Indian Journal of Radio & Space Physics
Vol. 13, October 1984, p. 168

Effect of Magnetic Activity on Radiowave Fading

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Received 26 *April* 1984

The effect of magnetic activity on the fading frequency of C W transmissions at oblique incidence recorded at Kakinada has been studied. The results indicate that there is positive correlation at 1800 hrs IST and negative correlation during 1900-2300 hrs IST between magnetic activity and fading frequency at this low latitude station. The result was explained on the basis of positive correlation between spread-F and fading frequency and negative correlation between spread-F occurrence and magnetic activity.

Though several investigations were conducted on radiowave fading, no effort was made to study the effect of magnetic activity on fading of C W transmissions at oblique incidence. The experimental technique consists of recording C W transmissions at Kakinada (geogr. lat, 16° 59′ N; long, 82° 15′ E; mag. lat, 7°N) a low latitude station, from AIR station, Hyderabad, on a frequency of 4.8 MHz. These recordings were done by means of a pen recorder for 5-10 min at hourly intervals between 1800 and 2300 hrs IST when the station was in operation. The details of the experimental set-up were reported by Rao[1].

Fading analysis was carried out, leaving out records exhibiting periodic fading and heavy noise, and fading frequency was evaluated in each case. The three hourly magnetic *K*-indices supplied by National Geophysical Research Institute, Hyderabad, were allotted for the entire data. From the data, the average fading frequencies for different hours were calculated for each *K*-index and the results are presented in Table 1. From a perusal of Table 1, it is clearly noticed that fading frequency is inversely correlated with magnetic activity at this low latitude station. Using statistical methods[2], the correlation coefficient was evaluated and it came out to be -0.92, which is highly significant.

To understand this aspect in detail, the data were further subdivided according to the hour of recording. It is noticed that fading frequency decreases with *K*-index at all hours except 1800 hrs IST. The presence of positive correlation at 1800 hrs IST and negative correlation at the remaining hours was not reported earlier. This can be partly explained as due to the positive correlation between fading frequency and spread-F reported by Rao and Rao[3], Krishnamurthy and Rao[4] and Rao[1] and negative correlation between spread-F occurrence and magnetic activity reported by Rao and Rao[5], Skinner and Kelleher[6], Chandra and Rastogi[7] and Rao[1]. The presence of positive correlation at 1800 hrs IST is quite logical as spread-F never appeared at this low latitude station at 1800 hrs IST[1].

Table 1—Variation of Average Fading Frequency with *K*-index

K-index	Average fading frequency (cycles/min) at hrs						
	Combined data	1800	1900	2000	2100	2200	2300
0	52.5	—	46.8	55	53	50.1	—
1	44.7	41	45	49.3	42	48	58.3
2	40.3	36.1	44.2	52	54.2	50.7	44.1
3	40.2	40.1	43.1	47.1	44	38.2	47.7
4	40.2	42.1	42	40	42.2	46	49
5	37.5	48.3	40.7	—	28.4	49.8	—

The author wishes to thank the Indian Space Research Organisation, Bangalore, for financial support. He also wishes to thank the Director, National Geophysical Research Institute, Hyderabad, for supplying *K*-indices data.

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