Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

PEM07-32 Room:304 Time:May 23 12:00-12:15

Radio observation of solar flares on this solar cycle and space weather

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The solar corona contains many particle acceleration phenomena that are caused by the interactions between coronal magnetic field and plasma. Non-thermal electrons accelerated in the corona emit radio waves in the metric range, resulting in many types of solar radio bursts being observed. One of the main emission processes of metric solar radio burst is a plasma emission. The plasma emission is emitted around local plasma frequency. When non-thermal electrons move in a density varying region, a frequency drift structure is observed. For example, type-III bursts are generated by non-thermal electrons propagating along open field lines. Type-II bursts are generated by non-thermal electrons propagating with a shock in the corona. Therefore, spectrum observations of solar radio bursts are important to observe and forecast space whether phenomena.

Iitate Planetary Radio Telescope (IPRT) is a ground-based radio telescope developed by Tohoku University. Solar radio observation system of IPRT (AMATERAS) enables us to observe radio bursts in the frequency range between 150 and 500 MHz, which is suitable to observe solar radio bursts. We have observed solar radio bursts since 2010 using this system. Many flare associated radio phenomena including two X-class flares have been observed by our observations. Some examples of recent major flares and associated radio phenomena observed by AMATERAS are reported to describe the importance of radio observations on the space weather research.

Keywords: Sun, flare, radio burst, ground-based observation, space weather