

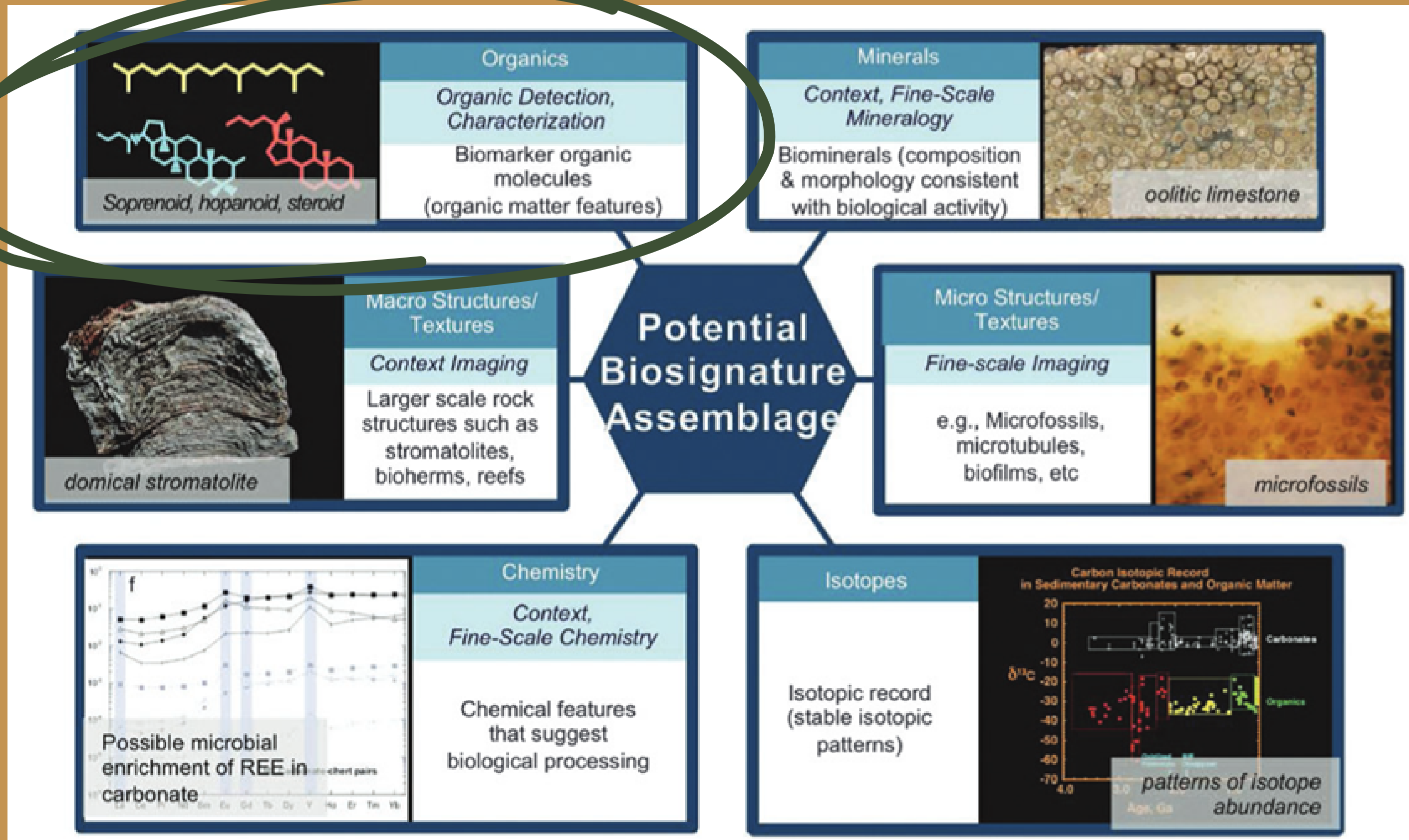
BIOSIGNATURE PRESERVATION IN ACIDIC AND CIRCUMNEUTRAL ICELANDIC HOT SPRING DEPOSITS

