PEM27-01 Room:421 Time:May 1 16:15-16:30

Micro-TypeIII radio bursts and outer corona

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We presents detailed features of micro-typeIII radio bursts and its relation to the outer corona, by using long-term observations made by the Geotail satellites. Micro-typeIII radio bursts are elements of the so-called type III storm, and are characterized by short-lived, continuous, and weak emissions. Their average power is estimated to be well below that of the largest type III burst by 6 orders of magnitude. The activity of micro-typeIII bursts with respect to the solar activity, lower frequency limit of the bursts and its relation to the solar activity, and the configuration of magnetic field line of which source electrons are trapped are investigated. The relationship between streamers and micro-typeIII bursts are discussed by using STEREO observations.

Keywords: micro-type-III burst, outer corona, solar radio burst, interplanetary space, inner-heliosphere

PEM27-02 Room:421 Time:May 1 16:30-16:45

Coronal vector magnetic field and the plasma beta determined from the NoRH and multiple satellites observations

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In the solar corona, there are various kinds of eruptive phenomena, such as flares and coronal mass ejections, which are caused by interactions between the coronal magnetic field and plasma. Hence, it is important to precisely measure the coronal plasma parameters, including the magnetic field, plasma density, and temperature, in order to understand the mechanisms that generate these eruptive coronal phenomena.

The solar coronal vector magnetic field, plasma density, and temperature is derived from coordinated observations of the radio thermal free-free emission using the Nobeyama Radioheliograph (NoRH) and multiple line-of-sight extreme ultraviolet observations using the Solar Dynamic Observatory (SDO) and the Solar Terrestrial Relations Observatory (STEREO). We observed a post-flare loop on the west limb on 2013 April 11. The line-of-sight magnetic field was derived from the circularly polarized free-free emission observed by NoRH, which was combined with the tilt angle toward the Earth observed with STEREO and converted to a vector magnetic field. The emission measure and temperature were derived from the Atmospheric Imaging Assembly (AIA) onboard SDO. The derived temperature was used to estimate the emission measure from the NoRH radio free-free emission observations. The derived density from NoRH was 40% larger than that determined using AIA, which is due to the fact that the low temperature plasma is not within the temperature coverage range of the AIA filters used in this study. The derived plasma parameters (vector magnetic field, plasma density, and temperature) were used to derive the plasma beta, which is a ratio between the magnetic pressure and the plasma pressure. The derived plasma beta is about 6.2×10^{-3} at the pool top region. The plasma parameters derived in this study were all based on observational results, and the calculated vector magnetic field presented herein is one of the least affected by assumptions or modeling ever derived.

Keywords: Sun, corona, magnetic fields, polarization observation, Nobeyama Radioheliograph

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PEM27-03 Room:421 Time:May 1 16:45-17:00

Relationships among cosmic ray intensity, the photospheric magnetic field, and solar wind speed

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We visualize three-dimensional structure of the coronal magneic field by using the Radial-Field model for the coronal magnetic field devised by Hakamada with synoptic maps of photospheric magnetic field observed by the NSO/Kitt Peak, USA. As the rsults, we obtained the radial component of the photospheric magnetic field (Br_pho) and the one of the coronal magnetic field (Br_sou) on the source surface on the same field line in the coronal magnetic field. We estimate the solar wind speed (SWS) by using IPS technique divised by STE Lab, Nagoya Univiersity. According to our previous analysis on the Carrignton rotation bases, Log10|Br_pho|, Log10|Br_sou|show good correlations with the SWS for the data of [-1.0 <= Log10|Br_pho|<= 1.5, (0.1 G <= |Br_pho|<= 31.6 G), -1.5 <= Log10|Br_sou|<= 0.0, (0.0316 G <= |Br_sou|<= 1.0 G)]. In this study, we add the intensity of Oulu neutorn monitor (NM), and study relations among rotation averages of these NM, SWS, and Log10|Br_pho|. We found good simple correrations coefficients between Log10|Br_pho|-NM (r=-0.773), and SWS-NM (r=0.703), as well as, a good multiple correlaion (r = 0.785) among them by using the regression equation in the form of NM = a + b *SWS + c *log10|Br_pho|with a = 6363, b = 1.186, and c = -1400.0. However, Log10|Br_pho|-SWS also shows good simple correlation (r=-0.802). We calculated partial correlation coefficients between (a) Log10|Br_pho|-NM, (b) SWS-NM, (c) Log10|Br_pho|-SWS and obtained (a) r=-0.294, (b) r=0.130, (c) r=-0.364. These results suggest that, althogh the cosmic ray intensities shown by NM is determined by the intensity of photospheric magnetic fields on the open field lines and the solar wind speed occupied by these field lines, the dpendence of magnetic field is stronger than the one of wind speed.

