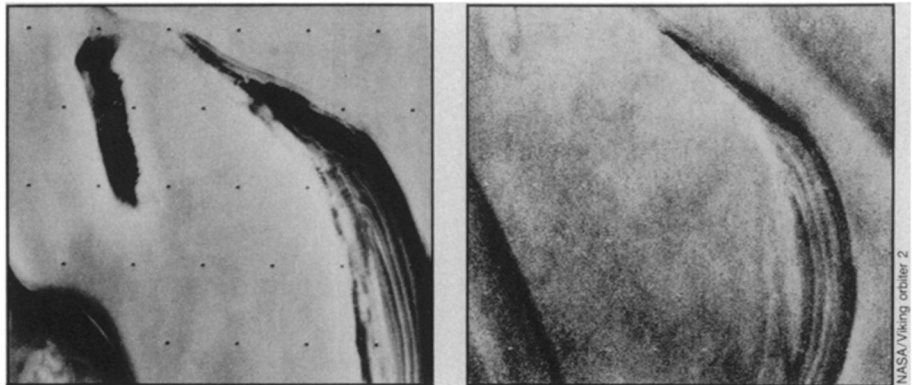


A Cold Winter for Viking Too

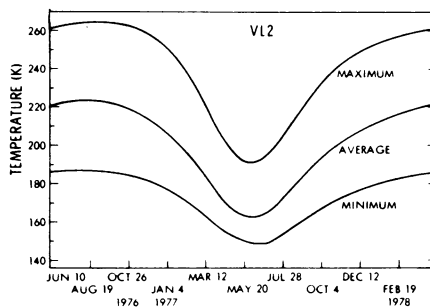
As record-breaking cold paralyzes much of the United States, officials at the Jet Propulsion Laboratory in Pasadena are beginning to worry that the cold of Mars may paralyze the Viking 2 landing craft. The spidery robot is less than 43° of latitude away from the planet's north pole, and fears are that falling temperatures, expected to bottom out in early June, could get low enough to crack the tape in the data recorder, jam mechanical parts such as the antenna swivels and soil-sampling arm, and freeze the fluids in the biology instruments.

A major factor in the advancing chill is the increasing opacity of the northern atmosphere, caused primarily by hazelike clouds of water-ice crystals which cut down the amount of the sun's warmth that reaches the Martian surface. Photos taken by the Viking orbiters in recent weeks show a radical change from pictures of the same regions as little as two months before. The surface features that stood out so starkly on the polar cap, for example, now appear hazy and greatly reduced in contrast, as the sunlight is scattered and attenuated by the condensate clouds.

Temperatures at the site in Utopia Planitia are only slightly below those predicted by Viking's thermal mapping team. But the model that yielded the predictions, though it was based in part on observations made when hazes were present, does not take into account a possible major seasonal change in the atmosphere's opacity. Team leader Hugh H. Kieffer of the University of California at Los Angeles points out that the model also neglects possible warming effects such as the ability of stronger surface winds, should they develop, to stir in more heat from the ground. But, he says, "It's my feeling that most of the ground will be covered with carbon dioxide frost all day long during the late winter," and even a slight increase in the predicted amount of daytime frost could appreciably lower the temperature. Lander 2, Kieffer acknowledges, may find itself in "an honest-to-God polar environment."



Martian north polar feature, photographed on Oct. 12 and Dec. 21, shows haze effects.



Cold predictions for lander 2 site.

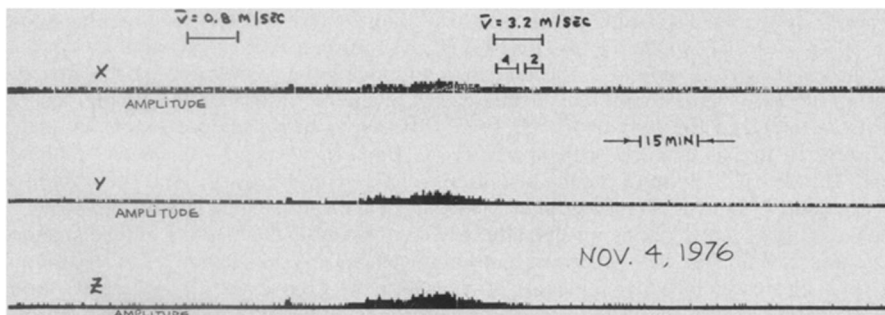
There is some difference of opinion about how to keep the lander from freezing to death. Some Viking engineers maintain that the best medicine for moving parts such as the spacecraft's two camera systems is simply to move them a lot—to go on using them rather than to let them sit idle, protected only by thermostatic control of the lander's numerous heaters in hopes that they will thaw out later on. Only a finite amount of heat can be dedicated to such purposes anyway, since project officials do not want to drain the batteries more rapidly than the nuclear power supplies can recharge them.

