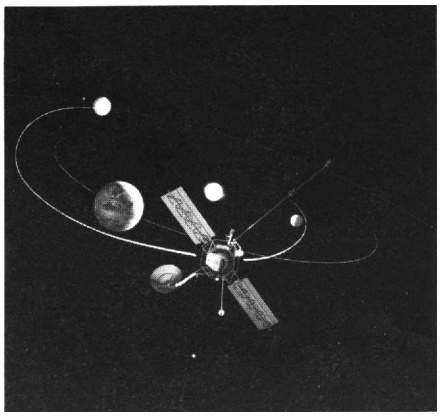
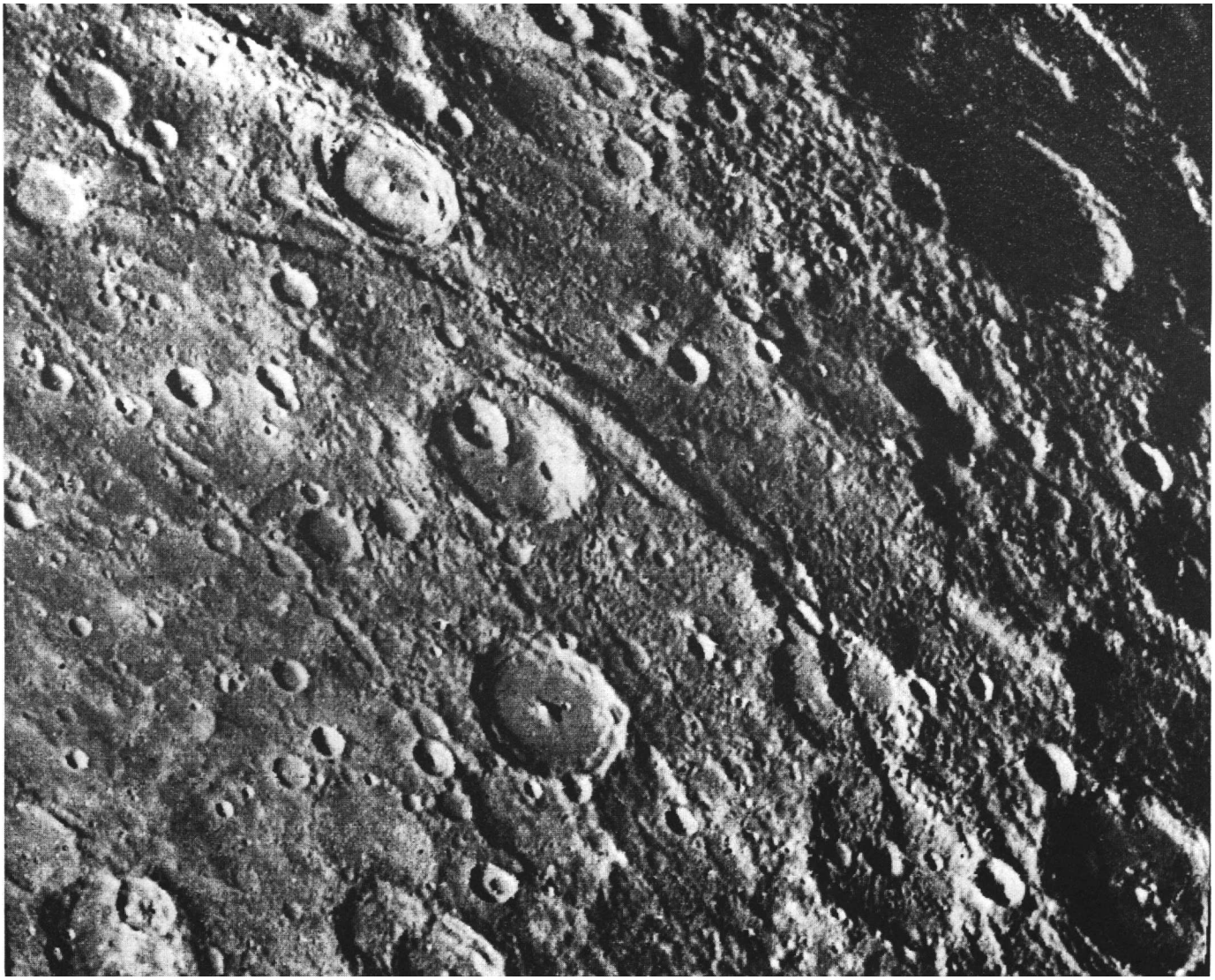


