Trace element mobility in shear zones within the Sartohay ophiolite, west Junggar, Xinjiang (NW China): implications from CO_2-metasomatism of peridotite and its shearing deformation

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The west Junggar of Xinjiang (NW China), located in the eastern part of Balkash-Junggar tectonic province, is a major component of the core of the Central Asian metallogenic region. This area is characterized by complex emplacements of ophiolite belts formed during the early Paleozoic. The ophiolite mélanges and associated flysch were unconformably covered by Devonian to early Carboniferous volcanic-sedimentary rocks, and were intruded by late Carboniferous to early Permian felsic intrusions.

The Sartohay ophiolitic mélange occurs along the Darbut-Sartohay fault in the southeast of west Junggar. The ultramafic units in Sartohay ophiolitic mélange were transformed to talc schist and listwaenite by CO_2-metasomatism along a shear zone. Meanwhile, these carbonated ultramafic rocks were deformed during uplift movement from the deep ductile shear zone, forming mylonitized listwaenite. Quartz ribbon, magnesite sub-grains and mariposite are orientated as shearing foliation. Rutile, zircon, monazite, and apatite developed in the foliation and coexist with mariposite and quartz ribbon. The proportions of mariposite, rutile, zircon, monazite, and apatite have a positive correlation with deformation degree of listwaenite. Consequently, concentrations of most trace elements including rare earth elements and high field strength elements increase from undeformed to mylonitized listwaenite. This study shows that shear zones served as pathways for percolation of fluid and mobility of 'immobile elements' during CO_2-metasomatism of serpentinite, which could be interpreted to be a function of the availability of CO_3^{2-}, PO_4^{2-} and SO_4^{2-} in fluid during the evolution of individual shear zones.