solar eruptions which one might reasonably associate with the ionospheric effects. Times of maxima of cosmic ray increases have been taken from the report published by Legrand, Chanson and Bonpas[2].

It can be seen that the increase in Δf(min.) at the high-latitude stations on January 20 which marks the start of the polar-cap absorption began within a few hours of the first two large solar flares and was roughly coincident with the first cosmic ray increase. The second cosmic ray increase on January 21, which was slightly more intense than the first, followed the third flare by several hours. It has since been reported that the geomagnetic storm which began with the sudden commencement at 1230 on January 21 was accompanied by a Forbush decrease which began at Ottawa at 21 hr. (ref. 5).

Because of the timing, it seems likely that the magnetic storm and the Forbush decrease might be associated with the flares which occurred on January 20. One of these flares, it may be assumed, must have ejected particles with a wide range of energies if it were responsible for the observed ground-level increase of cosmic rays, the polar-cap absorption and the magnetic storm. Just what contribution was made to these events by particles from the third flare on January 21 is difficult to say since the polar-cap absorption event and the magnetic storm were already in progress at the time this flare occurred. It seems possible, however, that this last solar outburst produced only particles with very high energies since the polar-cap absorption event at Baker Lake was much reduced on January 22 and there was no second sudden commencement, nor was there any marked increase in the magnetic activity around January 23. Although the blackout at Ottawa occurred soon after the flare on January 21, it is not likely that these two events were related. It seems more probable that the particles producing the blackout at this station came from one of the flares on January 20 and were precipitated at the lower latitudes because of the distortion of the geomagnetic field at the time of the storm. This effect has been discussed by Freier, Ney and Winckler[6] in their description of the detection of solar cosmic rays below the normal cut-off rigidities appropriate to the latitude of Minneapolis on March 26, 1958.

The association of the foregoing events is of course highly speculative. It would seem, however, that although the cosmic ray increases in January and December of 1957 were in some respects analogous, they were associated with quite different ionospheric conditions. Further observations at the time of such cosmic ray increases are required to establish the nature of this relationship.

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RADIOPHYSICS

Irregular Fading of Satellite Transmissions

In a paper by Kent[1] it was stated that irregular fading of satellite transmissions on 40 Mc./s. from *Sputnik* 1 did not occur when the satellite was south of 50° N., and indeed was of very small amplitude on the average when the magnetic inclination at the sub-satellite point was less than 68°, the value at the observing station near Cambridge. Mawdsley[2] has suggested that this might be due not to the absence of irregularities to the south of Cambridge but to the southerly irregularities being incorrectly oriented to give appreciable power scattering to the receiver.

Some observations made at Slough on transmissions from the satellite *Explorer* 7 at a frequency of 20 Mc./s. are of relevance in this connexion. Although this satellite never reaches as far north as the latitude of Slough, irregular fluctuations are frequently found on the signal-strength records; they were of greater magnitude at night than during the hours of daylight. If a scintillation index is defined, as is commonly done, by the ratio of the standard deviation of the fluctuations to the mean signal amplitude, then the distribution of the mean index with magnetic inclination is as shown in Table 1; a separate index was calculated for each half-minute of record.

Table 1. Mean Scintillation Index in Certain Ranges of Magnetic Inclination of the Sub-satellite Point. Night-time Results Only, for the Period January–February 1960

Ranges of magnetic inclination (deg.)	No. of indices in each range	Mean index
50–56	23	0·10
56–58	23	0·11
58–60	30	0·14
60–62	59	0·14
62–64	93	0·18
64–66	206	0·17
66–68	121	0·24
68–70	13	0·27

The inclination at Slough is 67°; it can be seen that there are scintillations well to the south of Slough, although the index certainly tends to fall off as the satellite moves away from magnetic north. The decrease is not so sharp and does not continue to such a low level as that found by Kent on the 40 Mc./s. transmissions he observed.

The height of *Explorer* 7 lay in the range 550–800 km. during these observations. The positional information on which the work was based was derived from prediction data. Consequently the figures in Table 1 may be subject to errors of up to 2° in the magnetic inclination of the sub-satellite point; this is not sufficiently large to affect the conclusions given above.

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