Long-term Akebono observations of MF/HF auroral radio emissions emanating from the topside ionosphere

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Using a long-term data set obtained from the Plasma waves and sounder experiment (PWS) mounted on the Akebono satellite, we report on the statistical properties of Terrestrial Hectometric Radiation (THR), auroral radio emissions emanating from the topside ionosphere in the MF and HF ranges. Statistical studies using the long-term Akebono/PWS data reveal clear bimodality in the frequency distribution of THR with two broad peaks near 1.6 MHz and 3.6 MHz and the spatial distribution of appearance of THR-L (lower than 2.5 MHz) and THR-H (higher than 2.5MHz). In the morning to postnoon sectors (3-15 MLT), the spatial distribution of both types of THR is confined to magnetic latitudes higher than 70 deg, while during nighttime (15-3 MLT) it spreads to lower magnetic latitudes (˜30 deg). The explanation of this distribution is that THR is favorably generated in the night-side auroral latitudes near 1000-km altitude. Occurrence rate of THR-L is higher than that of THR-H. There is a peculiar region where only THR-H is rarely detected in an altitude range higher than 6,000 km at magnetic latitudes higher than 60 deg during 18-3 MLT. The long-term measurements show clear solar activity dependence and seasonal variations of THR appearance; THR occurrence rate drops from a few percent during solar maxima to 0.1 percent or less during solar minima and is the highest in summer, lower in equinoxes, and the lowest in winter.