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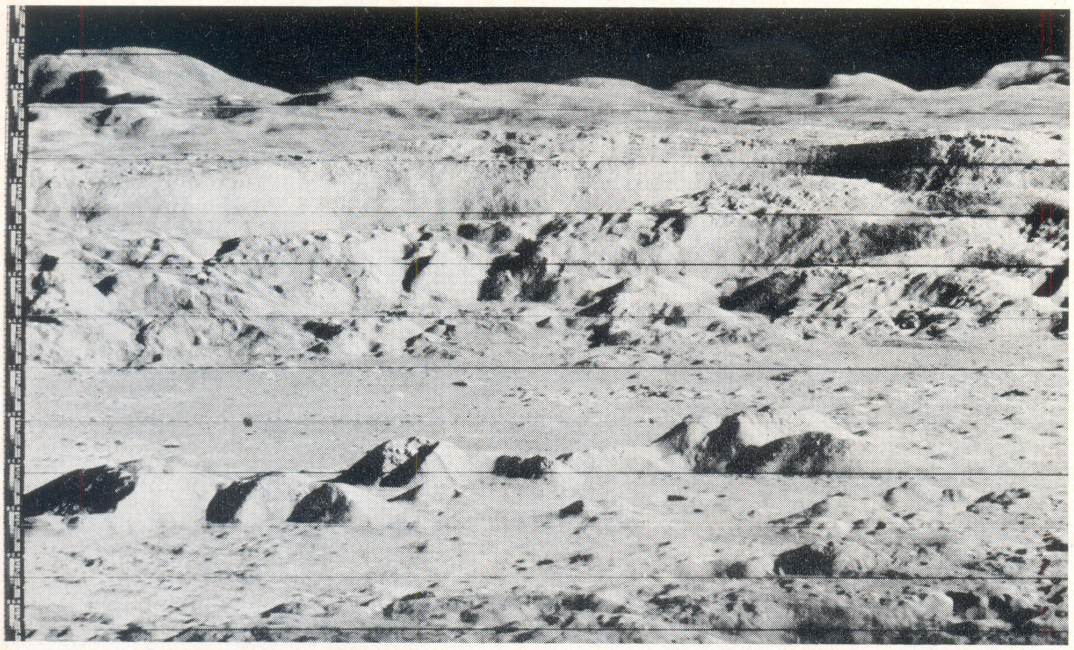
PHOTOGRAPH OF COPERNICUS?



Sirs:

In November 1966, the National Aeronautics and Space Administration had released to a number of major scientific journals and popular magazines, a lunar photograph taken by Orbiter II based on the belief that it was of the crater Copernicus. Since then, many astronomers have privately commented that the frame furnished by the spacecraft did not correspond to the topographic characteristics of Copernicus shown by the photographs taken from Earth, such as those of the Mount Wilson and Palomar Observatories. The possible difference between photography taken from only 28 miles above the lunar surface and that taken from Earth explains why such astronomers have never publically criticized the interpretation of the picture. It must be also said, however, that few astronomers accepted the interpretation of NASA and have even prepared scientific reports about the inner structure shown by the high lunar resolution photograph.

From August 1966 to August 1967, the writer was preparing at the NASA Manned Spacecraft Center a study about the characteristics of the lunar surface in order to support the Lunar Apollo Program. The study has been done by using the "successive transformations method", which is a discovery made from astronomical observations and is useful for predicting any kind of data. Because of this ability for predicting any kind of data, four reports were then prepared at the Manned Spacecraft Center with the purposes of predicting the optimum lunar landing site for a manned spacecraft (Report No. 1), obtaining the effective temperature of the lunar surface (Report No. 2), predicting the safest lunar landing area for an astronaut (Report No. 3), and analyzing the Surveyor and Orbiter photographs (Report No. 4). It must be said that the "successive transformations method" had the following previous applications: Spectral classification of the type B stars with photoelectric photometry observations sponsored by the National Science Foundation; confirmation of such spectral classification with spectroscopic observations sponsored by the North Atlantic Treaty Organization (Paris, France); a study of the microwave radiation of the Venus atmosphere by NASA at the Illinois Institute of Technology Research Institute (Chicago, Illinois) and a study of the distribution of blue stars in our galaxy with radioastronomical observations sponsored by the Carnegie Institution of Washington.

