Geomicrobiology of an Antarctic subglacial brine: a plausible Martian ecosystem

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The dry valleys of Antarctica are host to an assortment of brines at various stages of cryoevaporation [1]. It has been suggested that brines formed by similar processes exist on Mars [2]. Here we present geomicrobiological data on an Antarctic brine that exists below the Taylor Glacier in the Taylor Valley. Geochemical analyses of subglacial discharge collected at the surface site known as Blood Falls, indicates that the brine is of marine origin and has had limited contact to the atmosphere since it was covered by Taylor Glacier. The brine contains high conentrations of iron oxides (~3.8 mM), dissolved inorganic (~50 mM C) and organic carbon (~400 μM C), and is depleted in sulfate relative to is source waters (SO_4^{2-}:Cl^- ratios in seawater = 0.052; in Blood Falls = 0.035). The microbial diversity associated with this feature, described using molecular and culture techniques, reflects the *in situ* geochemistry with members known to cylce iron and sulfur compounds (i.e. *Thiomicrospria sp., Geopsychrobacter sp. and Desulfocapsa sp.*). Combining our geochemical and biological data on the Taylor brine allows for the theoretical modeling of both physical and geochmeical constraints on microbially mediated processes in this subglacial system. Importantly, the physical and chemical nature of Blood Falls brine provides a model system for assesing the biological potential for similar ecosystems on Mars.

References

[1] Lyons et al. (2005) *GCA* **69,** 305-323.
[2] Burth, D.M. and l.P. Knauth (2003) *JGR* **108,** 22-33.