On the Electrojet in South America

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Summary—The diurnal variation in the horizontal component (H) of south american stations under and close to the electrojet were plotted during the I.G.Y. Thus a dilatation towards the south of the electrojet in the western part of South America was inferred.

Resumen—Se graficó la variación diurna en la componente horizontal (H) de estaciones sudamericanas bajo y próximas al «electrojet», durante el A.G.I. Estas sirvieron para inferir una dilatación hacia el sur del «electrojet» en el oeste de América del Sur.

1. Material used

On the basis of data obtained by the Peruvian I.G.Y. stations: Talara, Chiclayo, Chimbote, Huancayo, Yauca, during 1957 and 1958 [1] 2) and of those corresponding to the La Quiaca and Pilar (Fig. 1), the graphs of the diurnal variation of the horizontal magnetic component (H), for quiet days and for each season of the year were made.

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2) Numbers in brackets refer to References, page 41.
The graphs were prepared in a similar way to those made in Perú, i.e., by using local time for each station. The value corresponding to the interval 0–1 hr. was deducted from each hourly mean value, and in order to easily visualize, the curves were represented in a superimposed way.

The selected quiet days were common to those of the Peruvian stations and to those of La Quiaca and Pilar. Whenever possible international quiet days were used and when records were missed days from the list of the 10 less disturbed days were included. The list of the days used is as follows. Fig. 2: Sept. 12, 13, 14, 18, 21, 22, 23, 1958, Oct. 11, 12, 18, 20, 21, 1958, Fig. 3: July 5, 15, 16, 28, 29, 30, 1958, Aug. 6, 15, 21, 1958. Fig. 4: Nov. 21, 1957, Nov. 5, 14, 21, 1958.

In the curve of La Quiaca (Fig. 4) data corresponding to Nov. 21, 1957, were missed but if we represent separately the days of Fig. 4, for Pilar, La Quiaca and Talara we see that the lack of the day for La Quiaca would not modify very much the curve obtained with only three days, on the contrary, the conclusion got below would be emphasized.

Figure 2
Diurnal variation of the horizontal magnetic intensity (H) for selected quiet days. Equinoxio
Diurnal variation of the horizontal magnetic intensity (H) for selected quiet days.

Winter Solstice (South)

Figure 3

Diurnal variation of the horizontal magnetic intensity (H) for selected quiet days.

Summer Solstice (South)

Figure 4
2. Discussion and conclusion

From Fig. 2, 3 and 4 we can see that although Pilar and La Quiaca have a variation in $H$ of 'Equatorial Type', magnitude in Pilar is, of course, much inferior to the magnitude of the Peruvian I.G.Y stations. The same is not true with the curves of La Quiaca where magnitudes are almost equal to that of Talara in Fig. 2 and 3, being larger in Fig. 4.

By taking into account the latitudinal variation of the normalize ranges $R_T^H$ as defined by FORBUSH and CASAVERDE [1]:

$$R_T^H = \frac{r_T^H(s) \text{ for given days}}{r_T^H(Hu) \text{ for same days}} \times 205 \text{ gammas}$$

where:

$$r_T^H(s) = \frac{(10-11)(11-12)(12-13)(0-1)(23-24)}{3}$$

and represented in their publication (Fig. 7) we see that Talara is located 8.2 towards the north of the top in the curve while La Quiaca is placed 10.0 towards the south of the same curve. As a consequence, the larger magnitude or the equal magnitude in the curves of La Quiaca with respect to those of Talara would indicate a dilatation of the electrojet to the south, in South America.

On the other hand, if we represent range $r_T^H$ against Dip-Latitude for the three epochs of Fig. 2, 3 and 4 we shall see, in Fig. 5 and according to values in Table 1,
that for equinoxio and winter solstice (south), the curves are smooth. The same characteristic is not present in summer solstice (south) since its left branch gives rather high values. It is supposed that these apparently anomalous values are due to the few available data we have to draw the curves and this would show the possibility of sporadic dilatation of the electrojet in South America.

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REFERENCES


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