In any event, shutting the lander down completely, says mission director Calvin Broome, is out. "If we did that," he says, "it would be all over. We'd never get it back." If the cold does reach critical

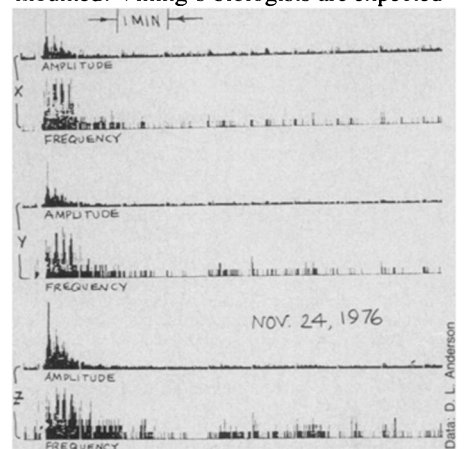
levels, the likeliest option so far will be to "cycle" the heaters in the gas-chromatograph/mass-spectrometer, to keep using one or both of the cameras, and to continue collecting data from the meteorology and seismology instruments. Lander 2's seismometer is the only working instrument of its kind ever to have operated on the Martian surface (its twin on lander 1 is still stuck), and its recent detection of two apparent Marsquakes less than three weeks apart (SN: 1/29/77, p. 68) has made it one of the most closely watched of all of Viking's scientific tools. An attempt to shut it down, says one engineer—who is not even on the seismology team—"would probably start a war."

The data-storage tape recorder, however, says Broome, would probably have to be mothballed, for fear of cracking the backing material of the tape itself. While it was shut down, the lander would use only its computer memory bank, probably restricting earthbound data transmissions to two a week.

Still, Broome points out (only half-seriously, one suspects), there is another potential source of warmth on board; in fact, it could heat the whole "science bay" where most of the instruments are mounted. Viking's biologists are expected



Lander 2 seismic traces may show the only Marsquakes ever recorded, the second at 15 times the sampling rate of the first.



to finish working with the spacecraft in May, and their instrument package contains numerous temperature-control devices. "One final grand and glorious use of the \$60 million biology instrument," says Broome, "may be to use it as a heater."

The killing cold is not here yet, however, and lander 2 this week began a month-long attempt to gather real, solid rocks instead of just more fine material for its inorganic-chemistry experiment.

Two major spectaculars are in store for orbiter 1. This month, the probe's path will be changed to carry it on nearly a dozen close flybys of Phobos, the larger Martian moon. The closest pass, scheduled for Feb. 23, should take the craft to within 70 kilometers of Phobos's surface, yielding photos of objects as small as a few meters across. Then, pending resolution of a computer problem, the orbiter will be shifted again, this time to fly within 300 kilometers of Mars itself. □

Element 126: 'No evidence'

Great excitement was caused by the announcement last June that a group of physicists had found evidence for the existence of element 126 and some other ultraheavy elements in samples of monazite, an ancient mineral from Africa. Skepticism and controversy were generated when various experimenters could find no such evidence in other pieces of monazite (SN: 12/4/76, p. 357).

One of the leaders in the first experiment, Robert V. Gentry of Oak Ridge National Laboratory, has now done the experiment in another way, one that avoids the controversial ambiguity of the first method. In the Jan. 31 PHYSICAL REVIEW LETTERS he, C. J. Sparks Jr., and three other Oak Ridge experimenters report that the new method shows no evidence for element 126 or any other super-heavies.

