

## **Life in the Atacama Field Journal**

August 18-19, 2005

Antofagasta and Salar de Navidad, Chile

### **Overview, Objectives and Participants**

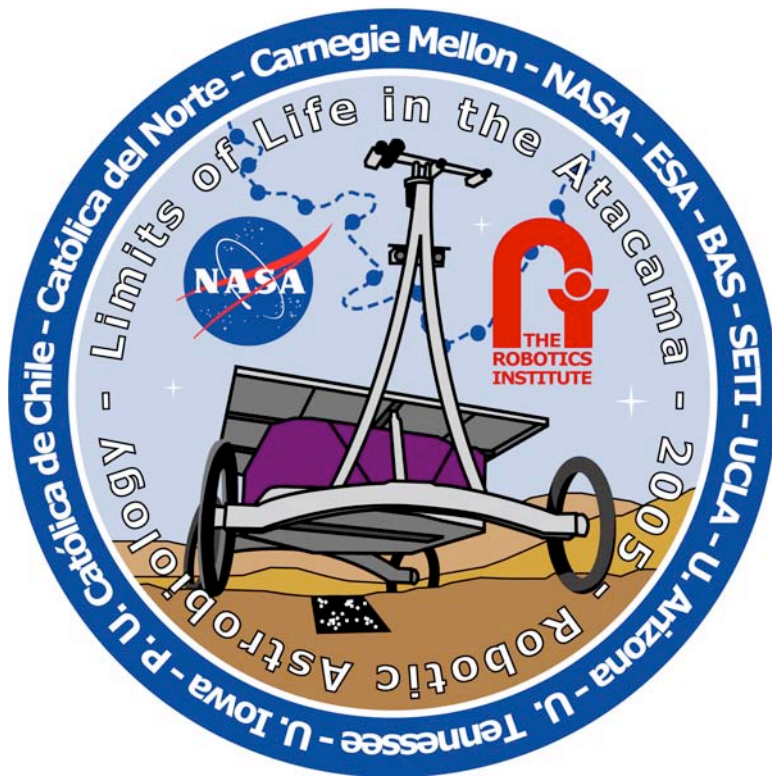
The Atacama Desert is the most arid region on Earth and in several ways analogous to Mars. It has been suggested that the desert is the most lifeless place on Earth—we are examining this hypothesis. It is known that microorganisms exist on the coastal perimeter and at higher altitudes, so some gradient must exist between these regions and the arid interior of the desert.



The Life in the Atacama project is investigating the distribution of life and characteristics of habitats in the desert. In our first field season (2003) we found that microhabitats were sparsely distributed in coastal regions. In our second field season (2004) we further studied the coastal region and also investigated the existence and character of habitats in the interior desert using our robot Zoë and its onboard fluorescence imager. This field season we make the survey of life and habitats possible by conducting long-distance traverses while deploying sensors in each potential habitat. Mobility is crucial as habitats are hypothesized to depend on locally variable conditions including moisture, solar flux, and rock/soil composition, thus we employ a rover Zoë to visit many locations and measure geologic and biologic properties of potential microhabitats.

The Life in the Atacama project is organized by Carnegie Mellon University where Zoë and its Fluorescence Imager were created. Remote investigations are also performed from Carnegie Mellon. NASA Ames Research Center has lead the science investigation and developed components of the rover autonomy software. Science co-investigators are from Universities of Arizona, California, Iowa, and Tennessee and in Chile, Univesidad Católica del Norte. The Life in the

Atacama project is funded by NASA Space Sciences Directorate with important support provided by government agencies and corporations.



This field journal serves as an informal record the activities of the remote team in Chile. We will describe what we plan on doing and what is actually happening. We will include interesting images and events, interesting to us anyway. We care about the weather and you may too. Enjoy.

### **Agenda**

- Arrive in Antofagasta
- Arrange logistics
- Select Site E camp and cargo drop

### **Status and Progress**

- Arrived in Antofagasta. Our good luck with travel continues with a uneventful flight south, quick connection, and flight back north to Antofagasta. It's only 20 hours from Pittsburgh to Antofagasta. Everything and every one arrived together and intact and our third field season began Thursday morning, August 18<sup>th</sup>.
- Arranged logistics. Our field work in Chile is becoming more routine now and thanks to our partners at Pontificia Universidad Católica de Chile in Santiago and Universidad Católica del Norte in Antofagasta everything is working smoothly. Shipping and customs has gone with out a hitch. With the new instruments we're adding to Zoë this year we needed to get a pressurized cylinder of

Argon (for the fluorescent dye spraying mechanism) in Antofagasta and this was accomplished. After many different government approvals for a weak radioactive source, we're also planning to test a neutron detector for measuring water abundance. We had several meetings seems to be in order to get the source we need.

- Visited Site E. We are studying three field sites this year, one north in the coastal range near Iquique (Site D), one south near the Domeyko Range, which forms the eastern border of the desert core, (Site F) and one between these limits and right on the tropic of Capricorn. This last location (Site E) is near to Antofagasta but not in an area we have operated in before so we made a quick visit in order to determine access roads, find a location for our camp, and choose a cargo drop.



We drove in from the north and made our way through the Cerros de Cuevitas to reach Salar de Navidad. Like Site C in 2004, this area lacks any apparent signs of life. We were very interested to find that this salar is a vast dry mud flat, unlike the blocky halite formation found Salar Grande. We did discover that along the shoreline are some areas with subsurface moisture, evidenced by mud underneath the surface crust. The area looks ideally suited to the survey investigation we will perform with Zoë. There are huge areas to traverse, quite a bit of geologic diversity, and the real possibility of detecting organisms through fluorescence imaging that are impossible to detect visually.

### **Upcoming**

- Drive to Iquique (400km)
- Select Site D camp and cargo drop

**Weather**

Mornings: Overcast, 14C, 60%RH (Antofagasta)

Afternoons: Clearing, light breeze, 10-20kph, 29C, 20%RH (Salar de Navidad)

Evenings: Clearing, breeze 40kph (max), 20C, 20%RN

**Quote of the Day**

“Argon is a noble gas. It won’t even explode, that’s beneath it.”