Petrology and geochemistry of ca. 2680 Ma pillow lavas at Sharrie Lake, southern Slave Province, Northwest Territories

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Neoarchean (ca. 2680 Ma) transitional to calc-alkaline volcanic rocks in the Tumpline Lake subarea of the Cameron River - Beaulieu River volcanic belt in the southern Slave province are being assessed to determine their potential as a prospective volcanogenic-hosted massive sulphide (VMS) environment. Bedrock mapping at Sharrie Lake, approximately 70 km ENE of Yellowknife, was completed at 1:7 500-scale in 2012 and 2013. Samples of pillowed mafic and intermediate lava flows from this strongly bimodal suite were collected for further study. In addition to some true pillowed basalt and andesite, many flows have basalt- like textures yet have the weathered appearance and silica values of a dacite or rhyolite. The VMS-potential of these pillowed lava flows will be assessed by characterizing the rock geochemistry and alteration characteristics, and constraining the timing of alteration and deformation relative to metamorphism.

Geochemical discrimination diagrams demonstrate that primary lithology varies from basalt to andesite, and several flows can be identified based on their distinct geochemical signatures. Lava flows have variable REE patterns although all show arc-like characteristics. Preliminary petrography demonstrates that alteration mineralogy is dominated by carbonate, chlorite, quartz, epidote, and minor sericite. In thin section, disseminated groundmass carbonate is common and ovoid aggregates of quartz and carbonate, interpreted as deformed amygdules, display textures indicating recrystallization during regional metamorphism. Lithogeochemical characterization of least altered - most altered sample pairs indicates that alteration is pre-metamorphic and possibly syn-volcanic. The principal components gained or lost in the metasomatic alteration reactions vary between flows of different primary lithology. The relative timing of alteration, particularly involving carbonate and quartz, is ambiguous owing to the effects of heterogeneous strain; sericitization is spatially associated with small veins cross-cutting amygdules and is interpreted to be late. Peak greenschist to lower amphibolite facies metamorphism was syn- to post-kinematic based on syn- to post-foliation hornblende growth and post- foliation garnet growth.

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