SHORT COMMUNICATIONS

RELATIONSHIP BETWEEN AMPLITUDE OF EQUATORIAL SC (−+) AND ELECTROJET STRENGTH

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STORM sudden commencements (SC or SSC) manifest at low and equatorial latitudes most commonly in two forms denoted as SC (+) and SC (−+) or SC*[1-5]. A fascinating aspect of SC at equatorial latitudes is the conspicuous enhancement of its magnitude during day time in the vicinity of the dip equator. This characteristic feature is observed in the amplitude of both the preliminary reverse impulse (PRI) and main impulse (MI) of SC (−+) and MI of SC (+); the rate of dip equator enhancement is, however, larger for SC (−+) than for SC (+)[4-10]. The origin of the occurrence of SC (−+) with enhanced magnitude at day time dip equator is not yet well understood. The recent studies of Araki[5], Rastogi[11,12] and Reddy *et al*[13] indicated that the signature and amplitude of SC events at the daytime dip equator are the net result of magnetospheric compression and transient changes in electrojet electric field. According to the model of Araki[5], the seat of electric currents causing changes in ground level H field associated with polar electric fields responsible for PRI and a major part of MI of SC (−+) (also of SC (+)) is at ionospheric levels. The dip equator enhancement of SC magnitude may therefore be expected to show a dependence on the electrojet strength at the time of SC. This is because the ionospheric currents are in general proportional to the Sq current system which shows the usual dip equator enhancement. This aspect has been examined in detail by Kane[14] who found the dip equator enhancement of SC (+) magnitude to be highly variable and not always commensurate with the electrojet strength. The situation in respect of the amplitude of PRI and MI of SC (−+) at dip equator is however not known. A study of the relationship of the amplitude of the constituent components of SC (−+) at dip equator to the electrojet strength at the time of its occurrence is therefore felt necessary and worthwhile and in this communication the results of such a study are presented. Since the dip equator enhancement of SC (−+) is much steeper than that of SC (+), the dependence of the amplitude of PRI and MI of SC (−+) on electrojet strength is investigated here by collating events spread in local time at an electrojet station. This is felt quite appropriate as the electrojet strength varies markedly during the course of the day and it also exhibits considerable day-to-day variability at any particular hour[15].

Original normal run magnetograms at Kodaikanal (lat. 10° 14′N; long., 77° 28′E; dip 3.5° N) covering the period 1957–78 constitute the basic data used for the present study. As we are primarily interested here in only the magnitudes of PRI and MI of SC(−+), normal run magnetograms are considered adequate for the purpose. Careful examination of SC events over the 22 yr period mentioned above showed the occurrence of 32 clearcut SC(−+) events at Kodaikanal which were more or less uniformly distributed in local time. The magnitude of the electrojet strength just prior to the onset of each SC(−+) event is estimated by evaluating