Keywords: cosmic ray intensity, photoshpheric magnetic field, solar wind speed

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PEM27-04 Room:421 Time:May 1 17:00-17:15

Does a Plasma Tail of Comet ISON (C/2012 S1) Cause the Interplanetary Scintillation?

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C/2012 S1 (ISON) (referred to as Comet ISON) showed a well-developed plasma tail (longer than 0.1 AU) before its perihelion passage on November 28, 2013. A plasma tail consists of ionized gases emitted from a cometary nucleus and orients itself in the anti-solar direction by an interaction with the solar wind. In this study, we investigated the plasma tail of Comet ISON with interplanetary scintillation (IPS) data. The IPS is a scattering phenomenon of radio waves by density fluctuations of the solar wind, and it is well known that interplanetary disturbances such as coronal mass ejections (CMEs) cause an abrupt increase in IPS. A cometary plasma tail may also be a potential cause for the IPS enhancement, while observational studies for C/1972 E1 (Kohoutek), 1P/Halley and other are still controversial (*e.g.* Ananthakrishnan *et al.*, 1975, 1987; Slee *et al.*, 1987; Abe *et al.*, 1997; Roy *et al.*, 2007). We identified radio sources whose lines-of-sight approached to Comet ISON's plasma tail between November 1 and 28, and obtained their IPS data using the Solar Wind Imaging Facility (Tokumaru *et al.*, 2011) of the Solar-Terrestrial Environment Laboratory, Nagoya University. From examinations for them, we confirmed four IPS enhancement events, which is likely to be related to the plasma tail passage. In this session, we report this preliminary result for them and discuss an IPS of a cometary plasma tail origin.

Keywords: Comet ISON (C/2012 S1), Cometary plasma tail, Radio scintillation

PEM27-05 Room:421 Time:May 1 17:15-17:30

Effects of phase and group velocities on wave spectra observed in the solar wind

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Waves propagating in a plasma medium which has a relative velocity to the observer are differently observed in the spectra from those in the plasma rest frame. As known in general, the observed frequency is Doppler shifted by the relative velocity between the medium and the observer, V_{rel}. The frequency shift is the result of the difference of the phase velocities of the waves in the medium rest frame and in the observer frame. When the wave vector has a finite angle with respect to V_{rel} and the component of V_{rel} parallel to the wave vector is considerable to the phase velocity, the difference of the phase velocities between the frames and the frequency shift become significant.

We note that the observed spectral density is also modified by V_{rel}. The modification of the spectral density is the result of the difference of the group velocities of the waves in the medium rest frame and in the observer frame. When the component of V_{rel} parallel to the group velocity vector is considerable to the group velocity, the difference of the group velocities between the frames and the modification of the spectral density become significant. In order to estimate the amount of the modification, we derive the analytical expression of the modified spectral density in the observer frame.

It is important to consider not only the frequency shift but also the modification of the spectral density of waves observed by spacecraft in a moving plasma, such as the solar wind. Indeed, the phase and group velocities of whistler-mode waves cause significant frequency shift and modification of the spectral density in the solar wind. By the modification of the spectral density, we can explain the characteristic properties of '1 Hz waves', which have been generally observed in the upstream regions of various bodies, and suggest that the broadband upstream whistlers are the same source waves. The understanding of the effects is necessary to reveal the true nature of waves propagating in a moving plasma and to discuss their generation processes.

PEM27-06 Room:421 Time:May 1 17:30-17:45

Monochromatic whistler waves at 8 Hz observed by Kaguya above the terminator of the Moon

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Magnetic fluctuations around the moon are characterized with 2 major categories: (1) large amplitude monochromatic waves of 0.01 Hz and (2) monochromatic or non-monochromatic whistler waves, both observed on the dayside surface of the moon or above the terminator. Their generation is associated with (1) the solar wind ions or (2) electrons, respectively, reflected at the surface of the moon or the local crustal magnetic field. The monochromatic whistler waves are found at 1-2 Hz with left-handed polarization due to the Doppler shift caused by the solar wind flow. The frequency range is determined by the group velocity of the whistler waves that can overcome the solar wind speed.

Differently from the previously known characteristics, a new type of monochromatic waves was found at 8 Hz in the magnetic field data obtained by MAP/LMAG onboard Kaguya. They concentrated above the terminator. They propagated in the direction of the background magnetic field and showed right-hand polarization. They are thought to be whistler waves propagating downstream, and the frequency was up-shifted due to the Doppler shift.

Keywords: moon, SELENE, KAGUYA, MAP/LMAG, whistler wave, solar wind