Phylindia Gant
University of Florida
AbSciCon 2024



Looking for Life Beyond Earth

1

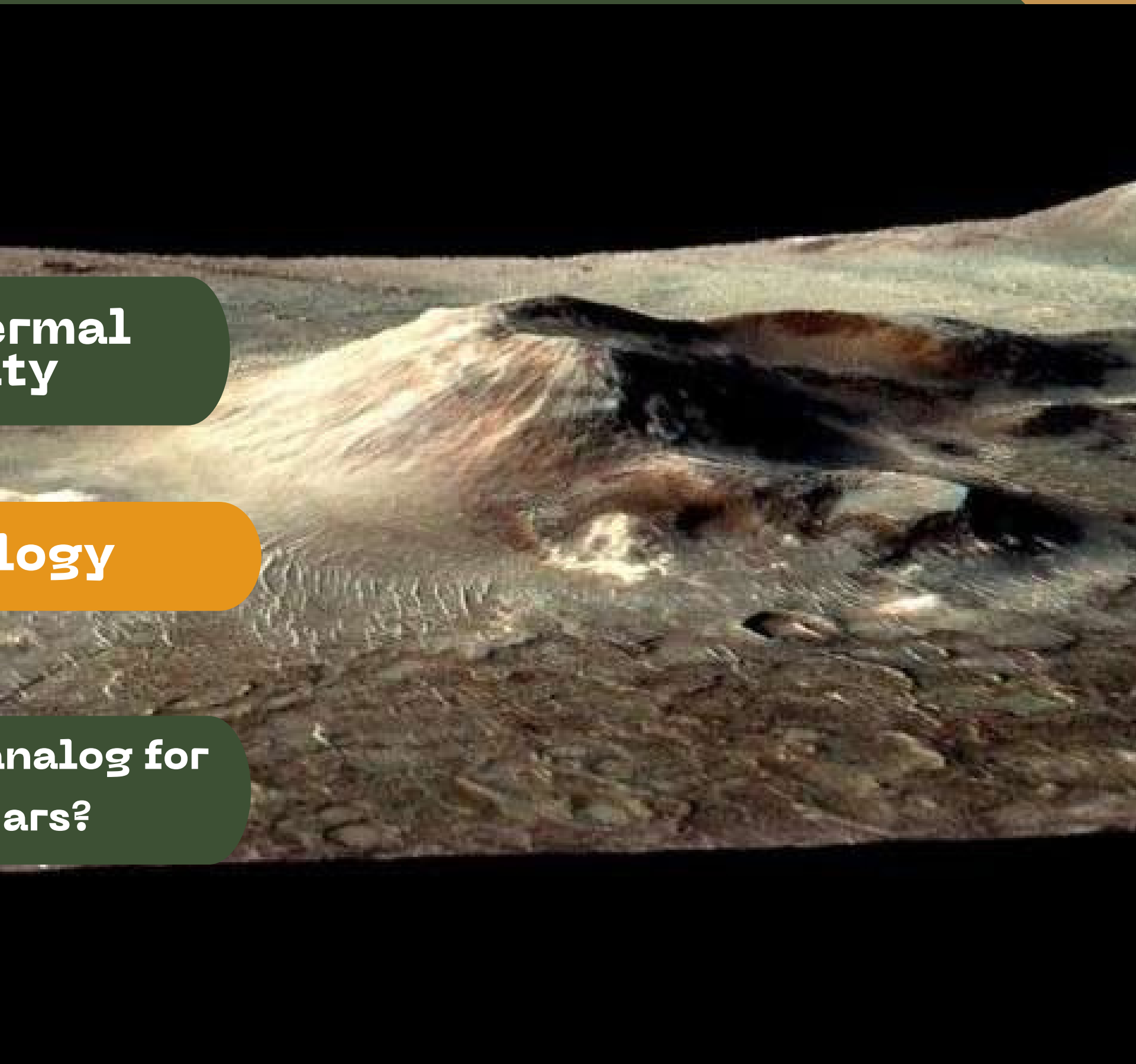




**Hydrothermal
Activity**

