Nb and Ta in the rutiles from eclogite in the Yuka of the North Qaidam UHP belt, NW China

J. ZHAO, D.L CHEN*, L. LIU AND X.H. ZHU

State key Laboratory of Continental Dynamics, NW Univ., Xi'an, 710069, PR China.
(*correspondence: dlchen@nwu.edu.cn)

Using LA-ICP-MS, we analysed the Nb, Ta concentrations of 14 rutile grains from four eclogite samples in Yuka, the North Qaidam UHP belt, NW China.

Analyses results show that both Nb, Ta concentrations and Nb/Ta vary dramatically, not only in different samples but also in different grains in the same sample, and even within individual grain. 03QH20 is a phengite eclogite containing some melting quartz-phengite veins and conglomeration. Rutiles in this sample have relative the highest concentrate and largest variation in Nb, Ta and Nb/Ta. In which, rutiles coexisting with garnet and omphacite have lower Ta and roughly chondritic Nb/Ta ratios of 16.41-19.65 with average of 17.93. Wheras rutiles in retrograde region and veins coexisting with Phen, Amp, and Qtz have lower but fluctuant Nb, Ta and overall subchondritic Nb/Ta of 4.38-13.67 with average of 9.08. And the lowest Nb/Ta in a grain occures at the core and increase towards the rim. 02QH15 is garnet rich massive eclogite, Omp mostly been altered into Amp or Chl. Rutiles in this sample have relative the lowest Nb, Ta concentrate but overall suprachondritic Nb/Ta ratios of 18.76-24.31 with average of 20.05. Differing from 03QH20, the highest Nb/Ta in a grain lie at the core and decrease from core to rim. Sample 08QH93 is a retrograde eclogite containing lots of Phen veins. Grt and Omp mostly overprinted by Amp, only fewer Grt left. Analyzed rutile grains all from veins coexisting with Phen. They show lower Ta, medium Nb and overall suprachondritic Nb/Ta ratios (Nb/Ta=19.33-23.43 with average of 21.56) and Nb/Ta decrease from core to rim. 08QH92 also a retrograde eclogite and rutiles coexist with Amp and Qtz. These rutiles have medium Ta and Nb content and roughly chondritic Nb/Ta ratios ranging from 15.82 to 18.52 with average of 17.26.

Our studies suggest: 1) Nb and Ta were highly fractionated in UHP rocks; 2) Nb/Ta characteristics in rutile cannot be changed remarkably during retrograde metamorphism; 3) Rutiles of 03QH20 and 08QH93 all from Phen vein but exhibit distinct characters, implying that dehydration melting during subdution resulted in subchondritic Nb/Ta and high concentrate Nb and Ta (e.g. 03QH20), whereas, during exhumation resulted in suprachondritic Nb/Ta and lower Nb, Ta concentrate (e.g. 02QH15 and 08QH93).

Integration of stream sediment geochemical and aeromagnetic datasets for mapping target areas for mineral exploration of iron deposits in eastern Tianshan, China

J. ZHAO[1]* AND Q. CHENG[1,2,3]

[1]Department of Earth and Space Science and Engineering, York University, 4700 Keele St., Toronto, Ontario, Canada M3J1P3 (*correspondence: zhaojie@yorku.ca)
[2]Department of Geography, York University, 4700 Keele St., Toronto, Ontario, Canada M3J1P3 (qiuming@yorku.ca)
[3]State Key Laboratory of Geological Processes and Mineral Resource, China University of Geosciences, Wuhan, Beijing, China

Previous researches proposed that most of the marine volcanic-sedimentary iron deposits in the eastern Tianshan ore district were formed within intermediate-mafic and intermediate-felsic volcanic rocks, and exhibit positive anomalies in aeromagnetic data [1].

From stream sediment geochemical data, principal component analysis (PCA) allows recognition of element assemblages (e.g. Fe_2O_3, K_2O, Na_2O, SiO_2, CaO, MgO, Al_2O_3, etc.) associated with ore-forming volcanic rocks. However, stream sediment geochemical data only reflect surface or near-surface distribution of elements, which are inadequate for mapping sub-surface ore-forming volcanic rocks. Nevertheless, aeromagnetic data can show magnetic differences between geo-bodies buried at depth. Since most of the iron deposits in the study area exhibit high positive anomalies in the aeromagnetic map, such anomalies can be considered to be among the most important diagnostic ingredients in mapping of mineralization targets.

Spatially weighted principal component analysis (SWPCA) method [2] was used to integrate the geochemical and aeromagnetic data sets. In the process of deriving ore-forming element assemblages from the geochemical data, the aeromagnetic data can be assigned as a spatially weighting factor to highlight areas containing more magnetic materials. The result shows favorable areas for iron mineral exploration.

[1] Zhang *et al*. (2001) *J. Changchun Inst. Tech. (Nat. Sci. Edi.)* **2**, 26–29. [2] Cheng (2006) *IGARSS* **2006**, 972–975.