Solar wind flow from coronal hole around solar maximum observed by using interplanetary scintillation

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The solar wind is generally well characterized by fast and slow regions (bimodal) around solar minimum, with the slow solar wind confined around the Sun's streamer belt and the fast solar wind observed at higher latitudes. On the other hand, small coronal holes appear at mid- and low latitudes in the solar maximum, and then the solar wind structure becomes highly complex. To clarify the relation between the solar wind structure and coronal magnetic field in the solar maximum, we analyzed the relation in years from 1999 to 2003. The solar wind velocity structures (0.3-0.9 AU) were derived by using tomographic analysis of interplanetary scintillation data observed at Solar-Terrestrial Environment Laboratory. The coronal magnetic fields were computed from magnetogram data observed at Kitt-Peak National Solar Observatory by using potential-field-source-surface (PFSS) model.

As results, we found that 1) most of small coronal holes are sources of the slow solar wind, 2) a few coronal holes are sources of the fast solar wind. In the second result, interestingly, we also found that these fast solar winds are surrounded by slow solar wind originated from same coronal hole. This structure is well explained by empirical solar wind model suggested by Wang and Sheeley (1991).