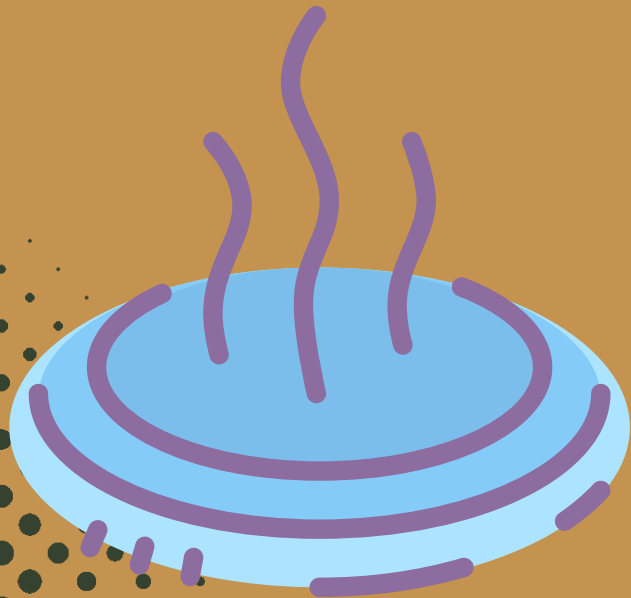
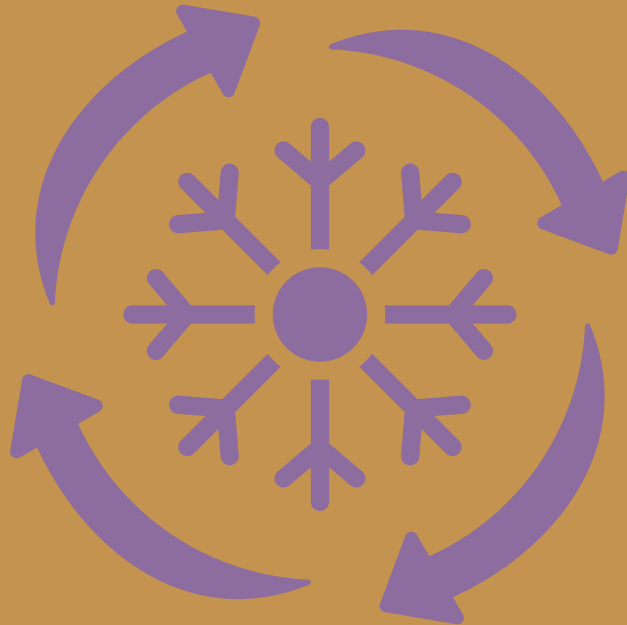
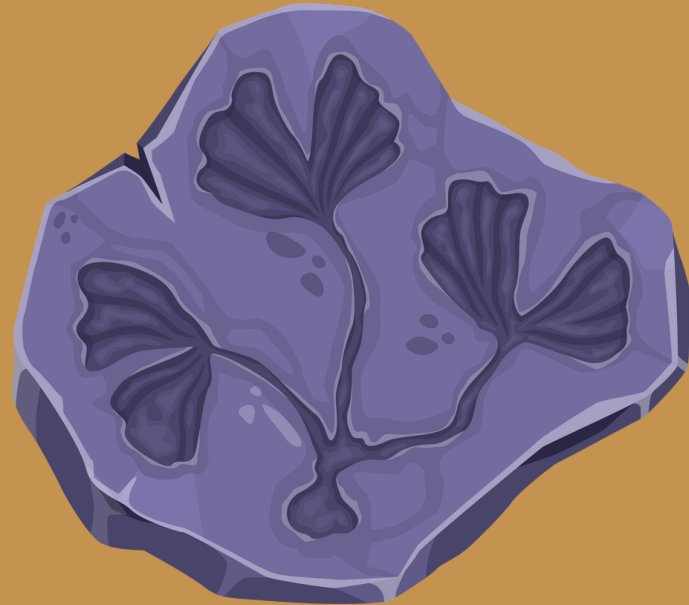
Mineralogy

