BUILDING A BIOSIGNATURE IMAGING, SPECTRAL AND THIN SECTION LIBRARY TO SUPPORT UPCOMING MARS SURFACE MISSIONS. Virginia C. Gulick[1], Paige Morkner[2], Jason Angell[1], Timothy Johnsen[1,3], Patrick M. Freeman[1,3], and Job Bello[4]. [1]NASA Ames/SETI Institute (NASA Ames Research Center, MS 239-20, Moffett Field, CA 94035, *Virginia.C.Gulick@nasa.gov*, [2]NASA ARC/OSSI, [3]UC-Irvine, , [4]UC- Santa Cruz, [5]EIC Laboratories, MA.

Introduction: Identifying minerals, organics, and potential biosignatures within individual rock and sediment samples is an important part of both terrestrial field and planetary surface exploration studies. To help with this effort, we are building a library of spectra, images, and thin sections of the biosignatures and the rocks and minerals with which they are associated. We have been characterizing the samples in the lab using Raman spectroscopy at two different laser excitations, 532nm and 785nm, close up imaging with constrained lighting conditions, and hand sample and thin section analysis. Samples are generally characterized as is, without grinding to powders, to retain the critical spatial and geologic context and alteration history of of the rock sample.

Locating Biosignatures in Rock: An important component of sample analysis on future missions will be location selection on the sample. Prepared samples are mostly homogeneous, but natural rock samples are more heterogeneous and non-uniform. Analysis of the travertine sample shown in Figure 1 revealed ß-carotene peaks in the more protected locations on the rock, while large flatter areas appeared devoid of spectral signatures pointing to life.

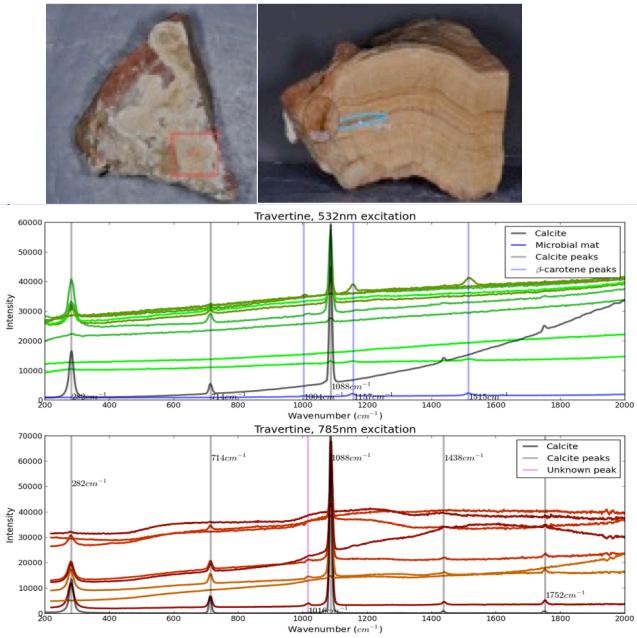

Figure 1: Travertine sample from Travertine Springs, CA. Image on left shows region where no biosignatures were identified. Image on right contained beta-carotene peaks in two protected regions circled. Plot shows several Raman spectra of the sample compared with β-carotene from a microbial mat *(blue) and calcite (gray) spectra. Distinct calcite peaks as well as distinct peaks in the sample demonstrate the ability to detect both minerals and biosignatures in the same spectra.*

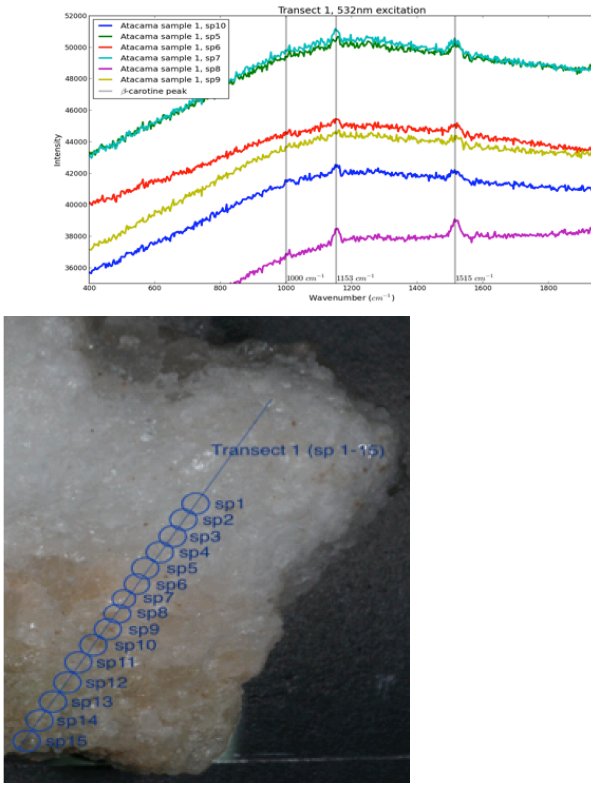

Figure 2: Spectra sp5-10 and sample showing transect 1, from which spectra were taken. Rock sample provided with β-carotene peaks highlighted, of Atacama salt rock by Alfonso Davila (SETI Institute).