



Space climatology of upper atmosphere using VLF whistler mode waves at low latitude

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Space climatology includes a description and understanding of the average properties and regular variations of the Sun Earth systems; description and analysis of probabilities of extreme events; and evaluation of long-term trends. At our low latitude station Varanasi a good amount of database of VLF whistler mode waves from 1990 onwards is available. The source of VLF wave is natural lightning discharges. Whistler activity varies with latitude having maximum around 50° geomagnetic latitude. The occurrence rate is low at low latitude and also depends on the solar and geomagnetic conditions.

In this paper, we report the results derived from the statistical analysis of whistler mode waves recorded at Varanasi during the period January 1990 - December 1999. The monthly occurrence rate is obtained which shows maximum during January to March. Seasonal variation of the occurrence rate is also studied. In order to study the role of geomagnetic disturbances on the occurrence rate, we have used K_P index and its variation. It is observed that the occurrence probability monotonically increases with ΣK_P values. It is observed that when $\Sigma K_P > 10$, the occurrence rate is greater than the average value. This tendency is found to be in good agreement with those reported by other workers. In addition we also present the probability of observation of whistler waves during the weak/intense geomagnetic storms. Detailed result of occurrence of whistler waves during the main phase and recovery phase of geomagnetic storms will also be presented. An attempt will be made to present explanation of these statistical results.