On a roll: Robot attempts desert voyage

When a burly four-wheel-drive vehicle set off across Chile's Atacama Desert this week, its driver was nowhere in sight. The semi-autonomous rover, called Nomad, takes its marching orders from engineers and members of the general public sitting thousands of kilometers away in North America.

Moving at less than 1 mile per hour, the robot is a prototype of the kinds of planetary explorers that may gather Martian rocks in the next century or hunt for meteorites in Antarctica, says William "Red" Whittaker, whose team developed the rover at Carnegie Mellon University in Pittsburgh. Nomad's 6-week journey comes at an auspicious time, overlapping with the Mars Pathfinder mission, which is scheduled to touch down on the Red Planet with its own small rover on July 4.

Whittaker chose the Atacama Desert for testing Nomad because the region has virtually no vegetation and a landscape similar to that of the moon or Mars. "The Atacama Desert is the place on Earth most like another planet," he says.

Funded mostly by NASA, the Nomad project has a goal of traversing 200 kilometers of desert terrain with the robot under remote supervision. Roughly the size of a compact car, the rover's large aluminum wheels can turn independently and extend out from the chassis for added stability on uneven terrain. It has three sets of stereo cameras in front and a 360° panospheric camera that enables remote drivers to see all around the robot.

While visitors to the Carnegie Science Center will be able to pilot Nomad, others can track its progress over the World Wide Web at http://img.arc.nasa.gov/Nomad/nomad.html and at http://www.ri.cmu.edu/atacama-trek/.

Scientists at the NASA Ames Research Center in Mountain View, Calif., plan to spend a week testing Nomad in three mock missions designed to simulate rock collecting on Mars, long-distance exploration on the moon, and meteorite collecting in Antarctica. Within the next 2 years, the Carnegie Mellon team plans to take Nomad on a meteorite-hunting trip in Antarctica to determine whether the robot can detect buried meteorites that get overlooked by human collectors, says Whittaker.

Veteran Antarctic researchers, however, are not holding their breath. When Whittaker last brought a robot to Antarctica, in 1992, the eight-legged machine called Dante walked only a few steps before it was crippled by a broken fiber-optic cable (SN: 1/9/93, p. 22).

Ralph Harvey of Case Western Reserve University in Cleveland, who has spent 21 field seasons searching for meteorites in Antarctica, says that robots could help in limited ways. "A robot can work on days that would make a human feel pretty uncomfortable, such as when the winds get above 20 knots and the air temperature drops below 20° below zero."

In better weather, though, robots will not be able to match humans' ability to pick out the few meteorites amid the thousands of terrestrial pebbles in many locations. "There is simply no tool for finding meteorites as good as the human brain and eye," says Harvey. *—R. Monastersky*

Carnegie Mellon

In a test, the half-ton robot called Nomad assesses the safety of the terrain before responding to remote commands.

Hubble images capture colliding supernovas

Astronomers have for the first time caught supernova remnants in the act of colliding. Although observers had seen evidence of past interactions between these shells of gas and dust blown off by exploded stars, the new images offer a rare glimpse of them "actually pounding into each other," says William P. Blair of Johns Hopkins University in Baltimore.

Such snapshots are not easy to come by. Supernova collisions last only a few hundred years—a mere blink of the eye compared to most processes in astronomy—as shells of material race through each other. Indeed, the fleeting encounter reported last week might have gone unnoticed had astronomers not been intrigued by a point of light in a galaxy 17 million light-years from Earth.

Lying near one of the spiral arms in the galaxy NGC 6946, the point glows brightly in visible light and even more brilliantly in X rays, according to ground-based observations by Blair's team and data from the German-British satellite ROSAT. Blair assumed he had come across a supernova only a few hundred years old—a tantalizing find, as such objects are relatively scarce and provide insight into the massive stars from which they arose.

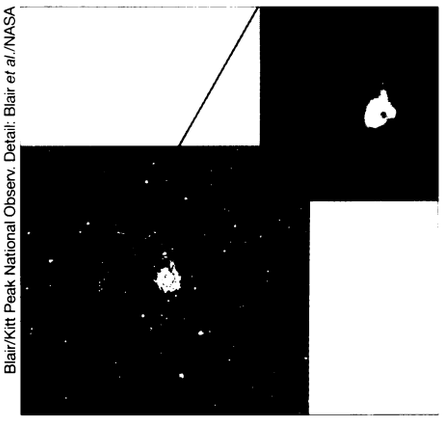
Visible-light spectra of the object revealed that it could not be young, however. The remnant had neither the enrichment of heavy elements nor the high velocity expected of material recently hurled from an exploded star. "It really took the wind out of my sails," says Blair.

The sharp eye of the Hubble Space Telescope showed that Blair's team had bagged an even rarer quarry. The images depict a moderately young remnant, about 25 light-years in diameter and 2,000 years old, crashing into one or two older, larger remnants that appear as interlocking loops. The collision generates the X-ray and visible-light emissions, Blair says.

Since 1917, astronomers have observed six supernovas in NGC 6946, leading Blair to speculate that the current smashup could be the start of a much larger process in which a slew of colliding supernovas blows a giant network of bubbles within the galaxy (SN: 11/21/92, p. 342).

Blair, along with Robert A. Fesen of Dartmouth College in Hanover, N.H., and Eric M. Schlegel of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., reported the finding at a meeting of the American Astronomical Society in Winston-Salem, N.C.

Such observations, says John C. Raymond of Harvard-Smithsonian, may help determine whether supernova explosions heat a substantial fraction of the interstellar gas in the Milky Way or whether their energy is confined to much smaller regions in the galaxy. *—R. Cowen*



Blair/Kitt Peak National Observ. Detail: Blair *et al.*/NASA

False-color image of the galaxy NGC 6946, taken from the ground, shows a point of light originally thought to represent a single supernova remnant. Detail: The Hubble Space Telescope reveals a bright crescent marking the site where the shell of gas from a relatively recent supernova explosion is plowing into a larger shell from another, older explosion.