MARINER VENUS / MERCURY 1973
STATUS BULLETIN

MARINER 10's Mercury II Encounter Successful - Now Enroute to Mercury III



A scarp, or cliff, more than 300 kilometers (185 miles) long extends diagonally from upper left to lower right in this Mariner 10 picture of Mercury taken on September 21. Numerous similar structures have been discovered by Mariner 10 during the television sequences on the spacecraft's second flyby of the planet. These structures are believed to be formed by compressive forces due to crustal shortening. The picture was taken from 64,500 kilometers (40,000 miles).

MARINER VENUS/MERCURY 1973 PROJECT OFFICE
Jet Propulsion Labratory California Institute of Technology
National Areonautics and Space Administration
Pasadena, California

23 SEPTEMBER 1974
BULLETIN NO. 36

Mariner 10 obtained this picture of an area 460 by 640 kilometers (285 by 400 miles) in the Southern hemisphere of Mercury during its second encounter with the planet on September 21, 1974. Taken from a distance of 78,000 kilometers (48,000 miles), the photo reveals a heavily cratered terrain with a prominent scarp extending several hundred kilometers across the upper left. A 40-kilometer-diameter (25 miles) crater, nested in a larger crater, 120 kilometers (75 miles), is at top center. A basin about 240 kilometers (15 miles) in diameter is barely discernible at lower right. Crater chains produced by material ejected from a larger crater located outside the field of view appear at lower left. The smallest details detected measure about 1.7 kilometers (one mile).

Mariner 10 re-encountered its friend the planet Mercury and immediately began sending pictures the 170 million km (105 million miles to earth every 42 seconds. Approximately 2000 photographs were taken.

The bright-side pass expanded the photographic coverage and pictures of the South Polar region were taken for the first time. The bright-side pass also provided better viewing angles of areas already photographed.

The new pictures showed a number of sharp-faced scarps or ridges, some rising as high as three miles and extending over 300 miles. These scarps differ from anything found on the Moon or Mars.

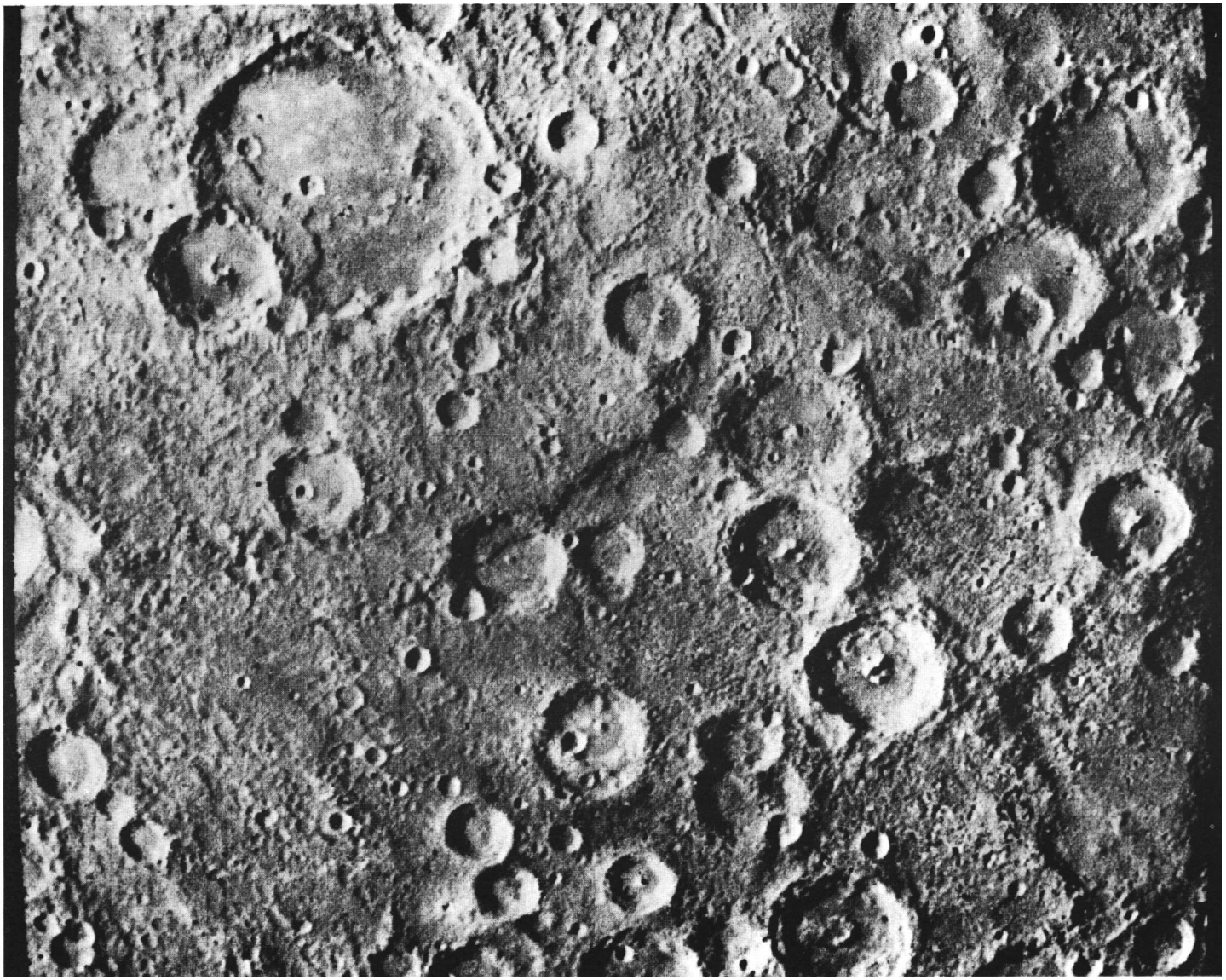
On Sunday evening the preliminary conditioning of Mariner 10 was initiated to place it in solar sailing condition. The TV cameras were turned off and the platform placed in a stowed condition.

