Annales Geophysicae

ISSN: 0992-7689 (printed version)
ISSN: 1432-0576 (electronic version)

Abstract Volume 12 Issue 2/3 (1994) pp 105-112

Selected solar wind parameters at 1 AU through two solar activity cycles

R. Bruno, U. Villante, A. Stecca

CNR/Istituto di Fisica dello Spazio Interplanetario, I-00044 Frascati, Italy
(2) Dipartimento di Fisica Universitá di L'Aquila, I-67010 L'Aquila, Italy

Received: 19 November 1992/Revised: 24 November 1993/Accepted: 25 November 1993

Abstract. In situ measurements of the solar wind largely cover more than two solar magnetic activity cycles, namely 20 and 21. This is a very appealing opportunity to study the influence of the activity cycle on the behaviour of the solar wind parameters. As a matter of fact, many authors so far have studied this topic comparing the long-term magnetic field and plasma averages. However, when the average values are evaluated on a data sample whose duration is comparable with (or even longer than) the solar rotation period we lose information about the contribution due to the fast and the slow solar wind components. Thus, discriminating in velocity plays a key role in understanding solar cycle effects on the solar wind. Based on these considerations, we performed a separate analysis for fast and slow wind, respectively. In particular, we found that: (a) fast wind carries a slightly larger momentum flux density at 1 AU, probably due to dynamic stream-stream interaction; (b) proton number density in slow wind is more cycle dependent than in fast wind and decreases remarkably across solar maximum; (c) fast wind generally carries a magnetic field intensity stronger than that carried by the slow wind; (d) we found no evidence for a positive correlation between velocity and field intensity as predicted by some theories of solar wind acceleration; (e) our results would support an approximately constant divergence of field lines associated with corotating high-velocity streams.

Correspondence to: R. Bruno

Article not available online

Last change: October 3, 1997
helpdesk.link@springer.de