type and Gondwanan-type sources, involving recycling and mixing relationships.

Four main potential source terranes were distinguished: i) Laurussian (Laurentia/Baltica)-type source, ii) Rheic magmatic arcs-type source, iii) Laurussian/Gondwanan (Meguma/West Avalonia)-type source, and iv) Gondwanan (Ossa-Morena)-type source.

The applied statistical work scheme proved to be very useful to unravel the potential terrane sources of the Late Devonian-Carboniferous synorogenic basins from SW Iberia, and to constrain the paleogeographic position of each Paleozoic terrane during the Laurussia-Gondwana collision.

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