Hydrocarbon Contamination and Biodegradation Within the Permanent Ice Cover of Lake Fryxell, Antarctica

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Materials and Methods:

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Sample Collection:

Ice cores were collected using a 10cm SIPRE corer from both contaminated and uncontaminated areas of the Lake Fryxell ice cover in December of 2003.

Decontamination:

Ice cores were shipped back to MSU were they were decontaminated by scraping in a -20°C walk-in freezer using clean techniques to remove any outside contaminants.

Isolates Capable of Bioremediation at 15°C

Table 1. Isolates were cultured from uncontaminated ice cores on 1/10 solid R2A agar, isolates shown were capable of degrading JP8 fuel as the only carbon source. Genomic DNA was extracted, PCR was performed using several different primer sets (Table 2). PCR product was sent to Tgen for sequencing. Sequences were aligned with Blast and NCBI’s blast tool was used to find the closest relative.

Table 2. List of primers used for sequencing

Conclusions:

Our experiments show that the native ice community found in Lake Fryxell is capable of degrading JP8 jet fuel and fractions of the fuel. Respirometry experiments showed that addition of N and P increased the rate of degradation, this may be due to the fact that this environment is limited in these nutrients. A change in community and diversity was observed in both the TTGE analysis and culturing methods suggesting that the hydrocarbon spill changed the community structure of the lake ice.

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