Kimberlite skarns: More common and more complex

M. G. KOPYLOVA[1], A. FULOP[2], M. GAUDET[1], L. HILCHIE[1]

[1] *University of British Columbia, Vancouver, BC, Canada, mkopylov@eos.ubc.ca; mgaudet@eoas.ubc.ca; lhilchie@eoas.ubc.ca;*

[2] *De Beers Canada; 300-1601 Airport Rd., Calgary, AB Canada, Alexandrina.Fulop@debeersgroup.com*

When carbonate-rich and silicate rocks are juxtaposed at high subsolidus temperature, their contrasting elemental chemical potentials trigger metasomatism. Kimberlites in contact with felsic-to-mafic rocks should theoretically develop skarn alteration, replacing both the wall rocks and magmatic rocks. Although some kimberlites are well exposed from mining, metasomatic effects in them are difficult to isolate because of the common presence of marginal country rock breccias and assimilated country rock xenoliths. The volatile-rich nature of kimberlite melts and faulting prior to the emplacement results in country rock brecciation and incorporation of as much as 70% xenoliths in kimberlite. We discuss several examples of mineralogical, textural and chemical zonation at contacts between felsic-to-mafic xenoliths, *in-situ* country rocks and kimberlites (Renard, Gahcho Kue, Snap Lake and Orapa). The subsolidus skarn reactions are preceded by magmatic assimilation. It partially melts feldspars and forms diopside and phlogopite coronas on xenoliths. To distinguish between incorporation and assimilation of xenoliths and contact metasomatism, we employed an improved isocon analysis that enables estimation of metasomatic contributions to geochemical diversity. Skarn reactions replace the original kimberlite minerals with serpentine, phlogopite, hydrogarnet, while xenoliths are replaced by serpentine, clinopyroxene, carbonate, chlorite, and pectolite. If the mode of felsic-to-mafic xenoliths exceeds 30%, the textures and the mineralogy of the kimberlite altered by assimilation and skarn reactions may resemble those of the Kimberly-type pyroclastic kimberlite (KPK). The distinct mineralogy of the KPK interclast matrix, the correlation between xenolith modes and the kimberlite texture, the spatial distribution of KPK in Renard and Gahcho Kue kimberlites indicate the principal role of crustal xenoliths in the KPK formation. Our data suggest that metasomatic recrystallization of kimberlites is more widespread than previously recognized, but is complex and accompanied by xenolith assimilation.