Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PEM027-P10 会場:コンベンションホール 時間:5 月 25 日 10:30-13:00

Activity of ECH waves near the equatorial magnetosphere seen by THEMIS: Implications for diffuse auroral emissions

Activity of ECH waves near the equatorial magnetosphere seen by THEMIS: Implications for diffuse auroral emissions

栗田 怜[1*], 三澤 浩昭[1], 三好 由純[2], 熊本 篤志[1], 土屋 史紀[1], 森岡 昭[1], Vassilis Angelopoulos[3], Chris Cully[4], Oliver Le Contel[5]
Satoshi Kurita[1*], Hiroaki Misawa[1], Yoshizumi Miyoshi[2], Atsushi Kumamoto[1], Fuminori Tsuchiya[1], Akira Morioka[1], Vassilis Angelopoulos[3], Chris Cully[4], Oliver Le Contel[5]

[1] 東北大・理・惑星プラズマ大気, [2] 名古屋大・STE 研, [3]IGPP, UCLA, USA, [4]IRF, Uppsala, Sweden, [5]CETP, France
[1]PPARC, Tohoku Univ., [2]STEL, Nogoya Univ., [3]IGPP, UCLA, USA, [4]IRF, Uppsala, Sweden, [5]CETP, France

It has been thought that the source of diffuse auroral emissions is scattered plasma sheet electrons into the loss cone by some wave-particle interactions. Both ECH waves and whistler-mode chorus have been thought to be the contributors to the production of diffuse auroral electrons since they can resonate with plasma sheet electrons. A question which wave mode dominantly contributes to the production of diffuse auroral electrons has been discussed for more than four decades and there is still controversy on the magnetospheric physics. A recent study done by Thorne et al. [2010] reveals that whistler-mode chorus is dominantly responsible for the production of diffuse auroral electrons. While, there are some observational suggestions that ECH waves cause diffuse auroral electron precipitations. [e.g., Nishimura et al., 2010; Liang et al., 2010]. Furthermore, the diffuse auroral electron precipitations derived by Newell et al. [2009] can be observed where no intense chorus emissions are occurred as shown by the THEMIS statistical survey [Li et al., 2009].

The scope of this study is to investigate distributions of average amplitudes of ECH waves near the equatorial magnetosphere in the region of $5 < L < 10$ to consider their role in production of diffuse auroral electrons. This study is an extended work done by Meredith et al. [2009] that investigated ECH wave intensity and occurrence in the region of $4 < L < 7$ near the equator ($|MLAT| < 3$ deg) by the CRRES wave measurements. The THEMIS Filter Bank (FBK) data were used to investigate the ECH wave distributions and the data obtained from June 1 2007 to November 30 2010 were used for the analyses. The magnetic equator is determined from the T89 magnetic field model and the magnetic latitude is also estimated from the ratio of the local magnetic field intensity to the equatorial magnetic field intensity based on the model.

We firstly derived the magnetic latitude distributions of ECH waves and their dependence on the geomagnetic activity. We set selection criteria of ECH emissions since the FBK data have very low frequency resolution which prevent us from determination of wave mode precisely. The results are consistent with the previous study about the latitudinal distributions. The magnetic local time distributions of ECH waves near the equator ($|MLAT| < 3$ deg) were derived using the same selection criteria. The derived magnetic local time distributions showed that ECH waves are observed at higher L-shells ($L > 7$) on the night side and the mean amplitudes enhance as geomagnetic activity level increases. Furthermore, as geomagnetic activity level increases, ECH emissions tend to be observed on the dusk side magnetosphere. The regions mentioned above correspond to the region where there are no intense chorus waves [Li et al., 2009] but diffuse auroral electrons are observed by the low altitude satellite measurements [Newell et al., 2009]. This indicates that ECH waves contribute to the production of the diffuse auroral precipitations to some degree. Thus, it is suggested that the spatially combined electron precipitations due to resonant interactions with ECH waves and whistler-mode chorus make the global morphology of diffuse aurora.

キーワード: ディフューズオーロラ, ピッチ角散乱, ピッチ角拡散, 波動粒子相互作用
Keywords: Diffuse aurora, wave-particle interaction, ECH wave, Whistler-ode chorus, pitch angle scattering, pitch angle diffusion