Enough propulsion fuel remains for two more maneuvers which will place Mariner on a course for a dark-side pass of Mercury on 16 March 1975.

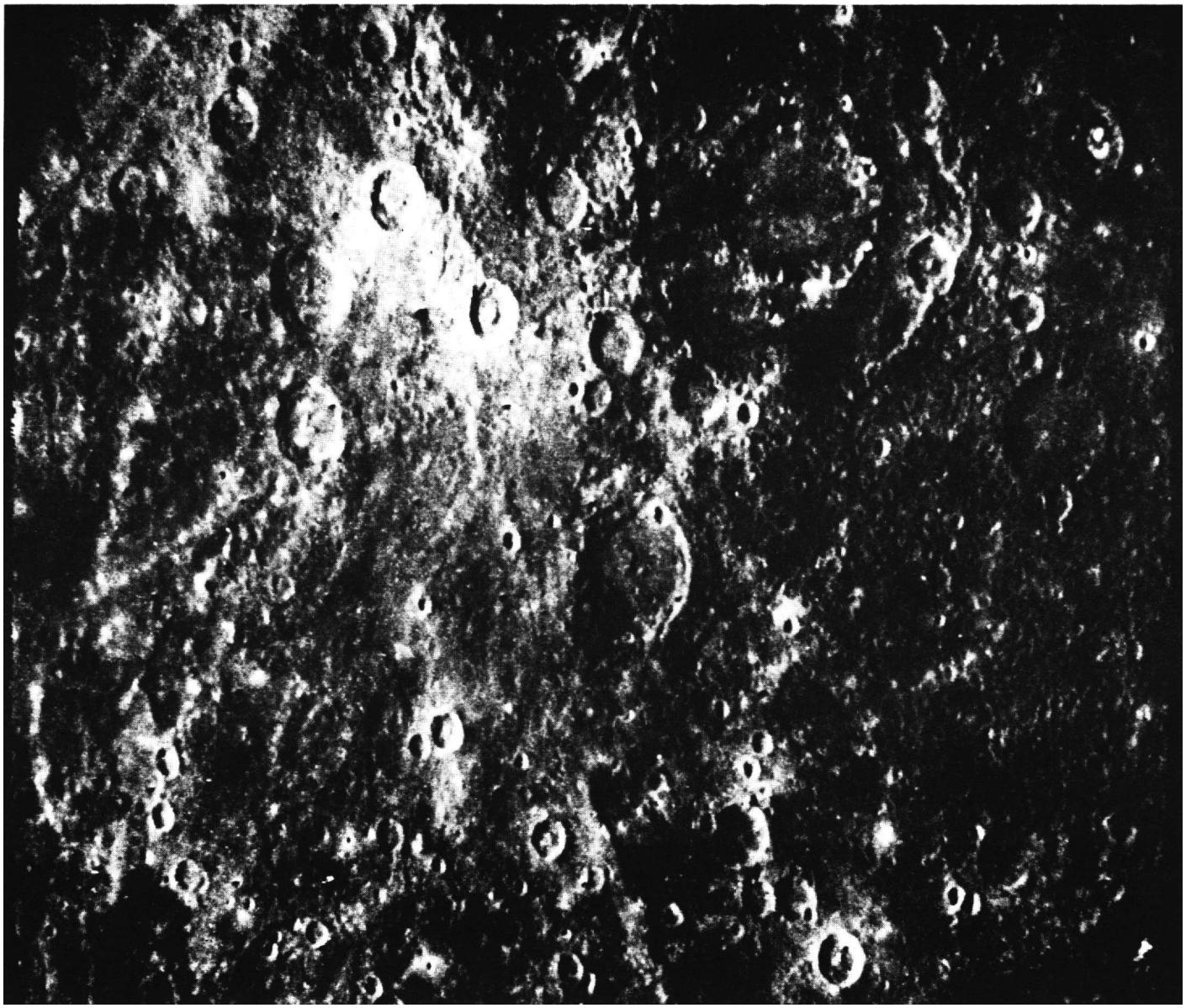
This imaging encounter enabled us to collect scientific data from the other instruments. The data system was configured so the priority for real-time data was given to imaging. As a result, the Charged Particle Telescope and Magnetometer experimenters have not as yet had an opportunity to review their data. The Plasma Science investigators did see some interesting phenomena changes in the plasma. Details cannot be provided until that data is correlated with the Magnetic Field experimenters as to whether it is a planet-related phenomena. Data was also collected with the Ultraviolet Spectrometer. This encounter was very fruitful for UVS as the spacecraft drifted slowly across the planet and collected data in a slow manner and obtained good statistics The upper limit data of the planet's atmosphere will be reduced by an order of magnitude. The helium abundance will be refined, and it may be possible to deduce if the helium is planet derived as opposed to solar-wind derived.

When the data from these experiments has been compiled, a preliminary report of these scientific experiments will be issued in a Status Bulletin.

