昭和基地における地磁気活動の季節及び長期的変化

吉田明夫[1]、山岸久雄[2]、門倉　昭[2]
[1]*温泉地学研究所*
[2]*極地研究所*

Seasonal variation and long-term change in the geomagnetic activity at Syowa station

Akio Yoshida[1], Hisao Yamagishi[2] and Akira Kadokura[2]
[1]*Hot Springs Research Institute*
[2]*National Institute of Polar Research*

Characteristics of seasonal variation and long-term change in the geomagnetic activity at Syowa station are investigated using *K* index data since the beginning of the observation. We converted *K* index into *as* index thai is linear in the amplitude of geomagnetic disturbance so as to make the comparison with the *am* index possible.

When the map where seasonal and daily variation of the average *as* index during 40 years are depicted is compared with that for the average *am* index in the same period, we get an impression that they are apparently different (Fig.1). Although such features that the geomagnetic activity tends to be the largest at the nighttime in spring and fall and to become the smallest in the afternoon in June and July are similar, the so-called semi-annual variation is not clear in the geomagnetic activity at Syowa station, especially in the daytime in the Universal Time. Further, the maximum in the geomagnetic activity is not seen at times of equinoxes, but shifts toward summer. This feature is the same as that seen in *AE* index. We think the cause is the same for the both indices and that can be attributed to the effect of the increase of electric conductivity in the ionosphere due to solar radiation in the summer time.

Over all, appearance in the long-term change in *as* index is similar to that in *am* index. For example, 11-year variation and change in the trend from increasing to decreasing at about 1990 are seen in both indices. These features are considered to reflect variation in the interplanetary magnetic field and solar wind velocity that are relevant in making geomagnetic disturbances. A remarkable longtime feature which we would like to note is the tendency that *as* index has been increasing relative to *am* index. The relative increase is more conspicuous in the season from spring to summer than the season from fall to winter in the southern hemisphere, and in the daytime. The seasonal difference in the increasing rate is not so clear at the nighttime when geomagnetic activity is high.

Another intersting finding is the 11-year period variation seen in the ratio of *as* index against *am* index. The variation is especially clear in the nighttime since 1980s. It is to be noted that the phase is inverse to that in the sunspot number variation and is shifted noticeably to the phase of the change in the geomagnetic activity. These facts indicate that the 11-year period variation is not caused by the variation in the solar winds. On the other hand, the clear inverse relationship to the variation in the sunspot number shows that it exhibits change in the electric conductivity in the ionosphere due to the variation in the ultraviolet radiation.

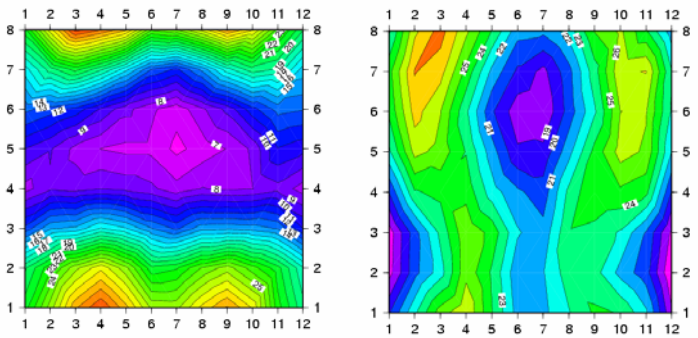

Figure 1
Left panel: Month-daily variation in the average *as* index during 40 years.
Right panel: Month-daily variation in the average *am* index during 40 years.