LONG TERM IMF-SECTOR STRUCTURE VARIABILITY

A.L.C. GONZALEZ and W.D. GONZALEZ
Ministério de Ciências e Tecnologia - MCT
Instituto de Pesquisas Espaciais - INPE
São José dos Campos - SP

The daily data of the polarity of the interplanetary magnetic field for the years 1926-1982, given by Matsushita and Trotter (1980) and by Svalgaard (1975, 1976), were studied by means of a power spectrum analysis in order to determine prevailing structures of this polarity as well as to search for recurrences in those structures (Gonzalez and Gonzalez, 1987). On a global scale, the presence of significant peaks at about 27.5, 13.5, 9.1 and 6.8 days was observed, with amplitudes decreasing in that same order. However, for shorter intervals of time (of the order of one year) the resulting spectral distribution does not necessarily present the same characteristics, particularly concerning the relative power of the peaks at about 27.5 and 13.5 days. These results were interpreted through a simulation with rectangular waves, as cases that correspond to a two-sector or to a four-sector structure, when the dominant peak is that of about 27.5 or 13.5 days, respectively.

By performing an annual survey of the data, it was found that there is a continuous change in the type of dominant structure, with intervals having well defined two-sector structure alternating with those having either a less defined structure or a well-defined four-sector structure. A further application of the power spectrum technique to this type of alternating variability in the dominant structure led to the conclusion that significant periodicities of about 3.7 and 1.5 years seem to exist in such a variability. These periodicities become important when compared to similar ones reported in studies of solar

and geomagnetic activity (Sugiura and Poros, 1977; Sugiura, 1980; Frazer-Smith, 1972; Delouis and Mayaud, 1975; Shapiro, 1967; Silverman and Shapiro, 1983).

Finally, a study of variations in the period corresponding to the peak of about 27.5 days was also accomplished, showing that it changes from about 28 days at the beginning of the solar cycle to about 27 days at the end of the cycle, as also found by Svalgaard (1972).

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