



The interplay between local and far-traveled sediment in North American Ancestral Rocky Mountain basins

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The Pennsylvanian-Permian Ancestral Rocky Mountains (ARM) system in the southwestern United States was initially recognized and documented by aprons of proximal, coarse-grained, arkosic sedimentary rocks within the Paradox, Eagle, and Denver Basins. Adjacent basement cored structures such as the Uncompahgre and Front Range Uplifts have been interpreted as the source for these rocks. However, new petrographic and detrital geochronologic data from sedimentary rocks deposited in the distal portions of ARM basins suggest that these basins were also filled by clastic material derived from non-local sources. The Appalachian orogen has been suggested as a possible source for this sediment, but the idea has not been thoroughly tested, and the relative volume of local vs. far-traveled sediment within ARM basins has not been assessed.

We present detrital zircon U-Pb data from 72 samples of late Paleozoic sandstones within the Paradox, Eagle, Denver, Holbrook, and Keeler Canyon basins (southwest United States) and integrate these data with all available late Paleozoic Laurentian detrital zircon data. Results of these analyses are compared to five potential source terranes: Appalachian crystalline core, Appalachian orogen sedimentary rocks, Ouachita-Marathon belt rocks, Newfoundland Appalachians, rocks of the Franklinian Belt, and Sonoran margin sedimentary rocks. The similarity of detrital zircon spectra are quantitatively compared using cross-correlation of kernel density estimation curves. Detrital zircon spectra of distal basin samples are characterized by 400-500 Ma, 1.0-1.3 Ga, ca. 1.4-1.8 Ga, and 2.5-3.0 Ga populations. Spectra from proximal samples are almost entirely made up of ca. 1.4 and 1.8 Ga grains. Detrital zircon U-Pb spectra of distal ARM basin rocks show close similarity to rocks of the arctic Franklinian Belt and suggest that large volumes of sediment were transported southwest (modern reference frame) across the northern Laurentian continent and re-deposited in the distal portions of ARM basins, whereas locally derived sediment dominated the proximal portion of these basins.