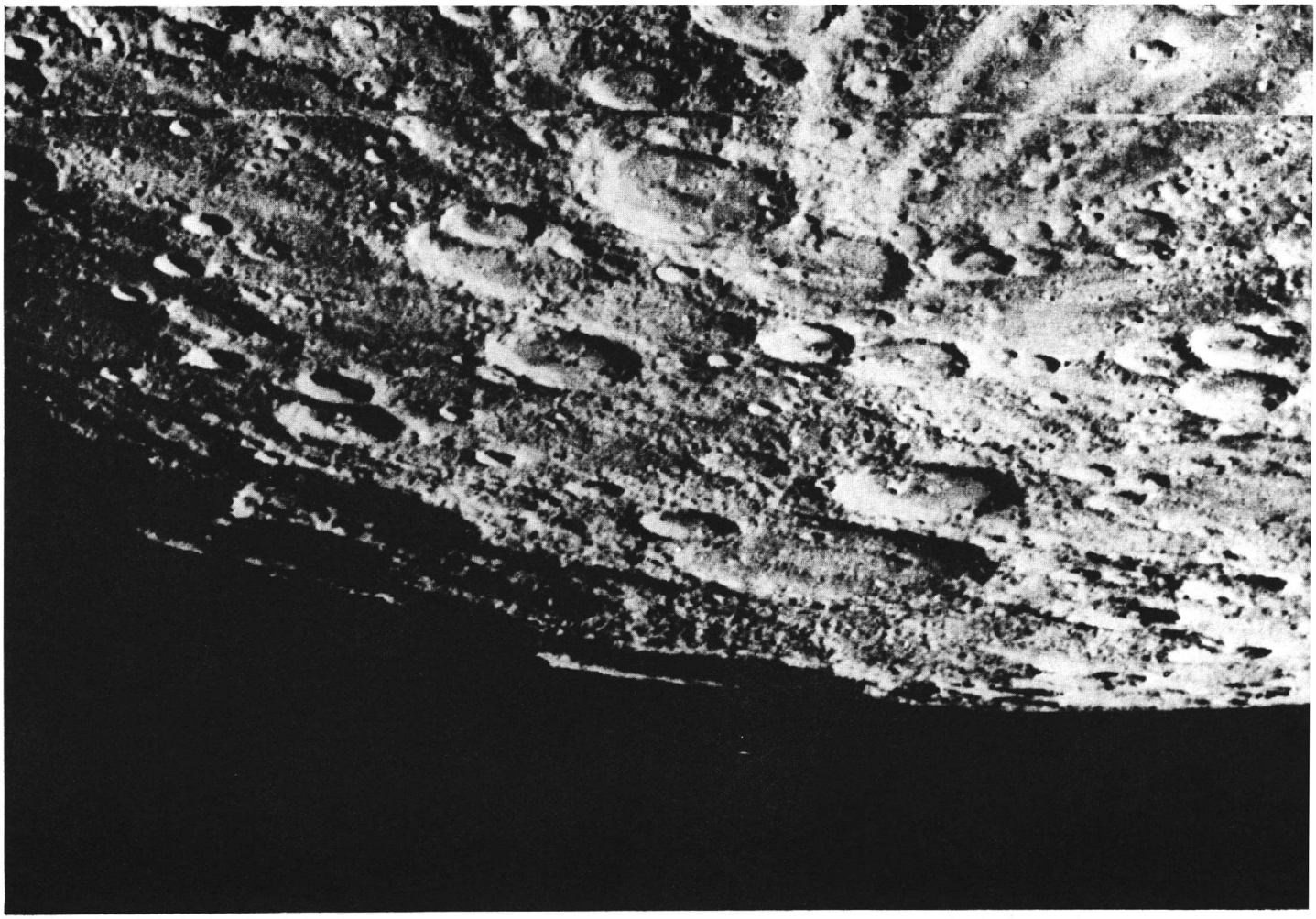
Status Bulletin.



