Occurrence characteristics of Type-III solar radio bursts in the solar quiet period

Saho Matsumoto[1], *Hiroaki Misawa[1], Fuminori Tsuchiya[1], Satoshi Masuda[2], Takahiro Obara[1]

1. Planetary Plasma and Atmospheric Research Center, Graduate School of Science, Tohoku University, 2. Institute for Space-Earth Environmental Research, Nagoya University

Type III bursts are impulsive radio bursts generated in association with solar flare. A characteristic spectral nature of Type III burst is its first negative frequency drift, which is considered to reflect energetic electrons moving upwards from the sun along an open magnetic field line generated by the magnetic reconnection process near the sun. On the other hand, it is also considered that simultaneously generated downward energetic electrons move into the dense chromosphere and make thermalized plasma, which enhances soft X-ray emissions (SXR) and is recognized as occurrence of flare. Thus, it is expected that solar flares in SXR have a tight relation with Type III bursts. However, there seems to be no small number of examples of Type III bursts which occur in weak or no SXR flare event.

We have derived characteristics of Type III bursts appeared in the solar quiet period and have compared them with SXR variations to investigate their mutual relation. For this purpose, we have analyzed dozens of Type III bursts appeared after 2014 using the database of the meter-wave range solar radio telescope in Tohoku University (IPRT/AMATERAS). For estimating SXR variations we have used the database of GOES SXR. As the result, it is indicated that the correlation between energy of Type III burst and corresponding variation of SXR is low actually, and Type III bursts with similar intensity appeared in a few orders of SXR variations. Then, we have also investigated expected solar surface phenomena corresponding to each Type III burst for revealing causalities of the low correlation. We referred to the RHESSI flare list and surveyed solar surface phenomena using the SDO/AIA image data. It is suggested that Type III bursts with very weak or no variation in SXR were related to compact solar surface phenomena such as EUV spot or jet. This result implies a possibility that a causality of the low correlation is due to the height or scale size of magnetic reconnection region which affects SXR intensity.

In the presentation we will introduce results of the statistical and event analyses of Type III bursts in the solar quiet period precisely and discuss expected causalities of the low correlation.

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