NASA Early Career Collaboration Award Short Report #1

This short report describes who I met with, any objectives that were met, any preliminary results.

I traveled to Penn State University from August 26th to September 1st to teach Fluorescently Labelled Embedded Coring to Hanna Leapaldt, my collaborator in the Ingalls Lab by conducting field work together in Green Lake, Fayetteville, New York. Our original intention was to performed dual clumped isotopes using Little Hot Creek Carbonates and perform FLEC on Green Lake samples on the same trip. This was the plan outlined in the original ECCA proposal. The collection of LHC carbonates was delayed by microbial mat disruption by record flooding in the Eastern Sierra Nevada Mountains during the spring, and so we made the judgment that we should wait to collect LHC carbonates for dual clumped isotopes until the incipient microbialites are more morphologically mature. Research in the Corsetti lab over the last decade shows that LHC incipient microbialites DO regrow on weeks-months timescales, so we do anticipate this happening, but being delayed by a few weeks in the 2023 growth season. A nominal effects letter from Inyo National Forest to sample LHC carbonates in the months of September, October, and November, so this work should continue.

Hanna Leapaldt and I decided to split our objectives into two trips: one for me to travel to Penn State and teach FLEC to her, and one for me to collect carbonates and bring them to Penn State for me to learn the dual clumped method from Hanna.

During our trip in the last week of August, our first objective was met. I flew to Penn State and met Hanna immediately. She was able to host me in her personal home, which allowed us to reallocate housing costs dedicated to our first trip to flight costs for a second trip. We immediately carried out two days of field work in Green Lake, Fayetteville, New York. I successfully taught Hanna the method for FLEC and we sampled both Green Lake benthic sediments and carbonates from actively growing thrombolites. We returned to Penn State and I met with the members of Miquela Ingalls lab. Dr. Ingalls invited me to give a research presentation during her lab meeting, which I was able to do. After presenting in the Ingalls lab meeting, I engaged in numerous positive, research-centered conversations with several members of the Ingalls lab including PhD students and one post doc. I spent the rest of the week teaching Hanna post-processing protocols in the lab to ensure she was able to continue working with the FLEC cores after I left. She also taught me the protocol for removal of organic carbon from carbonate rich microbial mats so that I can prepare LHC carbonates for dual clumped isotopes before our next round of travel.

Because the FLEC protocol takes one month to carry out, we do not have finalized preliminary results, but the FLEC cores from Green Lake are indicating that the processing is going successfully. An image from our field work is shown on page 2.

A FLEC core of sediment from the shore of Green Lake helped us practice the technique in preparation for sampling thrombolite material. The coring was successful and the samples were successfully transported to the lab and post processing started the same day.