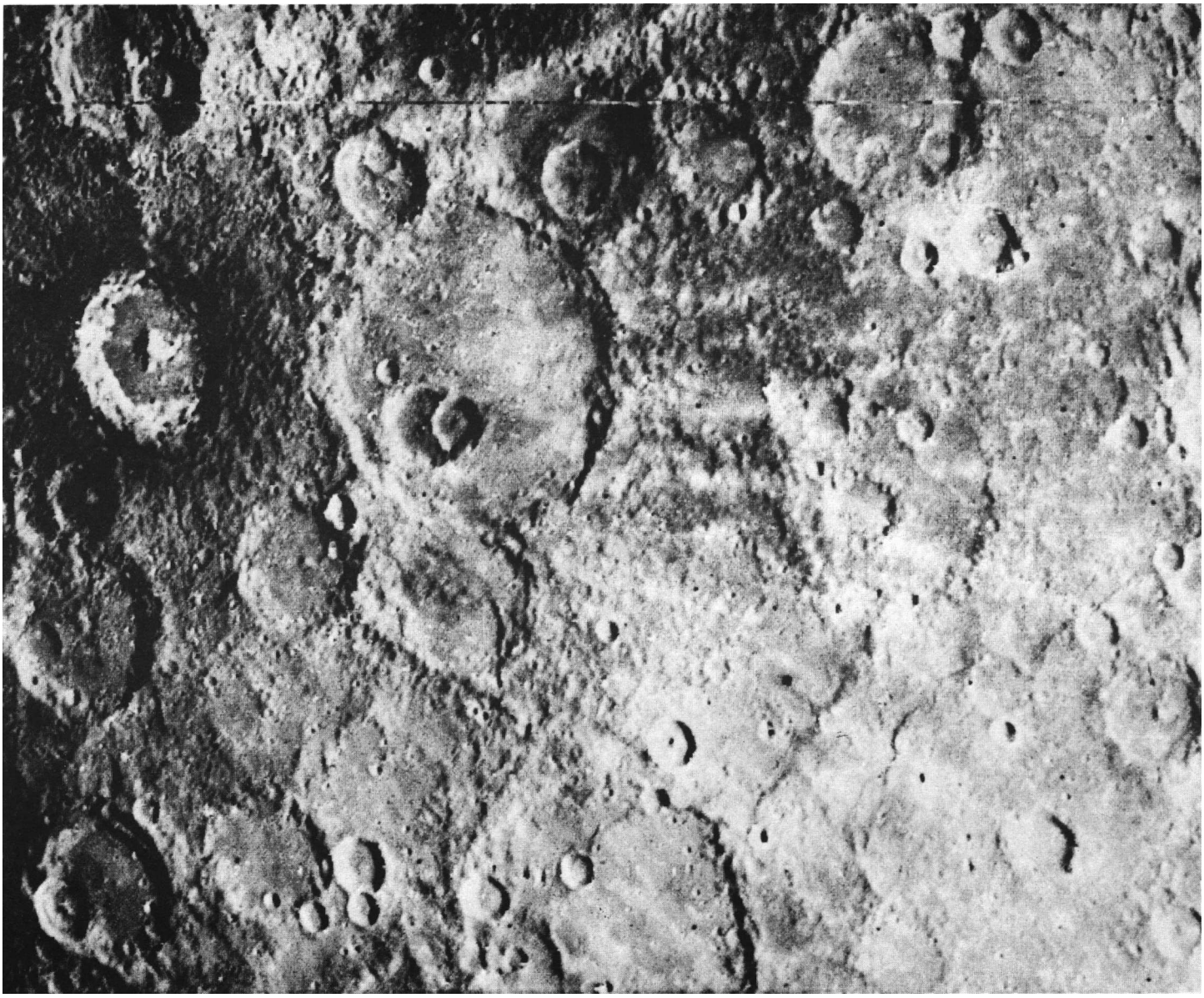
One of Mariner 10's two TV cameras took this picture of a densely cratered region of Mercury at 12:39 p.m. PDT, September 21, 1974 – 80 minutes prior to the spacecraft's second close encounter with the planet. Taken from a range of about 76,000 kilometers (47,000 miles), the picture shows a scarp, or cliff, two kilometers (7500 feet) above the surrounding area and is part of a larger system of faults which extends for hundreds of kilometers. Mariner 10, which mapped about one-quarter of Mercury's surface last March, is the first spacecraft to return to its target planet.



