

# ATMOSPHERIC, LITHIC AND SOLAR ENERGY SOURCES, DRIVE MICROBIAL MAT FORMATION IN A HYPERSALINE LAKE

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## Overview

### Objective:

- To investigate the energy and carbon sources sustaining microbial communities in lithifying and non-lithifying microbial mats in a hypersaline lake.

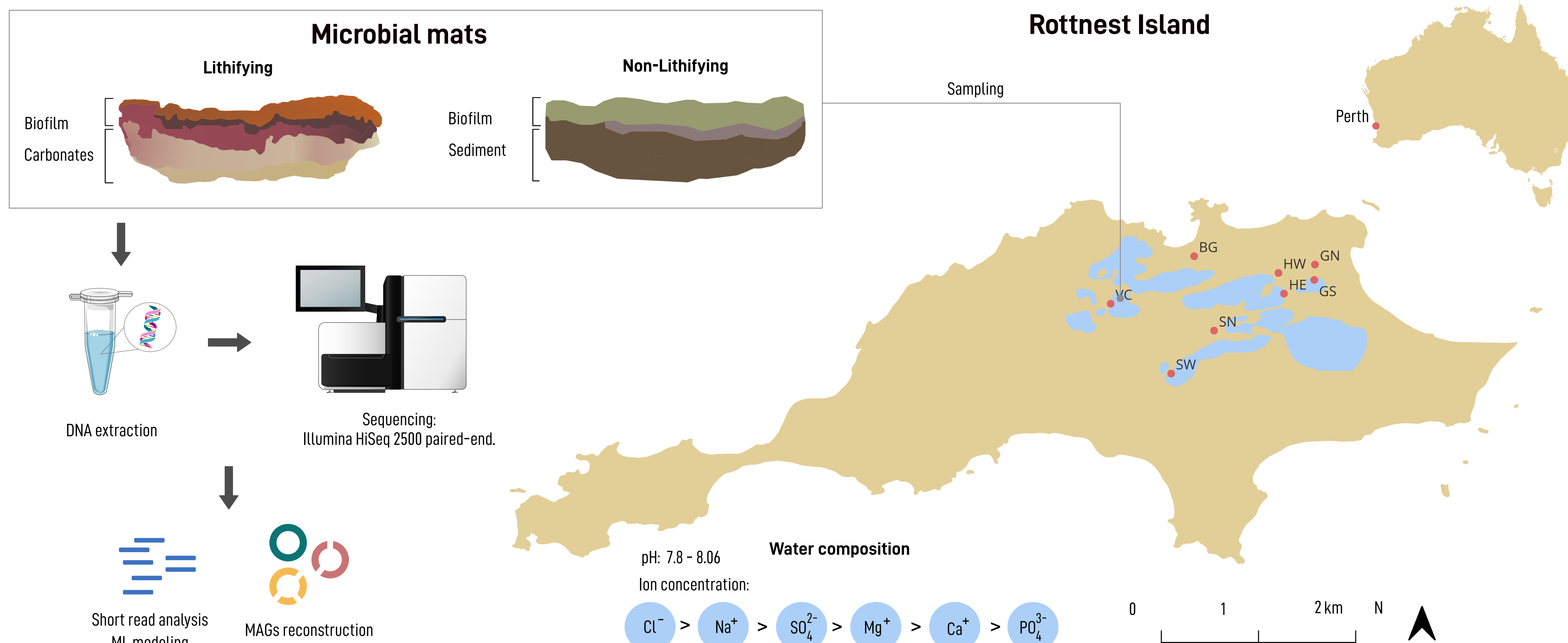
### Methods:

- Collected 11 non-lithifying and 28 lithifying microbial mats across 8 sites in hypersaline lakes on Rottnest Island, Australia.
- Performed shotgun metagenomics sequencing.
- Conducted bioinformatics analysis: short read processing, taxonomic, functional profiling, ML modeling, and MAGs reconstruction.

