

Cosmic ray increase associated with a small solar flare

P. S. GILL, LEKH VIR, R. S. YADAV* and M. K. KHERA

Gulmarg Research Observatory, Gulmarg

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ABSTRACT. A solar flare effect on cosmic ray intensity due to a small solar flare occurred on 19 June 1958 is described. This was observed at the Gulmarg Research Observatory (9000 ft, geomagnetic latitude $24^{\circ}.7$ N) with a standard meson cubical telescope and narrow angle telescopes.

The study of increases of cosmic radiation intensity associated with the five large solar flares has provided valuable information regarding the interplanetary magnetic fields and propagation of charged particles from the sun to the earth. All these flares were of importance due to their world wide effects. The effect of the solar flares of lesser importance on cosmic ray intensity is rather localized and a few reports of their effects have appeared in literature. Winckler *et al.* (1959), Peterson and Winckler (1958) and Corrigan *et al.* (1958) have reported cosmic ray increase associated with solar flares of importance 1 and 2. The effect of a solar flare of importance 2 on the intensity of hard component cosmic rays was detected at Gulmarg (geomagnetic latitude $\lambda=24^{\circ}.7$ N, height 9000 ft). The above flare occurred on 19 June 1958.

In connection with the IGY programme a standard meson cubical telescope is in operation at the Gulmarg Research Observatory. It measures triple coincidences of cosmic ray particles which can pass through 10 cm of lead. Two narrow angle telescopes having semi-angle $14^{\circ}.5$ and $7^{\circ}.0$ in north-south plane and 45° each in east-west plane are also running. These narrow angle telescopes are not independent but are incorporated

TABLE 1
Percentage increase from the daily mean of the data for different apertures of detector

Detector	Percentage increase of intensity from the daily mean
M^0	19.36 ± 0.50
$M^{14.5}$	17.23 ± 1.66
M^7	41.29 ± 3.27

with the main telescope. The recording is done at one-hour intervals. We will denote cubical telescope as M^0 , $14^{\circ}.5$ telescope as $M^{14.5}$ and 7° as M^7 .

Kodaikanal observatory reported a solar flare on 19 June 1958, starting at 0212 GMT reaching maximum at 0218 and ending 0237 GMT. Fig. 1 shows a plot of per cent deviation of intensity every hour from the daily mean. No correction has been applied to the data.

It is clear from Fig. 1 that the intensity is maximum at about 0300 GMT while the flare reached the peak at 0218 GMT. From the curves it appears that the cosmic ray intensity maximum has been delayed by about half an hour. Further the effect seems to be more pronounced in the case of narrow angle telescope M^7 .

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*Research Scholar, Ministry of Scientific Research and Cultural Affairs, Government of India

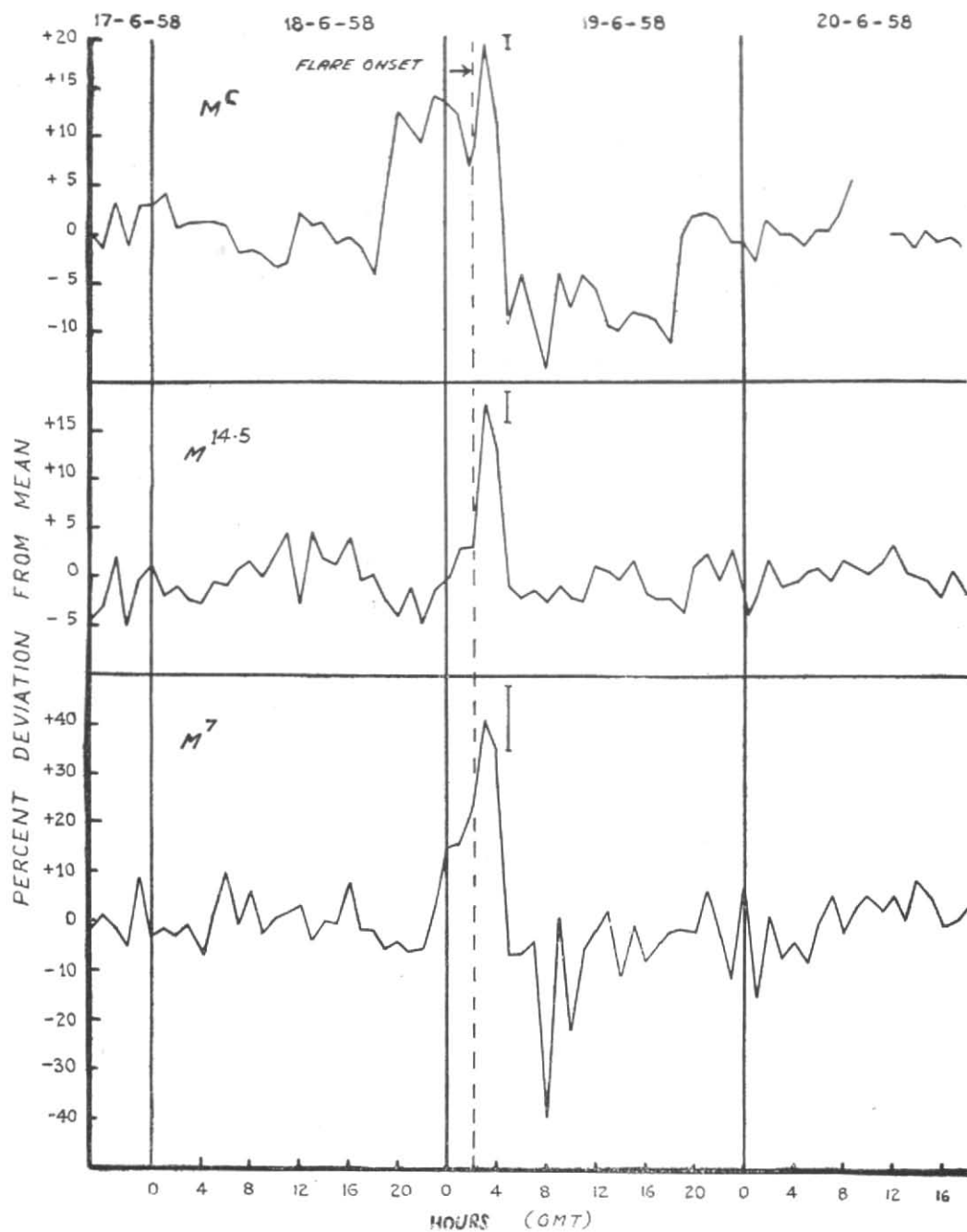


Fig. 1. Per cent hourly deviations of cosmic ray meson intensity at Gulmarg during 17-20 June 1958