Geochemistry and chronology of granitoids adjacent to the Mactung (Au-Cu)-W Skarn, Yukon-NWT

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Three spatially related granite intrusive and dike systems occur adjacent and within the Mactung mineralized skarn, which is situated in the eastern flank of the Selwyn basin along the Yukon-NWT boundary. These intrusives and satellite dikes are grouped into three lithologies: porphyritic biotite granite (dominant), leucogranite, and plagiogranite (secondary). Geochemical analysis of bulk rock samples from the lower skarn ore body shows the association of Bi with Au spatially related to W.

All the intrusive rocks show an ASI > 1: plagiogranite, 1.05-1.1; biotite granite, 1.10-1.20; and leucogranite, 1.20-1.60. They are either alkalic or calcic peraluminous that are ferroan and magnesian, respectively. The biotite granite and the plagiogranite appear to have an arc affinity, whereas the leucogranites and most of the dikes display both syn-collisional and within-plate setting. However, on the basis of their low content of Zr, REE, and Na/K, and higher Rb they can be classified as S-type granites. Barium, Rb, Th, Sr, Ce, Zr, Nd, Pb, Th/U, Rb/Nb, and La/Yb strongly differentiate the three intrusive suites.

Ar-Ar dating of muscovite and biotite reveal at least two episodes of magmatim: the ages found are 95.6 ± 0.3 Ma and 98.1± 2 Ma in muscovites and biotites of the porphyritic granite; 93.3±1.2 Ma in muscovites of leucogranite; 92.9±0.4 and 95.3±0.4 Ma in muscovites of m.g. leucocratic dike; 94.0±0.5 Ma in biotites of aplitic dike; 97.1±1.9 Ma in biotite grains of biotite hornfels; 89.9±2.9 Ma in ore zone biotite crystals; 95.7±0.4 Ma in biotites of footwall rocks and anomalous age of 127±20 Ma in amphibole grain with pyroxene core, from an amphibole-pyroxene skarn.

Taking the available geochronological data from this study, previous Re-Os dates of MoS_2 in quartz veins [1], and our new field evidences, we propose an early stage separation of a high-temperature mineralizing fluids preceding the final emplacement of the porphyritic pluton. Subsequent intrusions of leucogranite prolonged the thermal regime of the area resulting in the overprinting of Ar ages.

[1] D. Selby, R.A. Creaser and L.M. Heaman (2003) *Can. J. Earth Sci.* **40**, 1839-1852.

Parameters controlling metal adsorption at the biofilm/mineral interface: Evidence for a diffusion limited process and comparison with thermodynamic modeling

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Bacteria can form biofilm coatings on mineral surfaces and are thus able to change significantly trace metal ion sorption compared to biofilm-free mineral systems. In this study the influence of biofilms on mineral surface reactivity was quantified by determining the *in situ* partitioning of Pb(II) and Zn(II) between *S. oneidensis* MR-1 biofilms and oriented single crystal surfaces (α-alumina (1-102), (0001) and hematite (0001)) using the long-period XSW-FY method. The results indicate that Pb and Zn are preferentially sorbed to the bacterial biofilm for high metal concentrations (≥ 10e-6 M) after 3 hours of exposure. However, a significant increase in Pb and Zn partitioning to the mineral surface occurred following 20 hours of metal exposure on fresh samples, suggesting the existence of diffusion limited processes occurring at the biofilm/mineral interface. This partitioning as well as the speciation at the biofilm/mineral interface, given by a grazing incidence-XAFS study, will be compared with the results of thermodynamic modeling using FITEQL software, and the differences will be discussed in order to define the nature of the local microenvironments at the biofilm/mineral interface as well as the validity of a thermodynamic approach to study the complex biofilm/mineral interface.