Geophysical Research Abstracts
Vol. 14, EGU2012-9920, 2012
EGU General Assembly 2012

A mechanizm of the Lower Zone emplacement: new data from the Platreef (northern limb of the Bushveld Complex)

M. Yudovskaya (1,3), J. Kinnaird (1), A. Sobolev (2), D. Kuzmin (2), and A. Wilson (1)

(1) University of Witwatersrand, Johannesburg, South Africa (marina.yudovskaya@wits.ac.za), (2) Max Planck Institute (MPI) for Chemistry, Mainz, Germany, (3) IGEM RAS, Moscow, Russia

Here we describe new Lower Zone occurrences beneath the Platreef in the northern limb of the Bushveld Complex that was unknown before. The Lower Zone ultramafic sequence from 300 to 800 m thick were intersected by a few drilling boreholes in the Central sector of the northern limb. The Lower Zone is separated from the overlying Platreef sequence by intervals of country rocks which are represented by granofels and shales. Country rocks include thin sills of fine-grained norite and feldspathic pyroxenite similar in appearance and chemical composition to Marginal Zone rocks. Olivine and enstatite compositions show multiple reversals within the Lower Zone section. The reversals commonly start appearing well below a contact with an overlying cyclic unit and reach a stable composition at the contact with the normal fractionation trend upwards. The reversals in silicate compositions are accompanied by coherent reversals in a Cu/Pd ratio of the whole rocks which is higher in the underlying evolved unit and decreases abruptly on the contact with the more primitive overlying layer that is expected as a result of fractional crystallization of a S-saturated mafic magma. A major reversal is established on a contact between a layer of "basal" Pl-bearing coarse-grained pyroxenite similar in texture and chemistry to Platreef pyroxenite and overlying harzburgite. The style of reversals is consistent with a gradual mixing of fresh magma with more evolved resident liquid in the chamber as has been suggested by Teigler and Eales (1996). Our data enables some conclusions to be made: 1) the Lower Zone emplacement beneath the Platreef occurred as multiply magma batches which differentiated in the chamber forming cyclic units and thin layering; 2) the interval of country rocks between the Platreef and the Lower Zone marks a magmatic discontinuity; 3) the compositions of silicates in the Lower Zone of the northern limb are more primitive than those known for the western and eastern limb that requires re-considering a parenthal magma composition for the whole Complex; 4) the Pt/Pd ratio of the mineralized Lower Zone rocks is similar to Platreef characteristics and different to that of mineralization in the western and eastern limbs suggesting that this is a distinctive compositional feature of the parenthal magma for the northern limb.
References: Teigler C. and Eales H. (1996) FGSSA, Bul. 111.