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Fluid-induced Strain localization and the Fe enrichment-A case study of the Gongchangling Iron Mine, NE China

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The BIFs-origined Gongchangling Iron Mine is located on the northern edge of the Archean-Proterozoic Sino-Korean Craton, composed of a variety of schists and gneisses of regional greenschist-amphibolite facies metamorphism [1-4].

The structure of the Gongchangling Iron Mine is expressed in a form of narrow subvertical ductile shear zone of ～1.5 km wide, characterized by NE-dipping foliation at a high angle over 60° and nearly horizontal weak lineation. EBSD data on quartz <c> axis fabric indicates that the interlayers, characterized by a schistose texture, underwent weak or no ductile deformation; the iron-bearing units with a granular texture accommodated high strain, the higher Fe content, the stronger the quartz fabric. The results of oxygen isotope analyses show that the iron-bearing units experienced strong fluid alteration, marked by low $\delta^{18}O$ values and the interlayers experienced the least fluid alteration, marked by relatively high $\delta^{18}O$ values. Such a relationship of iron concentration-deformation intensity-texture-fluid activity suggests that the Gongchangling shear zone was formed in a process of fluid-induced strain localization; Enrichment of Fe was likely achieved via leaching out of dynamically recrystallized fine-grained quartz through strain localization.

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