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Latitudinal and MLT dependence of the seasonal variation of geomagnetic field around auroral zone

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Seasonal variation of geomagnetic field around auroral zone is analyzed in terms of geomagnetic latitude, magnetic local time (MLT) and geomagnetic condition in this study. The study uses horizontal component (H) of geomagnetic field obtained from 6 observatories located in geomagnetic latitude of 57.8N-73.8N along 115ºE geomagnetic longitudinal line. The results indicate that seasonal variations of geomagnetic field are different combinations of annual and semiannual variations at different latitudinal ranges. Both annual and semiannual variations show distinct MLT dependency: (1) At dayside auroral latitudes (around 72ºN geomagnetic latitude), geomagnetic field shows distinct annual variation under both quiet and disturbed conditions. Furthermore, the annual component is mainly contributed by data of dusk sector. (2) At nightside auroral latitudes (around 65ºN), geomagnetic field shows semiannual dominated seasonal variation. The semiannual component is twice as much as the annual component under disturbed conditions, while the annual component is comparable to the semiannual component under quiet conditions. Under quiet conditions, the semiannual component is mainly contributed by 1300-1400 MLT, meanwhile the annual component has two peaks: one is around 1100-1300 MLT and the other is around 2000-2200 MLT. Under disturbed conditions, the semiannual component is mainly contributed by data around midnight, while the annual component is mainly contributed by dusk sector. (3) At subauroral latitudes (around 60ºN), annual variation is comparable to semiannual variation under both quiet and disturbed conditions. The annual and semiannual component show similar MLT dependence as that of nightside auroral latitudes.