Genetic classification based on AFM

[1]DEEVSALAR, R., [1]GHORBANI, M.R., [1]GHADERI, M AND [2]AHMADIAN, J

(Deevsalar@gmail.com), (ghorbani@modares.ac.ir), (mghaderi@modares.ac.ir); Department of Geology, Tarbiat Modares University, Tehran 14115-175, IRAN; Payam Noor University, P.B: 19395-3697 Tehran, IRAN (Jamshidahmadian@yahoo.com)

Genetic relationship between different groups of rocks in an association of basic to intermediate rocks from a cogenetic suite (Malayer-Boroujerd Plutonic Complex, western Iran), including basic dykes, mafic bodies and intermediate rocks plotted on AFM digram makes such trends on the diagram that can be easily distinguished and therefore a conjunction point with one of the three lines on AFM triangle by best fitted trend line is expected. Olivine fractionation can be properly projected on FM line of the AFM diagram. Any point on the FM line has an MgO/FeO ratio that can be calculated using the values of these oxides in the plotted samples and equations of best fitted line for them on two variable diagrams MgO-(K_2O-Na_2O), FeO-(K_2O-Na_2O) and FeO-MgO. MgO/FeO is covnerted to Mg# and indicates the olivine composition. With different degrees of fractionation of this mineral from mafic parent magma, new compositions on previous trend can be calculated and their position on this line can be correlated with the plotted samples.

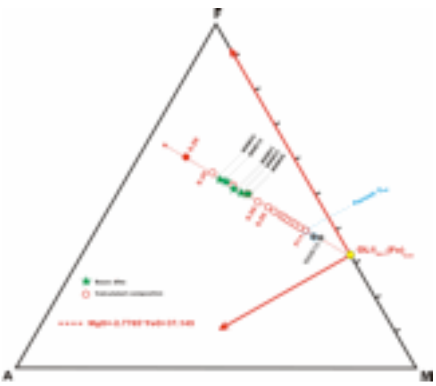

Figure 1. Differentiation trend for the basic dikes.

Mineral fractionation vector on Harker diagrams shows that olivine along with plagioclase fractionation plays an important role in generation of these samples (MBPC). Therefore, AFM diagram has properly exaggerated the role of olivine and can be used as an indicator of parental classification and investigation on petrogenesis and intra-group genetic relationships of samples on Harker diagrams

Isotopic composition of Sulfur in enstatite meteorites

C.DEFOUILLOY[1], F. MOYNIER[2], E. PRINGLE[2], J.-A. BARRAT[3] AND P. CARTIGNY[1]

[1]Institut de Physique de Globe de Paris, 1 rue Jussieu, 75238 Paris, France (correspondence: defouilloy@ipgp.fr)

[2]Washington University in St Louis, One Brookings Drive, St Louis, MO 63130, USA. (moynier@levee.wustl.edu)

[3]Université de Brest, lace Nicolas Copernic, 29280 Plouzane cedex, France. (barrat@univ-brest.fr)

Enstatite meteorites are the most reduced meteorites. They comprised two groups: the Enstatite Chondrites, considered to be primitive meteorites and subdivided into EH and EL (respectively, Fe-rich, and Fe-poor), and the Enstatite Achondrites (or Aubrites), which are differentiated meteorites. Several elements (O, Cr, Xe, Mo, Ni, but not Si) show similar compositions between Enstatites and Earth, suggesting a possible Enstatite origin for the Earth [1]. Yet, the genetic relationship between Enstatite groups remain unclear, some authors proposing a single Enstatite Chondrite parent body, while others have shown discrepencies between Enstatite groups and argued they could not be related.

Sulfur is a volatile element which could help apprehend the mechanisms underwent by the Enstatite parent body or parent bodies. We therefore initiated an extended database of high-precision S isotopic compositions ($^{33}S/^{32}S$, $^{34}S/^{32}S$, $^{36}S/^{32}S$) in Enstatite meteorites. Preliminary results show that sulfide content may vary from one group to another, from nearly 0 up to 3 wt% in Aubrites and EL6 and 3 to 5 wt% in EH3). Seventeen Enstatite meteorites have been studied so far. 11 of them contained enough Sulfur to be measured (5 EH3, 5 EL6 and one Aubrite). Sulfur isotopic composition is measured on a Mat 253 Mass Spectrometer, with a precision of 0.01 per mil for ^{32}S, ^{33}S and ^{34}S and 0.1 per mil for ^{36}S. No clear distinction appear in isotopic composition between the 3 groups studied (EH3, EL6 and Aubrite). The average $\delta^{34}S$ is of -0.40 ± 0.26 (1σ), which is lower than chondritic values, but also slightly lower than the previously reported $\delta^{34}S$ for Enstatites [2]. $\Delta^{33}S$ (-0.026 ± 0.005) is very homogeneous and within error of the CDT value. $\Delta^{36}S$ shows a greater variability (-0.012 ± 0.144), with several positive values measured in EH3 and the Aubrite. A larger number of samples will allow us to determine the extend of spallation processes and the slight differences with other chondrites [3].

[1]Javoy *et al*.. (2010) *Earth Planet. Sci. Lett.*, **293**, 259-268. [2]Gao and Thiemens (1993) *Geochim. Cosmochim. Acta*, **57**, 3171-3176. [3] Hulston and Thode (1965) *J. Geophys. Research*, **70**, no. 14, 3475-3484.

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