U-Pb Detrital Geochronology and Provenance Comparisons From Nonmarine Strata of the Dakota Group, Lytle Sandstone, and Morrison Formation in Northeastern New Mexico

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U-Pb detrital zircon ages from nonmarine sedimentary rocks of the Early–Late Cretaceous (Albian–Cenomanian) Dakota Group, Late Jurassic–Early Cretaceous(?) Lytle Sandstone, and Late Jurassic (Tithonian) Morrison Formation in northeastern New Mexico provide new geochronologic and provenance constraint on the age range and source of detritus delivered to the Cordilleran foreland basin during Jurassic–Cretaceous time. Presented here are four U-Pb detrital zircon age spectra (n=978 analyses) from detrital zircons extracted from the Pajarito Formation and Mesa Rica Sandstone members of the Dakota Group and underlying Lytle Sandstone in the western Dry Cimarron Valley east of Raton, New Mexico, as well as the uppermost part of the Morrison Formation exposed in the Crestone anticline near Las Vegas, New Mexico. All four stratigraphic units share strong similarities in occurrences of Paleo-Mesoproterozoic zircon ages with the majority falling between 1800–1600 (Yavapai-Mazatzal provinces), 1450–1350 (A-type granitoids), and 1300–1000 Ma (Grenville province). Neoproteozoic–Jurassic peak ages are also similar across each unit with primary peaks occurring between 625–595, 430–415, and 190–150 Ma. Neoproteozoic and early Paleozoic ages overlap with recycled Mesozoic eolianites of the Colorado plateau whereas Jurassic ages overlap with magmatic sources of the Cordilleran arc.

We note, however, that although the Mesa Rica Sandstone and Pajarito Formation both contain elevated occurrences of Cretaceous-age zircons with similar peak ages between 105–95 and 125–120 Ma, there are no occurrences of zircons younger than Late Jurassic in either the Morrison Formation or Lytle Sandstone. The nine youngest ages from the Morrison Formation fall between Early–Late Cretaceous (between ~190–150 Ma) whereas the nine youngest ages from the Lytle are between Middle–Late Jurassic (~172–150 Ma). The nine youngest ages from overlying strata of the Mesa Rica Sandstone and Pajarito Formation are all Late Cretaceous (Cenomanian–earliest Turonian) and occur between ~100–92 Ma. The youngest detrital zircon ages from the Morrison Formation and Lytle Sandstone support a Late Jurassic (Tithonian) age for both of these units whereas the youngest ages from both members of the Dakota Group indicate an age of earliest Late Cretaceous (Cenomanian). The youngest ages from the Dakota Group and Morrison Formation overlap with previously reported biostratigraphic age constraints from these units.

It is important to note that although our new geochronologic constraint from the Lytle Sandstone supports a latest Late Jurassic age for these strata, there are scenarios where the Lytle could be interpreted to be younger in age than Late Jurassic (i.e., Early Cretaceous). It is certainly possible that Late Cretaceous zircons in the Dakota Group represent reworked, air-fall tuffs from the Cordilleran arc (rather than fluvial, water-laid deposits), thus absences of these young Cretaceous grains in the Lytle could be interpreted as a temporary hiatus in air-fall material to the Lytle during the Early Cretaceous. In this scenario, the similarity in zircon ages and provenance between the Lytle and Morrison could be explained by later reworking and recycling of Morrison detritus into the Lytle during the Early Cretaceous.

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