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塔里木盆地西北缘乌什地区石炭系沉积与碎屑锆石年代学记录及其反映的构造演化

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摘要:

针对塔里木西北缘乌什地区石炭纪维宪期(Visean)至巴什基尔期(Bashkirian)连续较好的露头剖面,在沉积序列、砂岩组分及重矿物组合分析基础上,重点通过LA-ICP-MS分析砂岩样品碎屑锆石的原位U-Pb和Lu-Hf同位素,解析其年代学、物源特征及构造属性等信息。研究显示,石炭系砂岩碎屑颗粒以石英为主,火山岩屑和变质火山岩屑极少,物源构造属性主要指示再旋回造山带,且向上有向克拉通迁移的趋势;重矿物组合以锆石、电气石和TiO₂矿物等稳定重矿物为主,反映远源和相对稳定的构造背景。4个砂岩样品总体具有类似的碎屑锆石U-Pb年龄组成,主要反映三期年龄:392~496Ma、708~868Ma和893~1044Ma,其 $\epsilon_{\text{Hf}}(t)$ 大多介于-15~13之间;此外也少量存在1713~1917Ma、2376~2606Ma年龄,与该区石炭系不整合下伏地层(至少志留-泥盆系)物源构成类似。对比研究显示,上述碎屑物源以塔里木基底古隆起为主,与昆仑-阿尔金造山带剥蚀物源相关的塔里木前石炭纪沉积也可能提供部分再旋回物源,并成为西北缘早石炭世维宪期前沉积的893~1044Ma年龄碎屑锆石的主要来源;而维宪期后碎屑成分成熟度的增大和893~1044Ma年龄碎屑锆石丰度的锐减可能说明与昆仑-阿尔金造山带相关物源的减少,塔里木大陆内部(隆起)成熟物源的增加。换句话说,尽管放射虫资料说明早石炭世早维宪期后南天山洋已经关闭,但直到晚石炭世巴什基尔期塔里木西北仍然延续了前石炭纪的沉积物源格局,并未记录到南天山造山事件的沉积学效应。

英文摘要:

The Visean to Bashkirian profile is well exposed in the Wushi area, the northwestern margin of the Tarim Basin, Northwest China. Numerous sandstone samples were chosen to carry out U-Pb and Lu-Hf isotope test by LA-ICP-MS method. Based on detailed analysis of geochronology, heavy minerals, sandstone skeleton component, this research further explores sedimentary evolution and its geodynamic mechanism about the Tarim Basin and the periphery orogen in Carboniferous. Sandstone skeleton component analysis shows that sandstone grains are dominated by quartz, and volcanic-metavolcanic is lithic fragments. Its main provenance is the recycled orogen, and has the trend to migrate to the inner craton from the bottom to top. The main proportions of heavy mineral assemblages are stable heavy minerals, such as zircon, tourmaline, TiO₂ minerals. Heavy mineral analysis reflects the distant source and relatively stable tectonic setting are possible. The geochronological results show that the four samples have approximately similar U-Pb age patterns and Hf isotopic compositions, mainly reflecting multiphase tectono-thermal events with age groups of 392~496Ma, 708~868Ma, 893~1044, with $\epsilon_{\text{Hf}}(t)$ ranged from -15 to 13. In addition, there are also a small amount of 1713~1917Ma, 2376~2606Ma age. The geochronological information and provenance system are very similar to Silurian to Devonian strata underlying the unconformity. Comparing with the main potential source areas, the main provenance is the northern Tarim palaeohigh. The redeposition of pre-Carboniferous strata in Tarim Basin, associated with the erosion source in the Kunlun-Altun orogen, may also have some contribution, and became the mainly provenance of detrital zircon of 893~1044Ma before Early Visean; while the two facts, detrital composition maturity increased and the abundance of 893~1044Ma decreased rapidly, suggested that the material from the latter source diminished, and the mature material from the palaeohigh raised after Late Visean. In other words, although the radiolarian information shows that the South Tianshan Ocean had closed after Early Visean, the provenance system didn't change greatly until Bashkirian, and the information about collision, orogenic events and their effects of the South Tianshan and the Tarim hadn't been recorded.

关键词: [碎屑锆石](#) [U-Pb-Hf同位素](#) [乌什地区](#) [塔里木盆地西北缘](#) [南天山](#)

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