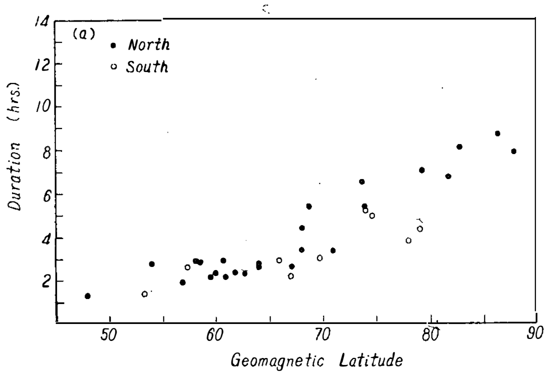
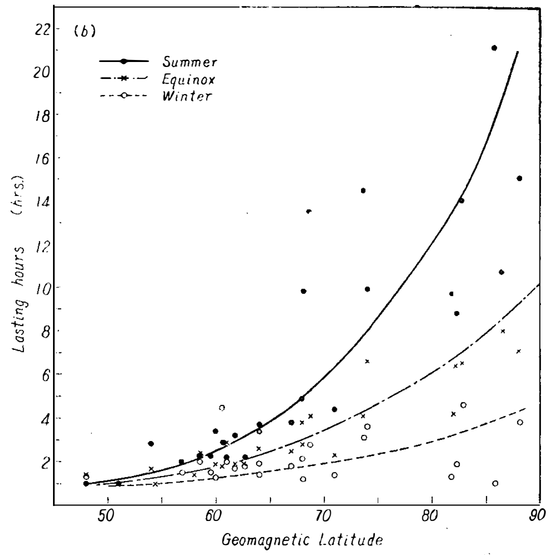


(a)



(b)

Fig. 8. Mean duration (lasting hours) for each season plotted against geomagnetic latitude.

DISTRIBUTION OF UNDERGROUND ELECTRICAL RESISTIVITY AROUND SYOWA BASE*

Takashi OGUTI**

昭和基地における Polar Magnetic Storm とその関連現象について*

小　口　　高**

Electrical resistivity of underground rocks around Syowa Base was estimated by using Wonner's configuration for shallow layers and by observation of geomagnetic and geoelectric variations for deep layers. The results obtained may be summarized as follows;

1) **Shallow layers** Observation has shown that there is a thin layer of low resistivity at the surface of the ground which has an axis of minimal resistivity in about E-W direction. Resistivity in this direction is about 4.4×10^4 Ω cm and that in N-S direction is about 5.5×10^4 Ω cm as seen in Fig. 1. The thickness of the surface layer was estimated to be 1.8 m at most. The layer is mostly composed of sand which is accumulated in the bottom of a valley elongated in E-W direction.

Under the sand layer, there exists an other of a little higher resistivity. The axis of minimal resistivity of the layer is about in N-S direction, the value of which is about 6.9×10^5

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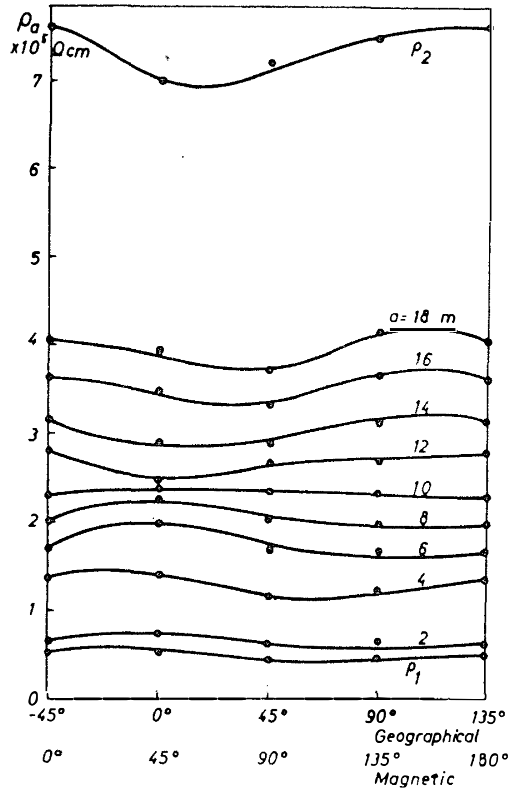

Fig. 1. Anisotropic resistivity of the ground around Syowa Base.
ρ_1: surface layer (sand)
ρ_2: middle layer (gneiss)

Ω cm, while the value in direction of the maximal resistivity is about 7.6×10^5 Ω cm. The values are in good agreement with those generally accepted for gneiss. The anisotropy may be due to the strike, which runs in N–S direction around the Base.

The most conductive direction of the middle layer is thus almost perpendicular to that of the surface layer, and the former just agrees with the predominant direction of geoelectric variations. The result is reasonable, since the electrodes were placed for measuring of geoelectric variations with 150 m distance, which is much longer than the thickness of the surface layer.

2) **Deep layers** Analysis of geoelectric and geomagnetic pulsations have shown that there is a systematic phase difference between the two kinds of pulsations. The phase difference decreases from $\pi/4$ with increase of period of pulsations, having a minimum value at the certain period, and increases again for long period variations. It can be also estimated theoretically[1] as a function of period, being dependent on the distribution of resistivity and the thickness of the middle layer.

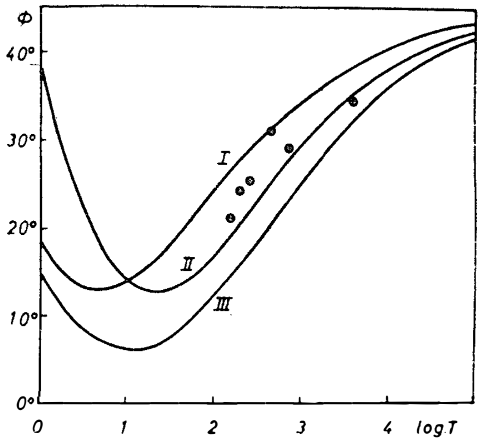

Fig. 2. Phase difference between geomagnetic and geoelectric pulsations with respect to period of pulsations.

Though a considerable scatter appears in the observed points, theoretical curve I or II seems to agree with the observations as seen in Fig. 2. The thickness of the middle layer is thus estimated to be about 3 km, and the resistivity of the lower layer is found to be about two order larger than that of the middle layer, being about 7×10^7 Ω cm.

Reference

1) J.G. Scholte and J. Veldkamp: Journ. of Atmos. and Terr. Phys. 6, 33 (1955).