LETTERS TO THE EDITORS

GEOPHYSICS

Diurnal Variation of High-latitude Auroral Frequency on Magnetically Quiet and Disturbed Days

DURING the winters of 1957–58 and 1958–59 an all-sky camera was operated by the Danish Meteorological Institute at Nord in Greenland (geographical co-ordinates 81.6° N., 343.4° E.; geomagnetic co-ordinates 80.9° N., 134.5° E.).

Fig. 1. Diurnal variation auroral frequency, Nord, 1957–59

Following a proposal by Stoffregen¹ the sky was divided into sectors north (N), between 80° and 60° northern zenith distance, zenith (Z), between 60° northern and 60° southern zenith distance, and south (S), between 60° and 80° southern zenith distance, north being defined here as the direction perpendicular to the auroral isochasm² through the station; geographically this direction is approximately west-north-west.

Fig. 1 shows the diurnal variation of auroral frequency in the three sectors on international quiet and disturbed days, respectively. It is seen that zenithal auroræ are most frequent in the day hours of international quiet days, with two principal maxima at about 5 and 13–14 hr. U.T. On international disturbed days these auroræ are less frequent. In S the quiet day variation similarly shows two distinct

maxima, at about 6 and 11–12 hr. U.T., whereas the variation on disturbed days is of a different shape, with a single maximum at about 9 hr. U.T., that is, near magnetic noon in the Mayaud system³. Smaller peaks at 9 hr. may be seen in the diurnal variation on disturbed days at Z as well as at N.

It is proposed that the observation should be interpreted as follows:

At magnetic noon the auroral zone is situated not far to the south of the station. When on magnetically disturbed days the auroral incidence near the zone

increases, the zone broadens and zonal auroræ are observed from the station near magnetic noon.

The auroræ which are observed above the station on quiet days become less frequent on disturbed days, possibly due to some sort of modulation effect. They may be said to belong to a special polar population (inner auroral zone), or, what may be the same in other words, to form a quiet-day appendix to the day-time part of the main auroral zone.

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¹ Stoffregen, W., *Medd. Uppsala Ionosförservatorium*, Rep. No. 5 (1959).

² Hultqvist, B., *Nature*, **183**, 1478 (1959).

³ Mayaud, P. N., *Ann. Geophys.*, **16**, 2, 278 (1960).