In reference to the application to lunar study, the performances of the "successive transformations method" are as follows: The landing site predicted in Report No. 1 is now finally included in the Apollo Lunar Program; the effective temperature of the lunar surface predicted in Report No. 2 for areas other than those of Sureveyor I has been confirmed by Surveyor III; the lunar surface composition predicted in Report No. 3 has been confirmed by Surveyor V and the actual location of Surveyor I on the Moon predicted in Report No. 4 has been confirmed by the corresponding Orbiter III photograph of the area where the spacecraft landed. Also in Report No. 4, the analysis of the Orbiter II photograph said to be of Copernicus was undertaken with the purpose of confirming by means other than optical observations, the lunar photographic information furnished by the Orbiters.

For analyzing the Orbiter II photograph cited above, the relevant features of the medium resolution frame were drawn on a transparent plastic with the purpose of comparing their distribution with those suggested by the "effective temperature contours" obtained from extrapolation to the entire lunar surface of the temperature datum furnished by Surveyor I. Such contours are different for depressions, ridges, mountains and craters on the Moon's surface and for this reason the corresponding distribution for each of the lunar features can be easily distinguished in a lunar photograph. From this comparison, it was found that the "effective temperature contours" for Copernicus did not match the distribu-

tion of features shown by the picture. The same comparison was then made with other major craters close to Copernicus by using the best lunar maps available, and the result obtained is as follows: The distribution of features shown by the Orbiter II photograph perfectly matched that of the "effective temperature contours" corresponding to the crater Kepler. After this identification, a final test was made by jointly locating the relevant lunar features of the frame, furnished by the spacefraft, on the Orbiter III photograph of Kepler and corresponding topographic information furnished by the lunar map. In that manner, conclusive evidence was obtained that the Orbiter II picture is that of Kepler and not of Copernicus.

In view of the fact that the North Atlantic Treaty Organization and the European Space Research Organization analyze the findings of the American and Russian lunar research, and also in view of the fact that the confirmation of the ability of the "successive transformations method" for the study of any kind of data was only possible with the sponsorship of NATO, the writer has taken the initiative to inform some European people about the lunar studies made at the Manned Spacecraft Center. It then was quickly realized that the identification made about the Orbiter II photograph's feature was very important in the sense that it could have profound effects upon where the first man lands on the surface. Therefore, Report No. 4 has been translated into French and the information about the picture mistakenly thought to be Copernicus is to be released soon. It must be also said that the NASA's Administrator was informed by the writer about the mistaken identification made by NASA, about the translation into French of Report No. 4, and about the forwarding to him of a copy of the French edition through the United States Senate, Committe on Aeronautical and Space Sciences.

The writer is not surprised about the incorrect identification because of the many possible sources of errors. Among such errors, for instance, one can mention faulty radar calibration of the spacecraft based on the present Earth-based data about the Moon, calibration of the sensors for the reflecting sunlight coefficient, also based on Earth-based data, and the complex topography of the lunar area of that crater caused by the multifaceted configuration of the lunar surface. This last characteristic of the surface of the Moon is the most adequate explanation of why Kepler was mistaken for Copernicus, even though Kepler is one-fourth as large as Copernicus and is about 18 degrees in longitude away from it. It is the opinion of the writer that, unfortunately, the importance of the technical mistake committed has been greatly magnified by the fast publicity made by NASA concerning the Orbiter II photograph cited on major scientific journals and popular magazines. Instead, it would have been better to spend more time analyzing the picture before publicizing the results. ■

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