

Earth and Planetary Materials Science Seminar (No. 1850)

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Room：Earth Science & Biology Lecture Room

-----ABSTRACT-----

Presenter: Ayano sofiya Abdulkadir

(Group: Geology and Petrology Research Group, E-mail: sofiya@cneas.tohoku.ac.jp)

Title: Geochemistry of the Pan-African mafic-ultramafic rocks in the Tulu Dimtu area, western Ethiopia

(A) Research background (Previous studies)

The Tulu Dimtu ophiolite is a zone of mafic-ultramafic rocks exposed in the southern part of the Arabian Nubian Shield and located along the Tulu Dimtu Belt at the join between the thrust fault and shear zone. Tulu Dimtu Belt is a NNE-SSW oriented low grade volcano-sedimentary and mafic-ultramafic rock of the Arabian Nubian Shield. The mafic-ultramafic bodies in the Tulu Dimtu are mostly characterized by the Serpentinized and carbonate-altered dunite, metadiorite and metadolerite association.

(B) Method

We examine eight mafic-ultramafic rocks in present study. Bulk rock major and trace element compositions of the all samples were determined by X-ray fluorescence spectrometry (XRF) at the Earth Science department laboratory of Tohoku University, Japan.

(C) Results and Discussions

The metadiorite and metadolerite rocks are characterized by moderate MgO contents (5.576-6.753%). The serpentine and listvenites have higher MgO contents (21.18-55.73%), Cr (1993.5-6726.5), Ni (1154.4-2146.3) and low Ti₂O (0.002-0.924), P₂O₅ (0.007-0.042) and alkalis. The studied samples do not exhibit simple straight-line variation on Harker diagrams for many elements. Most of these elements exhibit two geochemical trends may suggest two magma sources. The Metadiorite and metadolerite shows an alkalic and subalkalic suite characteristics, which have tholeiitic transitional to calc- alkaline affinities. The spidergram suggests that the metadiorite and metadolerite rocks are similar to ocean island basalt (**OIB**) pattern of Sun and McDonough (1989), where the rocks are slightly enriched in LILE (Sr, Rb, Ba), Positive spike in Ba, while Nearly flat in HFSE (Nb, Zr, and Y), slightly positive spike in Nb.

(D) Conclusions

The studied metadiorite and metadolerite rocks are associated with basaltic volcanic rocks of tholeiitic transitional to calc-alkaline affinity. The low Ti₂O, alkalis and P₂O₅ relative to their Cr-contents are suggest that the ultramafic rocks are derived from a mantle source, that they are predominantly cumulates. Trace element geochemistry suggests that the Tulu Dimtu metadiorite and metadolerite component has a transitional MORB / OIB character with a tendency to-wards within-plate volcanism. Tulu dimtu mafic-ultramafic rocks are intensely tectonized but have recognizable ophiolitic characteristics.

Keywords: Pan African; Arabian-Nubian shield; tholeiitic, calc- alkaline; supra-subduction zone