

Effect of solar activity on night-time F-layer height profile at the magnetic equator in West Africa during the solar minimum period 1995 – 1997

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Extended Abstract

The night-time equatorial F-layer height behavior at Korhogo (9.2° N, 5° W; 2.4°S dip lat), Cote d'Ivoire, in west African sector is investigated in this paper. The focus of this paper is to study the effect of solar activity on the night-time F-layer height. The period of study take place during the solar minimum (1995 – 1997), where data from quarter-hourly ionogram of an Ionospheric Prediction Service (IPS) 42-type vertical sounder is available at the station of Korhogo. The statistical analysis of the occurrence of night-time F-layer profiles through-out the solar minimum period (1995 – 1997) recently evidenced at Korhogo [1] revealed two main F-layer height patterns with specific characteristics associated with seasons. The one with the post-sunset height peak (Type-1) due to the evening $\mathbf{E} \times \mathbf{B}$ drift, associated with the northern winter period and the other with the midnight height peak (Type-2), observed during the northern summer period. The transition process from the pattern Type-1 to the pattern Type-2 was found to last only a few weeks during the equinox period.

In order to evaluate the effect of solar activity on night-time F-layer height profiles Type-1 and Type-2, the average value of the F-layer all the time, on the duration of every period is calculated and the variations of the temporal profiles of average height obtained, as a function of year, are analyzed.

During the consecutive years, the same F-layer profile Type-1 appears in the winter period with a peak the amplitude of which grows. In summer, the profile changes morphology from one year to another, passing gradually from the pattern Type-1, in 1995 at the solar minimum to relatively modified pattern Type-2 as a function to the increasing solar activity. However the amplitude of the peak increases. These results show that an important effect of the solar activity on the F-layer height is to lift the peak when the solar activity increases. However on the seasonal morphology, there is no influence of solar activity on the winter pattern Type-1. But on summer pattern Type-2, the relative change in the profile can be due to the method of data processing. Thus other investigations turn out to be necessary.

A quantitative study of the variations of the post-sunset peak height and the midnight peak height, as a function of solar activity during the various seasons finds that the height of the peak grows linearly with the solar activity. The post-sunset peak rises of 1 km when the number of sunspots increases by a unit whereas the midnight peak grows twice less faster for the same variation of the solar activity

References

1. K. S. Tanoh, B. J.-P. Adohi, I. S. Coulibaly, C. Amory-Mazaudier, A. T. Koba, and P. Assamoi, "Statistical study of the night-time F-layer dynamics at the magnetic equator in West Africa during the solar minimum period 1995 – 1997," *Ann. Geophys.*, **33**, 2015, pp. 143-157, doi: 10.5194/angeo-33-143-2015.