### Results:

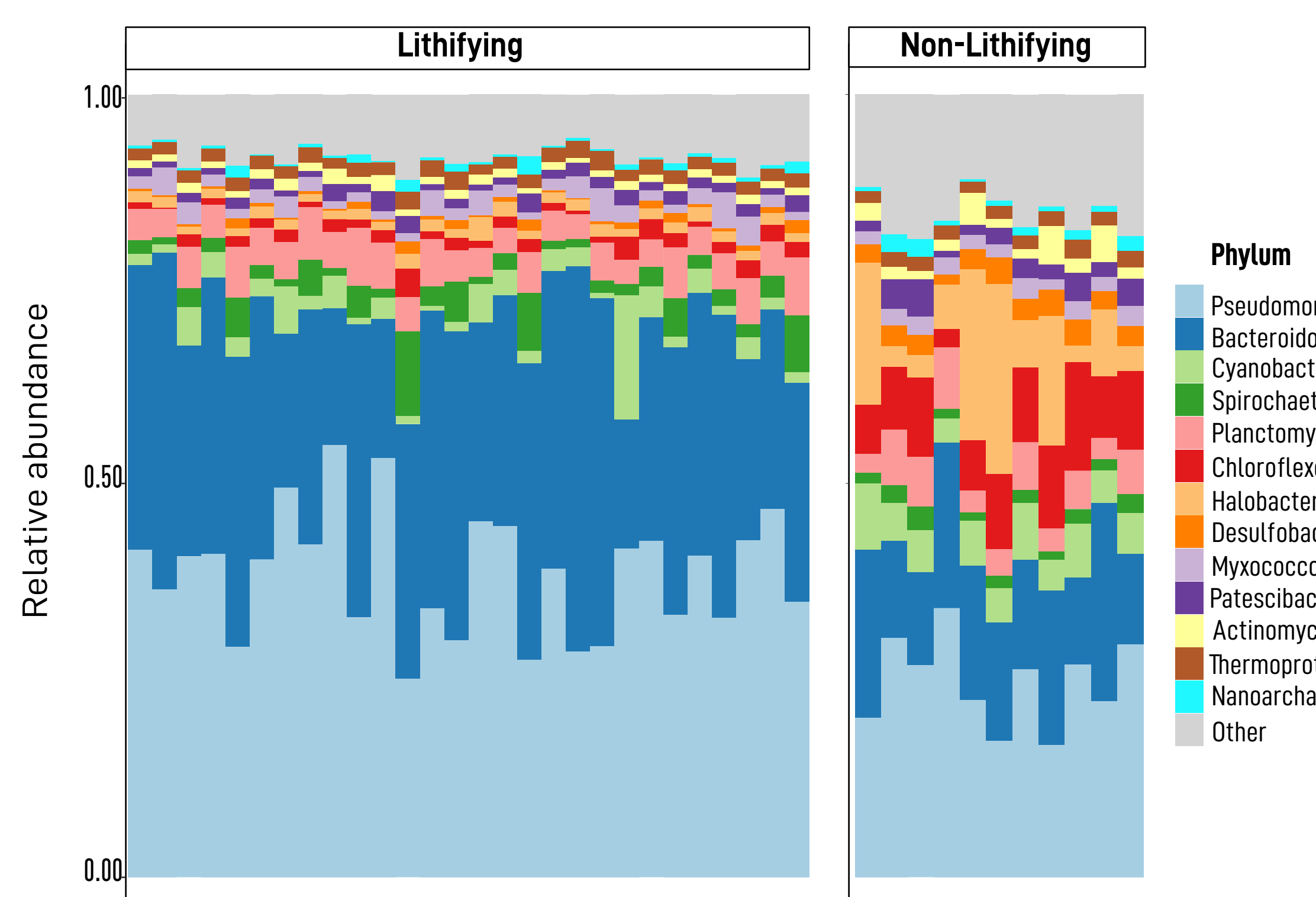
- Diversity and functional profile analyses show differences between lithifying and non-lithifying microbial mats.
- There are differences in energy and carbon sources utilization based on the type of microbial mat, whether lithifying or non-lithifying.