**Iceland an analog for
early Mars?**



Siliceous Sinter Biosignature Preservation

3

Hydrothermal System	Rapid Cooling	Entombment
		

1 Goal

Investigate the preservation and detection of organic biosignatures in relevant Martian analog mineralogies

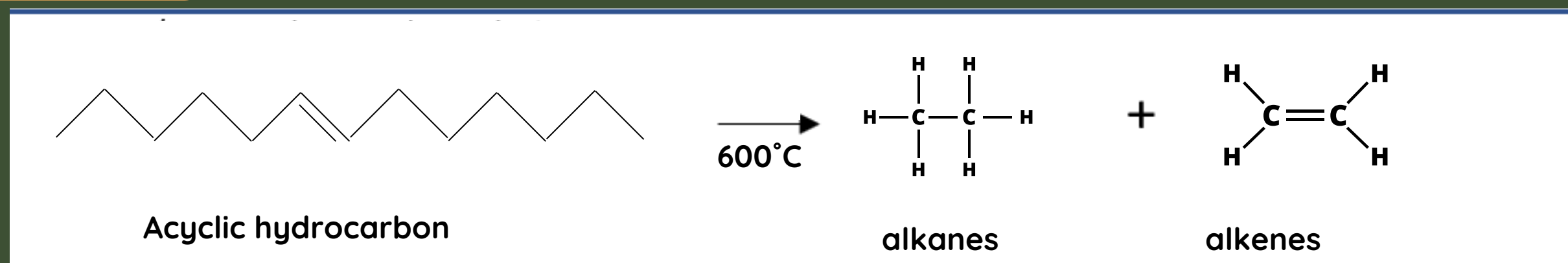
2 Hypothesis

The neutral silica sinter hydrothermal system will have more diversity and abundance of biosignature preservation than the acidic system.

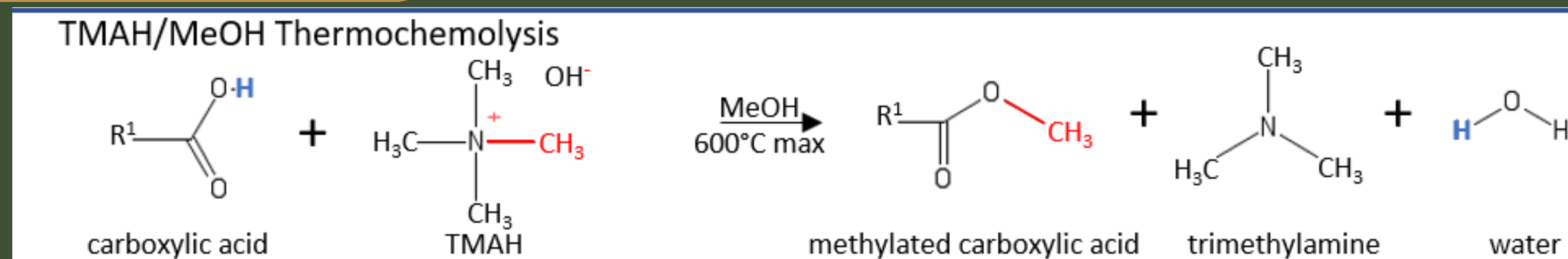
3 Methodology

To test this hypothesis, 10 samples will be used, seven samples from the acidic site and 3 samples from the circumneutral site. Each of these samples will be tested using different reagents, pyrolysis temperatures, and ramp rates.

