

550-385 (548)

### RECURRENCE FEATURE OF SOME OF THE GREAT MAGNETIC STORMS RECORDED AT KODAIKANAL (1949-1951)

Great magnetic storms associated with solar flares generally begin with a sudden commencement. They do not usually show a recurrence connected with solar rotation. On the other hand, the so-called minor geomagnetic storms generally lasting for many days do not show a definite beginning. These storms have a marked tendency to recur. H. W. Newton<sup>1</sup> has pointed out the recurrence feature of the great storm of 24-26 January 1949 and has observed a marked similarity in the details of the traces of January and March storms of 1949, especially in the sudden commencement and the hours following. The magnetograms of Kodaikanal have been examined to see whether such recurrence tendencies are noticeable during 1949-51. Kodaikanal magnetograms do not show a similarity in the traces of January and March storms of 1949. The storm of 19-26 February 1950 classed as one of the greatest sudden commencement type is found to show a recurrence with a sudden commencement on 19 March. It is also preceded by a moderate storm of 24-25 January, thus favouring a twentyseven-day recurrence tendency (Fig. 1).

During 1951 also, some great storms recorded at Kodaikanal show a recurrence

tendency with solar rotation. The great spotgroup of January 1951 lasted several rotations (Fig. 2) and with its central meridian passage on 29 January, 24-25 February, 23 March, 18 April, 16 May and 12-14 June respectively was followed by great geomagnetic storms on 27 February, 18 April and moderate storm on 14 June 1951, having nearly a fiftyfour-day recurrence tendency (moderate disturbances were also recorded on 31 January, 23 March and 16 May 1951).

Some of the above great storms of unusual duration recorded at Kodaikanal suggest that two overlapping storms may be involved, in some cases, a second sudden commencement suggesting the arrival of a fresh corpuscular stream, as indicated below (Fig. 3).

It seems very probable as Newton<sup>2</sup> has suggested that the repetition of great storms a solar rotation later is due to the occurrence of new solar flares, rather than to existing streams of solar particles, originating in the preceding rotation, *i.e.*, "a discrete flare for a discrete storm".

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#### REFERENCES

1. Newton, H. W., *Observatory*, **69**, pp. 74-75 (1949) & **70**, p. 234 (1950).
2. Newton, H. W., *Mon. Not. R. astr. Soc., geophys. Suppl.*, **5**, 331 (1948).

Date	Time of solar flare or geomagnetic crochet before onset of storm				Commencement of storm			Approximate time interval of solar corpuscles
	Time (GMT)	Latitude	Longitude	Intensity	Date	Hrs (GMT)	Type	
17-2-50	0200-0244 (Kodaikanal)	8°N	40°E	2	19-2-50	2342	s.e.	70 hrs
21-2-50	2340-2454 (Mt. Wilson)	11°N	26°W	3+		23-2-50	1040	s.e.
26-2-51	0200-0345 (Kodaikanal)	10°N	22°W	2	27-2-51	0025	s.e.	22 hrs*
13-6-51	Intense geomagnetic crochet between 0600 and 0712 observed at Kodaikanal, synchronous with an intense radio fade-out observed by All India Radio No flare data available					28-2-51	1416	s.e.
					14-6-51	1750	s.e.	
18-6-51	Geomagnetic crochet between 0602 and 0630 observed at Kodaikanal				17-6-51	1658	s.e.	16 h 54 m
					18-6-51	2310	s.e.	

\* (Second rotation of spot group) (Fig. 2)

† (Sixth rotation of spot group) (Fig. 2)

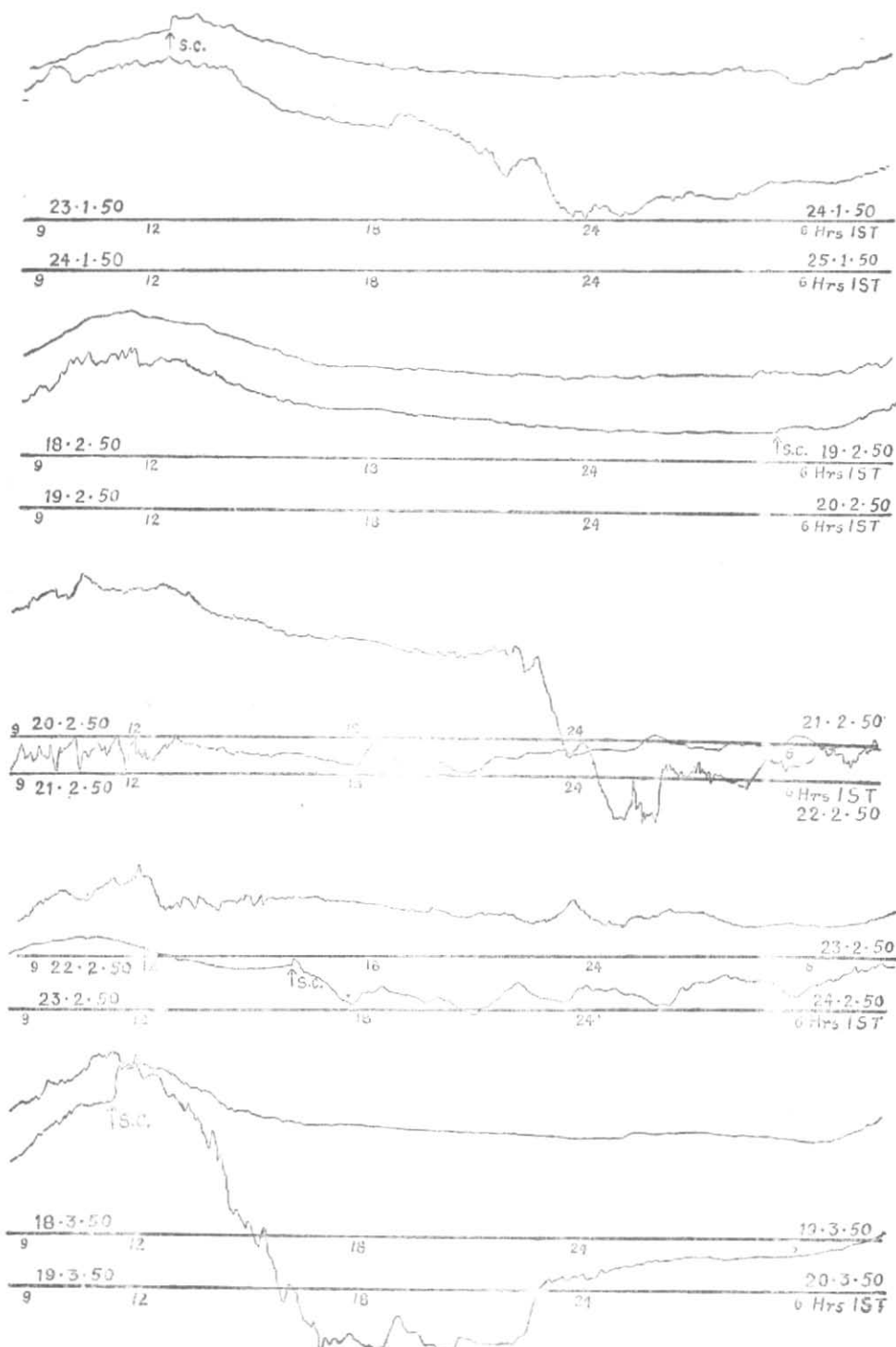


Fig. 1. H.F. magnetograms of Kodaikanal showing distinct twenty-seven-day recurrence feature of the great storms of 19-26 February 1950, on 19 March 1950. Two distinct sudden commencements are noticed in the great storms of 19-26 February one on 19th and another on 23rd, each s.c. being possibly connected with a distinct intense flare before an appropriate time interval.

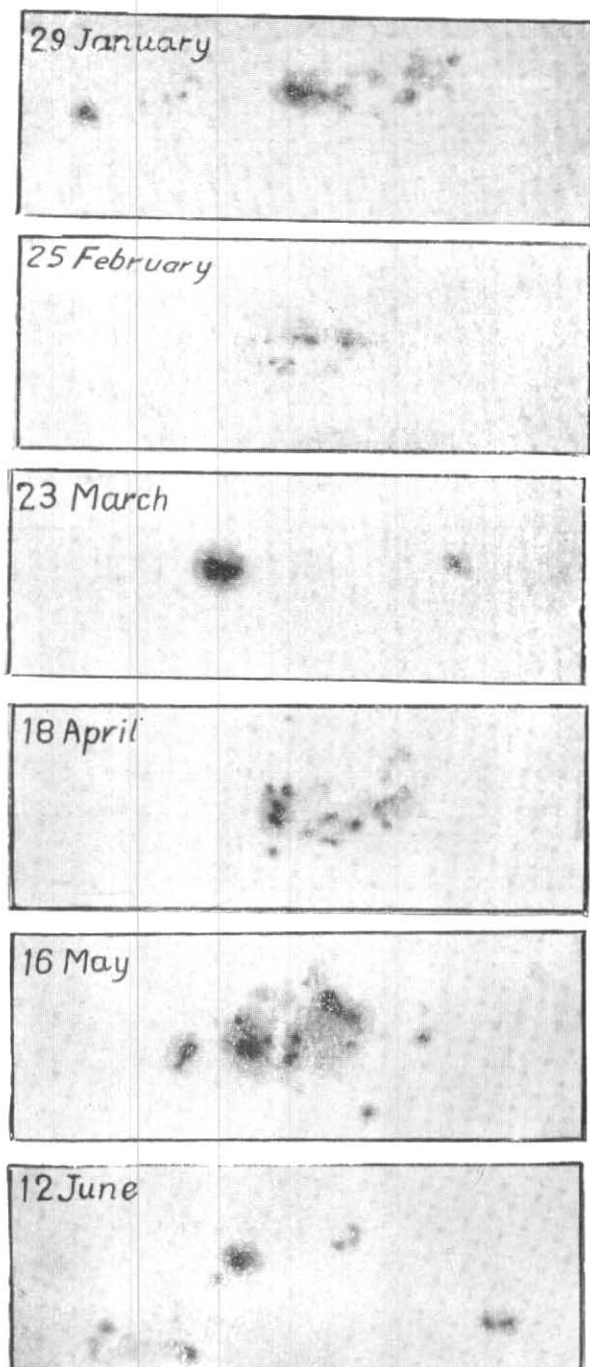


Fig. 2. The great spot group of 1951 on six solar rotations

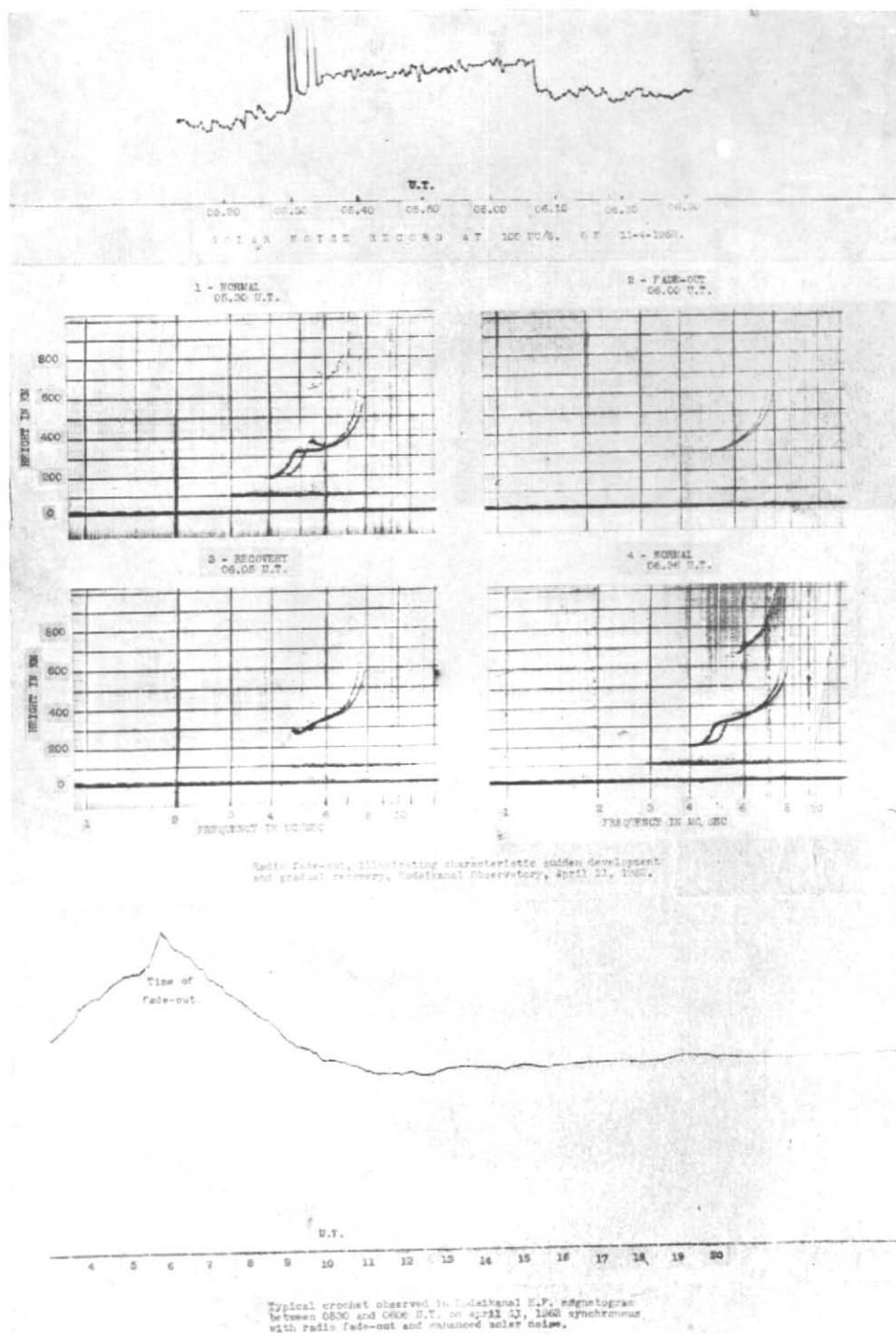


Fig. 1

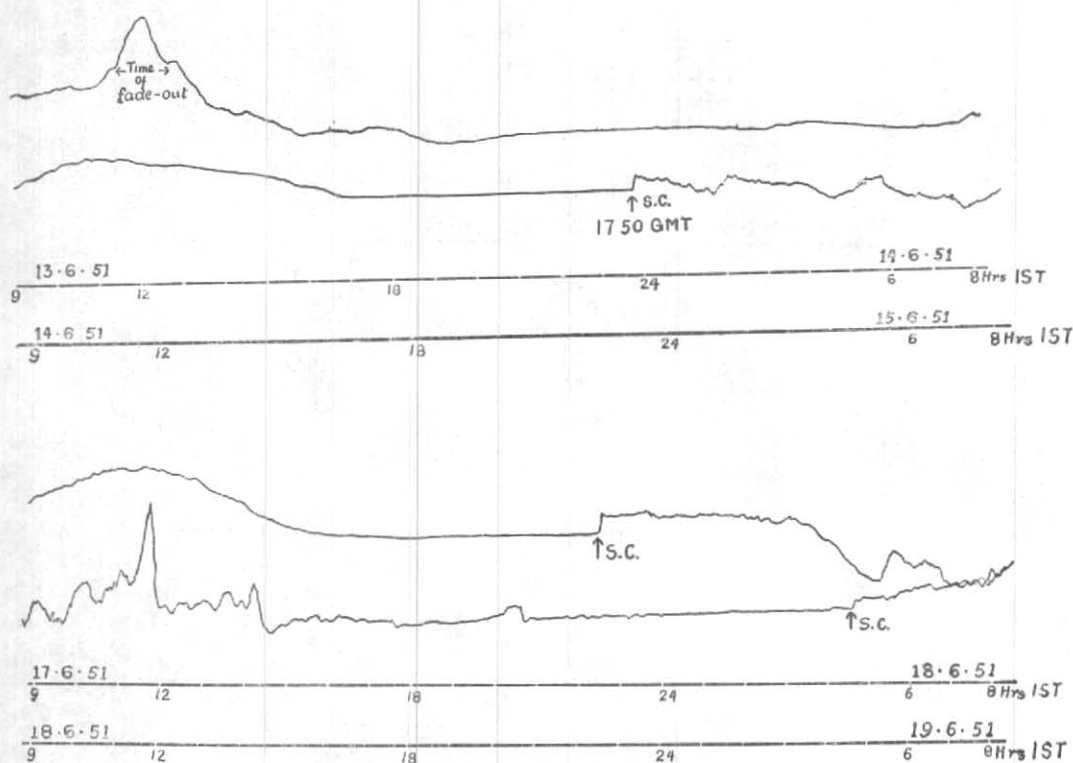


Fig. 3. Kodaikanal H.F. magnetograms showing the sudden commencement of the magnetic storm of 14 June 1951 at 1750 GMT following the intense radio fade out the preceding day recorded by the AIR, coincident in time with a geomagnetic crochet in the H trace giving the approximate time travel of solar corpuscles as 35 h 20 m. This is a typical case of three overlapping storms with three distinct s.c.