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Examining HSE Geochemistry of the Kalaymyo ophiolite, Myanmar: The effect of Partial Melting and Melt-Rock Reactions

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The behavior of highly siderophile elements (HSE) during partial melting and melt-rock reactions in the mantle remains poorly understood. This study examines the HSE geochemistry of Kalaymyo ophiolitic harzburgites, which represent the obducted oceanic mantle of the Neo-Tethys. Previous studies have identified two distinct groups based on petrography and geochemistry. Group 1 harzburgites have low spinel Cr# (14.4-22.3; 100 x molar Cr/(Cr+Al)) and high whole-rock Al_2O_3 (1.6-3.6 wt.%) and CaO (1.9-3.1 wt.%) contents, representing residual mantle peridotite after a small degree of partial melting. In contrast, Group 2 harzburgites have lower spinel Cr# and higher whole-rock Al_2O_3 and CaO contents than Group 1 harzburgites, indicating a higher degree of partial melting. Group 2 harzburgites also display various melt-rock reaction textures and higher spinel TiO_2 contents. Thus, our results provide valuable insight into the behavior of HSE during the partial melting and melt-rock reactions.

The results demonstrate that IPGE (Os, Ir, Ru) contents increase with an increasing degree of partial melting in both groups, which is consistent with the fractional melting model, except for one Group 2 sample that exhibits an abnormally IPGE-rich duplicate analysis. PPGE (Pd, Pt) contents in Group 1 remain in constant with increasing degrees of partial melting, whereas those in Group 2 display large variations from 3.1 to 8.0 ppb Pd and 5.5 to 12.9 ppb Pt. It is worth noting that Group 2 also exhibits high sample heterogeneity in PGE, as evidenced by the large differences between duplicate analyses. Generally, Re contents decrease with an increasing degree of partial melting in both groups. We attribute the large variations in PGE in Group 2 harzburgites to IPGE and Pt-Fe alloy formation during significant partial melting and desulfurization, followed by segregation of sulfide from the infiltrating melt during melt-rock interaction.