

Statistical and case studies of MF/HF auroral radio emissions emanating from the topside ionosphere

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This is a brief report on polarization features and the source region of MF/HF auroral radio emissions emanating from the topside ionosphere. The Akebono/PWS measurements show that band-limited natural radio emissions are often observed in a frequency range of 1-4.5 MHz when the satellite passed over the auroral latitudes during geomagnetic disturbances. These MF/HF auroral radio emissions are called 'Terrestrial Hectometric Radiation (THR)' and regarded as a counterpart of auroral roar and MF burst which are observable from the ground. THR typically occurs in either or both of two frequency bands near 1.5-2.0 MHz and 3.0-4.0 MHz, whose polarization features correspond to the L-O and R-X mode. The R-X mode, which has never been reported as auroral roar and MF burst, can be attributed to nonlinear coupling of two upper hybrid waves. The Akebono satellite can not only observe THR emissions away from their source regions, but also provide a rare opportunity for the in-situ measurement of the source regions. We present one particular THR event where the Akebono satellite crossed through the THR source region. This Akebono satellite observation shows THR emissions merge with upper hybrid waves in a frequency-time diagram under the matching condition $f_{UH} = 2f_{ce}$. This observation suggests that plasma instability enhances the upper hybrid waves under this condition, and then they are converted into electromagnetic THR emissions.