Neoproterozoic alkaline magmatism and gold deposits of the Yenisei ridge, Central Siberia: A result of the plume activity and late collisional tectonics

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The Precambrian thrust-folded belt of the Yenisei ridge in the Eastern Siberia was formed during the Neoproterozoic time as a result of multi-stage accretion of few arc island terrains to the Siberian Craton [1]. Collisional events (880-860 and 760-720 Ma) were accompanied with large granitic intrusions. The plume-related alkaline carbonatite-bearing magmatism was revealed on the temporal boundary about 680-670 Ma [2, 3]. Derivates of these parental magmas are included a mineralization of rare elements (Zr, Nb, Ta, TR, Au, PGE). The isotopic composition of igneous rocks (εNd +3.4…+5.5; εSr –12…–20) are showed mantle sources of primary magmas and a mixing between matters of depleted (HIMU, PREMA or MORB) and enriched (EMI) mantle. We assume an appearance of magma-pervious zones during a grower activity of plume with the combination of late collisional shear dislocations on the continental margin. The thermal activity of plume could be mobilized solutions in metamorphic suites. It could be a reason for formation of the Blagodat gold deposit localized in the strike-slip structures. The age of these ores corresponds to 700-690 Ma that directly preceded the riftogene magmatism. Thus, the Neoproterozoic manifestation of gold mineralization and alkaline magmatism in the Yenisei ridge is need to regard as interconnected geological events realized during single tectonic and magmatic cycle.

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Possible Archean mineral/microbial interactions: Laboratory model of microbial growth on serpentinized and non-serpentinized mineral surfaces

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Serpentinization reactions in peridotite-hosted systems such as Lost City Hydrothermal Field could have been common in near surface waters during the Archean (2.5-3.8 billion years ago) [1]. These processes would have presumably occurred alongside the early biosphere, containing methanogens and dissimilatory sulfate reducing bacteria. Within photic regions of Archean oceans, cyanobacteria could have produced oxygen oases via oxygenic photosynthesis [2]. Fayalite, enriched from fayalite-magnetite iron ore (Forsythe Iron Mine, Quebec), was reacted with synthetic, anoxic Archean seawater for 6 months at 120°C. This serpentinization model system increased silica concentration in fluid phase and produced secondary minerals (i.e. chrysotile) on fayalite mineral surfaces. Scanning electron microscopy (SEM) revealed *Methanococcus voltae* and *Desulfovibrio* spp. preferred colonizing serpentinized versus non-serpentinized mineral surfaces. Colonization by *Desulfovibrio* spp. was enhanced by the formation of extra-cellular polymeric substances. Using SEM-energy dispersive x-ray analysis, the sulfate reducing bacteria were also found to produce iron sulfides suggesting that dissimilatory sulfate reduction was active on the serpentinized mineral surfaces. In contrast to more selective colonization by *Methanococcus* and *Desulfovibrio*, cyanobacteria grew as a mat across the fayalite 'sediment' surface. Detection of CH_4 and O_2 in gas phase indicated growth of methanogens and cyanobacteria in their respective reaction systems. Cyanobacterial growth increased pH of reaction system, catalyzing $CaCO_3$ precipitation on cyanobacterial cell surfaces. Physically 'tearing' the mat from the mineral sediment surface during SEM sample preparation resulted in distinctive filamentous molds within an exopolymeric matrix. This is comparable to tidal flows tearing biofilms in natural systems, indicating cyanobacteria possess stronger affinity for the mineral substrate than biofilm. It also created unique casts of the cyanobacteria that if fossilized would produce unique biomarkers.

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