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吕梁杂岩界河口群的源区特征及构造背景: 来自锆石U-Pb年龄和Hf同位素的证据

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摘要:

华北克拉通中部造山带被认为是由东西陆块碰撞而产生的陆陆碰撞带,而吕梁杂岩位则位于中部造山带中段西缘,紧邻中部造山带与西部陆块的边界。总体上,吕梁杂岩可以分为花岗质岩体以及变质表壳岩两大类,其中前者中的赤坚岭片麻岩在本次研究获得的锆石LA-ICP-MS U-Pb年龄为2180Ma,而 $\epsilon_{\text{Hf}}(t)$ 值为+0.52~+4.30。变质表壳岩又可进一步划分为界河口群、吕梁群以及野鸡山群,其中界河口群主要由变质岩、大理岩以及少量的斜长角闪岩组成。变质沉积岩的地球化学及Nd同位素特征说明它们的源岩为中酸性岩石,有可能是太古宙上地壳新生酸性弧物质的混合。本次研究以及前人的研究数据都表明界河口群最下部奥家滩组中变质沉积岩的碎屑锆石最小峰值年龄在2.0Ga左右,这为界河口群形成时代下限做出了限制,而界河口群中斜长角闪岩的顺时针近等温降压P-T轨迹则与中部造山带中~1.85Ga的主期变质作用特征一致,这为界河口群形成时代的上限做出了限制。由于界河口群中碎屑锆石的U-Pb年龄以及Hf同位素特征与同属吕梁杂岩的野鸡山群一致而与西部陆块孔兹岩带中的变质沉积岩具有相似性,因此我们推断界河口群的源岩不是来自中部造山带而是来自鄂尔多斯陆块。综上所述,在2.00~1.85Ga之间形成于鄂尔多斯陆块东缘被动大陆边缘盆地中的界河口群在~1.85Ga的东西陆块碰撞过程中沿着韧性剪切带向东逆冲而进入中部造山带中。

英文摘要:

The Trans-North China Orogen (TNCO) is considered to be a continent-continent collisional belt, along which the eastern and Western blocks collided. The Lüliang Complex is located in the middle segment of the western margin of the TNCO, adjacent to the boundary between the Western Block and the TNCO. The Lüliang Complex can be divided into the granitoid plutons and supracrustal rocks. The Chijianling gneisses in the former give LA-ICP-MS U-Pb zircon ages of 2180Ma and $\epsilon_{\text{Hf}}(t)$ values between +0.52 and +4.30. The supracrustal rocks have been subdivided into the Jiehekou, Lüliang and Yejishan groups, of which the Jiehekou Group is mainly composed of meta-siltstones, meta-pelitic rocks, marbles and minor amphibolites. Geochemistry and Nd isotopic data from the meta-sedimentary rocks indicated that the source rocks are felsic, probably from the Archean upper crust and newly-formed arc felsic rocks. Combined with the previous data, our data suggested that the youngest detrital zircon age peaks from samples of the Jiehekou Group are consistent within the errors and gave an age of ~2.0Ga, which is the maximum formation age of the group. On the other way, the similar isothermal decompression P-T path with other high-grade metamorphic rocks in the TNCO suggests that the Jiehekou Group also experienced the ~1.85Ga metamorphic event, which is the minimum formation age of the group. Furthermore, due to similarities of the Jiehekou Group with the khondalitic rocks from the Western Block and remarkable difference with the Yejishan Group in the zircon U-Pb and Hf isotopic data, we suggest that the Jiehekou Group and the khondalitic rocks in the Western Block share a provenance. In a word, the Jiehekou Group was formed between 2.0Ga and 1.85Ga on the eastern margin of the Western Blocks in a passive margin environment and was thrust eastward during the ~1.85Ga collision with the Eastern Block.

关键词: [华北克拉通](#) [吕梁杂岩](#) [界河口群](#) [锆石U-Pb年龄](#) [锆石Hf同位素](#) [源区](#)

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