A Worthwhile Effort: Hoping to Revive Communication with the Phoenix Mars Lander

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It's worth the effort of trying, and anything more from here on out will be considered a bonus. This seems to sum up current efforts by engineers at NASA's Jet Propulsion Laboratory to resurrect communication with the Phoenix Mars Lander, which is now sitting dormant on Mars.

More than one Earth year has passed since the last communication with Phoenix. The Mars Lander touched down in the Red Planet's northern hemisphere, above its Arctic Circle, on May 25, 2008. By all accounts the operation was a success. In fact, Phoenix exceeded its mission life expectancy. While team members hoped for just 90 days of communication, Phoenix operated well beyond this nominal timeframe, sending data back to Earth for more than five months, until its last communication on November 2, 2008.

As such, Phoenix surpassed mission expectations by sending back what engineers and scientists consider a generous collection of material for years of analysis ahead. From ice presence, to soil composition, to the first detection of snowfall, Phoenix provided vast and valuable data for further study and greater overall knowledge of Mars. Specific topics include water presence, climate history, past or present habitable environments, and potential resources for human exploration.

Winters on the Red Planet are long and unforgiving. One year on Mars spans 686 days, almost twice as long as a year on Earth. When Phoenix reached Mars in May 2008, it was early summer there with more-than-ample sunlight. As the year on Mars progressed into winter and the hours of sunlight diminished, engineers knew Phoenix would shut down. Ultimately, with no more sunlight, the solar-powered Mars Lander could no longer recharge its batteries. The electronic components were neither expected to survive such frigidity, nor withstand heavy layers of ice coating brought about by the Martian winter. Phoenix was not designed to operate beyond one Mars summer and autumn season.

Nonetheless, campaigns are underway to reestablish communication with Phoenix. The first took place in January, the second is happening now during what is mid-springtime at the landing site, and if still no signal is detected, a third campaign is scheduled for early April. These campaigns involve dozens of overflights by the orbiting Mars Odyssey Spacecraft, listening for specific UHF signals that Phoenix would send out if functioning. Despite the low probability of Phoenix surviving winter, scientists say they would be remiss to lose an opportunity for additional communication, however small. "We could still learn a lot from Phoenix," says JPL Planetary Scientist Dr. Troy Hudson. "There's a small chance of resurrecting Phoenix and talking to it again. If the resource is still there, we can use it."

Such efforts are costly and time consuming, potentially diverting resources and manpower from other, more tangible operations. "NASA's budget is not infinite," Dr. Hudson acknowledges. "Listening for Phoenix costs money. Therefore, we cannot do it forever."

As time progresses, engineers know the likelihood of reviving communication with Phoenix diminishes. Therefore, while Mars' northern hemisphere emerges from its long winter, combined with the fact this is the first time Phoenix itself is emerging from such conditions, now is considered a logical time to put forth these renewed communication efforts. Scientists concede that if they have not heard from Phoenix by April, they will most likely put their efforts to rest.

As of February 24, no signal has been detected. Still, Odyssey's overflights continue.

The Phoenix Mars Lander demonstrated itself to be a valuable resource during its five months of active data transmission. Scientists like Dr. Hudson credit Phoenix with a number of firsts in terms of scientific discovery. Phoenix proved the theoretical arguments of ice presence under the surface of Mars in its polar regions, by digging beneath the planet's surface soil. The Lander also aided in studying the soluble chemical composition of Mars' soil, by providing first-time measurements of the soil's acidity and alkalinity. Scientists for the first time established the existence of snowfall on the Red Planet, thanks to Phoenix's instrumentation to detect the presence of clouds and falling particles.

Phoenix is equipped with a camera to take photographs through a number of various filters. The Lander also contains a probe to measure soil temperature and thermal properties, as well as humidity. Gathering more data from these instruments is among the numerous exciting possibilities in resurrecting communication with Phoenix. However, for the brutal winter Phoenix faced, scientists and engineers are not holding their breaths for such new data. Still, they can imagine the potential.

Just as on Earth, one summer is not like the next, and this year's winter differs from the one before it. Did the subsurface ice that Phoenix uncovered expand over the past year, did it shrink, or did it remain largely unchanged? NASA's Jet Propulsion Laboratory might just answer such a question with the help of some fresh data.

"We can see the big picture from orbit, but ground-truth allows us to better know and understand what's happening," Dr. Hudson explains. For him, this justifies Odyssey's campaigns to reestablish a signal with Phoenix, while he remains optimistic yet realistic. "Phoenix achieved all of its original mission goals, providing plenty of data to study for years. Anything more from Phoenix now would be a bonus."

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