

Evolution of the Northern Andes Cenozoic magmatic arc as recorded in the forearc detrital record

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In subduction systems, the sediments in forearc basins may record a more complete history of magmatism and topographic growth than the present exposure of the arc itself. The forearc of SW Ecuador and northern Peru archives the modern convergence history along the Northern margin of South America and has shown a great potential to unravel the poorly defined exhumation processes resulting from the modern orogeny along this segment of the chain. Thus, it may help to resolve orogenic and magmatic periods related to the Andean evolution that are poorly identified in chain outcrops or that are missing from the geological record because of overburden or erosion. Chronologic and provenance insights in the forearc were recently obtained from U-Pb single grain dating by LA-ICP-MS of detrital zircons. The resulting age spectra suggest that the forearc sediments of SW Ecuador and NW Peru were sourced from the trenchward sections of the Andes (i.e. the Western Cordillera). Thus, U-Pb dating in the forearc defines significant and enigmatic periodic clusters at ~90 Ma, ~72 Ma, ~60 Ma ~43 Ma and ~30 Ma which most likely define cyclic periods of intense magmatic production in the Andean Arc and are coincident with some of the major geodynamic events defined in this part of the Andes. As zircon preserves an exceptional record of magmatic, and thus continental crustal evolution the present study also proposes a combined Hf and O isotopic analysis as well as trace and rare-earth elements in zircons from the forearc to unravel the geochemical, tectonic and geodynamic characteristics of this section of the North Andean Arc.