S001-13
A 会場 ：11/4　 PM2 （15:45-18:15）
17:30～17:45

#千葉　翔太 [1), 今村　剛 [2), 徳丸　宗利 [3), 塩田　大幸 [4), 松本　琢磨 [5), 安藤　紘基 [6), 竹内　央 [7), 村田　泰宏 [7), 山崎　敦 [7),Bernd Hausler[8),Paetzold Martin[9), 岩井　一正 [10), 村上　豪 [11), 三好　由純 [3),Sami Asmar[12),Luciano Iess[13)
[(1] 東大・新領域・複雑理工,[(2] 東京大学,[(3] 名大 ISEE,[(4] 情報通信研究機構,[(5] 名大・ISEE,[(6] 京産大,[(7]JAXA/宇宙研,[(8]Bundeswehr University Munich,[(9]University of Cologne,[(10] 名大 ISEE,[(11]ISAS/JAXA,[(12]JPL/NASA,[(13]Dipartimento di ingegneria meccanica e aerospaziale Universita La Sapienza

Physical properties of the solar corona derived from radio scintillation observations with the Akatsuki spacecraft

#Shota Chiba[1)], Takeshi Imamura[2)], Munetoshi Tokumaru[3)], Daikou Shiota[4)], Takuma Matsumoto[5)], Hiroki Ando[6)], Hiroshi Takeuchi[7)], Yasuhiro Murata[7)], Atsushi Yamazaki[7)], Hausler Bernd[8)], Martin Paetzold[9)], Kazumasa Iwai[10)], Go Murakami[11)], Yoshizumi Miyoshi[3)], Asmar Sami[12)], Iess Luciano[13)]
[(1]Complexity Science, University of Tokyo.,[(2]The University of Tokyo,[(3]ISEE, Nagoya Univ.,[(4]NICT,[(5]ISEE, Nagoya University,[(6]Kyoto Sangyo University,[(7]JAXA/ISAS,[(8]Bundeswehr University Munich,[(9]University of Cologne,[(10]ISEE, Nagoya Univ.,[(11]ISAS/JAXA,[(12]JPL/NASA,[(13]Dipartimento di ingegneria meccanica e aerospaziale Universita La Sapienza

The solar wind is a supersonic plasma flow streamed from the solar corona. The acceleration of the solar wind mainly occurs in the outer corona at heliocentric distances of about 5 –　20 solar radii, where the coronal heating by magnetohydrodynamic waves and the wave-induced magnetic pressure are thought to play major roles in the acceleration. The mechanisms have not been fully confirmed by observations because the acceleration region is too close to the Sun to be observed by in-situ probes.

The radio occultation observation covers the acceleration region fully and can obtain the large-scale process of the plasma complementary to in-situ observation. JAXA's Venus orbiter Akatsuki conducted the radio occultation observations on the opposite side of the sun as seen from the Earth. Key physical processes in the acceleration region can be observed with radio occultation. Coronal plasma traversing the ray path disturbs radio waves' amplitudes and frequency, from which we can derive physical parameters such as the flow speed and waves' amplitudes. We can derive roughly three types of physical quantities from the radio occultation data.

First, the radial velocity and the turbulence characteristics (power-law exponent, axial ratio, and inner scale) were retrieved from the intensity scintillation time-series by fitting a theoretical spectrum to the observed power spectra. In the radial distribution of the derived solar wind velocity, fast winds originating from regions near a coronal hole and slow winds from other regions were identified. Second, by applying wavelet analysis to the frequency time-series data, we can detect quasi-periodic fluctuations (QPC) that are thought to represent acoustic waves and quantify the amplitude, the period, and the coherence time of each wave event. The density amplitude and the wave energy flux were estimated following Miyamoto et al. (2014). Finally, we can derive the magnetic field's variations from circular-polarization data. Faraday rotation of a linearly polarized electromagnetic signal is the result of the magnetized plasma. Transmitted signals include the dual-circular polarization, and we can derive the Faraday rotation caused by magnetic fields variations from the phase shift between right and left circular polarization. We analyzed data taken by radio occultation observations using Akatsuki's radio waves during the superior conjunction periods in 2011, 2016, 2018, and 2021. Especially in 2021 campaign, Akatsuki and ESA's spacecraft BepiColombo had solar superior conjunction almost simultaneously in March. Both spacecraft continuously monitored the solar wind with radio occultation during this period. Furthermore, simultaneous measurements using BepiColombo and Akatsuki were conducted to observe the same stream of the solar wind on March 13-14. We will also conduct the cross-correlation analysis between the Akatsuki and BepiColombo's signals to derive the flow speed.