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Provenancial tracing for the Southern Ningxia in the northeastern margin of the Tibetan Plateau and its tectonic implications

weitao wang
China (weitaoww@gmail.com)

Located in the northeastern corner of the Tibetan Plateau, the Southern Ningxia basin deposits huge thick Cenozoic strata whose provenancial analysis provides the exceptional opportunity to testify the deformational processes in the northeast Tibetan Plateau. Here, the single grain detrial zircon U-Pb ages and Hf isotopic compositions are used to trace the source variation of the 27∼4 Ma strata based on the Magnetostragraphy from the Sikouzi section. Most of the U-Pb ages from 27∼12 Ma samples concentrate within the intervals of 200∼470 Ma (clustering around two peak ages of 230 Ma and 440 Ma), 1600∼1890 Ma, 2100∼2450 Ma. In contrast to the 27∼12 Ma samples, 7 Ma sample has one more detrital zircon age peak of 720∼980 Ma, and zircons from the sample with age of 4 Ma is dominated by U-Pb ages in range of 200∼490 Ma. In the samples collected from the Sikouzi section, the 1600∼1890 Ma and 2100∼2450 Ma zircons mainly have positive εHf(t) values, the 720∼980 Ma zircons have positive εHf(t) values ranging from -15.1∼-1.7, and the 200∼470 Ma zircons have εHf(t) values of -11.2 to 12.5. Comparing these with neighboring tectonic units, we found that zircon populations at 1600-1890 Ma, 2100-2450 Ma probably were drained from west margin of Ordos block, the 720-980 Ma zircons have their affinity to the Xihuashan and Nanhuashan and zircons at 200 [U+FF5E] 470 Ma may come from west Liupanshan. The results of zircon source trace suggest that the southern Liupanshan probably initiate uplift at ∼27 Ma and late Miocene deformation and uplift in this region may related to reactivation of Haiyuan-Liupansh fault system in stages.