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# 鞍山陈台沟BIF铁矿与太古代地壳增生：锆石U-Pb年龄与Hf同位素约束


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摘要：

新发现的陈台沟隐伏铁矿床位于辽宁鞍山附近,矿石类型以条带状铁矿石为主,铁矿层顶板围岩为绿泥石英片岩,底板围岩为黑云石英片岩元素地球化学分析表明,铁矿石及磁铁矿单矿物均富集重稀土,具La、Eu及Y正异常,无明显Ce负异常,反映成矿物质来源于海底高温热液 (约0.1%) 与海水的混合溶液,且BIF沉积时海水处于缺氧环境。标型组分分析显示铁矿石及磁铁矿属于沉积变质型或BIF型。原岩恢复表明,绿石英片岩原岩为酸性火山岩,黑云石英片岩原岩为泥砂质岩石,二者皆富集Rb、Th、U、LREE,亏损Nb、Ta、Ti。构造背景分析表明两类片的原岩均形成于岛弧背景,反映了陈台沟BIF沉积时的构造环境。LA-ICP-MS锆石U-Pb定年显示铁矿体夹层绿泥石英片岩中岩浆锆石形成于551±10Ma,代表陈台沟BIF形成时代;变质锆石形成于2469±23Ma,代表后期变质作用时代。Hf同位素分析显示大多数锆石具有正的$\varepsilon_{Hf}$值 (-2.23~7.54),表明岩浆源区以亏损地幔物质为主,但明显受到古老地壳物质的混染;二阶段模式年龄 ($t_{DM2}$) 主要介于3133~2580Ma之间。结合其他矿区Hf同位素资料,指示鞍本地区可能存在新太古代(~2.55Ga)地壳增生事件。综合分析认为,陈台沟铁矿属Algoma型BIF新太古代末华北克拉通大规模BIF成矿事件的代表之一。

英文摘要：

Located in the Anshan area, Liaoning Province, the newly discovered Chentaigou concealed iron deposit mainly nsists of banded iron ores, with the roof rock of chlorite-quartz schist and the bottom rock of biotite-quartz schist. C ochemical data show the iron ore and magnetite are enriched in HREE characterized by positive La, Eu and Y anoma without apparent negative Ce anomaly, indicating that the ore-forming materials were derived from mixtures of hig T hydrothermal fluids (~0.1%) and seawater, and implying that the seawater was under anoxic condition during th eposition. Typomorphic studies indicate that the iron ore and magnetite are metamorphosed sedimentary-type or B F-type. The protolith of chlorite-quartz schist was acid volcanic rock while that of biotite-quartz schist was pelitic or enaceous rocks, which are all enriched in Rb, Th, U and LREE, and depleted in Nb, Ta and Ti. The protolith of these s ists was formed under island arc setting, suggesting that the Chentaigou BIF was deposited in island arc setting. L CP-MS zircon U-Pb dating shows the magmatic zircons were crystallized at 2551±10Ma, representing the formation ge of the Chentaigou BIF, while the metamorphic zircons were formed at 2469±23Ma, reflecting the age of later m morphic event. Hf isotopic data indicate that most of the zircons have positive $\varepsilon_{Hf}(t)$ values between -2.23 and 7.54 mplying that the magma provenance was mainly made up of materials from depleted mantle with contamination of ycled old crust. Two-stage model ages ($t_{DM2}$) are primarily between 3133Ma and 2580Ma. Combined with Hf isotopi data of other deposits, it is suggested that Neoarchean (~2.55Ga) crustal growth occurred in the Anshan-Benxi are To sum up, we propose that the Chentaigou iron deposit belongs to the Algoma-type BIF, which represents a large cale Neoarehean BIF metallogenic event widely distributed in the North China craton.

关键词：条带状铁建造 绿泥石英片岩 太古代 地壳增生 陈台沟铁矿 鞍山地区

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