

ruled out as the possible cause of this phenomenon observed by the authors. The fact that on all the three occasions, the beginning of the phenomenon is closely connected with the time of sunrise also suggests that it is not due to solar flares. Another point of difference between the Ahmedabad observations and the present work is also of interest. The Ahmedabad workers do not report complete extinction of the cosmic noise as has been observed in the present case.

A possible explanation of the phenomenon might be the presence of a small-scale irregularity in the upper ionospheric layers. Calculation of the electron density necessary to reflect radiation of this high frequency shows that it should be at least ten times more than the normal values for the F_2 layer at this time of the day. If it is assumed that there is such a concentration of matter just before sunrise in these layers, then, as the sun rises above the horizon, the ionisation will gradually increase until the necessary density of electrons is produced to reflect back the cosmic radio waves. Meanwhile, the temperature of this region would be increasing setting up a process of diffusion resulting ultimately in a rapid disappearance of this conglomeration. The magnitude of the initial concentration of atoms and molecules determines the time for which this phenomenon is observed. Thus the density of matter must have been much higher on Febru-

ary 21, 1958, than on the other two occasions. This picture can also explain the reason for the occurrence of this phenomenon in the early hours after sunrise. During the day time, the possibility of finding high concentrations of molecules and atoms is remote. During the night, while such possibility exists, the necessary ionising radiation will not be available to provide the large electron density required.

The use of extra-terrestrial sources of radio radiation for the study of the ionosphere is now well established. But most of the work in this field is being done in temperate regions. The fact that no similar observation has been reported by these workers leads us to believe that this phenomenon may be peculiar to the tropical ionosphere.

SUMMARY

Cosmic radio noise observations at a wavelength of 10 metres reveal that ionospheric effects are considerable in the tropical regions even at this wavelength. On three different occasions, total reflection of the cosmic noise was observed, unrelated to any solar phenomenon, but closely connected with the time of sunrise. An explanation based on the assumption of a locally high concentration of matter in the upper ionospheric layers is given.

1. Ramanathan, K. R., Bhonsle, R. V., Kotadia, K. M., and Rastogi, R. G., *Proc. Ind. Acad. Sci.*, 1958, 43 A, 306.

LITHIUM DEVELOPMENTS

A CENTURY after Bunsen and Matthiessen first prepared lithium metal in sufficient quantity to permit its full examination, this alkali metal and its compounds have been promoted to a prominent place as regards applications in industry.

Lithium carbonate is now regarded as useful in enamels and glazes, as source of lithium chemicals; while the hydroxide is of widest use for conversion to lithium soaps for multi-purpose greases which resist water and weathering, for absorbing carbon dioxide in submarines and confined spaces since it is not deliquescent and does not form a cake of carbonate. In the alkaline storage battery, lithium hydroxide is included with potash to improve capacity. The hydroxide as monohydrate, the carbonate, the fluoride and even powdered lepidolite are all used in lithium glass production where decrease in coefficient of expansion and increase in strength are claims for this inclusion.

Yet lithium has gone much further than in the expansion of such applications first developed some years ago. In the intensive work on ramjet fuels, those hydroborons known as "H.E.F.s" or high-energy fuels, lithium and boron came under close examination in this new project begun a decade ago. Lithium was passed by at first, regarded as too rare for practical purposes; yet the use of lithium hydride for production of hydroborons by reaction with boron halides has brought back lithium into the ramjet field. Even if lithium metal, apart from de-gasification of copper has failed to find a useful role, this appreciation of the hydride, the possibilities of lithium for preparing tritium and of the isotope lithium 7 for control rods in fast reactors, all mark the attention being accorded Arfwedson's metal. Moreover, mere mention of lithium hydride brings up the increasing importance in organic synthesis, and that of lithium aluminium hydride, of lithium alkyls and aryls, of the metal itself in vitamin A synthesis.