



Ionospheric Sounding Measurements and Geomagnetic Field Variations at Tamanrasset Observatory

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The ionosphere is ionized upper part of the atmosphere, extending upward from 60 km altitude above the Earth's surface. It is subdivided in three main layers labeled D, E and F. In this work, we want to analyze the temporal variation of the electronic density of these ionospheric layers. We want to focus particularly on the F2 layer. The analysis of the ionograms obtained from the ionospheric vertical soundings done at the Tamanrasset ionosonde station, allows to derive the critical frequencies and the virtual heights of all the ionospheric layers. The electronic density of the F2 layer is then obtained starting from the determination of its critical frequency (f_{0F2}). The ionograms obtained from measurements made during the year 1956 and from the continuous soundings covering years 1992 to 1994 are used to compute the electronic density. The obtained results clearly show that the amplitude of this electronic density is much higher for year 1956 than for the years 1992 to 1994. This is mainly related to the solar activity which was in its ascending phase during the year 1956 and close to the maximum of the solar cycle 19. The solar activity for the 1992-1994 time interval was in its descending phase, close to the minimum of the solar cycle 22. Applying a Fourier Transform to these data sets highlights peaks corresponding to the well known harmonics of 1 year, 6 months, 27 days, 24 hours and their subharmonics. The wavelet analysis shows an interesting fractal behavior of the temporal variations of the electronic density and of the geomagnetic field. A good correlation between the two phenomena has been observed. The comparison of the results of the Ebro ((40.82N, 0.49E), Spain) and Tamanrasset (TAM(22.79N, 5.53E), Algeria) observatory data shows interesting longitudinal/latitudinal effects.