

Provenance and Paleogeography of the Mesozoic southern Ordos Basin, North Central China: Implications of U-Pb detrital zircon geochronology

Xiangyang Xie¹, Paul L. Heller, and Kevin, R. Chamberlain

¹Department of Geology and Geophysics, University of Wyoming, 1000 E. University Ave. Laramie, WY 82072, telephone: 307-766-2245, email: xyxie@uwyo.edu

Two deformation belts — the Qinling orogenic belt to the south and the Western Liupanshan thrust belt to the west, including the Qilian-Qaidam terrane — control the evolution of the southern Ordos Basin, China, during early Mesozoic time. U-Pb detrital zircon geochronology is used to identify provenance, reconstruct paleogeography, and document the relative timing of basin margin deformation.

Four samples of the Yanchang Formation, middle to late Triassic age, were collected from the southern Ordos Basin, one from the southern and three from the southwestern basin margin. In total 447 detrital zircon grains were analyzed. All LA-ICP-MS measurements were conducted at GeoAnalytical Laboratory, Washington State University. Three major age populations — 240–490 Ma, 1.8–2.0 Ga, and 2.2–2.8 Ga — characterize the detrital zircon grains of the Yanchang Formation. The two oldest age groups match ages of basement rocks found in the underlying North China block. However, younger ages can be subdivided into three distinctive groups: 240–300 Ma, 300–400 Ma, and 400–490 Ma. The youngest group matches ages exposed to the west in the Qilian-Qaidam terrane, whereas the older groups indicate a southern, Qinling orogenic belt source area. In all samples detrital zircon from the western source area overwhelms the southern source, regardless of proximity to either basin margin. Thus, the Qinling orogenic belt, even during deformation, was never the dominant source of detrital zircon to the south Ordos Basin. Furthermore, stratigraphic changes in provenance within the Yanchang Formation indicate that: 1) deformation in the Qinling and Western Liupanshan belts began in Middle Triassic time in this area; and 2) the southern source area barely contributed sediment by Late Triassic time. This result is surprising in that most studies suggest that the Qinling orogenic belt was the longer lived and more dominant tectonic feature in this part of China during early Mesozoic time.