R006-31
A 会場 ：11/7　AM2 （10:45-12:30）
11:45〜12:00

#山川　智嗣 [1)], 関　華奈子 [1)], 天野　孝伸 [1)], 三好　由純 [3)], 高橋　直子 [2)], 中溝　葵 [2)], 山本　和弘 [1)]
([1] 東大・理,[2]NICT,[3] 名大 ISEE

Control of the dynamics of cold particles on the excitation of ULF waves based on the magnetosphere-ionosphere coupled model

#Tomotsugu Yamakawa[1)], Kanako Seki[1)], Takanobu Amano[1)], Yoshizumi Miyoshi[3)], Naoko Takahashi[2)], Aoi Nakamizo[2)], Kazuhiro Yamamoto[1)]
([1]School of Science, The University of Tokyo,[2]NICT,[3]ISEE, Nagoya Univ.

Storm-time Pc5 ULF waves are electromagnetic pulsations (1.67-6.67 mHz), which can be generated by ring current ions associated with the injection from the magnetotail during substorms. The excitation mechanism and global distribution of ULF waves are keys to understand the dynamic variation of the outer radiation belt, since they can drive radial transport of radiation belt electrons [e.g. Elkington et al., 2003]. Theoretically, drift-bounce resonance has been considered to be a candidate excitation mechanism [Southwood, 1976]. Previous spacecraft observations suggest both drift resonance and drift-bounce resonance excitation of ULF waves [e.g. Dai et al., 2013; Oimatsu et al., 2018]. Recently, Yamakawa et al. [2022, submitted] could reproduce both the drift resonance and drift-bounce resonance excitation of storm-time Pc5 ULF waves based on the magnetosphere-ionosphere coupled model. The coupled model could enhance the amplitude of ULF waves. However, this simulation was performed under the condition of constant density and how the dynamics of cold particles affects the excitation of storm-time Pc5 waves is not well understood.

We used magnetosphere-ionosphere coupled model between GEMSIS-RC [Amano et al., 2011] and GEMSIS-POT model [Nakamizo et al., 2012]. GEMSIS-RC model solves 5-D drift-kinetic equation for the PSD of ions and Maxwell equations self-consistently. GEMSIS-POT is a 2-D potential solver in the ionosphere. We developed the simulation code for updating the density of cold particles in GEMSIS-RC model in order to include the dynamics of cold particles. We compared simulation results between two cases; Case a (constant density, Yamakawa et al. [2022, submitted]) and Case b (including the dynamics of cold particles).

Simulation results have shown the excitation of two types of Pc5 ULF waves for both cases. First, we find the drift resonance excitation of Pc5 waves in the dayside. They are driven by the positive energy gradient of the PSD of ions with the energy of 50-120 keV. Second, Pc5 waves excited associated with the drift-bounce resonance are seen in the duskside. They are driven by inward gradient of ion PSD. We find that if we include the dynamics of cold particles, the region where second harmonic mode waves are generated extend to the region of lower L shell. The excitation region of fundamental mode is similar between two cases. We will also report on the time evolution of density and its effect on the excitation of ULF waves.