IONOSPHERIC DISTURBANCES ACCOMPANYING NON-CROCHET AND CROCHET ASSOCIATED FLARES

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From the systematic comparison and study of data on Ionospheric flare effects reported by Indian Ionospheric Stations for 1957-58, two distinct groups of disturbances were selected. One group consisted of flares accompanying Sudden Cosmic Noise Absorption on 25 mc/s (Bhonsle 1960), a short wave fade out on about 6 mc/s and sometimes SEA at 27 and 100 kc/s but not a crochet or a geomagnetic disturbance. In second group flares were associated with crochet in addition to all the above ionospheric flare effects. This group can be termed as crochet associated flares after Dodson and Hedeman (1958). 12 cases of the events in first group and 14 in second were noted.

In all these events belonging to both the groups, except one or two, flare, associated ionospheric effects and crochet, if present, all start with almost simultaneous occurrence prevailing for a certain duration. Additional fade out or SEA on low frequency either precede or what is more likely follow this main disturbance in many events.

SCNA is the predominant of all flare effects as regards intensity and also duration in all the cases belonging to both the groups. Applying Shain and Mitra's (1954) criterion to classify flares on the basis of maximum absorption during associated SCNA, it is possible to compare the relative intensities of flares and the associated ionospheric disturbances. Table I gives such a classification for both the groups together with the values of maximum absorption during associated SCNAs. Similar classification of fade outs in two groups with importance estimated by their duration, as no record of the field strength was available, is given in Table II.

Dodson and Hedeman (1958) reported that no major SID's are associated with crochet flares though these are ordinarily important flares. Present analysis shows that, though crochet flares are ordinarily important flares, there is a proportional increase in the intensity of ionospheric flare effects also as evident from the tables. The minimum ionization, that will produce maximum absorption of cosmic noise to about 1.4db, seems to be essential to have a crochet associated with a flare.

One interesting fact observed is that the end of the simultaneously occurring disturbances is marked with the end of SCNA on 25 mc/s in almost all the

TABLE I

Flares Optically determined Class	Non-crochet Flare events		Crochet Flare events	
	Flare intensity by max. absorp- of SCNA Class	Value of max. absorption during SCNAs db	Flare intensity by max. absorp- of SCNA Class	Value of max. absorption during SCNAs db
1−	3	3.2	--	--
1	2	0.7	2	0.8
1+	2	0.7, 0.8, 1.1, 1.8	2	1.8
1+	--	--	3	4.3
2	2	0.9, 1.0, 1.1, 1.1	2	1.4
2	-	--	3	2.4, 2.6, 3.0, 3.5, 3.6, 4.47
2+	2	1.1	3	6.0
3	--	--	3	3.01, 10.0
3+	--	-	3	20.00

TABLE II

Duration	Non-crochet Flare disturbances Number of F.O.s	Crochet Flare disturbances Number of F.O.s
Below 30 min.	7	2
Between 30-50 min.	2	5
Above 50 min.	2	6

cases of non-crochet flare disturbances and in some of the crochet flare events if the end of the crochet is disregarded. This delay in the end of SCNA on higher frequency over that of a fade out on lower frequency is minimum of 10 min. in some cases and as large as 50 min. in others.

D-region absorption is inversely proportional to the square of the frequency and in cosmic noise single passage is involved. However total ionospheric ionization is responsible for cosmic noise absorption while only the *D*-region ionization is effective in case of communication fade out. Hence this delay in the recovery of SCNA, when much appreciable, may possibly be explained by the probable excess ionization pesent at higher levels (Mitra *et al.* 1958) rather more favourably during non-crochet flare disturbances.

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