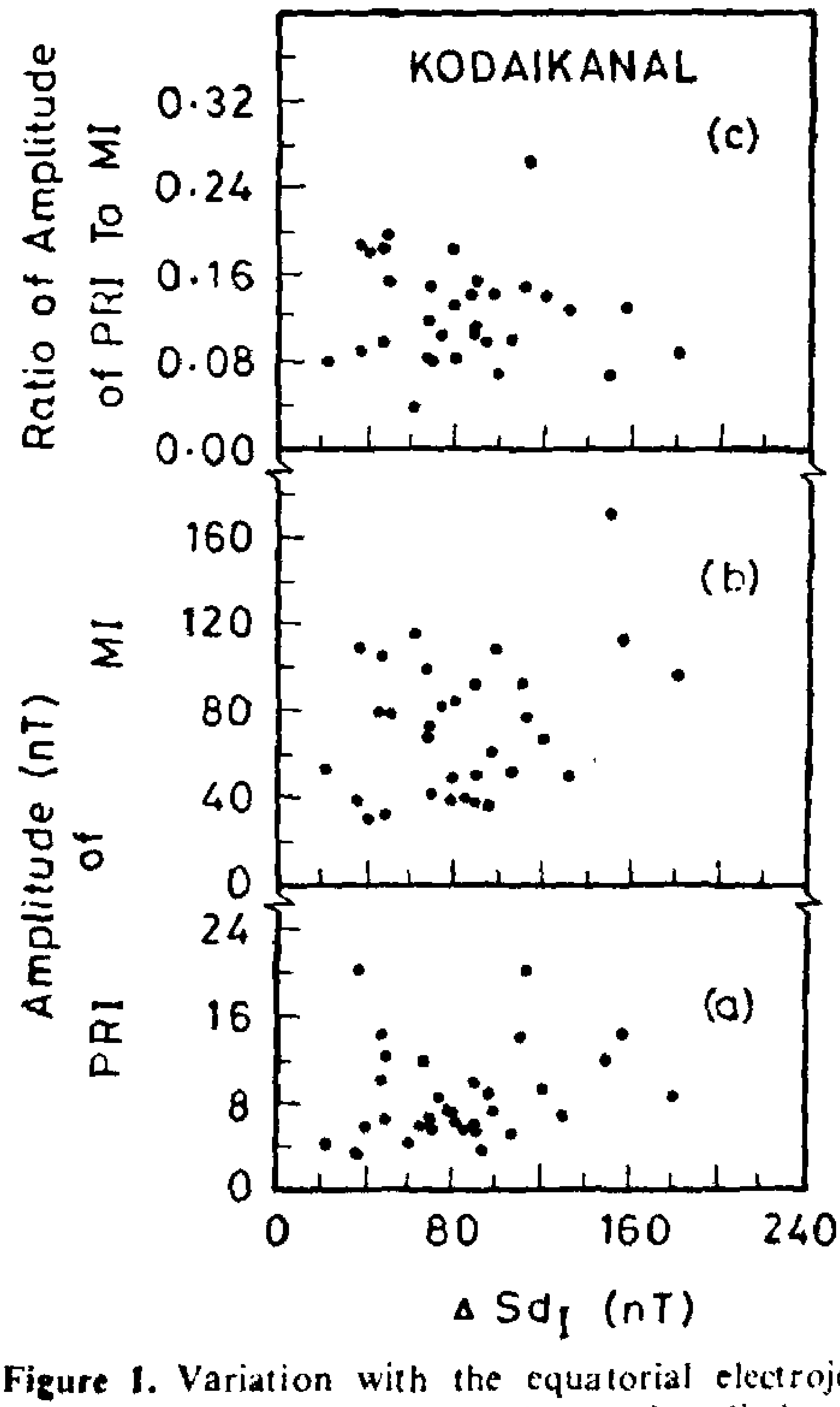

Figure 1. Variation with the equatorial electrojet strength (Δ SdI) of (a) magnitude of preliminary reverse impulse (PRI) (b) magnitude of main impulse (MI) and (c) ratio of the magnitude of PRI to MI for SC SC(−+) events at Kodaikanal.

the parameter Δ SdI from published hourly H field data of Kodaikanal and Alibag, following the procedure introduced by Kane[16]. Figure 1a and b depict the relationship of the amplitude of PRI and MI to the electrojet strength for the 32 events studied. The mass plots presented in figure 1a and b show a large scatter clearly indicating that the amplitudes of PRI and MI of SC(−+) do not vary systematically with the electrojet strength prevailing at the time of SC. Rastogi[1] reported a high ratio of the amplitude of PRI to MI of SC(−+) events at Kodaikanal to occur only during the midday hours, from which he inferred the ratio to be related to the strength of the electrojet current at the time of SC. We have examined this aspect and it is found that the ratio of PRI to MI amplitude does not also exhibit any definite relationship with the electrojet strength as may be seen from figure 1C.

The present results revealed the lack of any systematic dependence of the amplitude of PRI and MI (and their ratio) of SC(−+) events in the Indian electrojet region on the electrojet strength at the time of SC. This finding is similar to the one reported earlier by Kane[14] for MI of SC(+) events. It is quite plausible therefore that the amplitude of SC(+) and SC(−+) at electrojet location is governed more by the magnitude of the transient change during SC in the dynamo region electric field than by the strength of the electrojet at the time of SC. The VHF backscatter data of Reddy *et al.*[13], in fact, showed the SC associated electrojet electric field to increase with an increase in SC(+) amplitude at dip equator. Further such observations are very much required, especially for SC(−+) events, to substantiate the understanding reached from the present study as regards the factors that govern the amplitude of SC (−+) and SC(+) at day time dip equator.

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CRYSTAL STRUCTURE OF BARIUM SULPHAMATE

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NEEDLE-shaped crystals of barium sulphamate $Ba(NH_2SO_3)_2$ were grown by slow evaporation from the aqueous solution obtained by sulphamic acid neutralised with barium hydroxide.

Well-formed needle-shaped crystal was mounted on a CAD-4 Enraf-Nonius automatic diffractometer. The cell dimensions confirmed the values arrived at by photographic technique and were refined in the auto indexing procedure from the setting angles of 25 reflections. The crystal data are given in table 1.

TABLE 1

Crystal Data
$a = 10.579(1)$Å, $b = 13.416(1)$Å, $c = 4.829(2)$A
$V = 685.369(1)A^3$, F.W. $= 329.51$ g, $z = 4$
$\rho_{obs} = 3.238(A)$ g.cm^{-3}, $\rho_{cal} = 3.19$ g.cm^{-3}
$\mu(\lambda = 0.7107$ A$) = 69.03$ cm^{-1}.

The intensities of 997 independent reflections in the range $0.5° < \theta < 30°$ were measured in the $\omega/2\theta$ scanning mode with graphite monochromated MoK_α radiation.

Systematic absences Okl, k+l = 2n+1, hOl, h = 2n+1 indicate that the space group can either be Pnam or $Pna2_1$. The data were corrected for Lorentz polarisation and for absorption[1].

Using the intensity data, a Patterson synthesis was computed and the heavy atom, barium, was located at (0.176, 0.185, 0.25). After three subsequent cycles of structure factor calculations and a Fourier synthesis,