Late Neoproterozoic intracontinental rifting of the Tarim carton, NW China: An integrated geochemical, geochronological and Sr–Nd–Hf isotopic study of siliciclastic rocks and basalts from deep drilling cores

WEIYAN CHEN[1], GUANGYOU ZHU[2], HUIHUI YAN[3]

[1] Research Institute of Petroleum Exploration and Development, PetroChina, Beijing, China. 7104700@qq.com

[2] Research Institute of Petroleum Exploration and Development, PetroChina, Beijing, China. zhuguangyou@petrochina.com.cn

[3] Research Institute of Petroleum Exploration and Development, PetroChina, Beijing, China. yanhihui2018@163.com

Late Neoproterozoic extensive rifting in Tarim has been intensely debated regarding an intracontinental or aback-arc environment,which forms a key aspect for elucidating the Precambrian basement architecture and evolutionof the Tarim craton. Recently, a deep well called Tarim Geological Survey Well (X1) was drilled from the northwest Tarimbasin. Sixty-six samples were collected from the Sugetbrak Formation of the X1 well, including 6 sandstone samples, 29mudstone samples and 31 basalt samples, for integrated geochemical, geochronological, and Sr–Nd–Hf isotopic analyses. The results indicate that the basalts geochemically show distinct affinity with ocean-island basalts, characterized by enrichments in light rare-earth elements (REEs) and no depletions in Nb and Ta and indicating an intracontinental rifting environment. The presence of 572-Ma zircon in the Sugetbrak basalts reveal the rifting mainly developed in an interval of 541–572 Ma. Geochemical and petrographic data show that the coeval basaltic tuffs or clasts contributed 5–20% to the deposition of the Sugetbrak Formation. The zircon age cluster between 1.8 and 2.0 Ga and abundant Paleoproterozoic detrital zircons with ultrahightemperature (UHT) granulate REE signature in the Sugetbrak sandstones indicate a Paleoproterozoic orogenic event occurred in the Tarimcraton that could be related to the assembly of the Columbia supercontinent. In contrast, theNeoproterozoic zircons fromthe Sugetbrak sandstones display positive εHf(t) values, and some have hydrothermal alteration REE signature, indicating Tarim could be a locus for early mantle plume activities thatbroke the Rodina supercontinent.