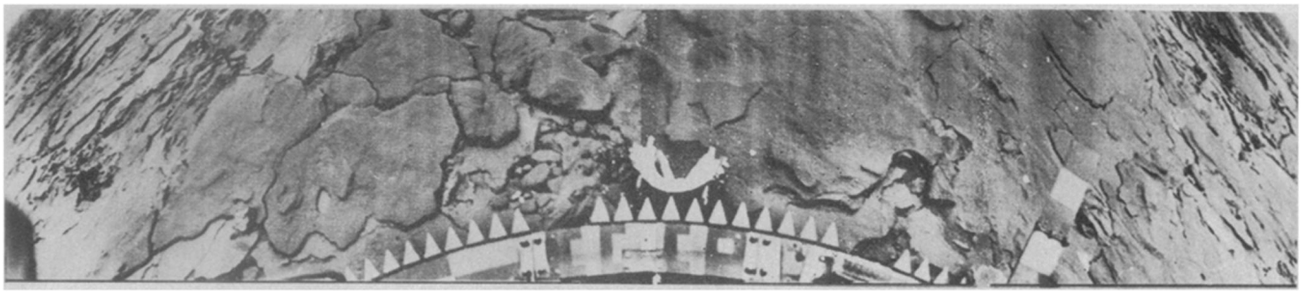
The other side of Venera 14: Capturing Venusian evolution?



The possibility of basaltic lava flows on Venus has been anticipated from studies of radar data, gravity maps, radionuclide measurements and other analyses, and additional evidence for basalt has come from the major-element chemistry provided by X-ray fluorescence spectroscopy data from the recent Soviet Venera 13 and 14 landing craft (SN: 3/27/82, p. 214). In addition, however, the landers took four pictures of the surface (one of which has since been processed in color — see p. 248) — a feat accomplished only twice before, by Veneras 9 and 10 in 1975. And among the tiny gallery of half a dozen photos, perhaps the classic example of a familiar, flow-layered basaltic lava terrain is shown in the Venera 14 image above.

The lander reached the surface of the planet on March 5, carrying a pair of cameras angled down on opposite sides of the craft's bulbous body. (One of its photos, together with both black-and-whites from Venera 13, appeared in the March 20 SN.) The conspicuous fine material evident in the Venera 13 images is almost absent here, leaving a clean view of smooth-but-fractured, layered plates. A glance might suggest mere flat bedrock, but details such as the hole in the slab just above the landing-ring's left end strongly point to a layered evolution of the terrain. Is Venus still adding new layers? □

Astronomers' wish list for the decade of the '80s

When you wish upon a star, it *can* make a great deal of difference who you are — if you're a committee of prominent astronomers. At the beginnings of two past decades, the 1960s and the 1970s, the National Academy of Sciences has empaneled an advisory committee of astronomers to review the state of the science and to recommend policy for the coming decade. Now the group empaneled for the 1980s, chaired by George B. Field of the Harvard-Smithsonian Center for Astrophysics, is presenting its report.

These committees have a good track record. Most of what they have proposed has been done in whole or in part. The biggest recommendation of the 1970s report, the Very Large Array radio telescope, is now functioning to general satisfaction on the high plains of New Mexico. Undoubtedly much of the credit is due to the ability of these panels to achieve agreement on one overall program by representatives from all factions and specialties of astronomy and then to generate support for it from the astronomical community at large. To quote the current report: "Assignment of priorities to the four major new programs required intensive discussion, which resulted in unanimous agreement."

Those four major programs are, in order of priority:

- An Advanced X-ray Astrophysics Facility, which would be a permanent national observatory in space and would be designed to give X-ray pictures comparable in depth and detail to those of the best optical and radio telescopes (estimated cost $500 million).
- A Very Long Baseline Array of radio telescopes designed to give a resolution of details down to 0.3 milliarcseconds on radio maps. Such an array would link a series of antennas stretching from coast to coast. Resolution of this kind could reveal details of the centers of quasars and active galaxies and possibly pin down the nature of the spectacular sources of energy within them (estimated cost $50 million).
- A new Technology Telescope, an optical telescope with a 15-meter-diameter mirror. This would provide a ten-fold increase in light-gathering power at visible wavelengths and a hundredfold increase in speed for spectroscopy at infrared wavelengths. "The committee finds the scientific merit of this instrument to be as high as that of any other facility considered and emphasizes that its priority ranking does not reflect its scientific importance but rather its state of technological readiness" (estimated cost $100 million).
- A Large Deployable Reflector in Space, a mirror in the 10-meter class to carry out observations in the far infrared and submillimeter wavelengths that are inaccessible from the ground (estimated cost $300 million).

There are seven moderate new programs, recommended in "rough" order of priority:

- An augmentation of the NASA Explorer program (estimated cost $200 million).
- A far ultraviolet spectrograph in space to carry out a thorough study of the wavelength range between 900 and 1,200 angstroms (estimated cost $150 million).
- A space very-long-baseline-interferometry antenna. Connected to ground based arrays of antennas, it would extend the baseline of their work and greatly increase the resolution of radio maps (estimated cost $60 million).
- Construction of optical/infrared telescopes in the 2.5-meter class. Existing facilities of this class are heavily oversubscribed with requests for observing time. This is a leftover from the 1970s report (estimated cost $20 million).
- An Advanced Solar Observatory in Space (estimated cost $200 million).
- A series of cosmic ray experiments in space (estimated cost $100 million).
- An astronomical search for extraterrestrial intelligence (SETI). Because of the nature of this kind of study, the committee recommends a moderate but continuous effort projected for a very long term (estimated cost $20 million).

Last, but not necessarily least, the committee endorses four small new programs. The one of highest priority is a 10-meter-diameter antenna for submillimeter wave radio observations, another leftover from the 1970s report (estimated cost $4 million). The other three are a spatial interferometer for the mid-infrared range, extending the detail-resolving capabilities of interferometry to this range ($3 million); a high-precision optical astrometry program for more precise measurements of stellar positions ($3 million); and a temporary program to maintain scientific expertise at U.S. universities, essentially a program to establish temporary new job slots for young astronomers, who face particularly dismal prospects over the next decade due to falling college enrollments and a very low rate of expected retirements (estimated cost $10 million).

For the decade the total program (including certain support activities) would cost $1,720 million — roughly equivalent, says the committee, to the support actually given in the 1970s. — *D. E. Thomsen*