Regarding USS

National Aeronautics and Space Administration
Goddard Space Flight Center
Contract No.NAS-5-12487

ST-PR-LPS-10562

SUCCESS OF LUNA-13

THE MOON IS NOT A DEAD HEAVENLY BODY

by

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(BELGIUM)

13 FEBRUARY 1967

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From the Belgian Weekly
" POURQUOI PAS ?"
Brussels, 12 January 1967

by Germain Ajoux
Scientific Commentator

SUMMARY

In performing with the help of LUNA-13 a study of the lunar soil by radioactivity, Soviet scientists have realized an experiment henceforth classical on Earth, but which constitutes a prominent first in the Cosmos. It is generally considered that the data collected by this method will improve considerably the knowledge we now have of the lunar crust.

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The Soviet space station LUNA-13, which landed on the Moon on the Christmas eve has completed from end to end its program as announced by the Tass Agency on 30 December 1966. The first conclusions of these observations are that the lunar soil is less dense than the terrestrial soil, but it is just about as resistant.

The characteristic of the lunar soil could be studied owing to a special sonde and an emitter of fast neutrons. A small powder explosion has sunken the sonde into the soil under a pressure of seven kg, and a special gauge revealed that "till a depth of 20 to 30 cm, the mechanical properties of the superficial layers of the Moon are close to those of terrestrial soil of average density".

However, measurement of the density of the lunar soil by radioactivity has shown a density of 1 g/cm^3, which is considerably less than the density of the terrestrial soil and the average density of the Moon.

It should be noted in this connection that by having LUNA-13 carry out such a study Soviet scientists picked up speed over their American colleagues. Indeed, as of 1963, the American researchers of the Lawrence Radiation Laboratory, installed at the University of California, had set up an electronic equipment

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* Succès de LUNA-13. La Lune n'est pas un astre mort.

that could be placed aboard a satellite and capable of analyzing the lunar surface by neutron activation. However, such an equipment was never sent to the Moon. But Soviet scientists presently did just that with their own.

The principle of the method is as follows : once the sonde is placed on the lunar soil, a ground-emitted radiosignal reaches it, unlatching a source of fast neutrons, which are elementary particles of 13 minutes lifetime. These neutrons penetrate into the lunar crust, activating some of its elements. These begin then to decay, emitting a gamma-radiation which is registered and analyzed by a counter. This counter then sends the obtained information to Earth by radio. These elements' decay period, as well as the energy emitted by them, allow the determination of the nature of these elements by comparison with experiments performed in laboratory, and hence to determine also the nature of the lunar soil of the region.

Thus, analysis by activation constitutes a choice device for the selenologist, even if it acts at distance.

THOSE STRANGE GLEAMS

The Soviet astronomer Nicolas Kozyrev reported several years ago that he observed a gaseous eruption emitted by the lunar cirque Aristarchus. While he made this observation, this cirque appeared to be anomalously brillant in the spectrograph's visor. Since then, the French astronomer Dubois and several American scientists have observed such luminous phenomena in numerous regions of the lunar surface. Thus, recently, the Soviet astronomer Madame Nina Petrova of the Pulkovo Observatory near Leningrad has discovered a peculiar luminosity in the region of the Kepler cirque.

Several hypotheses were advanced in order to explain these phenomena. Certain scientists believe that this luminescence must result from the effects of solar radiations on the minerals present on the lunar surface. The Soviet astronomer Vsevolod Troitskiy considers, for example, that aluminum oxides may be found amongst lunar rocks. Their luminescence could be produced under the action of Sun's corpuscular radiations.

Nicolas Kozyrev has indicated another possible source of Moon's proper luminescence : the slow degassing of rocks in certain regions of the Moon under the calorific action of solar radiation after the long lunar night. The ejected gases may glow with a visible light under the action of solar corpuscular and ultraviolet radiation.

One may also envisage the hypothesis of internal residual activity of our natural satellite (localized volcanism, for example).

The data collected by LUNA-13 will no doubt permit the specialists to arrive at a much more precise idea of the question. Perhaps even the examination in depth of these data could confirm, now and henceforth, some of the observations made by astronomers.

A PRIMITIVE FORM OF LIFE ?

Seemingly, the Moon would not only have a geologic life, but its arid surface might perhaps conceal some form of primitive life. This is what was recently stated by Alexander Oparine, Director of the Institute of Biochemistry of the USSR Academy of Sciences.

It is evident, states he, that the conditions prevailing on the Moon are too hard for harboring any form of life such as is known to us. The absence of free water and atmosphere, the brutal variations of temperature, the intensity of ultraviolet and other cosmic radiations would be mortal for any terrestrial organism, not protected by special devices. However, all these factors still do not permit us to deny all the possibilities of life of the Moon.

Our terrestrial life is characterized by its extraordinary faculty of adaptation to the ambient medium. Assume, pursues the scientist a planet where life exists but has developed only in seas and oceans, as was probably the case during some period on our own Earth. Under such conditions, the very possibility of life on emersed ground is difficult to conceive. From the standpoint of purely marine organisms, such as medusae (jellyfish), where the life on emersed ground is entirely impossible, this would appear as a total absurdity. The complex processes of adaptation that are accomplished in the course of the evolution of terrestrial organisms would be very difficult to conceive theoretically had we not had in front of us a number of data concerning them.

Life, pursues Alexander Oparine, is a peculiar, infinitely complex and perfected form of the organization and movement of matter. It springs up at a specific stage of the evolution of matter provided adequate conditions exist for that. If these conditions were created on our satellite in a not too remote past, primitive organisms might have been born in it, subsequently adapting themselves to more and more rigorous conditions. They might, for example, have abandoned the lunar surface to take refuge in the depths where the temperature variations are relatively feeble and where water may have been preserved in one form or another.

If the future explorations of the Moon allow us to discover some of these primitive organisms, even in the form of traces, this would immensely improve our knowledge of the very nature of life. Indeed, at present we are aware of only one form of it, a "single model" which is offered to us by our own life on the terrestrial surface that appeared and developed in specifically rigorous conditions. If we were afforded the opportunity to study an identical form of movement of the matter, but which would have been born and developed in a different fashion than on Earth, it would doubtless allow us to deduct what is in our own terrestrial life is indispensable and what is, to a certain degree, fortuitious and accessory.

But for this, we should at least wait for the answers that will be given us by other "LUNA"-s.

*** T H E E N D ***

VOLT TECHNICAL CORPORATION

Translated by ANDRE L. BRICHANT
on 13 February 1967

Distribution same as for 545