

# Paleozoic basin evolution during tectonic and climatic transitions in the eastern Precordillera of Argentina

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The Precordillera of western Argentina displays a complex pre-Andean stratigraphic record related to Paleozoic plate convergence along the southwestern margin of Gondwana. An investigation of the basin configuration and clastic depositional systems of the Silurian-Devonian Rinconada Formation and Carboniferous Jejenes Formation of the eastern Precordillera, accompanied by new U-Pb detrital zircon and igneous geochronological results, provides insight into basin evolution, drainage reorganization, and climatic and tectonic interactions during Paleozoic deformation and glaciation.

Measured stratigraphic sections and lithofacies analyses of the Silurian-Devonian succession indicate deposition of sediment gravity flows in a submarine fan environment with mass-transport deposits containing olistoliths of Ordovician carbonates. Flexural subsidence was induced by shortening of Mesoproterozoic basement and cover strata in the adjacent Famatinian orogenic belt. The foreland basin was then deformed during the Late Devonian Chanic orogeny, prior to regional glacial scouring of remnant topography during the Late Paleozoic Ice Age. Analyses of unconformities, cross-cutting relationships, and depositional systems within a Carboniferous paleovalley (Quebrada Grande, Sierra Chica de Zonda) indicate four facies associations controlled by glacial advance and retreat in a fjord setting. Glacial advance was recorded by deposition of diamictites, conglomerates, and sandstones in subglacial fan (FA4) and dropstone-bearing mudstones and thin sandstones in a distal fjord environment (FA3). Glacial retreat involved deposition of tabular high- and low-density turbidites in a fjord head delta (FA2) and matrix- and clast-supported conglomerates in a fan delta (FA1). New high-precision U-Pb geochronological results from CA-ID-TIMS analyses of an interbedded tuff within intermediate stratigraphic levels indicate a maximum depositional age of  $318.3 \pm 0.4$  Ma with accumulation rates of  $\sim 120$  m/Myr during regional mid-Carboniferous (Bashkirian) deglaciation.

Detrital zircon U-Pb geochronological results for seven sandstone samples (840 individual grain analyses) provide an integrated provenance framework for the Silurian-Carboniferous succession. Contributing source regions are identified as four distinct tectonic provinces: (1) Neoproterozoic-Cambrian eastern Pampean metamorphic basement and plutonic rocks (1300-500 Ma); (2) the Famatinian magmatic arc (495-450 Ma); (3) Mesoproterozoic western Pampean metamorphic basement (1450-950 Ma); and (4) Paleozoic Precordillera basin fill (1450-350 Ma). The U-Pb results signify consistent sediment derivation from western Pampean basement with progressive shifts during the Carboniferous indicating drainage expansion to include the Famatinian magmatic arc and eastern Sierras Pampeanas province.

The transition from a Silurian-Devonian deep marine foreland basin to an isolated Carboniferous fjord reflects major orogenic and climatic transitions in SW Gondwana. Late Ordovician-Silurian (Famatinian) and Late Devonian (Chanic) shortening created elevated topography that was subsequently beveled by glacial erosion during the Late Paleozoic Ice Age. We suggest that deformation related to subduction and terrane collision helped drive changes in Paleozoic basin configuration, sediment dispersal, and depositional environments. However, profound climate changes during regional glaciation further regulated the depositional processes and spatial extent of late Paleozoic clastic deposition across the Precordillera.

Supervisor Signature:

