

I. PHYSICS

Astrophysics (Geomagnetism)

SOLAR ECLIPSE EFFECT ON SHORT PERIOD GEOMAGNETIC FIELD VARIATIONS

G. K. RANGARAJAN *and* A. V. S. MURTY

Indian Institute of Geomagnetism, Bombay

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THE total solar eclipse of February 16, 1980, was preceded by a storm—a sudden commencement—beginning at 0310 UT on February 14 and another at 1234 UT on February 15. The disturbed conditions prevailed till 22 UT of February 17, 1980.

Keywords : Solar Eclipse Effect; Geomagnetism; Geomagnetic Field; Flux Gate Magnetometers; *H*-Magnetogram

EXPERIMENT

Equipment

To monitor the geomagnetic field changes associated with total solar eclipse, two temporary stations were established in the line of totality at Raichur (Geogr. Lat. 16.2°N) and Bobbili (18.5°N) and were in operation between February 10 and February 22. These stations were equipped with 3 component flux gate magnetometers (sensitivity 10 nT/cm) and four channel recorders with a normal chart speed of 20 mm/hr and with an increased speed of 100 mm/hr and doubled sensitivity for the duration 1400 to 1700 IST every day. Complementing these two temporary stations, 7 permanent magnetic observatories between 35°N and 8°N were functioning, out of which Alibag (18.5°N) and Trivandrum (8.5°N) experienced nearly 85 per cent obscuration of the sun. Magnetograms from Hong Kong (22.2°N) a station located in another longitude sector (nearly 45° away from Alibag) east of India and where the eclipse duration in India corresponded close to post-sunset conditions are also available through the courtesy of Dr Walker of Hong Kong University.

The *H*-magnetograms of Alibag, Trivandrum and Hong Kong on 14, 15 and 16 of February 1980 have been digitized at 3 minute interval and subjected to power spectral analyses and the preliminary results are reported here. Because of the varying chart speed and amplifications adopted and the stormy conditions prevalent, analysis of the data at the two temporary stations has become more complex and the results would be reported later.

RESULTS

Power spectra, computed from data for the two intervals 05–08 UT and 09–12 UT for the three stations—Trivandrum (TRV, in the equatorial electrojet and eclipse region), Alibag (ALB, low latitude station outside the jet influence in the eclipse region) and Hong Kong (HKG, low latitude station outside the eclipse zone) for

February 14, 15 and 16, 1980, showed common periodicities centred on 35, 20 and 10 minutes. It is noticed that the ratios of amplitudes at a particular frequency for TRV/ALB and HKG/ALB diminished from the first interval to the second on each day. The quantum of reduction for all the three days are comparable for (TRV, ALB) pair, indicating that the reduction in current strength of Sq brought about by the eclipse is precisely of the same proportion as the reduction in the current strength in (Sq + jet) close to the dip equator. On the other hand, the ratios for (HKG, ALB) pair for the three days show that while the reduction varies between nearly 50 to 80 per cent on February 14 and 15 (non eclipse, control days), on February 16 the reduction becomes negligible varying between 0 to 25 per cent only (see Table I). This change in the factor of reduction can definitely be attri-

TABLE I

Percentage decrease of the ratio of amplitude HKG/ALB from 05-08UT to 09-12UT period for the short period fluctuations in H

Date	Periodicity		
	35 min	20 min	10 min
14-2-1980	40	53	47
15-2-1980	66	70	76
16-2-1980	15	nil	26

buted to the eclipse induced reduction in the amplitude for 09-12 UT duration as compared to the absence of the eclipse effect in 05-08 UT interval affecting only Alibag and not Hong Kong.

Short period geomagnetic fluctuations at low latitudes have ionospheric contribution whose magnitude is diminished during the duration of obscuration of the sun by the moon.