パルセーティングオーロラにともなう降り込み電子の変調

三好 由純 [1]; 齊藤 慎司 [2]; 関 華奈子 [1]; 加藤 雄人 [3]; 坂野井 健 [4]; 西山 尚典 [5]; 浅村 和史 [6]; 平原 聖文 [7]
[1] 名大 STE 研; [2] NICT; [3] 東北大・理・地球物理; [4] 東北大・理; [5] 東北大・理・惑星プラズマ大気; [6] 宇宙研; [7] 名大・STE 研

Internal modulations of precipitating electrons associated with pulsating aurora

Yoshizumi Miyoshi[1]; Shinji Saito[2]; Kanako Seki[1]; Yuto Katoh[3]; Takeshi Sakanoi[4]; Takanori Nishiyama[5]; Kazushi Asamura[6]; Masafumi Hirahara[7]
[1] STEL, Nagoya Univ.; [2] NICT; [3] Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.; [4] Grad. School of Science, Tohoku Univ.; [5] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [6] ISAS/JAXA; [7] STEL, Nagoya Univ.

We report internal modulations of precipitating electrons of the pulsating aurora from the Reimei observations and the numerical simulation. In the pulsating aurora region, Reimei observed precipitating electrons at two different energy ranges [Miyoshi et al., 2010, Nishiyama et al., 2011]. Higher energy components have temporal variations with a few ˜tens seconds, which cause the pulsating aurora emission, and few Hz modulations of the flux are imbedded in the precipitations. On the other hand, the lower energy electrons around 1 keV show continuous precipitations without significant internal modulations. The whistler mode chorus waves have been considered as a mechanism to cause the pulsating aurora. Several characteristics of the frequency spectrum of chorus waves are well consistent with features of precipitating electrons of the pulsating aurora. Lower- and upper-band chorus waves cause the high-energy precipitations and the low-energy precipitations, respectively. The gap at the half-gyrofrequency corresponds to absence of precipitations between low- and high-energy electrons. In general, a block of lower-band chorus appears every ˜10s seconds, and the block consists of an assembly of a few rising tones with repetition periods of ˜100 msec. On the other hand, the upper-band chorus appears continuously, and many rising tone-like elements seem to be embedded in the upper-band. In order to simulate how chorus waves cause the scattering of energetic electrons, we performed the GEMSIS-WPI test-particle simulation [Saito et al., this meeting], taking into considerations of basic characteristics of lower- and upper band chorus. The results showed that the lower-band chorus caused the precipitation of high energy electrons. The blocks of lower-band chorus produce the on-off signature of the precipitating electrons, which cause periodical variations of the pulsating aurora. Each rising tone produces the energy dispersion of precipitating electrons, which cause few Hz modulations of the precipitating electrons. This study suggests that the chorus-wave particle interaction is the primary mechanism of the pulsating aurora.