Springtime effects in mesosphere and ionosphere over Kazakhstan region

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The ionospheric density obtained from foF2 in the vertical sounding ionograms, emission rate and rotation temperature of O2 (0-1) measured by the MORTI instrument over Kazakhstan region, Almaty (43.25N, 76.92E) during the period of February-April 2000 have been analyzed to study springtime effects in the mesosphere and ionosphere. The disturbances in the emission rate and temperature are evident from February 29 to March 12 with increase in their magnitudes during time interval considered (Delta E=200R, Delta T=80K. Later the emission rate shows the lower values without returning to the intensity observed in February.
The periodogram method and COPHASE technique have been used to assess the statistically significant oscillations present in the data, estimate azimuth, horizontal phase speed and wavelength for all harmonics extracted from the time series. The results indicate that the horizontal phase speeds lie between 38 and 1515 m/s, the horizontal wave lengths are always greater than 250 km, and the periods of waves lie between 45 and 499 min. The azimuths of the wave propagation are different from day to day as an instability in their values. There exists an increase in the amplitudes of the emission rate and temperature perturbations during the time interval considered on March 10 with a maximum about 27% in the emission rate and 4% in the rotation temperature. The fluctuating component of the ionospheric critical frequency Delta foF2 obtained as a difference between the current foF2 values and an ionospheric background level a climatological behavior) shows a negative disturbance which appears simultaneously with the sharp increase in the mesospheric emission rate and temperature on March 10 as if it would be a depletion in electron density. Duration of this negative ionospheric disturbance is about 24 hrs, and Delta foF2 = 25\%.
The variations in horizontal components of the Earth's magnetic field H recorded at the "Alma-Ata" magnetic observatory show a regular quiet- time behavior during these March days (March 9, sum Ki=10; March 10, sum Ki=17; March 11, sum Ki=19; March 12, sum Ki=23; March 13, sum Ki=12).