INTER-RELATIONS AMONG THE UPPER ATMOSPHERE DISTURBANCE PHENOMENA OVER THE POLAR REGION*

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極光帯における dH/dt および地電流変化*

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Inter-relations among the upper atmosphere disturbance phenomena in the auroral zone are discussed based on the observation at Syowa Station (69°00′S in latitude and 39°35′E in longitude). Results obtained can be summarized as follows;

1) Geomagnetic bay type disturbances, ionospheric disturbances represented for example by blackout or anomalous increase in *fEs* and abrupt increase of auroral luminosity λ5577 in zenith begin simultaneously with each other within the accuracy of observation. It is noteworthy that the onset of increase of zenith luminosity but not of total activity is simultaneous with the other disturbance phenomena, as seen in Fig. 1.

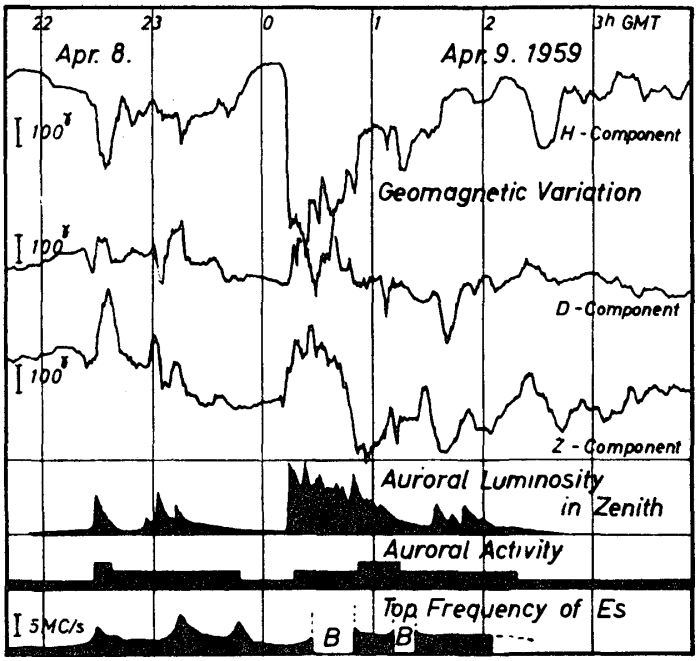

Fig. 1. A set of records of the upper atmosphere disturbance phenomena.

2) Direction of auroral arc is in good agreement with that of over-head electric current deduced from geomagnetic variations.

3) Ionospheric blackout follows geomagnetic bay type disturbances and auroral displays in morning-daytime, while the increase in *fEs* follows those in evening-night time.

4) Numerical relations among quantities representing physical state of the lower ionosphere

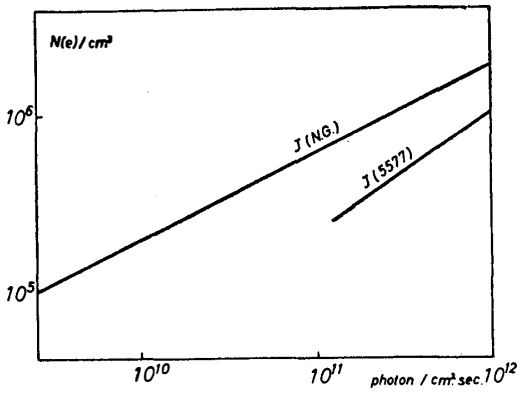

Fig. 2. Relation between electron density and auroral luminosity.

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during auroral displays, *i. e.* decrease of geomagnetic holizontal intensity, increase in *fEs* due to anomalous ionization in the lower ionosphere and auroral intensity, are examined and proved to be consistent with each other. As an example, relation of number density of electrons with auroral luminosity λ5577 is shown in Fig. 2, together with the same kind of relation with luminosity of Nitrogen negative groups obtained by OMHOLT[1].

5) From the observed facts mentioned above, it may be concluded that the polar magnetic disturbances are due to the motion of electrical charge along the lower border of aurorae caused by anomalous ionization in the lower ionosphere, which results in either ionospheric blackout or increase in *fEs*.

Reference

1) Omholt A.: Journ. Atmos. Terr. Phys. 7, 73 (1955).

MAGNETIC VARIATION ON THE ANTARCTIC OCEAN NEAR SYOWA BASE*

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昭和基地周辺における海上の磁気偏差*

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Introduction

In the case of using the magnetic compass for sailing, we must know the compass error between the compass north and the meridian. This compass error consists of the variation, the deviation and the mechanical errors of the compass itself. We report about the result of the magnetic variation observed in the Antarctic ocean near Syowa Base.

Measurement

The magnetic variation is the difference between the true meridian and the magnetic meridian, but we must think of the including deviation in it. The true meridian can be easily get by the gyro-compass.

T the true bearing of the ship's head

C the compass bearing of the ship's magnetic compass

δ the deviation by the ship's head

V the variation

i shows N, NE, E, SE, S, SW, W, NW (8 cardinal points of the compasses)

$$Ti-Ci=\delta i+V \quad \ldots.(1)$$

$$1/8\sum(Ti-Ci)=1/8\sum\delta i+V \quad \ldots.(2)$$

$$V=1/8\sum(Ti-Ci)-1/8\sum\delta i \quad \ldots.(3)$$

We calculate the variation V by this formula.

$1/8\sum\delta i$....practical coefficient of the deviation.

$$V=1/8\sum(Ti-Ci)-A \quad \ldots.(4)$$

Coefficient A has no connection in the element of the terrestrial magnetism and we can adapt

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