



A MISSION TO MARS AND A MISSION FOR ARGENTINA

By Daniel Krishock

NASA engineer Raúl Romero has two missions ahead of him. One is to help find a definitive answer to the question of whether there was ever life on Mars. The other is to continue his efforts to help Argentina's small but accomplished space program continue to grow. Both present challenges, but as someone who has spent more than three decades exploring space, he knows reaching for the stars takes time.

Born in Argentina's second biggest city, Rosario in Santa Fé province, Romero and his parents emigrated to the US when he was a teenager. While a student at the University of Southern California in the 1980s he began working part-time at NASA and after graduation he was hired as a full-time employee. Over the years he has been involved with multiple missions to explore Mars. The one he is working on now, Mars 2020, is the first in a series of missions that scientists hope will settle the question of whether there was ever life on the red planet.

"Scientists disagree on that question because all we've been able to look at is the data sent back by the rovers landed on the surface," he explains. With some scientists saying the data shows the answer is yes and others saying the answer is no or the data is inconclusive, the only way to really find out is to bring samples back to Earth.

The Mars 2020 mission rover *Perseverance*, launched in July, has travelled a third of the 300-million-mile journey to Mars and will touch down in February of next year. Since landing the first vehicle on the planet 25 years ago, NASA scientists have learned a lot about the planet's surface, so the landing spot has been carefully

picked. The rover's search for samples will be even more precise because the vehicle that weighs more than 2,000 pounds is carrying the first drone, the *Mars Helicopter*, that will be able to fly in the planet's thin atmosphere and help pinpoint the most promising areas for collecting samples.

In addition to gathering samples, *Perseverance* will also conduct tests to see whether it is possible to produce oxygen out of the planet's carbon-dioxide atmosphere. If it is, that will make future human missions easier by reducing the amount of oxygen they will need to carry.

Though the samples *Perseverance* will collect during its one Martian year (687 Earth days) mission on the planet will be left there. Over the next 10-plus years subsequent missions will carry out the tasks of placing the samples in containers, transporting the containers to a satellite orbiting the planet, and sending the satellite back to Earth in the 2030s.

Argentina's space program may not be that ambitious but Romero is impressed by what has been accomplished, primarily through INVAP, a state company founded in 1976 by the Province of Río Negro, in San Carlos de Bariloche. INVAP "started basically in a garage," says Romero, with the founders working "*a pulmon*," an Argentine expression that roughly translates as "by bootstrapping."

Forty years later, what actually started as a "lab in a shed at the local airport" devoted initially to nuclear research has developed into an impressive organization that has expanded its range of

activities, especially in the field of satellites. The company began building its first satellite in the late 1980s and has since launched several, the most recent being the SAOCOM 1B, which was carried aboard a rocket launched in August by the Elon Musk company Space X. Like all of Argentina's satellites, the SAOCOM 1B satellite is designed to support the study of Argentina's climactic conditions and topography to support the country's powerhouse agriculture industry.

Romero is amazed by the progress INVAP has made over the years. "When I went there in October, my mouth was watering," he states. He was particularly impressed that INVAP has consolidated all its testing for environmental conditions – extreme temperatures and the like -- satellites face in a single building. "At NASA we have to wheel the vehicle from one building to another," he says.

That progress is even more impressive given the hurdles INVAP, like many companies in Argentina, faces in the form of constantly changing and complex economic, political, and regulatory conditions. Like organizations anywhere in the world that are funded by the government, INVAP must also deal with changes in priorities and funding levels from its primary source of support: The National Scientific and Technical Research Council (CONICET). In addition to INVAP, Romero has developed an ongoing relationship with the National University of Tucumán's jet propulsion laboratory. Last year he also helped the Buenos Aires Planetarium in the development of a film about the solar system. As in the case of INVAP, he was impressed by the ingenuity the young team working on the project at a local film school applied in creating 3-D imagery on borrowed resources and a shoestring budget.

Romero would like to do even more to support Argentina's space program but explains he is limited on just how much he can do since the international exchange of information and technologies is governed by international treaties and protocols, as well as the regulations set by individual countries. He and a NASA colleague are working with the agency's legal department to see what they can do without "all the tie-ups" such requirements can create.

Although he has lived in the US for nearly 40 years, it appears that Romero has not lost that special Argentine talent for figuring out how to get around obstacles to get something done.-

