Pergamon
www.elsevier.nl/locate/asr

Adv. Space Res. Vol. 24, No. 11, pp. 1499–1502, 1999

Printed in Great Britain
0273-1177/99 $20.00 + 0.00
PII: S0273-1177(99)00714-0

THE EFFECT OF GEOMAGNETIC ACTIVITY ON THE DYNAMICS OF THE UPPER MESOSPHERE-LOWER THERMOSPHERE AND ON PARAMETERS OF THE Es-LAYER.

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ABSTRACT

The present paper describes the effects of geomagnetic disturbances on the behaviour of the following dynamic processes : prevailing wind, tide, meso-scale turbulent motions within the heights 80-110 kms of upper mesosphere-lower thermosphere. We investigated the geomagnetic effects as a function of altitude and season. As a result of our analysis some regularities of the influence of geomagnetic activity on the dynamics of the lower thermosphere have been revealed.

INTRODUCTION

Intensive researches of physics of the atmosphere are conducted in the last decade, have detect the effect of geomagnetic activity on a atmosphere of the Earth. The changing of wind direction on opposite, followed by increment of wind velocities variance, at powerful magnetic storms passage was detected. (Kazimirovsky and Vergasova, 1991),. A significant changes of semidiurnal tide phase and small changes of amplitude also detected. Analysis of the correlation of prevailing wind components velocities in a height range 80-100 kms with values of indexes S10,7 and Ap was conducted in (Vergasova and Kazimirovsky, 1992). A significant correlation of prevailing wind with index S10,7 is basically observed in summer and winter. Correlation of prevailing wind with indexes of geomagnetic activity Ap is practically small and only in some years for station Irkutsk is found significant negative correlation of zonal prevailing wind with indexes Ap. Works, connected with effect of geomagnetic activity on Es layer are summarized in (Whitehead, 1989), where maked a conclusion that magnetic activity does not have much influence on Es layer.

Thus, the problem of detecting the effects of geomagnetic activity on dynamics of upper mesosphere - lower thermosphere and E-sporadic layer is not resolved up to the end and requires additional study.

DATA PROCESSING TECHNIQUE

In this work for the analysis we used geomagnetic activity indexes Kp over period 1958-1972, 1986-1990 and for the prevailing winds of the neutral atmosphere, measured by a meteor radiolocation station with phase altimeter (Sidorov and Fahrutdinova, 1991) in Kazan (56°N, 49° E) within the height range 80-110 kms over period 1986-1990. We also used the hourly data for maximum frequency of the ordinary wave reflected from the Es layer - foEs for period 1958-1972 obtained at Moscow station (56°N, 37°E).

The analysis of the influence of geomagnetic conditions on the wind in the lower thermosphere was conducted for the following parameters : the magnitude of zonal component U and meridional component V of prevailing wind, amplitude and phase of diurnal and semidiurnal tide, and the parameter B, characterising the irregular structure of wind over the range of meso-scale disturbances. The magnitude of the last parameter has been calculated from