SMD Space Science & Astrobiology

- Rover goes to Atacama for Life Search PSTAR
- POC: Emmett Quigley (SSA), Arwen Davé
- Short story:

A rover hosting a payload of life search instruments and a drill was put through its paces in Chile’s Atacama Desert by a collaboration of code S scientists, code TI roboticists, code R engineers, and instruments PIs from Ames, JPL, Goddard, John’s Hopkins, and Spain’s Centro de Astrobiologia. The aim of this field season of the PSTAR known as ARADS was to compare drill-based observations with science excavations tracing subsurface life, biosignatures, salts, and water. The Space Science Airborne Instrument Development Lab (SSAIDL), located in N 245, supported three pieces of critical hardware: the 2-meter drillstring, the scoop for the robot arm, and the arm adaptor.

The drillstring team included Code S’s Emmett Quigley, manufacturing and field readiness expert; Code R’s Arwen Davé, for mechanical and systems engineering; and Code TI’s Dean Bergman overseeing drill and rover interfaces along with Honeybee Robotics. The team collaborated on design and development of the 2-meter drill string, and performed precision machining and modifications to support a compressed purchase-to-shipping timeline.

Fieldwork for the 2017 season required frequent change-out of the 2-meter drill string extension. The team provided new machining and field assembly processes to achieve reliable flute alignment. The payoff came when, despite daily temperatures of ~100°F, high winds, and cleanliness requiring
bunny suits, goggles, and gloves, the field team drilled more than 13 meters – the most productive field season ever with the Icebreaker drill. They performed more than 30 change-outs of the 2-meter extension.

The Scoop team included Thomas Stuckey, software engineer (TI), as well as Emmett Quigley (S) and Arwen Dave (R). The team took a 3-D printed prototype, designed by Arwen Dave at the SSAIDL, to the next readiness level, a field unit with a sheet metal body, stepper motor with programming, and a wire-EDM’d stainless steel scraper. This unit was finished in one week and supported sterile sample delivery.

And finally, a robot arm adapter was designed at the AIDL to be interchangeable with arm attachments for this and previous arms. Field kits were developed for perishable parts and sent along to support the team in the field. Honeybee and AIDL team developed an assembly and operations manual.

This is another success due to collaboration across Directorate, Center and industry, and demonstrates the SSAIDL and its core group of cross-code engineering, manufacturing, and field work experts is vital to the space science division as well as Ames.