Microbial Diversity During the Polar Night Transition in Lakes of The McMurdo Dry Valleys

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Conclusions: Tag **sequence data** showing Eukaryal community structures **cluster by season**, regardless of depth, in **FRX**. Samples **cluster by depth in WLB**. **Fluorescence** data show **upward migration** of phototrophs in the **fall** in FRX and **clustering by depth in WLB**.

Introduction: During the 2007-2008 IPY, we stayed in the MCM during the **summer-winter transition**. Sampling during the darkness of winter is logistically prohibitive; this study is an important step towards understanding the **year-round ecology** of MCM lakes. This project allowed us to examine ecosystem responses as **photosynthetic inputs of new carbon stopped**. We **hypothesize** that the change in season and loss of carbon inputs lead to changes across the lake ecosystems, which may manifest as **shifts in microbial community structures**.

Lake Fryxell sunset (by A. Chuichiolo)

Methods:

A. Underwater spectral fluorometer detection of phototrophic communities.

B. 454 pyrosequencing identification of microbial communities.

Sample collection:
FRX & WLB
2 depths each
Summer & Fall

FRX=Lake Fryxell
WLB=West Lobe Bonney

rRNA tag generation
V6 or V9[1] hypervariable regions

102,126 Archaeal
127,834 Bacterial
96,851 Eukaryal

Sequence trimming and filtering

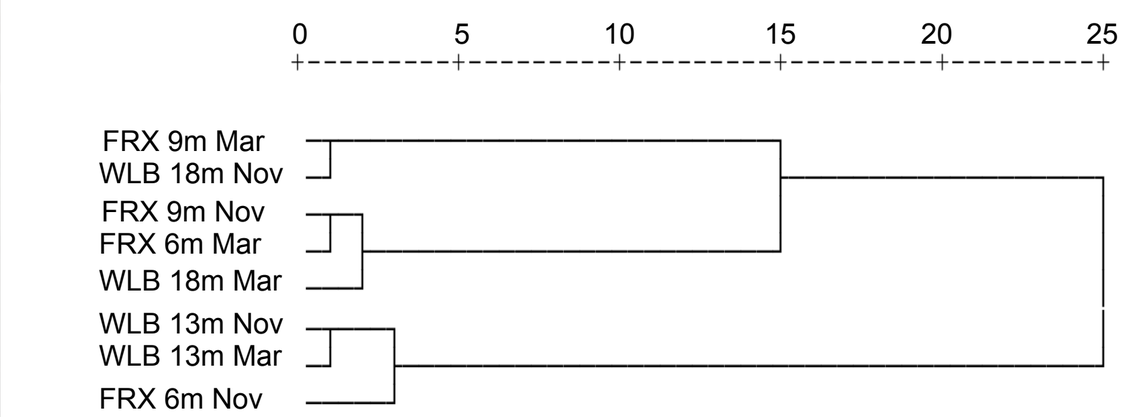
Taxonomic classification (GAST[2])

Clustering, OTUs

- **Seasonal comparisons!**
- Inter and intra-lake comparisons
- Rarefactions
- Diversity indices

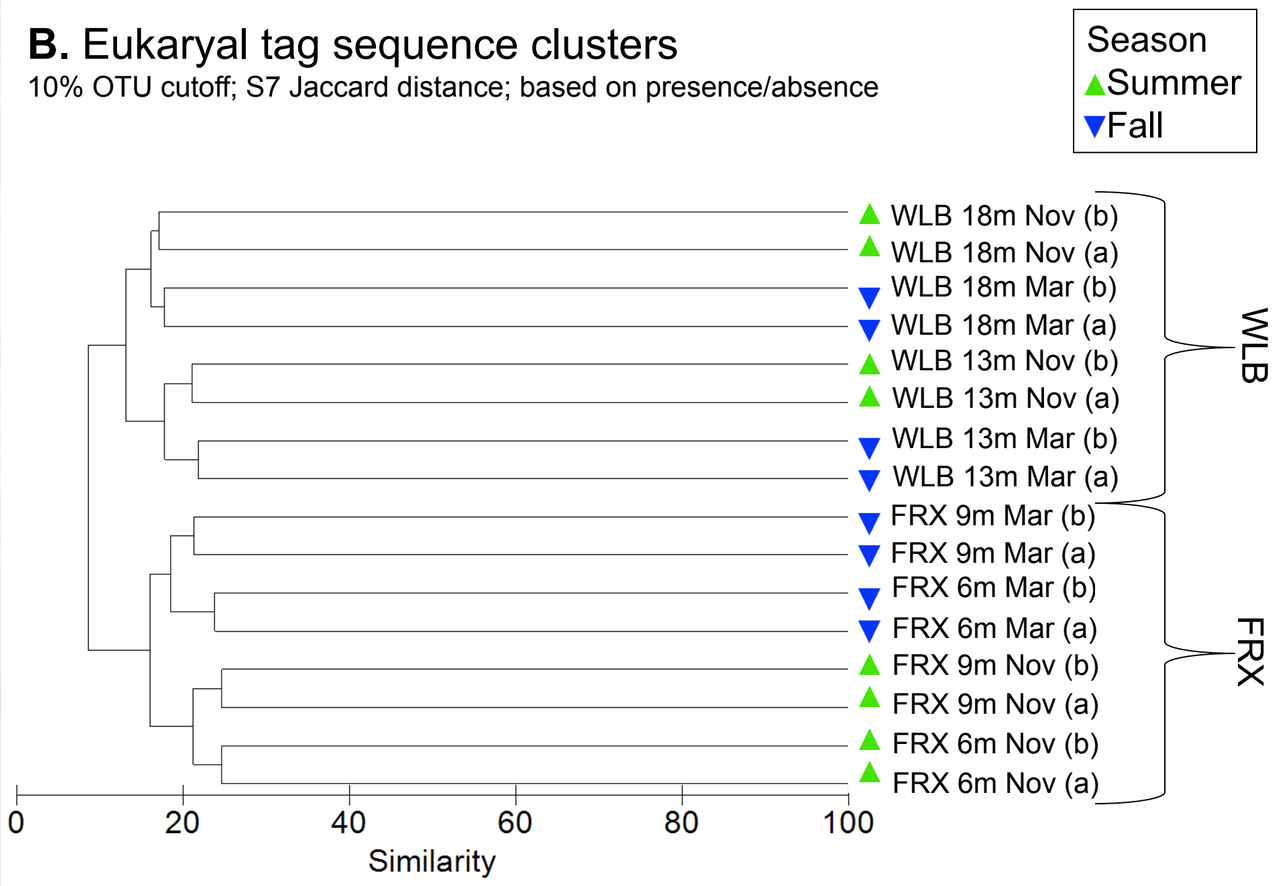
[1]Amaral-Zettler L.A., *et al., PLoS ONE* **4**, (2009).
[2]Huse, S.M., *et al., PLoS Genetics* **4**, (2008).

Results: Phototrophic community structures



A. Fluorescence-based clustering of phototrophic communities.
Furthest neighbor linkage, Pearson correlation interval.

B. Eukaryal tag sequence clusters
10% OTU cutoff; S7 Jaccard distance; based on presence/absence



Significance: This study presents some of the first data on the responses of MCM lake microbial communities to the summer-winter transition. Because sampling cannot be conducted during the winter, these data are important in understanding the year-round ecology of dark, icy systems.