Melt migration and dunite formation in the mantle section of the Oman ophiolite: Insights from lithophile and highly siderophile elements coupled with structural observations

D. KLAESSENS[1*], L. REISBERG[1], D. JOUSSELIN[1], M. GODARD[2]

[1]CRPG, Université de Lorraine, CNRS, UMR 7358, 15 rue Notre Dame des Pauvres, F-54501 Vandoeuvre-lès-Nancy, France (*correspondence: dklaesse@crpg.cnrs-nancy.fr)

[2]Géosciences Montpellier, CNRS-UMR 5243, Université de Montpellier, Montpellier, France

The processes of melt migration in the mantle, particularly beneath mid-oceanic ridges, are still largely debated. Here, we present a combination of structural observations and geochemical data on peridotites from the Oman ophiolite, where a paleo-spreading center seems to be well-preserved. We observe three types of dunite throughout the mantle section: (1) a dunitic layer at the summit corresponding to a melt storage and reaction zone, called the *Moho Transition zone* (MTZ); (2) concordant and discordant dunitic dykes occuring sporadically throughout the whole section; and (3) concordant dunitic bands at the base. We have analyzed highly siderophile (HSE) and lithophile (in progress) element compositions of the three types of dunite and of their associated host harzburgite to investigate their origin. Os compositions of the three dunitic types show distinctive features. MTZ dunites have suprachondritic $^{187}Os/^{188}Os$ ratios (0.1375 to 0.1489) and low Os concentrations (0.3908 to 1.1771 ppb Os) indicating melt-rock interaction at high melt/rock ratios. In contrast, the $^{187}Os/^{188}Os$ ratios of the basal peridotites are subchondritic (0.1165 to 0.1280), and their Os concentrations vary more strongly, ranging from 0.7783 to 7.1747 ppb. The dunitic dykes and harzburgites of the main mantle section have highly variable Os contents (0.3908 to 5.9596 ppb) and subchondritic to suprachondritic $^{187}Os/^{188}Os$ ratios from 0.1169 to 0.1411. The chondrite-normalized abundances of the highly siderophile elements (Os, Ir, Ru, Pt, Pd and Re) are variable, but generally consistent with the primitive upper mantle (PUM) pattern. Nevertheless, some samples, particularly dunites, from the base of the ophiolite show marked depletion in Pt and Pd. These preliminary data suggest that MTZ dunites and basal peridotites have recorded different processes: the former, melt-rock reaction at high melt/rock ratio; the latter, ancient melt depletion.