## Methods

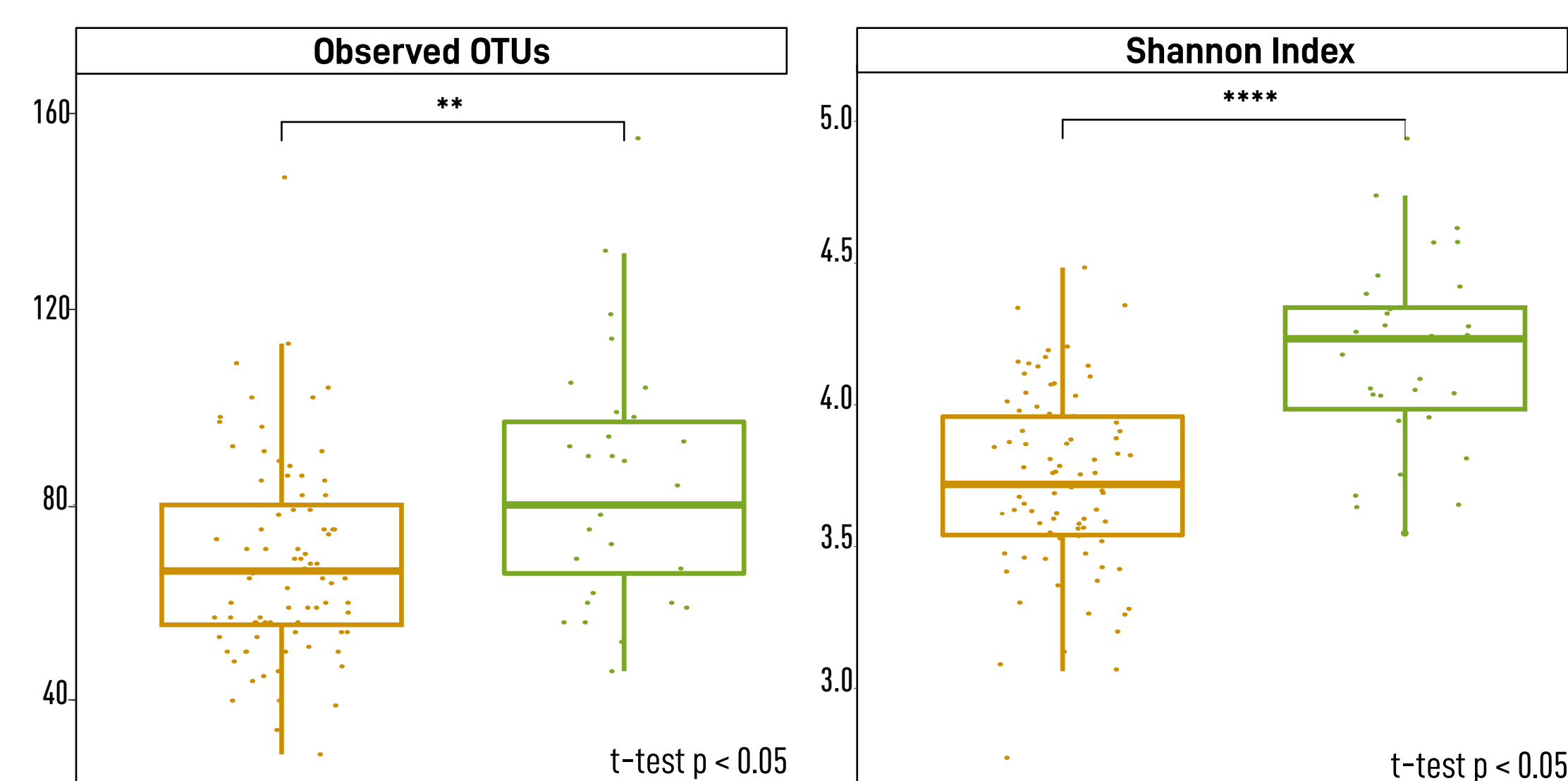


## Results

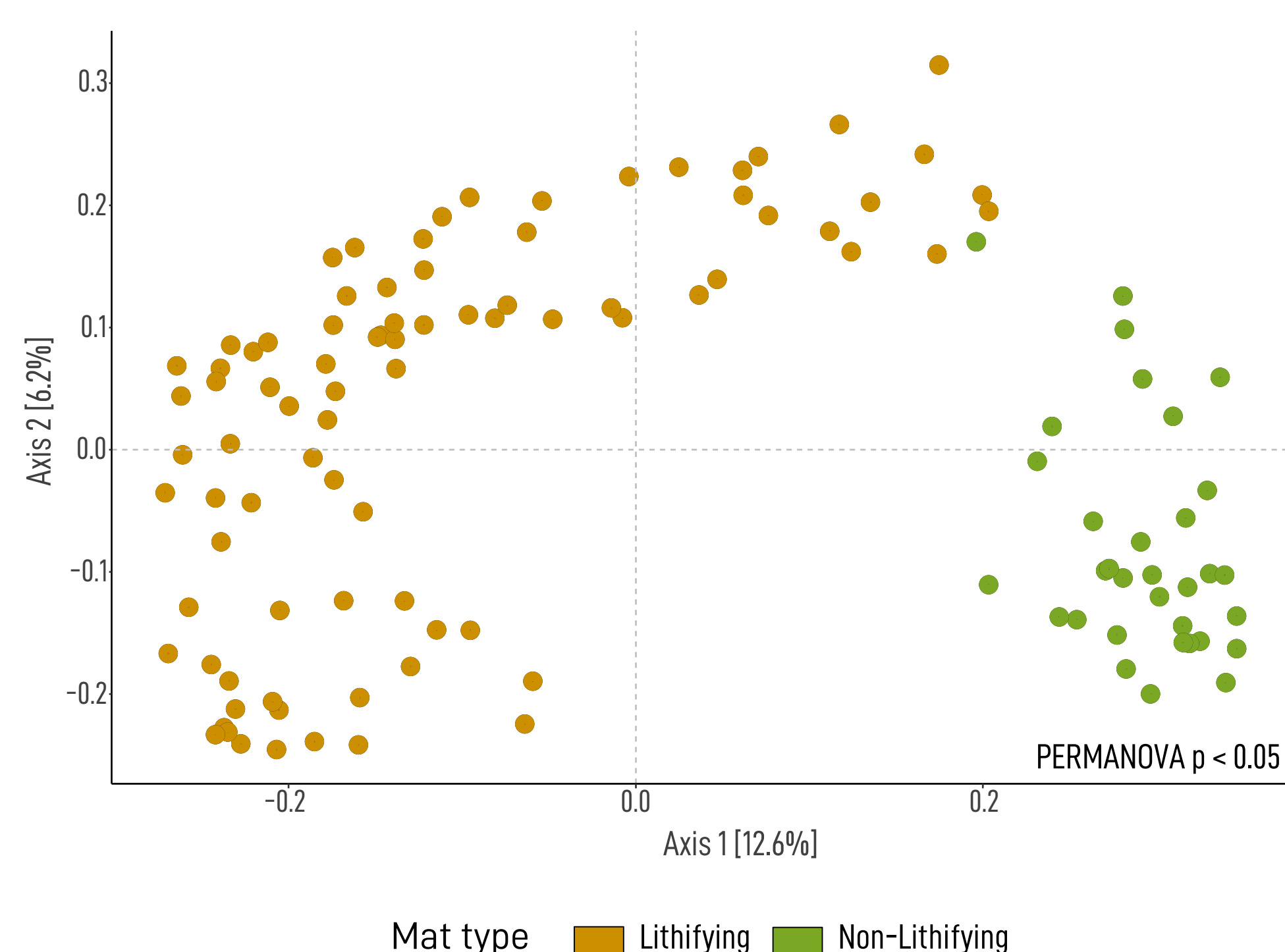
### Taxonomy profile - SingleM



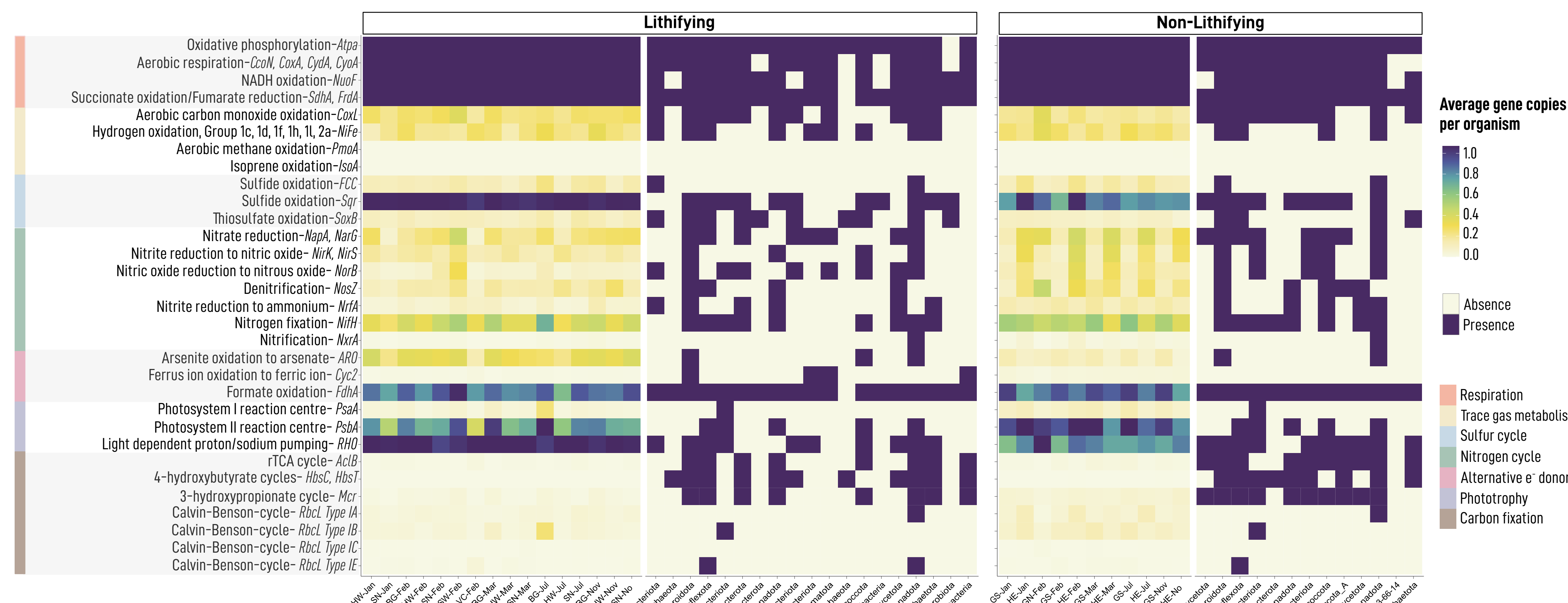
### Alpha diversity



### Beta diversity



### Functional profile



### Random Forest model



## Conclusion

- Significant differences in community structure suggest a shift likely associated with the process of lithification.
- Despite similar gene presence, ML analysis shows lower gene abundance in lithifying mats, suggesting reduced activity.
- Trace gases, lithic compounds, and solar energy appear to be crucial energy sources for lithifying processes.

### References:

Mendes Monteiro, J., Vogwill, R., Bischoff, K., & Gleeson, D. B. (2020). Comparative metagenomics of microbial mats from hypersaline lakes at Rottnest Island (WA, Australia), advancing our understanding of the effect of mat community and functional genes on microbialite accretion. *Limnology and Oceanography*, 65(S1). <https://doi.org/10.1002/lno.11323>

