60,000—70,000 km. from the moon, and about 470,000 km. away from the earth. The photographing continued for about 40 minutes. The special orientation system which included optical and gyroscopic pick-ups, logistic electronic devices and control machines, insured the orientation of the satellite with regard to the sun and the moon necessary for photographing the invisible side.

The first published photograph of the moon's circular disc shows about three-fourths of the hidden side and about one-fourth of the seen side with features already known to man. The latter enables one to piece together the hitherto unseen lunar objects and those already known, and thereby to determine their selenographic co-ordinates. It is now possible to determine the true form of several known lunar formations, specifically the Southern Sea, whose considerable portion is located on the other side of the moon. The photographs show that mountainous areas occupy most of the moon's reverse side and there are very few seas of the kind seen on the side facing the earth. There is a mountain range stretching over 2,000 km. to the south-southeast of the Humboldt Sea. It crosses the equator and continues into the southern hemisphere. Beyond the mountain range is an extensive mainland with a heightened reflective capacity. There is a crater sea about 300 km. in diameter between 20 and 30° latitude North and 140 and 160° longitude West. This has been named the "Sea of Moscow". The bay in the southern part of this sea has been called the "Bay of Astronauts". Other craters clearly discernible in the photograph have been named "Tsiolkovsky", "Lomonosov" and "Joliot-Curie".

SOLAR ORIGIN OF THE OUTER ZONE OF TRAPPED RADIATION

EXPERIMENTS with three space rockets, *viz.*, Pioneer III, the first Russian cosmic rocket and Pioneer IV, which were launched on different dates inside of three months, have provided confirmatory evidence for the solar origin of (at least) the outer zone of the trapped radiation surrounding the earth (see *Curr. Sci.*, 1959, 28, 229). The two U.S. deep-space probes Pioneer III and Pioneer IV were launched on December 6, 1958, and March 3, 1959, respectively, while the Russian cosmic rocket was launched on January 2, 1959. The Pioneer programmes were conducted under the same space investigation project so that the scientific equipments for collection and transmission of data in the payloads of the two probes were practically identical. Hence from a comparison of the two sets of observations fairly reliable conclusions could be drawn, especially regarding temporal changes in the trapped zones (see *Nature*, 1959, 184, 219).

One striking fact that has emerged from this comparison is that the intensity of the trapped radiation in the outer zone was enormously greater on March 3, 1959, than on December 6, 1958; at the same time the region of maximum intensity had extended some 15,000 km. farther out. Thus at distances from the centre of the earth of 40,000, 45,000 and 50,000 km., the counting rates of the two respective Anton 302 Geiger tubes (with tested identical characteristics) were 55, 20 and 8 with Pioneer III, as against 16,000, 2,400 and 230 respectively, with Pioneer IV. The region of maximum intensity was 20,000-25,000 km. with Pioneer III, while it was 32,000-42,000 km. with Pioneer IV. It is to be noted that the observations with the Russian cosmic rocket showed that the general character of the outer zone was much the same on January 2, 1959 as it was on December 6-7, 1958.

Geophysical observations showed that there was a magnetic storm on February 25 and that there were auroræ of strong intensity on February 25-28 and on March 1. A special study of these phenomena revealed that there were at least three sequences of geophysical events starting on February 25, March 26, and April 23 respectively, which were due to intense M-region activity in the Sun. It is very significant that the launching of Pioneer IV was preceded by days of geophysical disturbances, whereas Pioneer III and the Russian cosmic rocket were launched during quiet geophysical periods.

These facts suggest that the large temporal differences shown by the Pioneer observations are due to changes that had taken place in the outer zone following strong corpuscular emission from the Sun. Pioneer IV has thus provided direct evidence for the solar origin of the outer radiation zone.