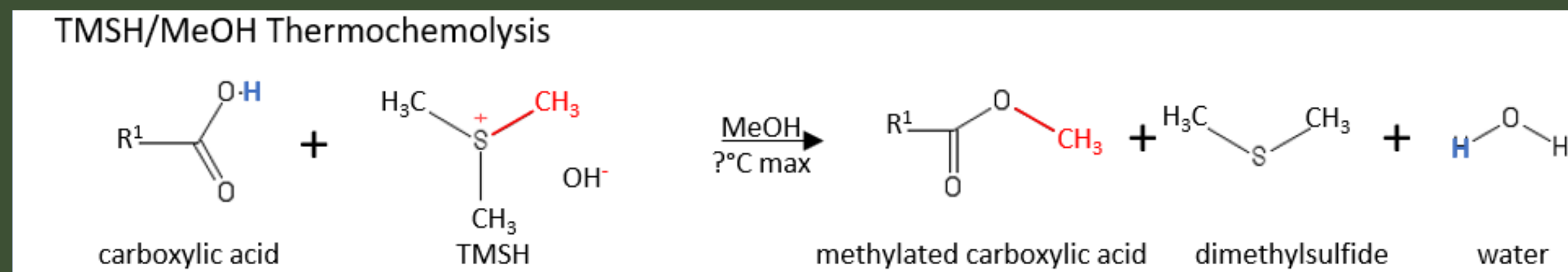
1 Neat Pyrolysis



2 Thermochemolysis – TMAH



3 Thermochemolysis – TMSH



Icelandic Hot Spring Deposits

Acidic



- Kerlingarfjöll, Iron Spring 1
- pH range from 3.4 to 4.1

Neutral



- Ytri Tunga Beach, Iron Spring 2
- pH range from 6.9 to 7.0

Results – TMAH: Fatty Acids																			7
	C8	C9	C10	C11	C12	C13	C14	i-C15	α-C15	C16	C17	C18	C20	C21	C22	C23	C24	C25	C26
N1		X	X		X		X	X	X	X	X	X							
N2	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X
N3	X	X	X		X		X			X	X	X							
A1	X	X	X		X		X			X	X	X							
A2	X	X	X		X		X			X		X							
A3										X		X							
A4																			
A5	X	X	X		X		X			X	X	X							
A6	X	X			X					X		X							
A7										X		X							

8

[illegible][illegible][illegible]

1

Flight-Like Detection

Alkanes and alkenes (n=13) were detected in the neutral samples but not in the acidic samples.

Four fatty acids were detected in the acidic samples, but 6–7 were detected in the neutral samples.

MUFAs and methyl-branched FAs were only detectable in the neutral samples.

2

TMAH vs TMSH

TMAH yielded FA from both the acidic and neutral samples.

TMSH only yielded FA from the neutral samples.

3

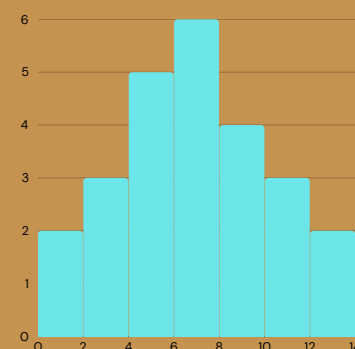
Acidic vs Neutral

The acidity in the samples acts as a barrier to detecting fatty acids and acyclic hydrocarbons in these samples.

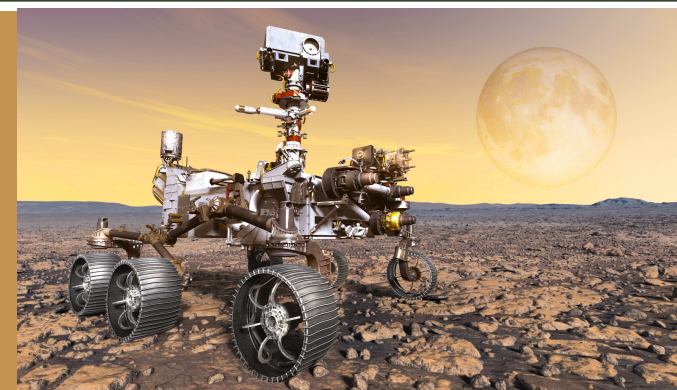
This may be due to a neutralizing effect of the highly alkaline reagents with the acidic samples.

