Variations of solar activity physical phenomena over 30 years

J. F. Valdés-Galicia, V. M. Velasco and B. Mendoza

Instituto de Geofísica UNAM, Ciudad Universitaria, 04510, México D.F., México

(jfvaldes@geofisica.unam.mx/ Phone: +525 56-22-41-22)

Based on time series for the period 1970-2000, in this work we make an analysis of significant periodicities shown by several phenomena linked to solar activity such as coronal hole area, radio emission in the 10.7cm band and hard X-rays. We use the wavelet method that gives information in the frequency and time domains. We also show the results corresponding to a cosmic ray intensity series for the same time span. Of particular interest are the mid-term periodicities (1-2 years) that have attracted much attention recently. Over the whole period, coronal holes and radio variations show an important annual variation and a less significant bi-annual periodicity that are not manifest in the hard X ray series spectrum. The increase in the annual variation is most important around the years of maximum solar activity whereas the bi-annual periodicity is intermittently present over the cycles. When the time series are separated in low and high frequencies, the latter are in phase with the general solar cycle. Although somewhat shifted in frequency, these periodicities might well correspond with those found in cosmic ray intensity, solar magnetic flux and other terrestrial and interplanetary phenomena.