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The effect of the carrier frequency decreasing of serpentine emission in the polar cap during weak geomagnetic activity

Nadezhda Kurazhkovskaya[1] , **Boris Klain[1] ,** Alexander Kurazhkovskii[1]

[1] Borok Geophysical Observatory, Branch of the Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, Borok (Yaroslavl oblast), Russia

klb314@mail.ru

The effect of the carrier frequency (f_{SE}) decreasing of serpentine emission (*SE*) observed in the 0.1–5.0 Hz frequency range under conditions of a quiet magnetosphere (Kp ~ 0–2) was discovered. The data of the dynamic spectra of ultra-low-frequency (ULF) emission at the Antarctic Vostok Observatory (corrected geomagnetic coordinates Latitude −85.41°, Longitude 69.01°) were used for an analysis. The unique analog magnetic records of the Vostok Antarctic observatory, which have been digitized at high resolution (20 Hz) were obtained from the World Data Center for the Solar-Terrestrial Physics (Moscow) (http://www.wdcb.ru/arctic_antarctic/antarctic_magn_4.ru.html). For 1970–1972 the 90 cases of serpentine emission observation, the central carrier frequency of which smoothly decreased (several times, sometimes to 0) and then increased almost to the initial level at time intervals significantly exceeding the maximum modulation period (1 h) were analyzed. Typical modulation of the carrier frequency emission with periods of 1–60 minutes was persisted in all analyzed cases. The most likely time of observation of the detected effect was in the hours before midnight. It was shown that a decrease in the f_{SE} and its subsequent increase were observed against the background of weak geomagnetic activity and relative stability of the dominant number of solar wind and IMF parameters. Based on the fact that the f_{SE} decreases predominantly near midnight synchronously with a decrease of the auroral activity (the *AE* index value), it can be assumed that in undisturbed geomagnetic conditions, the emission is most likely excited near the polar cusp, and then penetrates into the polar cap region. Presumably, this behavior of the f_{SE} is stimulated by a decrease in the plasma parameter β (equal to the ratio of thermal pressure to magnetic pressure) and the ratio of proton density to helium ion density *Np/Na*, the dynamics of which are similar to the average variation of the *SE* carrier frequency. Apparently, the increase of turbulence solar wind and the proton density decrease compared to the helium ions density affects not only at the flow regime of high-latitude regions of the magnetosphere, but also the variation in the carrier frequency of serpentine emission observed in the region of the polar cap.