R007-02
Zoom meeting B ：11/2 PM2 (15:45-18:15)
16:00～16:15

Distribution of Solar Wind Sources at the solar surface from 1985 to 2016

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The global solar wind structure is usually observed as latitudinal bimodal structure, i.e. the slow solar wind (SSW) in lower latitudes and the fast solar wind (FSW) around the poles. The width of the SSW belt strongly depends on solar activity. During a solar minimum, the SSW belt is confined in a narrow region around the equator (20 deg.). The SSW belt extends to higher latitudes in a rising phase and covers the whole Sun during a solar maximum. Then, the SSW belt shrinks to lower latitudes in a declining phase. In JpGU 2021 meeting, we reported a good correlation (r ˜0.7) between the boundary latitude of the fast-slow solar wind and the tilt angle of the heliospheric current sheet (1). The high correlation indicates that the solar wind sources at lower latitudes increase during high solar activity periods. In this study, we determine the solar wind source region at the solar surface by the PFSS approximation of the coronal magnetic field using the synoptic magnetogram at Kitt Peak National Solar Observatory from 1985 to 2016. Each footpoint cluster of open magnetic fluxes on the solar surface is labeled as an isolated open flux region (a candidate of a coronal hole) by the coronal hole detection algorithm (2). Then, physical properties such as the average magnetic field strength, the physical area, the magnetic flux expansion rate, and the centroid coordinate of each open flux region are calculated. The average speed of the solar wind originated from each open flux region are derived from the interplanetary scintillation (IPS) observation at ISEE/Nagoya University. We plot the solar wind source on a butterfly map produced by using open magnetic field footpoints and compare the properties of the open flux region and solar wind speed. In this presentation, we discuss the variation of the distribution of solar wind sources and the connection to the global structure of the solar wind.

References:
(1) Fujiki et al, JpGU2021, PEM14-P03, 2021, “ Simple Estimation of the Global Solar Wind Structure”
(2) Fujiki et al, ApJL, p827, L41, 2016, “LONG-TERM TREND OF SOLAR CORONAL HOLE DISTRIBUTION FROM 1975 TO 2014”