

Global distribution of the solar wind speed during Cycle 22-24

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Observations of interplanetary scintillation (IPS) at 327 MHz have been conducted since 1980s at ISEE of Nagoya University using multi-station system. The IPS observations enable reliable determination of global distribution of the solar wind (SW) speed via the computer assisted tomography analysis. We investigated long-term variation of the solar wind speed distribution for the period between 1985 and 2020, which covers solar cycles (SCs) 22-24. The solar activity dropped significantly during this period, and peculiar aspects of the solar wind structure have been reported from several studies for SC24. Derived SW data clearly demonstrate that global distribution of SW speed changes systematically with the solar cycle. At solar minima, the fast SW develops over the polar region, and the slow SW is located at equatorial region. At solar maxima, the fast SW diminishes in size, and the slow SW dominates at all latitudes. This solar cycle variation of SW show good correlation with polar field strength. One of prominent features found for SC24 data is an increase in fast wind area at low latitudes. Another features of SC24 data is enhanced North-South asymmetry of slow wind distribution, particularly for the period between 2011 and 2015; i.e. at solar maximum of SC24. These are considered as heliospheric responses to the peculiar solar activity in SC24.

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