# Early Paleozoic construction of southwest Gondwana: evidence from detrital zircons in the Sierras Pampeanas

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Basement exposures in the Sierras Pampeanas at 26º–33ºS give a unique opportunity to compare paleo-sediment sources along a significant stretch of the Andean foreland. To this end we have studied a large number of widespread samples using U-Pb SHRIMP age determination of detrital zircons, coupled with identically-located Hf and O determinations. The study includes comparison with neighbouring sectors in NW Argentina and Patagonia, and inferred sources in Eastern Laurentia, Southern Africa and East Antarctica.

The detrital zircon age patterns of metasedimentary rocks from the Western Sierras Pampeanas (WSP) indicate predominant derivation from the adjacent 1330–1030 Ma Mesoproterozoic complexes, with the same lithologies and time span as the Grenville province in Eastern Laurentia. More specifically, an important secondary detrital peak at ~ 1.4 Ga shows the same juvenile Hf isotope signature ($\varepsilon$Hft from +11.2 to +5.3) as the Southern Rhyolite Province of the southeast USA, which lies along the western margin of the Grenville province. Terranes with Laurentian affinities are also found in the Puna and Arequipa to the north, and probably to the south in the North Patagonian Massif. Thus a large, ribbon-like collage of drifted Laurentia-derived terranes (MARA) is inferred to have been welded to SW Gondwana during the Early Cambrian Pampean orogeny.

The MARA terrane collage collided obliquely with the Eastern Sierras Pampeanas (ESP), the latter consisting of a 540–530 Ma continental volcanic arc and its Neoproterozoic to Early Cambrian metasedimentary envelope. The detrital zircon patterns of ESP high-grade metasedimentary rocks deposited before the Pampean orogeny are identical to those of the low-grade tract of the Puncoviscana Formation of NW Argentina. The main pattern of the "Puncoviscan series" is strongly bimodal, with peaks at ~ 570–670 and ~ 1000 Ma and a minor Late Paleoproterozoic peak (1860–1900 Ma). There are no obvious nearby sources for the main peaks, which are probably derived from SW Gondwana sources such as the East Africa–Antarctic orogen and/or the Dom Feliciano belt.

Although volumetrically very scarce compared with the "Puncoviscan series", distinct detrital zircon age patterns have been reported from both the ESP and NW Argentina. For example, our sample from the Ancaján series, which is tectonically interleaved with the "Puncoviscan series" near the eastern slope of Sierra de Ancasti, has several characteristics in common with the metasedimentary rocks and Neoproterozoic cover of the WSP. This includes important Early Mesoproterozoic components (1200–1500 Ma), significant Late Paleoproterozoic peaks (~ 1800–1900 Ma), and the absence or very minor presence of Late Neoproterozoic peaks. This important observation strongly suggests that the Laurentian platform sediments of MARA were tectonically involved with SW Gondwana sediments during the Early Cambrian Pampean collision. The accretion of MARA shaped the outer edge of SW Gondwana, becoming the basement for future Andean episodes.