Diurnal, semiannual and year to year variations of the geomagnetic activity at Syowa Station, Hermanus and Kakioka

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Geomagnetic activities observed at Syowa Station, Kakioka and Hermanus are compared to study regional characteristics in the diurnal, seasonal and year to year variations. In doing the analysis we converted the K-index to the am-like index that represents amplitude of the geomagnetic disturbance in a linear scale, and used the am-like index in calculating the daily, monthly and yearly averages. The am-index is also used as the reference in the comparison. The geographical and magnetic local times at Syowa Station and Hermanus coincide with the Universal Time, but those at Kakioka differ about 9 hours.

The diurnal and monthly changes in the magnetic disturbance at Hermanus are almost the same as those in the am-index. The pattern at Kakioka is similar as well when we take into consideration the local time difference of 9 hours from the UT and reversal of summer and winter. On the contrary, the seasonal variation at Syowa Station differs from that at other stations especially in the day time for which maximums of the magnetic disturbance appear in January and November. A similar tendency is discerned as well in the seasonal variation at Hermanus, though it is not so distinct. However, when the daily mean value of the am-like index is used in the analysis, the seasonal change is very alike for all stations. This is because the geomagnetic activity in the night time is far larger than that in the daytime at Syowa Station, and the daily average represents disturbance in the night time whose seasonal variation is very similar to that at other stations. Change in the conductivity in the ionosphere probably influences on the seasonal variation in the geomagnetic disturbance in the day time at sites of high latitude.

Year to year variation in the geomagnetic disturbance is very alike for all Stations. In accordance with that fluctuation in the ratios between yearly averages of any two Stations is small. Interestingly, a clear 11-year variation is seen in the ratio between Syowa Station and Hermanus whose peaks coincide with those in the 11-year cycle in the Sunspot number. The maximums in the ratio correspond to the minimums in the Sunspot number, though.

A tendency of increase is found in the geomagnetic activity at Syowa Station relative to the am-index. On the other hand a relative decrease is seen for the geomagnetic activity at Hermanus. Any one-directional change is not observed at Kakioka. The secular increase at Syowa Station is more conspicuous in early and mid summer season in the Antarctica.