R007-12
Zoom meeting A ：11/1　PM1　(13:45-15:30)
14:30-14:45

太陽メートル波帯 II 型電波バーストのスペクトル微細構造と高エネルギー粒子現象との関係 - II

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Relationship between solar energetic particles and spectral fine structures of metric type II radio bursts - II

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It is well known that a type II burst is one of sporadic and intense solar non-thermal radio phenomena, which shows gradual negative frequency drift in the metric to kilometric wavelength ranges and is generated with a coronal mass ejection (CME) event. As a plausible generation process of type II bursts, it is proposed that electro-static plasma waves originated from energetic electrons are effectively converted to electro-magnetic waves (type II bursts) at the region where the local plasma frequency is equal to wave frequency. A type II burst often occurs with energetic protons and ions with the energy of more than the MeV grade, and such an energetic phenomena is called a solar energetic particle (SEP) event. The coincident occurrence of type II bursts and SEPs strongly suggests that both energetic electrons and protons/ions would be the same origin initiated by a CME event. The occurrence characteristics of type II radio bursts and also SEPs have important information on the origins and generation processes of energetic particles and have been of course investigated well individually, however their relationships have not been well known except a recent research for the kilometric to hectometric type II bursts (Iwai et al., 2020).
We have investigated the relationship between SEPs and metric type II bursts from a view point of the clarification of characteristics of SEPs from the occurrence characteristics of type II bursts. We have especially paid attention to spectral fine structures of type II bursts identified in the metric wavelength by our group (Kashiwagi et al., 2016). We have analyzed drift rates of fundamental elements of type II bursts using the radio data observed with the AMATERAS system, Tohoku University (Iwai et al., 2012) for the type II burst events observed in 2011 ? 2017 with weak to extinct SEP natures. From the drift rate analyses for the spectral fine structures, two possibilities are suggested for their origin: 1)the fine structures are just apparent ones where radio waves are generated in some expanded area simultaneously if the source regions are in relatively dense plasma condition, or 2)the fine structures reflect fast drift SEPs with radiating short-term radio bursts if the source regions are in not so dense plasma condition. In the presentation, we will introduce results of the drift rate analyses and discuss relationship between SEPs and spectral fine structures of type II bursts including a viewpoint of space-weather, and also make reference to future observations of solar radio observations in meter to decameter wave ranges.