

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Astrobiology and Exploration (6)

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FIRST DESCRIPTION AND CHARACTERIZATION OF NEWLY DISCOVERED ANDEAN  
MICROBIAL ECOSYSTEMS IN THE PUNA DE ATACAMA, A MARS ANALOGUE ENVIRONMENT**Abstract**

Raman spectroscopy's powerful in-situ analysis capabilities have been recently employed on NASA's *Perseverance* rover and will be used by ESA's ExoMars *Rosalind Franklin* rover to study mineral composition and to search for biosignatures on Mars.

We propose that combining Raman spectroscopy with microbiological sequencing of extremophile communities and contextualisation of their habitat is a powerful method to understand and interpret Raman spectroscopic results on Mars.

The Puna de Atacama in the Central Andes presents a unique combination of environmental factors that makes it an excellent analogue environment to study life on Archean Earth and Noachian Mars: It features volcanic activity, low oxygen content, very intense UV radiation, and very low annual temperatures with strong wind chill. The highly saline lakes in the area feature high arsenic and/or cadmium content.

We combined Raman spectroscopy, optical microscopy, microbiological sequencing and studies of the waterchemistry to characterize several previously unstudied Andean microbial ecosystems in high-altitude saline lakes, saltflats, geothermally heated rivers and hot springs close to the Ojos del Salado volcano. We present the results and the contextualisation of their environment obtained during the LICA-EuroMoonMars international scientific expedition in February/March 2022.