

I-4-7. Magnetic Disturbances and Aurorae in the Nearpolar Region of the Northern Hemisphere*

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The comparison of the daily variations in frequency of aurora appearances in the zenith at the high-latitudinal stations of the northern hemisphere with the daily variation of magnetic activity (Q -index) by the IGY materials showed that:

- In the nearpolar region ($\phi \geq 78^\circ$) maximum in daily variations of frequency of aurora appearances somewhat outgoes the corresponding maximum in magnetic activity.
- In the region between the first and the second zones of aurorae ($70^\circ \leq \phi \leq 78^\circ$) the morning maximum in frequency of aurora appearances coincides in time or somewhat outgoes the morning maximum of magnetic activity. The evening maximum in frequency of aurora appearances coincides with the minimum of magnetic activity and vice versa, the evening maximum of magnetic activity coincides with the minimum in frequency of aurora appearances.
- Near the main zone of aurorae the maxima in daily variations of magnetic activity and aurora either coincide or they are a little bit displaced in time towards each other.

The comparison given shows that daily variations in aurora appearances statistically goes in phase with magnetic activity

variations only in the region of the main auroral zone. Within the polar cap the morning aurora maximum somewhat outgoes the corresponding magnetic activity maximum, and at the hours of the night maximum the variations go in the counterphase.¹⁾

Report²⁾ gives the comparison results of hourly values of magnetic activity and aurora appearances in the zenith at all hours of the day. Table I for $SP=7$ (winter 1957-58, $\phi \sim 77.5^\circ$) gives the results of such comparison separately for the hours of morning and night maxima of magnetic activity.

The figures in the table mean in percentage the number of appearances of the given value of magnetic activity.

At the station $SP=7$ at 22-24h of univ. time there are maxima (morning) in daily variations both as frequencies of aurora appearances and as magnetic activity. At 5-7 o'clock with rather great magnetic activity (night maximum) there were some times fewer aurorae in the zenith. It is evident that the distribution of magnetic disturbance with aurora absent and aurora present in the zenith is approximately equal. Consequently, it is not possible to say definitely, that magnetic disturbances at these hours are connected with aurora appearances. Magne-

Table I.

Q-index magnetic activity	$SP=7$			
	Univ. time			
	22-24 "morning" maximum		5-7 "night" maximum	
	aurora present	aurora absent	aurora present	aurora absent
1	12	3	8	6.5
2	40.5	23	54	30
3	40.5	42	15	41
4	7	23	23	18.5
5		9		2.5
6				1.5

* This paper was combined with I-4-6 and presented by A. I. Lebedinsky.

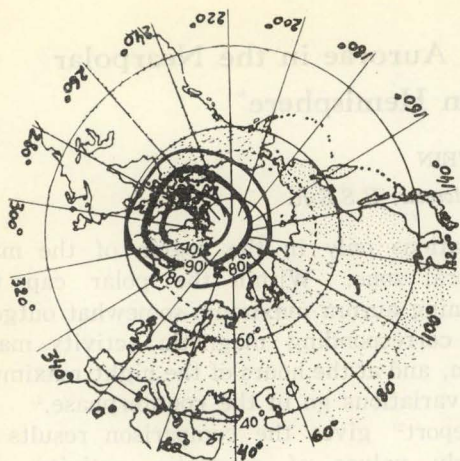


Fig. 1. Isolines of frequency of aurora appearances in the zenith at the hours of the morning maximum. In the gaps—the frequency of aurora appearances in percentage.

The thick line—the second zone of aurorae.

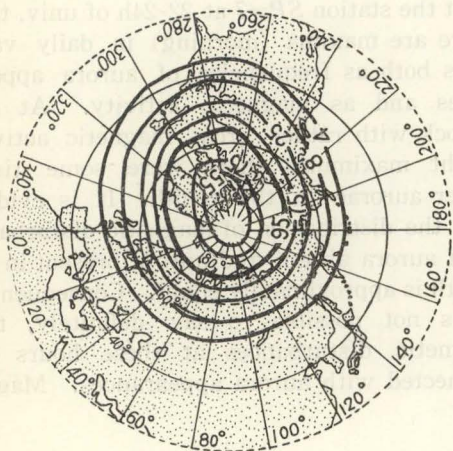


Fig. 2. Isolines of frequency of aurora appearances in the zenith at the hours of the night maximum.

tic disturbances appear in both cases when there are aurorae in the zenith and when there are no aurorae.

In literature there is an indication to the fact that in the nearpolar region there is the second zone of maximum aurora repetition.³⁻⁶⁾

Fig. 1 gives isolines of frequency of aurora appearances in the zenith (the isoaurora) at the hours of the morning maximum. A thick line denotes the second zone of aurorae. While drawing the line besides the probability of aurora appearances in the zenith at the morning hours they should take into account the aurora location at the hours of the morning maximum at the nearpolar stations of the Arctic II, Resolute Bay, Baker Lake, Godhaven, Cape Tobin, Nord, Alert. The second near-polar zone of aurora is an oval, surrounding the pole of uniform magnetization. In the western hemisphere the zone is situated at the geomagnetic latitudes $\phi \sim 75^\circ - 80^\circ$, in the eastern hemisphere—at the latitudes $\phi \sim 74^\circ - 76^\circ$.

Fig. 2 gives isoaurorae for the hours of the night maximum. The location of the maximum isoaurora at night hours differs little from the location of the main auroral zone²⁾.

References

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