**CONTROL ID:** 1799273

**TITLE:** Geomicrobiology of Subglacial Lake Whillans, Antarctica

**AUTHORS (FIRST NAME, LAST NAME):** John C Priscu[1], Brent Craig Christner[2], Mark L Skidmore[3], Jill Mikucki[4], Trista Vick-Majors[1], Amanda Achberger[2], Alexander B Michaud[1], Andrew Mitchell[5], Carlo Barbante[6]

**INSTITUTIONS (ALL):** 1. Department of Land Resources & Environmental Sciences, Montana State University, Bozeman, MT, United States.
2. Department of Biological Sciences, Louisiana State University, Baton Rouge, LA, United States.
3. Department of Earth Sciences, Montana State University, Bozeman, MT, United States.
4. Department of Microbiology, University of Tennessee, Knoxville, TN, United States.
5. Institute of Geography and Earth Sciences, Aberystwyth University, Aberystwyth, United Kingdom.
6. Institute for the Dynamics of Environmental Processes, CNR, University of Venice, Venice, Italy.

**ABSTRACT BODY:** Subglacial Lake Whillans is the first Antarctic subglacial lake to be sampled directly. Hot water drilling was used to access the water column and sediments of Subglacial Lake Whillans in January 2013 as part of the Whillans Ice Stream Subglacial Access Research Drilling (WISSARD) Project. The ~1.5 m deep lake lies 800 m beneath the surface of the Whillans ice plain and had temperature, conductivity and pH values near -0.5 °C, 720 µS/cm and 8.1, respectively. The lake had relatively high dissolved organic carbon and low dissolved oxygen. Molar particulate organic C to N ratios in the water column and sediments exceeded 16 revealing a system deficient in N relative to C. δ18O values for the lake indicates that glacial ice melt water is the primary water source; Cl- to Br- concentrations and ratios suggest a minor seawater component. Conductivity and δ18O values in the upper 38 cm of lake sediment infer a seawater influence in the deeper sediment layers. Delta17O-nitrate values of the lake water indicate microbial production as the dominant source for SLW nitrate. Bacterial densities in the lake averaged 100,000/mL and contained diverse morphotypes. Radiolabeled substrate incorporation and ATP levels showed active biosynthesis in both the water column and surficial sediment layer. Small subunit rRNA gene sequences revealed that the lake water was dominated by phylotypes related to archaeal chemotrophic ammonium oxidizers. Members of the Proteobacteria (Gamma, Beta, Delta), Planctomycetes, and Actinobacteria collectively represented the remainder of the OTUs found in the water column. In contrast, only one archeal OTU was identified in the sediments; most sediment phylotypes identified were affiliated with the Proteobacteria. Many of the bacterial phylotypes were closely related to species that grow chemolithotrophically using reduced iron, sulfur, or nitrogen compounds or C1 hydrocarbons as electron donors. Collectively, our results indicate the presence of an active microbial community beneath the Whillans Ice Plain dominated by chemolithoautotrophs. These organisms appear to play a significant role in subglacial weathering processes.

**KEYWORDS:** 0456 BIOGEOSCIENCES Life in extreme environments, 0448 BIOGEOSCIENCES Geomicrobiology, 0720 CRYOSPHERE Glaciers, 0746 CRYOSPHERE Lakes.

(No Image Selected)

(No Table Selected)

## Additional Details

**Previously Presented Material:** nothing presented or published

## Contact Details

**CONTACT (NAME ONLY):** John Priscu

**CONTACT (E-MAIL ONLY):** jpriscu@montana.edu

**TITLE OF TEAM:**

---