Geophysical Research Abstracts, Vol. 7, 00359, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00359


# Petrologic significance of chrome spinel from late Precambrian concentrically zoned mafic-ultramafic complexes, Eastern Desert, Egypt

**H. Helmy**

Geology Department, Faculty of Science, Minia University, 61519 Minia, Egypt

The petrography and chemistry of chrome spinel from three late Precambrian concentrically zoned mafic-ultramafic complexes in the Eastern Desert of Egypt is presented. These complexes; Gabbro Akarem (GA), Genina Gharbia (GG) and Abu Hamamid (AH) are located along major fracture zones trending NE-SW and represent the magmatic roots of a late Precambrian arc. They form small elliptical bodies (3.5 - 11 km long and 0.5 - 2.5 km wide) and comprise a peridotite core enveloped by wehrlite-pyroxenites and gabbros at the outer margins. Petrographically the three complexes are variably altered where the original silicate minerals, i.e. olivine, ortho- and clinopyroxenes, amphiboles and plagioclase are partially or completely preserved. GA and GG complexes contain disseminated (and locally massive) sulfide ore (of sub-economic importance) while AH is sulphide-free. The major silicates of these rocks are partially serpentinized olivine (Fo 87, 82 and 77 at GA, GG and AH, respectively), Opx (89, 85, 81), Cpx (96, 90, 85), hornblende (mg 88, 85, 81) and plagiocalse (An 88, 77, 67). Modal analyses and mineral chemistry suggest a normal fractionation trends with more magnesian parent magma at GA (melt Mg = 66) and more evolved rocks at AH (melt Mg = 55). Chrome spinel forms an abundant accessory mineral in the three complexes; it is mainly abundant in the core ultramafic rocks. Petrographically, the chrome spinel shows similar habits, distribution and textures. Two types of chrome spinel are found, Al-rich and Al-poor (Cr-magnetite), both types co-exist in the same polished thin section. Al-rich spinels are commonly included in pyroxenes and unaltered olivine. Al-rich spinels from GA and GG are richer in Al2O3 (up to 45 and 42 wt.Spinels from GA, GG and AH are similar to spinels from Alaskan-type complexes and are typical of the arc environment. The generally high total Fe and high Fe3+ contents suggest high oxygen fugacity during arc petrogenesis. The distinct differences

in Al and Cr contents of spinels in the three complexes are attributed to differences in parent magma compositions and/or depth of crystallization. The chemical diversity of spinels reflects the dynamic environments in which these magmas were crystallized. It is concluded that these complexes represent different depths of the root of a late Precambrian arc(s). A comparison of the magmatic evolution of late Precambrian arcs and Mesozoic arcs is presented.