

Magellan: Sharp images, startling silences

Already haunted by Hubble's troubles, a grounded shuttle fleet and a mirror defect in the next generation of U.S. weather satellites, NASA found its current showcase satellite, the Venus-orbiting Magellan, suddenly silenced on Aug. 16.

Radio transmissions resumed about 12 hours later, but contact ceased again on Aug. 21.

The craft had finished nearly two orbits in its first radar scanning of Venus—recording the sharpest images ever obtained of the planet's cloud-soaked surface—when the initial interruption occurred. For some reason, Magellan had automatically gone into a "safe mode," a shift designed to protect it by turning the solar panels toward the sun to maintain a constant supply of electrical power. This jerked the craft's antenna off line from Earth and broke radio contact.

Magellan resumed communications with Earth last week only after it had entered a second safe mode, which sent information at 40 bits per second instead of the usual 1,200.

As engineers and scientists were analyzing the situation early this week, NASA officials said Magellan was healthy and expressed optimism they could and would solve its problems. Then, contact unexpectedly ceased again.

Though tense and uncertain about the transmission problems, Magellan scientists expressed elation at the five hours' worth of data obtained during the first test of the craft's radar-mapping prowess, and at the computer-generated images the two-orbit scanning yielded.

"The radar-processing people have had super success in producing images from the data so far. I'm just totally blown away by the beauty of these pictures," project scientist R. Stephen Saunders of NASA's Jet Propulsion Laboratory in Pasadena, Calif., told SCIENCE NEWS.

As engineers aligned and checked out the spacecraft's radar for its initial mapping test, "predictions were that we were only going to get about 10 locations along the orbit," says Magellan science manager Thomas W. Thompson of the Jet Propulsion Lab. "Instead, we have almost all of the [two orbits]."

"I was just expecting to get a few little postage stamps, and we got the whole roll," Saunders adds. "I think that probably many, many journal articles could be written even about the data we have already."

NASA has released three images, each showing part of a large geologic feature called Beta Regio, discovered in the 1960s by Earth-based radar telescopes. In the 1970s, planetary scientists suggested Beta Regio resulted from volcanism. The Magellan pictures show such details as a multi-ringed volcanic basin and smooth

lava plains, as well as ridges and grooves whose varying roughness suggests they formed from a number of eruptions rather than a single volcanic event.

The clarity of Magellan's first images increased officials' hopes that the craft would soon recover its full voice and begin its long-term mapping of Venus on Sept. 1 as planned.

Analysis of the first communications loss identified three contributing factors but not the root cause.

For one, a signal from the computer in Magellan's positioning system had unaccountably failed to communicate with the craft's main computer. That led the main computer to switch to a safe mode and break radio contact with Earth.

The main computer also directed the craft's star sensor to locate and lock on the star Sirius—a maneuver that would have aimed Magellan so that its medium-gain antenna pointed toward Earth, reestablishing communications. But the sensor failed to find Sirius, perhaps because a solar flare or the sun glinting off a loose paint chip fooled the star finder, engineers suggest.

Finally, the craft shifted to a second safe mode, in which it turned in a conical motion that eventually allowed its antenna to lock on Earth.



Magellan radar image depicts part of the eastern flank of a major volcanic area on Venus called Beta Regio. Detail at right shows the resolution achieved, revealing features as small as 120 meters across. Earth-based radar images of the same area have shown nothing smaller than 1 kilometer.

When silence struck a second time on Aug. 21, Magellan engineers hurriedly met to assess the situation. Early the next morning, with meetings still underway, Thompson told SCIENCE NEWS they could only hope that Magellan was still in a safe mode and that the solar panels were still charging the batteries. — J. Eberhart

Schizophrenia, depression share brain clue

Scientists have identified a brain region apparently involved in both schizophrenia and severe depression, two of the most incapacitating psychiatric disorders. The finding, which confirms clinical observations of some overlap between schizophrenia and depression, stems from the largest positron emission tomography (PET) study of psychiatric patients to date, says Richard J. Haier of the University of California, Irvine.

The PET scans show that people with schizophrenia or depression, compared with healthy individuals, have a substantially lower metabolic rate in the brain's frontal lobes and basal ganglia, according to Haier and Irvine colleagues Monte S. Buchsbaum and William E. Bunney. These areas regulate language and other types of complex thought.

The scans reveal differences as well, Haier's group reported last week at a meeting of the International College of Neuropsychopharmacologists, held in Kyoto, Japan. These arise in the limbic system, which regulates emotion. While structures in the limbic system show lowered metabolism among schizophrenics, limbic metabolism runs unusually high among depressed individuals.

"It's hard to say if metabolic rates in specific brain areas relate to specific psychiatric symptoms," Haier points out.

"But as we study bigger samples, we hope to identify subcategories of schizophrenia and depression with PET."

The researchers examined 40 severely depressed individuals, 18 schizophrenics and 28 healthy controls. Depressed participants had not used antidepressant drugs for at least several weeks. Schizophrenic volunteers were recruited through Irvine-area psychiatrists and had never taken an antipsychotic medication.

All participants received an injection of harmless, short-lived, radioactive glucose isotopes, which the brain used for energy. A PET scanner recorded gamma rays emitted as the isotopes decayed, revealing areas of high and low brain activity. A computer transformed this information into color-coded images of brain metabolism (SN: 4/30/88, p.280).

Clinicians had previously noted links between depression and schizophrenia. For instance, depression sometimes involves delusions and hallucinations, while schizophrenia can include secondary signs of depression. Moreover, antipsychotic drugs sometimes ease depression, and antidepressants sometimes quell symptoms of schizophrenia.

"These are two separate disorders, but they share disturbed metabolism in a common brain area," Haier concludes.

— B. Bower