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Paper No. 349-7
Presentation Time: 9:00 AM-6:30 PM

CHANGE IN PROVENANCE OF PROTEROZOIC METASEDIMENTARY ROCKS IN THE PICURIS MOUNTAINS BASED ON LASER-INDUCED BREAKDOWN SPECTROSCOPY (LIBS) OF DETRITAL TOURMALINE

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Assembly of southwestern Laurentia during the Paleoproterozoic Yavapai and Mazatzal orogenies is well-documented. An additional tectonic event, the Mesoproterozoic Picuris Orogeny, has been proposed (Daniel et al., 2013, GSA Bulletin, 125:1423-1441) based on 1600-1475 Ma detrital zircons in the Piedra Lumbre Formation of the Hondo Group, Picuris Mountains, northern New Mexico. These ages are consistent with source rock derivation from Australia and Antarctica. Units underlying the Piedra Lmbre Fm. include the Rinconada Formation that contains detrital zircons with a unimodal age of ca. 1710 Ma (Daniel et al., 2013), most likely sourced from local rocks of Yavapai age. This study evaluates the change in provenance by analyzing detrital tourmalines from the Rinconada, Pilar, and Piedra Lumbre Formations in the Copper Hill Anticline, Picuris Mountains.

Tourmaline is an ideal mineral for sediment provenance studies because it forms in a wide pressure-temperature-composition range, incorporates a fingerprint of its host rock chemistry, has very slow diffusion rates, and is resistant to abrasion. By focusing on distinct detrital cores in tourmaline grains, reflecting the original lithologic association in which tourmaline formed, a change in source region can be evaluated. Laser-Induced Breakdown Spectroscopy (LIBS) spectra are rich in information, including the concentrations of all elements, isotopic ratios, and information on the structure of the analyzed material, thus helping to identify source lithology and changes in provenance. LIBS spectra are modeled using Partial Least Squares Regression (PLSR) in a matching algorithm developed to identify the lithology in which the tourmaline crystallized. Changes in sediment source regions, reflected in a shift of detrital core compositions, provide an additional method to evaluate sediment provenance during orogenesis.

Session No. 349--Booth# 478

T222. Proterozoic Accretion of the North American Continent – United Plates of America Revisited (Posters)
Wednesday, 28 September 2016: 9:00 AM-6:30 PM

Exhibit Hall E/F (Colorado Convention Center)

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