



Detection of the solar cycles of 10.8 years in the temperature field of the earth

N. Sánchez-Santillán (1), D. Salas de León (2), R. Garduño (3), S. Guzmán (3) and A. Salas (3)

(1) Depto. El Hombre y su Ambiente. Universidad Autónoma Metropolitana-Xochimilco. (santilla@correo.xoc.uam.mx) 2) Instituto de Ciencias del Mar y Limnología, UNAM, (3) Centro de Ciencias de la Atmósfera, UNAM

We have taken the annual data of surface temperature from 144 stations of the World Weather Records (WWR), selected with two criteria: first, the series were longer than 90 years and, second, their geographic distribution was most homogeneous as possible, including islands. These time series span from 1775 the longest one and 1920 the shortest, until 1990. Using the method of spectral analysis (Fast Fourier Transform), we try to find the effect of solar activity (Zürich Index) in these series. Among the several periodicities of this activity, we select that of 10.8 years, because the greatest spectral density (80825.94) corresponds to this cycle. To the solar activity series and to the temperature one of each station, its trend (tendency lineal, general of its whole interval) was eliminated and expressed as anomaly (with respect to the average of the whole interval of observations). As long as the statistical method requires a minimum of 256 data and our series do not reach this number of years, they are repeated iterated in order to apply it. From the frequency spectrum that appears in each temperature series, we select that closest to the 10.8 years period; specifically that be between 10.6683 and 10.9385 year, which are (respectively) the intermediate points between 10.8000 and 10.5366 years (which is the solar period immediate lower), and between 10.8000 and 11.0769 years (which is the immediate upper). Then we computed the difference between that central value and the selected period of each temperature series. This differences are geographically displayed, trying to explain this distribution pattern of magnitude and sign as a function of factors such as continentality-maritimity, altitude

and orography.