Stratigraphy and geochemical characteristics of Neoproterozoic iron formations at El Dabbah, Central East Desert, Egypt

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In the Eastern Desert of Egypt, Neoproterozoic Banded Iron Formations (BIFs) are reported within the Nubia greenstone belt (Ali et al., 2009). A relationship of the BIFs which stratigraphically resemble to the Algoma type BIFs with the snowball earth has not been established, are related to magmatic activities. Their stratigraphy and internal structure are not well understood in this area. In this study, the establishment of stratigraphy including Iron formations (IFs) and chemical analysis are carried out to examine the state of iron formations at El Dabbah in the middle of the Eastern Desert, Egypt.

Greenstone sequence in the El Dabbah area, which was deposited in a strike-slip basin on the Nubia shield during pan African orogeny, is covered by the Hammamat Group. The greenstone sequence preserved the thick volcano - sedimentary rocks with gabbro, coarse-grained volcaniclastics rocks, pillow lavas, black shales, and IFs. A stratigraphy in this greenstone sequence, which is 4000m in total thickness, composes Basal, Lower, Middle, and Upper members. There are 14 iron sections within this greenstone sequence.

Especially, IFs sequence are preserved within Lower and Upper members. IFs sequences are well preserved within massive - pillow lavas sections and they contain laminated greenish - black shales. IFs are composed of magnetite and/or hematite. Magnetite - rich IFs are poor in lamination, whereas hematite - rich IFs are rich in that. Only in the part of iron ore deposit, IFs have clear banded structures, and hold dark gray chart layers and red jasper nodules which can be regarded as BIFs.

Rare Earth Element (REE) analyses of IFs by ICP - MS revealed light REE enrichment and show negative Eu anomalies, while Archean BIFs show the positive Eu anomalies (e.g. Mojzsis et al., 2002). Klein (2005) reported that positive Eu anomaly is an index of supply of Fe and Si ion by hydrothermal activities. Therefore, this research samples have been affected by hydrothermal activities and clastic materials from volcanic arc.

Concentrations of Fe, Si, Na, Mg, Al, P and Ca in IFs were mapped by Electron Probe Micro Analyzer (EPMA). There is a negative correlation between Fe and Si. Si - rich regions contain a large amount of Na, Mg, Al, P and Ca. Boundaries between Fe - and Si – rich regions of IFs gradually change Si - to Fe - rich regions, whereas those of Archean BIFs are clear.

On the whole, Neoproterozoic BIFs in El Dabbah, Central Eastern Desert, Egypt have abundant clastic materials from volcanic arc and the boundaries of layers are unclear.

References

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