

1981

162)

Venera 13

Nation: USSR (98)

Objective(s): Venus flyby and landing

Spacecraft: 4V-1M (no. 760)

Spacecraft Mass: 4,363 kg

Mission Design and Management: NPO

Lavochkin

Launch Vehicle: 8K82K + Blok DM (Proton-K no. 311-01 / Blok DM no. 5L)

Launch Date and Time: 30 October 1981 / 06:04 UT

Launch Site: NIIP-5 / launch site 200P

Scientific Instruments:

Flyby bus:

- 1) magnetometer
- 2) cosmic-ray detector
- 3) solar wind detectors
- 4) Signe-2MS3 gamma-ray burst detector

Lander:

- 1) x-ray fluorescence spectrometer and drill
- 2) x-ray fluorescence spectrometer for aerosols
- 3) imaging system
- 4) pressure and temperature sensors
- 5) mass spectrometer
- 6) Groza-2 lightning detector
- 7) gas chromatograph
- 8) nephelometer
- 9) spectrophotometer

10) accelerometer

11) humidity sensor

12) prop soil mechanical/electrical probe

13) seismometer

Results: Venera 13 was one of the third pair of heavy Venus flyby/lander probes launched towards Venus by the Soviet Union in the 1970s (after Venera 9/10 and Venera 11/12). The Soviets picked the landing site for Venera 13 based on information passed on by NASA from the Pioneer Venus Orbiter vehicle. The Venera 13/14 combination had an improved set of instruments (such as the spectrophotometer, the gas chromatograph, and the mass spectrometer), including a redesigned soil sampler. After two midcourse corrections on 10 November 1981 and 21 February 1982, the Venera 13 lander separated from its parent on 27 February 1982. The capsule entered the Venusian atmosphere and began relaying atmospheric data back to the flyby probe, which continued to fly past the planet after a 36,000-kilometer-range encounter. After a roughly 1-hour-long descent, the lander set down on the Venusian surface at 03:57:21 UT on 1 March 1982. Landing coordinates were 7.5° south latitude and 303° longitude. The probe continued to transmit for another additional 127 minutes, far beyond the planned lifetime of 32 minutes. The probe found temperature and pressure to be 465°C and 89.5

atmospheres, respectively. Venera 13 repeated the attempts at color surface photography (using red, green, and blue filters) that failed on Veneras 11 and 12 and succeeded by relaying to Earth the first color photographs of the surface of Venus. Venera 13 returned eight successive panoramas showing a field of orange-brown angular rocks and loose soil. Successful soil analysis (which failed on Veneras 11 and 12) showed soil similar to terrestrial leucitic basalt with a high potassium content. The flyby module entered heliocentric orbit. Its engine was fired on 10 June 1982 as part of a test for the anticipated Halley's Comet flyby.

163)

Venera 14

Nation: USSR (99)

Objective(s): Venus flyby and landing

Spacecraft: 4V-1M (no. 761)

Spacecraft Mass: 4,363.5 kg

Mission Design and Management: NPO

Lavochkin

Launch Vehicle: 8K82K + Blok DM (Proton-K no. 311-02 / Blok DM no. 6L)

Launch Date and Time: 4 November 1981 / 05:31 UT

Launch Site: NIIP-5 / launch site 200L

Scientific Instruments:

Flyby bus:

- 1) magnetometer
- 2) cosmic-ray detector
- 3) solar wind detectors
- 4) Signe-2MS3 gamma-ray burst detector

Lander:

- 1) x-ray fluorescence spectrometer and drill
- 2) x-ray fluorescence spectrometer for aerosols
- 3) imaging system
- 4) pressure and temperature sensors
- 5) mass spectrometer
- 6) Groza-2 lightning detector
- 7) gas chromatograph
- 8) nephelometer

- 9) spectrophotometer
- 10) accelerometer
- 11) humidity sensor
- 12) prop soil mechanical/electrical probe
- 13) seismometer

Results: Venera 14 was identical to its twin, Venera 13. The spacecraft carried out three midcourse corrections on the way to Venus: on 14 November 1981, 23 November 1981, and 25 February 1982. Russian sources indicate that one of the corrections was incorrect (probably the first) and could have jeopardized the mission. The lander probe separated from its flyby parent on 3 March 1982 before the entry cycle began. The probe's main parachute opened at an altitude of 62 to 63 kilometers, thus activating the atmospheric instruments. The parachute was released at an altitude of 47 kilometers, and the 760-kilogram lander fell to the surface using only the atmosphere as a retarding medium. The probe made safe contact with the Venusian surface at 07:00:10 UT on 3 March 1982 and continued with 57 minutes of transmissions. Landing coordinates were 13.25° south latitude and 310° longitude, about 1,000 kilometers from the Venera 13 landing site. As with its twin, Venera 14 returned color photographs of its surroundings and examined a soil sample (about 1 cubic centimeter taken from a 30-millimeter-deep sample). Soil was deposited in a chamber sealed off from the outside environment and was then progressively transferred through a series of chambers by blowing air until the sample was deposited in its final chamber with a temperature of only 30°C. Here it was examined by the x-ray fluorescence spectrometer. Temperature and pressure outside were considerably higher than at the Venera 13 site: 470°C and 93.5 atmospheres, respectively. The flyby probe, meanwhile, passed Venus at a range of 36,000 kilometers and entered heliocentric orbit, continuing to provide data on solar x-ray flares. It performed one trajectory change on 14 November 1982.