Timing of Late Cretaceous Volcanism and Chronostratigraphy of the Ripley Formation using U-Pb Dating of Detrital Zircons

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Bentonite lenses that are found locally throughout the Upper Cretaceous Ripley Formation within the Mississippi Embayment potentially have a regional volcanic origin. A recently discovered bentonite bed exposed by mining south of the city of Pontotoc, Mississippi, is younger than known Late Cretaceous volcanism based on lithostratigraphy and biostratigraphy. The Ripley Formation consists of ~73 m of fossiliferous clay, sand, and calcareous sand beds. The uppermost strata of the Ripley constitute the formally named Chiwapa Member, which is overlain by the Upper Cretaceous Owl Creek Formation. A previously known bentonite bed is located within the Chiwapa Member to the north of Pontotoc, but the newly discovered bentonite is located directly above the Chiwapa, where its upper contact represents the boundary between the Ripley and the Owl Creek. The contact between the Chiwapa Member and the overlying Owl Creek/Prairie Bluff Formation has an estimated age of ~68.5 Ma, based on Ammonite biostratigraphy. The southern Pontotoc mining activity has exposed ~2.5 m of fine sand grading upward into ~2.5 m of sandy clay, which contains the bentonite bed. Bulk samples were collected in the lower fine sand and continued upsection in ~1 m intervals, beginning with the gradational lower contact with the bentonite, and two locations within the bentonite bed itself. Zircon age dates were determined using a laser ablation inductively coupled plasma mass spectrometer (LA-ICPMS). Geochronologic U-Pb age dating results show two distinct age distributions: ~500 to 300 Ma and ~1500 to 925 Ma. The largest detrital population ranges from ~1500 Ma -925 Ma, which coincides with zircon sources from the Mid-Continent anorogenic granite-rhyolite province from ~1500 Ma -1300 Ma, and the Grenville orogen from ~1250 Ma - 950 Ma. Possible zircon sources for the smaller age distribution ranging from ~500 Ma - 300 Ma are the Appalachian cordillera, including the Taconic, Acadian, Alleghanian, and Ouachita orogenies. The bentonite is interpreted as volcanic in origin and continued work will focus on recovering and dating volcanogenic zircons, which will confirm that the Mississippi Embayment region experienced a period of volcanism earlier than the previously known youngest volcanic activity at Jackson Dome (~70 Ma).