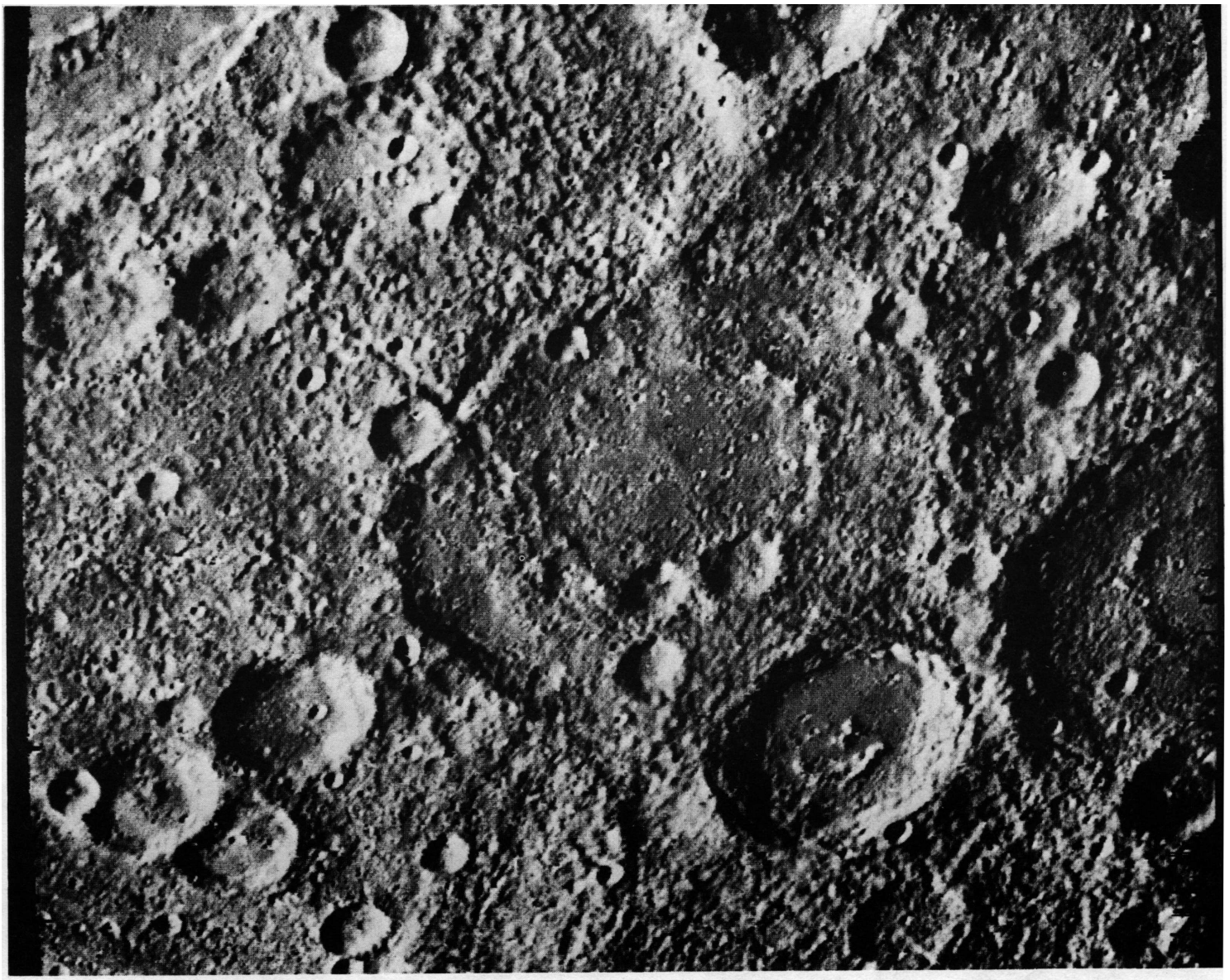
A faint double ring crater is seen at upper right in this picture of Mercury taken one hour and 40 minutes before Mariner 10's second rendezvous with the planet September 21. Located at 35° S. Lat., the outer ring is 170 kilometers (100 miles) across. Double ring craters are common features on Mercury. This particular feature and the bright rayed crater to its left were seen from a different viewing angle in pictures taken by Mariner 10 during its first Mercury flyby last March 29.



