



Ground-based observation of MF auroral radio emissions in the auroral zone

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Ground based observation of MF auroral radio emissions has successfully detected as auroral roar and MF burst. It has been believed that the auroral roar is originated from strong excitation of upper hybrid wave in the auroral ionosphere when $f_{uh} \sim nf_{ce}$ is satisfied and propagates to the ground after the mode conversion into the L-O mode electromagnetic wave [e.g. Weatherwax et al. 2002]. In order to understand physical processes of the MF auroral radio emissions, a radio spectrograph system was installed at Husafell in Iceland (invariant latitude: 65.3deg) in 2005. The polarization character of the $3f_{ce}$ roar was verified as L-O mode. Most of the observation results support the previous theory; however, the auroral roar event detected on May 23, 2007 was significantly unmatched with it. When we take the hypothesis that the frequency of auroral roar coincides with harmonics of f_{ce} in the source region, the observed roar's frequency of 3.1-3.5 MHz indicated the source's altitude range of 550-880 km. However, the emission generated in this altitude range must encounter Z mode cutoff, and it cannot arrive on the ground. We proposed alternative hypothesis that the plasma instability occurs at $(n+1/2)f_{ce}$ ESCH waves. In this case, the estimated altitude of the source region is 250-350 km. In addition to the extended study of the contribution of the ESCH waves, we are planning to collaborate with ESR in Longyearbyen to identify the ionosphere condition.