

## Big Question

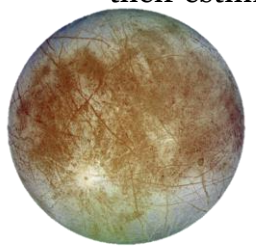
**Ocean World:** An ocean world is considered any planet or moon currently with a liquid ocean.

Earth the only known Ocean world with life

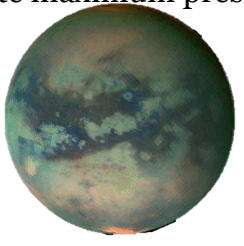


**Is there any life on other ocean worlds?**

Example of Known Ocean Worlds (aka Icy Moons) and their estimate maximum pressures in oceans



Europa  
(200 MPa)



Titan  
(500 MPa)

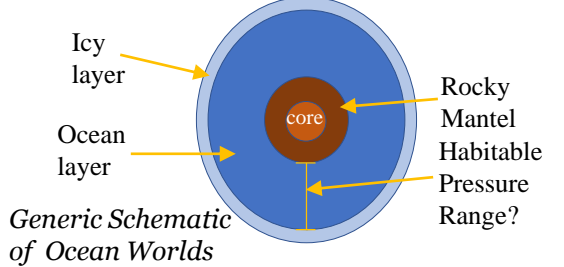


Ganymede  
(1,000 MPa)

## Research Question

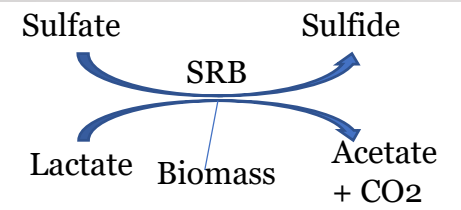
**What are the pressure limits for microbial activity in aquatic environments?**

We will determine if pressure has a critical effect on biogeochemical cycles on Ocean Worlds.



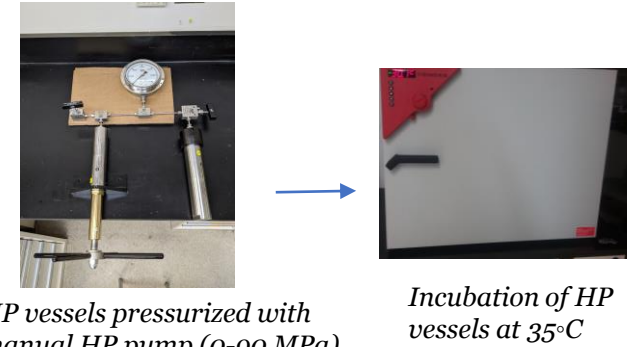
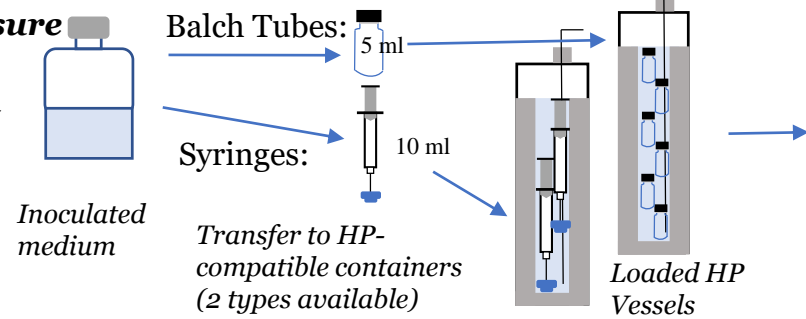
## Methods

**Microbial Sulfate Reduction (MSR)** as a model for microbial activity on Ocean Worlds



**Sulfate reducing bacterium (SRB):** *Desulfovibrio hydrothermalis (Dh) AM13* grown in an anoxic marine mineral medium w/ ~ 22 mM sulfate + varying lactate conc.

**High-Pressure (HP) incubation Set-up:**

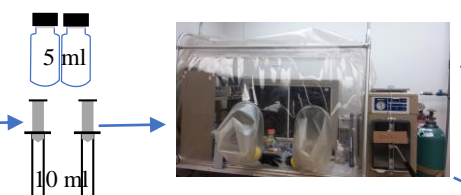


## Research Plan

**Objective: Define the pressure landscape of MSR by characterizing 1) SRB growth rate and survival and 2) MSR rates and yields**

**Research Plan :**

Time point 0  
Time point 1  
Time point 2  
Time point 3...



Sub-samples taken regularly over 6 months

Preparation of samples in Anaerobic Chamber

