B218-P002 **Room: Poster Session Hall** **Time: May 17**

Serpentinization-driven systems in the seafloors of icy satellites.

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Hydrothermal systems on Earth provide a possible analog for biological environments under the surfaces of icy moons. The discovery of the Lost City system, which is supported almost entirely by exothermic hydration of olivine, brings the possibility for an additional source of heat and nutrients in extra-terrestrial oceans. In icy moons, heat from hydration of the rocky crust could have been a source of energy. In such systems, the question remains whether serpentinization (conversion of peridotite to serpentine) could still be happening today. Lowell and Rona (2002) estimated the age of the Lost City system based on measured permeabilities and modeled reaction kinetics. Their model takes flow rate into account, and predicts an age of ˜10$ˆ2$ to 10$ˆ4$ years, bracketing the ˜30,000 year age inferred by Fruh-Green et al (2003) by 14C dating. In their analysis, Fruh-Green et al suggest lower flow rate in other systems could extend their lifetimes to millions of years. In icy moons, assuming fluid flow is low but sufficient to drive reaction, applying peridotite permeability data in the range of 34-100 C suggests even longer time scales, O(100) million years for the 100 C measurement, to completely alter 1 km of rock. For the example of Europa, seafloor pressure gradient is shallower than Earth's (by a factor of 0.2) due to its lesser gravity, implying that hydration reactions could propagate to 7 times greater depth. Assuming an initially dehydrated crust, we consider the ways in which permeability and mantle oxidation state affect reaction type, rate, and depth. We find that serpentinization reactions could provide a long-term source of heat and oxidizable methane.