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Corundum genesis in aluminous leucosomes at the Blue Jay Sapphire occurrence (British Columbia, Canada) as a record of metamorphism and partial melting in the Monashee Complex

LINDSEY ABDALE[1], LEE A GROAT[1], PHILIPPE BELLEY[2], JAN CEMPIREK[3] AND COREY WALL[1]

[1]University of British Columbia
[2]Memorial University of Newfoundland
[3]Masaryk University

Presenting Author: lindsey.abdale@gmail.com

The leucosome-hosted sapphire (corundum) occurrence near Revelstoke, British Columbia, Canada, occurs in the Monashee Complex of the Omineca Belt of the Canadian Cordillera. Corundum occurs in banded or pod-like zones within a leucosome containing muscovite + biotite + albite + orthoclase + garnet ± zircon ± sillimanite ± ilmenite ± monazite ± rutile ± Zn-rich spinel ± titanite. Petrography, whole rock geochemistry, zircon morphology, and thermodynamic models support an anatectic source for the leucosome. Relatively high FeO, MgO, Al_2O_3, CaO, and TiO_2, and low SiO_2 and K_2O contents of Blue Jay rocks suggest they represent restite. Numerically modeled melt compositions using the Rhyolite-MELTS software of Thor-Odin dome basement paragneiss approach the Blue Jay leucosome SiO_2 values at temperatures between 700-750 °C at 7-8 kbar, which correspond to melt-yields of ~10% melt. A calculated P-T projection using the Perple_X software indicates that the Blue Jay corundum formed at the expense of muscovite through the reaction: Ms = Crn + San + H_2O. A pseudosection calculated using Perple_X shows that garnet equilibrated at 6-9 kbar and 650 to 750 °C in a melt bearing assemblage: staurolite + muscovite + garnet + sillimanite + ilmenite, and the corundum-bearing pods were fully solidified by 2.5-5 kbar and 650-750 °C in the assemblage: plagioclase + K-feldspar + biotite + corundum + sillimanite + ilmenite. Zircon $^{206}Pb/^{238}U$ ages and trace element content indicates that corundum formed between 56 and 50 Ma.