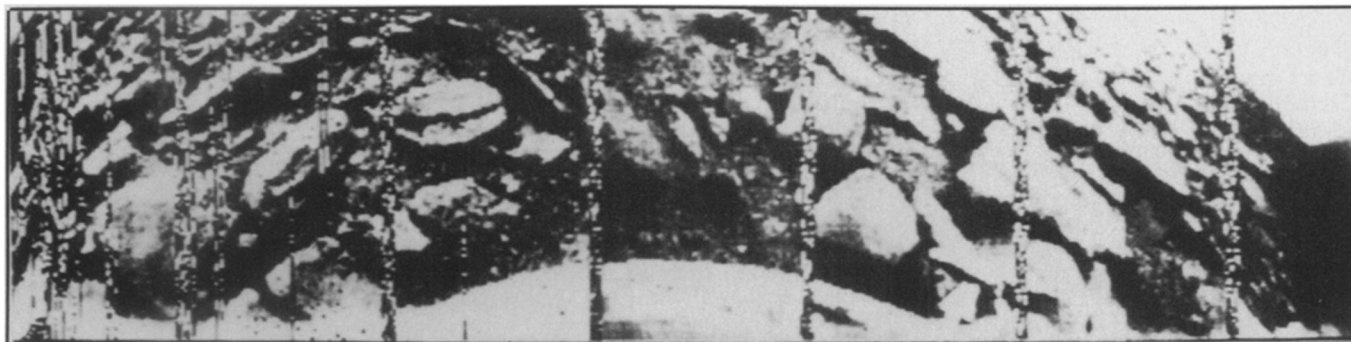


Grand Unveiling of the Rocks of Venus



Wide world

First surface photo of Venus: Venera 9 sends back photo of unexpectedly angular, rocky terrain, formerly hidden by clouds.

Tenaciously, the planet Venus had held onto its reputation as a world of mystery, wrapped in dense, murky clouds that block the view of earth-bound astronomers and crush intruding space probes like children's toys. Last week a corner of the veil was lifted.

The two Soviet craft that accomplished the feat—Venera 9 and Venera 10—apparently lasted only 53 and 65 minutes respectively on Venusian soil, yet together they nearly tripled the time spent by functioning, manmade objects on that inhospitable wasteland. And for the first time, they gave earthlings a look.

Five times before, Soviet probes had descended to the surface of Venus, but the first three were apparently dead—victims of heat and pressure—before they got there. Only Veneras 7 and 8 were able to transmit after landing, and no pictures were included in their combined 73 minutes of data. The U.S. Mariner 10 took pictures, but only from far above the cloud tops as it flew by on its way to Mercury.

Launched June 8 (SN: 6/14/75, p. 382), Venera 9 went into orbit around the cloudy planet on Oct. 20. Previous visitors had either simply flown by, like Mariner 10, or headed straight for the surface like the U.S. Ranger or Surveyor probes to the moon. For two days the Soviet craft orbited the planet before detaching a parachute-equipped descent stage that would make the trip to the ground. From the top of the Venusian atmosphere, according to Soviet officials, the descent took one hour and 15 minutes, with much of the braking accomplished by the spacecraft's dished radar antenna (the parachute reportedly was jettisoned 31 miles up).

And then: the first picture. Until that moment, many scientists had felt that even if a spacecraft survived the hostile environment, it would be unable to "see" anything, at least by visible light, on the cloud-dimmed Venusian surface. If something were visible, it would be impossibly distorted by the dense atmosphere, or at least enough that the horizon

would appear to bend upward at the sides, like the view from within a huge bowl. Venera 9 (and, three days later, Venera 10) seems to have shown them wrong.

And, appropriately for a quixotic planet, the first images from the surface of Venus have already raised their share of questions. The initial photo, apparently taken with the camera looking almost straight down (suggesting that mission officials wanted to ensure at least one picture before moving anything), contains remarkably clear views of some sharp-edged, angular rocks. According to Boris Nepoklonov, one of the mission scientists quoted by the Soviet news agency Tass, "This seems to knock the bottom out of the existing hypothesis by which the surface was expected to look like a desert, covered with sand dunes because of constant wind and temperature erosion." In fact, he says, "even the moon does not have such rocks. We thought there couldn't be rocks on Venus—they would all be annihilated by erosion—but here they are, with edges absolutely not blunted. This picture makes us reconsider all our concepts of Venus."

Part of the explanation, a U.S. researcher suggests, could be the low wind speed, which Venera 9 reported as only about 1.8 miles per hour. But this and previous Veneras have also confirmed expectations of a surface atmospheric pressure some 90 times that of earth, which would mean that a lot more energy—and, presumably, potential for erosion—is bound up even in slow-moving winds. In addition, earth-based observations have strongly indicated the presence of sulfuric acid and possibly other corrosives, which could have an erosive role.

But the rocks are there, apparently about 12 to 16 inches across in the down-looking photo. The picture, says Venera scientific director Mikhail Marov, is "so sharp that we can class the stones as young rocks, since we can clearly see sharp angles and flat sides."

An important question is why the surprisingly sharp rocks also seem to have

surprisingly sharp shadows. If the Venusian atmosphere diffuses incoming sunlight as broadly as has been expected, why are not the shadows either faint or multi-directional, if not completely absent? Soviet officials gave no immediate indication of whether the landing craft carried their own lighting, or even of the wavelengths at which the images were made.

The second craft, Venera 10, reached the surface on Oct. 25, following a June 14 departure from earth. Touching down about 1,375 miles from its predecessor, it showed a horizon about 200 to 300 yards away, with an intervening terrain said to be strikingly different from that shown by Venera 9. Soviet researchers described the view as that of an old mountain formation with smooth, rounded rocks that seemed nearly flat, much more in keeping with theories of severe erosion. Between the rocks, reported Tass, were regions of debris resembling cooled lava or weathered rock.

Earth-based radar studies of Venus have revealed a number of huge craters which could represent either volcanic or meteor-bombardment effects, although the dense atmosphere would seem to mitigate against such large meteorites getting to the surface intact. In fact, says Aleksandr Badilevsky of the Soviet Institute of Geochemistry, the discovery of some of the sharp-edged, apparently newer rocks "testifies to recent catastrophic processes like volcanic eruptions or earthquakes. . . . Venus, apparently, is internally active."

Understanding the processes that are shaping the surface of Venus will not be easy—the photographs offer far more tantalization than explanation—and it will require a much greater knowledge than now exists of the environment in which such shaping takes place. The two probes, for example, report surface temperatures of 869 and 905 degrees F., similar to previous data, and such heat, together with its effects on surface chemistry, makes Venus a one-of-a-kind laboratory for investigation. □