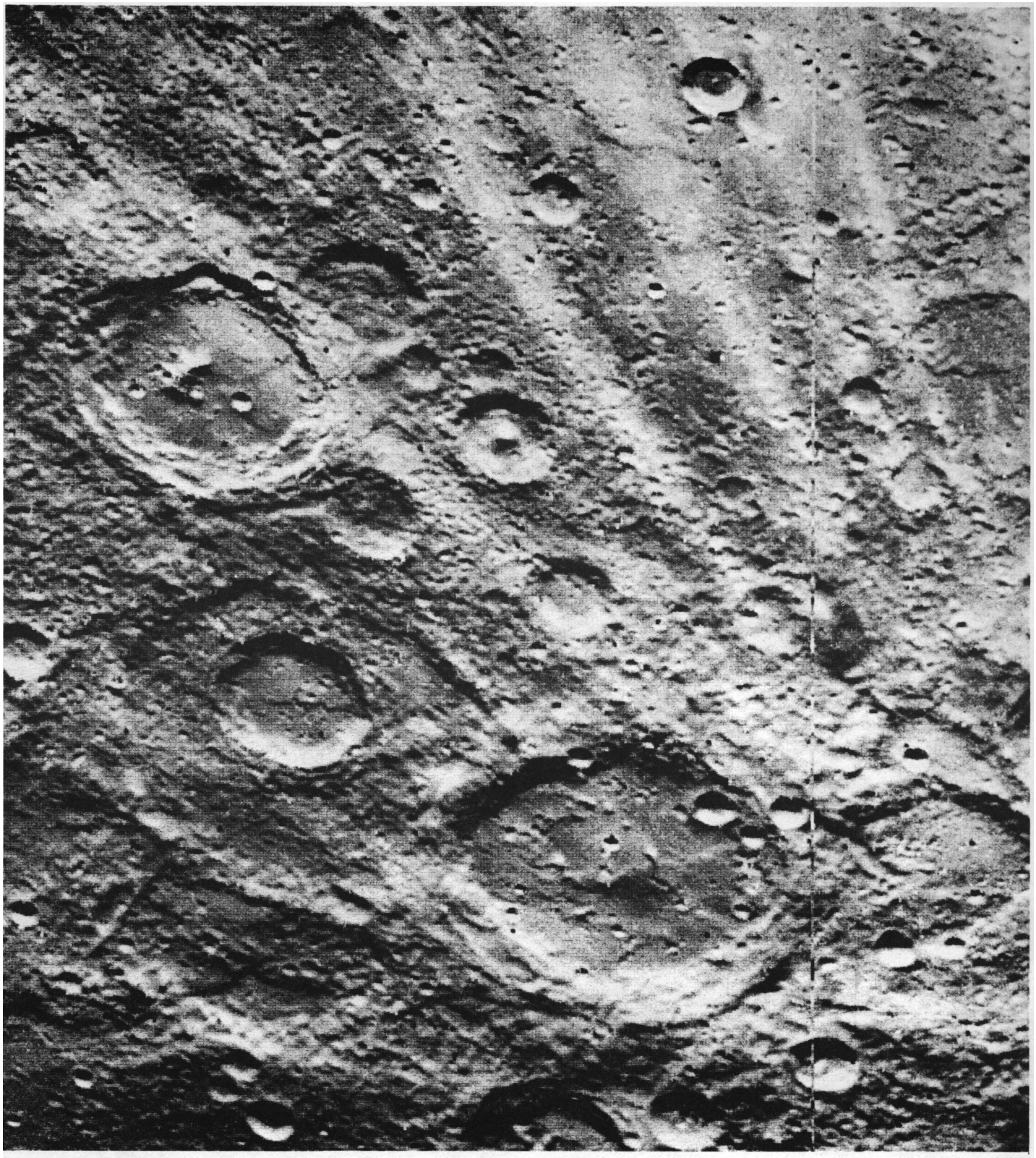
Mercury's south pole was photographed by one of Mariner 10's TV cameras as the spacecraft made its second close flyby of the planet September 21. The pole is located inside the large crater (180 kilometers, 110 miles) on Mercury's limb (lower center). The crater floor is shadowed and its far rim, illuminated by the sun, appears to be disconnected from the edge of the planet. Just above and to the right of the south pole is a double ring basin about 200 kilometers (125 miles) in diameter. A bright ray system, splashed out of a 50-kilometer (30-mile) crater is seen at upper right. Stripe across the top is an artifact introduced during computer processing. The picture was taken from a distance of 85,800 kilometers (53,200 miles) less than two hours after Mariner 10 reached its closest point to the planet.



Mariner 10 took this picture from a distance of 63,400 kilometers (39,300 miles) about an hour after it passed under the south pole of Mercury. The dark-rimmed crater at upper left is 67 kilometers (42 miles) in diameter. It is surrounded by an extensive ejecta blanket and exhibits a bright ray pattern which extends into and beyond the larger crater (120 kilometers, 75 miles) to its right and near the picture's center. The dark-rimmed crater is similar to crater Tycho on Earth's moon. The center of this picture is located 33° S. Lat., 158° W. Long. North is to the top.



Taken about 40 minutes before Mariner 10 made its close approach to Mercury on September 21, this picture shows a large (230 kilometers, 142 miles) double-ringed basin (center of picture) located in the planet's south polar region — 75° S. Lat., 120° W. Long. The basin was seen from a different viewing angle on Mariner 10's first sweep by Mercury last March. This picture was taken from about 55,000 kilometers (44,000 miles). North is toward upper left.



A field of bright rays — created by ejecta from a crater — radiating to the north (top) from off camera (lower right) is seen in this view of Mercury taken September 21 by Mariner 10. Source of the rays is a large new crater to the south, near Mercury's south pole. Mariner 10 was about 48,000 kilometers (30,000 miles) from Mercury when the picture was taken at 2:01 p.m. PDT, just three minutes after the spacecraft was closest to the planet. Largest crater in this picture is 100 kilometers (62 miles) in diameter.