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阿尔泰南缘早泥盆世康布铁堡组的SIMS锆石U-Pb年龄及其向东向北延伸的范围

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摘要:

麦兹火山-沉积盆地康布铁堡组的年龄及其东界,以及阿尔泰南缘早泥盆世火山活动往东往北延伸的范围仍然没有确定;康布铁堡组火山岩的源岩及其形成的构造环境还有待阐明。近年来在麦兹盆地东侧发现了萨吾斯铅锌矿床,矿床赋存于康布铁堡组火山岩,与别斯萨拉玢岩体密切相关。本研究对萨吾斯铅锌矿床的康布铁堡组流纹岩和别斯萨拉玢岩进行了SIMS锆石U-Pb定年以及主微量元素组成测定,以期回答上述问题。流纹岩锆石的18个靶点给出了一致的谐和年龄和加权平均年龄(401Ma);花岗闪长玢岩锆石的15个靶点给出了一致的谐和年龄和加权平均年龄(401Ma)。因此,萨吾斯铅锌矿床康布铁堡组流纹岩和别斯萨拉玢岩是同期喷发/侵入的;康布铁堡组火山活动的时代在早泥盆世;麦兹火山-沉积盆地的东界应抵达卡拉先格尔断裂西侧。在~400Ma时期,阿尔泰地区不仅存在着广泛的花岗岩类深成岩浆活动,也发生了强烈的酸性火山喷发,两者共同构成了阿尔泰南缘的大陆边缘岩浆弧。但是,火山喷发主要集中于阿尔泰南缘,受断裂控制。花岗闪长玢岩的一些锆石给出513.8Ma和3134Ma的U-Pb年龄,反映区内陆壳由寒武纪-奥陶纪岩石组成,并且还有前寒武纪微陆块。硅-碱、 $\text{SiO}_2\text{-K}_2\text{O}$ 、 $\log \tau\text{-log } \sigma$ 、 $\text{SiO}_2\text{-FeO}/(\text{FeO}+\text{MgO})$ 图以及构造环境判别图表明,萨吾斯铅锌矿床的流纹岩、凝灰岩、石英闪长玢岩-花岗闪长玢岩以及阿尔泰南缘早泥盆世康布铁堡组火山岩形成于活动大陆边缘或岛弧环境。康布铁堡组中下段细碧角斑岩在岛弧海底环境喷发,上段流纹岩喷发于大陆边缘环境。原始地幔标准化的多元素蛛网图表明,萨吾斯矿床的三类岩石具有明显的Nb、Ta、Ti和Sr、P、Ba负异常,显著富集Th、U、K、La、Ce、P、r、Zr、Hf。结合锆石U-Pb年龄,作者认为它们的源岩应以寒武纪-奥陶纪的岛弧岩石为主;同时,可能还含有一定比例的前寒武纪古老陆壳岩石。冲乎尔、克兰、麦兹三个火山-沉积盆地在所属构造单元、陆壳基底、火山岩岩石地球化学以及沉积岩的比例上都表现出系统变化,这些变异控制了阿尔泰南缘块状硫化物矿床从西部到中部到东部的成矿元素组合上的变化。

英文摘要:

Such problems remain unsolved that include age of the Kangbutiebao Formation within the Maizi volcanic-sedimentary basin and its eastern boundary, northeastern extension, source rock and tectonic setting of the Early Devonian volcanic rocks along the southern Altay Mountains. The Sawusi Pb-Zn ore deposit, newly discovered to the east of the Maizi basin as known to the present, occurs within volcanics of the Kangbutiebao Formation and spatially closely related to the Biesisala porphyrite. This study performed SIMS zircon U-Pb dating of rhyolite from the Kangbutiebao Formation and Biesisala porphyrite, Sawusi deposit, and analyzed major and trace element compositions of these rocks, in an attempt to solve the above problems. Eighteen analyses on 18 zircon grains from the rhyolite yielded identical concordant age and weighted mean age of 401 Ma, whereas 15 analyses on 15 zircons from a granodiorite porphyrite yielded identical concordant age and weighted mean age of 401 Ma. Therefore, rhyolite of the Kangbutiebao Formation and the Biesisala porphyrite, Sawusi, are coeval, age of the Kangbutiebao Formation is Early Devonian instead of Late Silurian to Early Devonian, and the Maizi volcanic-sedimentary basin is extended as further east to the western side of the Kalaxiangar fault. At ~400 Ma, extensive acidic volcanic eruption occurred concurrently with widespread granite plutonism within the Chinese Altay mountains. Both of them collectively constitute the magmatic arc on the southern Altay continental margin. However, unlike granites that occur throughout the Altay mountains, the Early Devonian volcanics focus on the southern Altay mountains as controlled by faults. Some zircons from the granodiorite porphyrite yielded ages of 513.8Ma and 3134Ma. These results suggest that basement of the southern Altay mountains consists mainly of Cambrian to Ordovician rocks, with presence of Precambrian micro-continent. Diagrams $\text{SiO}_2\text{-alkalies}$, $\text{SiO}_2\text{-K}_2\text{O}$, $\log \tau\text{-log } \sigma$, $\text{SiO}_2\text{-FeO}/(\text{FeO}+\text{MgO})$, and tectonic discrimination diagrams demonstrate that rhyolite, tuff, and quartz diorite-granodiorite porphyrite from the Sawusi, and volcanics of the Kangbutiebao Formation within the southern Altay mountains were formed in an active continental margin or island arc setting. While keratophyre of the middle-lower section of the Kangbutiebao Formation was erupted on the ocean island setting, rhyolite of the upper section erupted in the continental margin. Primitive mantle-normalized multi-element diagrams show that the three types of igneous

s rocks in the Sawusi have pronounced Nb, Ta, Ti and Sr, P, Ba anomalies, and are markedly enriched in Th, U, K, La, Ce, Pr, Zr and Hf. Based on the above features and zircon U-Pb ages, authors consider that source materials of the igneous rocks in the Sawusi deposit are dominantly Cambrian to Ordovician island arc rocks with various amounts of Precambrian micro-continental rocks. The three volcanic-sedimentary basins, Chonghuer, Kelan and Maizi, show systematic variations from the west to the east in such aspects as tectonic affiliation, proportions of continental basement, petrology and geochemistry of volcanic rocks, and proportions of volcanic to sedimentary rocks. These variations largely determine the variation in metallogenetic element associations of sulfide and iron ore deposits along the southern Altay mountains.

关键词: [SIMS锆石U-Pb年龄](#) [康布铁堡组](#) [麦兹火山-沉积盆地](#) [岩浆弧](#) [前寒武纪微陆块](#) [萨吾斯铅锌矿床](#)

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