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Letters to the Editor

COMMENTS ON THE PAPER ENTITLED

"Effect of Electrojet on low latitude radio wave scintillations" by B Lokanadham (CAS in Astronomy, Osmania University, Hyderabad 500 007) and S Sudhakar Reddy (Department of Physics, S A P Arts and Science College, Vikarabad 501 101), *Indian J Radio & Space Phys*, Vol. 21 (No. 5), October 1992, pp. 274-276.

Lokanadham and Reddy[1] have given results indicative of the direct control of scintillation activity by the equatorial electrojet strength by comparing the mean monthly values of scintillation activity and a parameter called 'monthly mean values of maximum electrojet strength'.

In effect what is observed is that when solar activity is high, scintillation activity is also high, and in parallel electrojet strength also increases. These two are well known results. In other words, if x represents solar activity, y_1 the electrojet strength and y_2 the scintillation activity, we have, from known results

$$y_1 = m_1 x + c_1$$
$$y_2 = m_2 x + c_2$$

and hence

$$y_2 = (m_2/m_1)\, y_1 + (c_2 - c_1 m_2/m_1)$$
$$= m y_1 + k$$

providing a linear relationship between electrojet strength and scintillation activity through the third parameter—solar activity. Based on this, it is very inappropriate to say that scintillations at low latitudes are controlled by equatorial electrojet.

If this point were to be made categorically, the authors should have chosen varying strengths of equatorial electrojet confining to same epoch of solar activity and season and found out the relationship between scintillation activity and equatorial electrojet. The present approach is not proper at all.

The authors use the parameter $(Sd_1)_{max}$ to quantify electrojet strength and say that they have followed Rush and Richmond's formulation[2] for this. The cited paper defines the electrojet strength as the difference between the ranges in the daily variation of horizontal intensity at two stations, one in the vicinity of the dip equator and the second quite away from the influence of the electrojet. The ranges are computed as the difference between average of 3 hourly values centred on local noon and 6 hourly values centred on local midnight. They also clearly state that in performing this subtraction about half the ionospheric contribution is also removed. In the diagrams given by the authors, the electrojet strength is about 150 nT during low solar activity period and about 260 nT during high solar activity. I wonder from where the authors could conjure up such staggering values of equatorial electrojet field from which magnetospheric component and planetary S_q component have been removed by the process of subtraction!

Typical values of ranges of diurnal variation on International Quiet days during 1979 (solar maximum year) at Alibag and Trivandrum are listed in Table 1, to show the kind of numbers one should expect.

It is clear that under the most favourable conditions of high solar activity and quiet magnetospheric conditions and taking only the difference between a single maximum hourly value and a single minimum hourly value, the electrojet strength varies only between 50 and 150 nT at the most. There is no doubt in my mind that the authors have got their computed numbers all wrong, leading to the highly inflated figures used in the diagrams.

Incidentally, the last sentence "Thus it is seen that the scintillation activity in the low latitude belt has also been influenced by the equatorial

Table 1—Typical values of ranges of diurnal variation on International Quiet days during 1979 (solar maximum year) at Alibag and Trivandrum

International quiet days in 1979	Range (ΔH) at Alibag (ABG) nT	Range (ΔH) at Trivandrum (TRD) nT	Difference field (TRD-ABG)* nT
Jan. 10	32	91	59
11	35	116	81
13	36	94	58
14	95	164	69
17	84	104	20
Mar. 7	73	171	98
12	63	198	135
14	81	217	136
20	57	202	145
21	78	178	100
Jun. 1	42	129	87
3	68	129	61
5	87	134	47
18	50	84	34
20	80	131	51
Sep. 2	79	126	47
7	28	132	104
8	52	190	138
9	64	164	100
19	58	137	79

*The difference field is indicative of the electrojet strength and will be an overestimate in comparison with the formula adopted by Rush and Richmond[2].

electrojet currents as reported by Rastogi[1]" is also misleading. All that Rastogi[3] reported was that daytime scintillations in the equatorial region are usually absent in the presence of the equatorial electrojet current and that only during conditions of partial or complete counter electrojet followed by occurrence of blanketing type of Es, strong daytime scintillations are observed. This, in no way, supports the authors' results presented in their paper under reference.

I suggest that the authors retract the communication, re-do the computations as mentioned above and submit fresh set of diagrams to substantiate their statement that the low latituded scintillations are influenced by the changes in the equatorial electrojet current.

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References

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2 Rush C M & Richmond A D, *J Atmos & Terr Phys (GB)*, 35 (1973) 1171.
3 Rastogi R G, *J Atmos & Terr Phys (GB)*, 45 (1983) 719.