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DETRITAL ZIRCON U/PB DATING OF SANDSTONES IN PERU: IMPLICATIONS FOR PROVENANCE AND PALEOGEOGRAPHY

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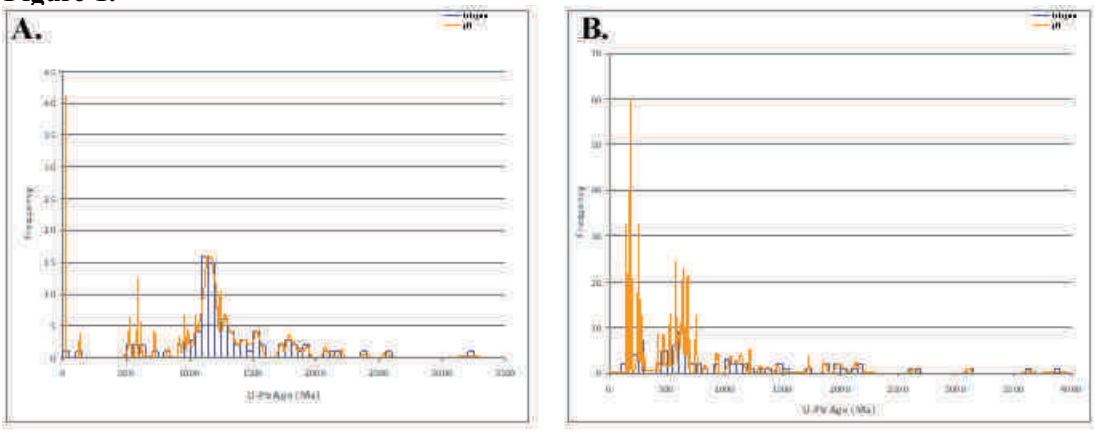
ABSTRACT

Detrital zircon population density curves provide a "fingerprint" of provenance that link detrital zircon ages observed in clastic samples to published ages of cratonic shields and other possible sediment source regions. In samples collected in the Chachapoyas region of Peru, statistically significant populations of detrital zircons were separated and age dated by U/Pb laser ablation. Population density curves of observed zircon ages were created for each sample and compared with published ages of shield sediment source areas. Peaks on these population density curves can be generally correlated to ages of shield areas on the South American continent, yielding significant insight into the paleogeography and tectonic history of Peru.

The shield areas of South America have been dated with reasonable accuracy (Almeida et al., 2007; Chew et al., 2008; Santos et al., 2000; Tassinari and Macambira, 1999). A shield source can be inferred for many of the observed population peaks in the samples. However, there is no source area in the shield that could have yielded the 250 and 500 Ma detrital zircon peaks observed in the samples collected in this study (Figure 1). Chew et al. 2008 suggests that younger zircons could be sourced from igneous bodies that formed during collision events that created Protoandean deformation. The Laurentian collision could source the 500-600 Ma zircons, and the Jurua event could source the 250 Ma zircons. Our samples support the view that Late Carboniferous - Jurassic sediments were primarily sourced from Protoandean highlands that have since been eroded and deformed. In Cretaceous time the primary sediment source switched to the shield, but younger west-derived sediments continued to contribute to the Cretaceous sandstones.

Figure 1.



A. Cretaceous sandstone with a zircon age "fingerprint" indicating sediment input from older shield regions; B. Paleozoic sandstone showing zircon age peaks of roughly 250 and 500 Ma, indicating significant sediment input from non-shield source areas.

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