The first experiment had irradiated the monazite with protons. The protons were expected to energize atoms in the monazite, and these atoms would then give off characteristic gamma rays. But critics pointed out that protons might have energized several things at once, and the result would be confusion between gamma rays characteristic of element 126 and those from processes involving known elements. In their latest experiment, the Oak Ridge group used synchrotron radiation from the Stanford Linear Accelerator Center's SPEAR storage ring. Synchrotron radiation is monochromatic and tunable to a particular energy level, so the confusion inherent in the proton experiment doesn't arise. "Our results show," they say, "that none of the superheavy elements are present in the giant-halo inclusions studied." □

Scientists answer the creationists

Since Copernican cosmology, no other scientific theory has caused such controversy and public debate as the theory of evolution. From the Huxley-Wilberforce debates of 1860 to the Scopes "monkey" trials of 1925, evolutionary principles repeatedly have clashed with fundamentalist belief which holds the book of Genesis as the literal account of creation.

In recent years the creation-evolution debate has been rekindled, primarily because of the organized efforts of groups like the Creation Research Society, the Institute for Creation Research and other fundamentalist groups. A new biology textbook based on "creationist" teaching has been gaining acceptance in some school districts, and many state legislatures and school boards now are considering whether the creation theory should be given equal time in the classrooms with modern evolutionary theory.

To support their claims, the creationists have published several books and technical monographs criticizing evolution on scientific grounds and pointing out the differences of opinion among evolutionists on specific details. As an alternative to the evolutionary view, the creationists posit that the Bible must be the source of information about the origins of earth.

Although some scientists think the resurgence of the evolution-creation debate ludicrous, the growing political strength of the creationists has alarmed others. The American Humanist Association (AHA) has now issued a statement signed by 179

prominent scientists, educators and religious leaders affirming evolution as a principle of a science. The 650-word statement, which is being sent to major school districts in the United States, is published in the January/February HUMANIST, along with 18 pages of supporting articles (the lead one by the noted biogeologist Preston Cloud). On the sponsoring committee were Bette Chambers, president of the AHA, Isaac Asimov, Hudson Hoagland, Chauncey Leake, Linus Pauling and George Gaylord Simpson. The scientists call on school boards, teachers and textbook publishers to oppose the "equal time" laws pending in several state legislatures and to reject the concept that evolution is a tenet of a religion of a "secular humanism."

"There are no alternative theories to the principle of evolution, with its 'tree of life' pattern, that any competent biologist of today takes seriously," the statement reads. "Evolution is the only presently known scientific and nonreligious explanation for the existence and diversity of living organisms. It is therefore the only view that should be expounded in public-school courses on science, which are distinct from those on religion."

The statement, Chambers says, is intended to make clear to the public that there is no dispute within science about the validity of evolution. Some question whether such statements have any positive effect, but, she says, not to issue it would be "intellectual cowardice." □

The year of the earthquake

If 1977 goes down as the year of the terrible winter, 1976 must be remembered as the year of the earthquake. According to estimates from the U.S. Geological Survey, as many as 695,000 people died last year in earthquakes and quake-related disasters. The only world quake death toll exceeding this was recorded in 1556 when 830,000 people died in China.

Almost all of the fatalities last year were again located in China, where official estimates are placed at 655,000, although some observers regard the figure with some skepticism. All the same, two earthquakes in other areas of Asia, both registering over 7.0 on the Richter scale, could also have caused more deaths, but none have been reported.

In case the numbers become too inconceivably large, it should be remembered that in 1975 only 1,350 deaths were reported from earthquakes, and in 1974, there were only 5,000.

Oddly enough, 1976 was a little below average in number of "major" earthquakes, those 7.0 or greater on the Richter scale. An average of 19 major earthquakes occur each year, but in 1976 only 18

major earthquakes were recorded.

Waverly Person, the geophysicist at the Survey's National Earthquake Information Service who compiled these figures, explained that the large number of deaths was due to the occurrence of the stronger quakes in areas of high population or less resistant building construction.

In the United States, the strongest quake registered only 5.0, and no deaths or injuries were reported at all.

While earthquakes were wreaking havoc around the world, volcanoes lay relatively quiet. Only 10 new eruptions were located last year, compared with 24 in 1975. Evacuations prior to eruptions played a major role in saving lives. Although La Soufriere in Guadeloupe and Cotopaxi volcano in Ecuador never erupted, similar evacuations did save lives in the major eruptions at Taal in the Philippines and Api Siau in Indonesia. Now geophysicists are gearing up for a major eruption of Mauna Loa, the world's largest volcano, located on the island of Hawaii. Scientists at the Geological Survey predict the bursts to begin by the summer of 1978. □