1 Next Steps

Quantification

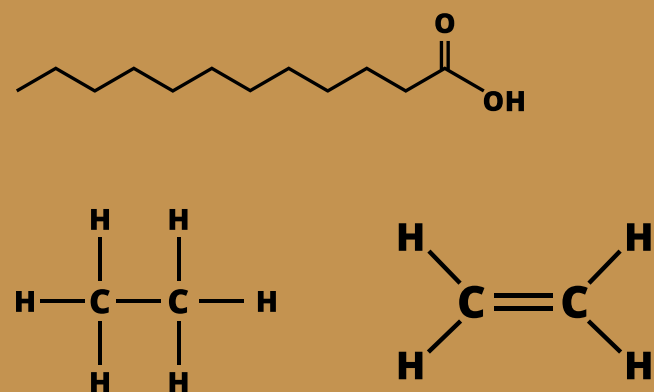


Spaceflight-like technology

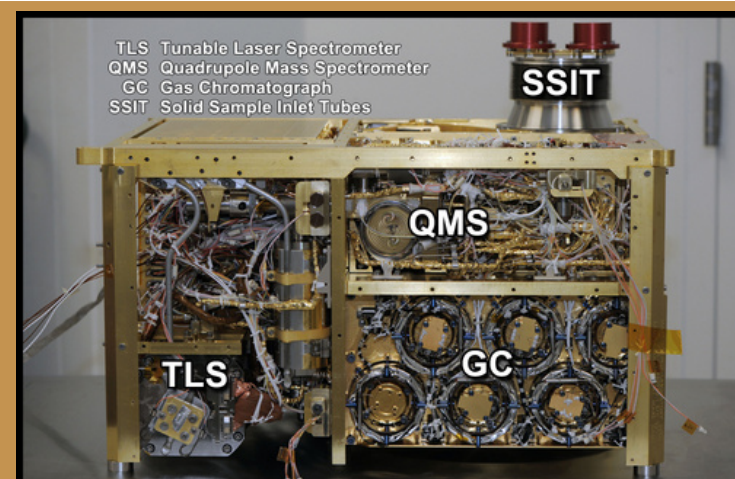


2 Main Takeaway

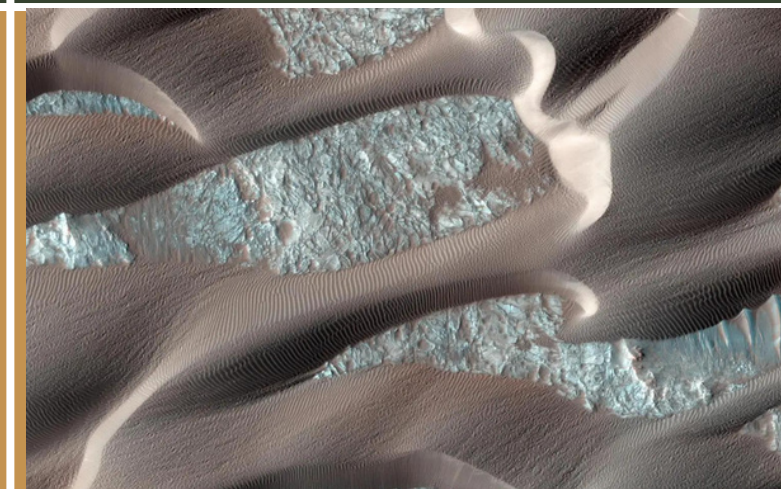
Organics Preservation in Acidic vs Neutral Hot Spring Deposits



Modern Spaceflight Technology



Martian Hydrothermal Systems



Thank You! Questions?

Phylindia Gant | AbSciCon 2024

University of Florida

✉ pgant@ufl.edu

