

Morphology of the spectral resonant structures of the background electromagnetic noise in the ULF range at L=5.2

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The data of the ULF observations in SGO for 1995-1999 were used to study the morphological features of the SRS. The characteristics studied are the occurrence rate of the SRS and frequency interval between the neighbouring spectral bands. We show that the two characteristics exhibit pronounced diurnal, seasonal, and long-term variations. In agreement with observations in mid-latitudes the occurrence rate and frequency interval is lower during the day time. We also found clear seasonal dependence: the SRS occurrence rate and frequency interval are smaller in summer and larger in winter. The data allow to study variations in the course of transition from minimum to maximum of the solar cycle. Both occurrence and frequency interval exhibit clear downtrend during the transition. In addition, the dependence of the SRS on the geomagnetic activity was investigated. We found that the SRS occurrence rate decreases when the geomagnetic activity increases. All the features are interpreted in the frames of theory of the ionospheric Alfvén resonator (IAR) which is believed to exist in the upper ionosphere. According to the theory the SRS frequency interval depends mainly on the maximal value of the plasma density in the F-region and characteristic scale of the plasma density decay above the F-region maximum. Using the ionosonde observations in SGO and ionospheric model IRI-95 we calculated (on the basis of the IAR theory) the monthly median values of the SRS frequency interval. The result of comparison with observations showed amazing coincidence. According to the theory, the occurrence rate should depend on the quality of the resonator, which is, in particular, depends on the conductivity in the E-region. This explains why the SRS occurrence depends on geomagnetic activity. We conclude that the IAR theory satisfactorily explains the morphology of the SRS in the auroral zone and that the IAR does exist in the auroral latitudes.