Long-term properties of the solar wind and their relation to solar cycles

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The solar wind variations during particular solar cycles have been described in many previous studies including the solar cycle 23 that was characterized by a long, deep, and very complex solar minimum with very low values of many solar wind parameters.

Using statistical methods, we analyzed 25 years of Wind spacecraft measurements with motivation to reveal differences and similarities in magnetic field components and solar wind plasma parameters in individual solar cycles. We tracked the changes of the solar magnetic field strength, and components, solar wind speed, density, dynamic pressure, temperature, and composition. Except quiet solar wind conditions during solar minima and maxima, we also selected significant discontinuities (ICME and CIRs) and investigated their influence on profiles of average parameters. For this, we followed other quantities connected with their presence as their average front normals, regions of transitions between high and slow wind streams, special interplanetary magnetic field orientations, etc.). We discuss a behavior of investigated parameters over solar cycles as well as on shorter time scales (in the order of days and hours).