

## Long-term variations of the solar plasma parameters at 1 AU

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Interplanetary magnetic field (IMF) and plasma data taken near 1 AU by a variety of spacecraft have been used to study the variations in the plasma parameters during the 37-year period 1967- 2004. Our analysis reveals the following results: (1) The IMF magnitude,  $B$  and all of the solar plasma parameters namely: solar wind speed  $V$ , temperature  $T$ , number flux  $NV$ , entropy  $S$ , plasma pressure,  $P$  and the thermal pressure  $P_{th}$  of the solar wind display obvious solar as well as magnetic cycle variations. (2) The product  $VB$  and the geomagnetic activity as characterized by the index  $A_p$  display both of those cycles as well. (3) The IMF magnitude,  $VB$  and  $S$  are correlated with the level of solar activity. They lag it with  $\sim 5$ -10 solar rotation (SR). (4) The solar wind speed,  $T$ ,  $NV$ ,  $P_{th}$ ,  $P$  and  $A_p$  are anti-correlated with the level of solar activity. They lead solar activity by  $\sim 1$ -2.5 years. (5) The solar speed is correlated with  $N$  for cycles 20, 21 and 22. It lags  $V$  with  $\sim 30$  SR. However  $V$  is anti-correlated with  $N$  for cycle 23. (6) The product  $VB$  is more related to the geomagnetic activity than the other interplanetary parameters.