MICROBIAL ECOLOGY WITHIN THE TOP METER OF PLAYA SEDIMENTS AT WHITE SANDS NATIONAL MONUMENT (NEW MEXICO). M. Glamoclija[1], A. Steele[2], M.L. Fogel[3], K. Sirisena[1,2], S. Ramirez[1], I. Widanagamage[1], A. Waldron[1*], M. Zeidan[1*] and S. Potochniak[1*]. [1]Department of Earth and Enviri-onmental Sciences, Rutgers University - Newark (m.glamoclija@rutgers.edu), [2]Geophysical Laboratory, Carnegie Institution of Washington, [3]Department of Earth Scienes, University of California at Riverside [1*]Authors are undergraduate students.

Introduction: Sulfates found in Martian sedimentary sequences have been proposed as a part of diagenetic sequences at the Noachian/Hesperian transition, within which fresh water lacustrine environments desiccated and transitioned to more saline environments where sulfates formed [1, 2]. Consequently, playas and lacustrine sequences have been suggested as sites of high astrobiological interest for investigations of biosignatures on Mars [3]. Playas and evaporitic desert environments have been discussed through many publications, and it has been noted that microorganisms living in evaporitic translucent settings (i.e. halite, gypsum, bassanite, or other salts) will position themselves close to the surface, but not quite exposed to it, to prevent desiccation [4,5,6,7]; in some cases stratification of organisms within communities has been reported for the first few mm below the surface [8].

Besides the important and dominant evaporation process, a second dominant characteristic of playas is the presence of a shallow groundwater table. The near surface colonization strategy of microbes is to actually explore an extension capillary fringe that will almost reach the surface. In our current work, we "followed the water" and drilled about 1 m into the playa sediments to explore this environmental gradient and probe microbial diversity between the surface and 1 m depth down to the groundwater table. We also tested depth profiles of active playa (e.g., Lake Lucero), where we sampled 2 shallow profiles: one in the middle of an area that usually gets flooded and second on the edge of the temporary lake (i.e., the area that dries early in the season). We sampled more stable geologically older and more compact lacustrine sequences as well. These older sequences are not as exposed to seasonal playa activity and hence, the moisture content and salinity are more consistent throughout the year.

Results: XRD analysis revealed that samples are mainly composed of gypsum and minor mineral phases as halite and quartz. SEM/EDS revealed the presence of amorphous phases: halite, glauberite, magnesium chlorite salt. Diatom frustules were found in more stable, older lithological sequences. Cation analyses showed that general concentrations of Na, Fe, Mg and Sr decreased with depth, consistent with our mineralogical and general lithological observations, however K increased and Ti concentrations were below detection for surface samples and for the deepest sample that directly interacted with groundwater. The concentations levels of NH_4 increased with depth, while NO_3 and C, N, S analyses will be determined.

Microbial communities in these samples are mainly composed of Eubacteria (around 80%) and in lesser % Archaea. Eukaryotes were detected in only some of the samples and represented with very low diversity of organisms. When using resemblance analysis, S17 Bray Curtis similarity %, all of different depth profiles have very low similarity %, about 10%. It is important to note that the most Bacterial and Archaeal OTUs have been found in surface crusts within a mixture of thenardite, mirabilite and gypsum minerals, groundwater collected from one of the drill holes, and a piezometer from Lake Lucero. These samples have a similar number of OTUs in comparison to groundwater samples collected from a nearby dune field, which has almost twice the number of bacterial OTUs. Groundwater from the playa has more Archaeal OTUs than dune field water, with one of the samples having almost 5x more Archeal OTUs, which varied within the lithological sequences.

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