Measurements of the mesosphere temperature by two molecular emissions in Yakutsk (62°N, 129,5°E)

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The intensity and rotational temperature of OH molecular emissions and the first atmospheric band of O_2 (0-1) are measured at station Maimaga (63°N, 129,5°E) with the digital infrared diffraction spectrograph registering the two molecular bands simultaneously. The measurement error varies from 2K to 10K with a signal/noise ratio. The measurement result of night average rotational temperatures both emissions during observational seasons of 1999-2001 which, as is believed according to numerous measurements, are emitted at different heights – 87 km for the hydroxyl, 95 km for the molecular oxygen have been presented.

The analysis of rotational temperature measurements of OH and O_2 molecular emissions over Yakutsk from 1997 to 2001 has shown that seasonal change of the atmosphere temperature at the luminosity heights of OH(6,2) (87 km) and O_2(O-1) (95 km) does not contradict to the result obtained earlier other high-latitude stations. The amplitudes of annual and semiannual components for hydroxyl are ~34K and ~11K, molecular oxygen are ~26K, and ~8K, respectively. Intensity of the molecular oxygen atmosphere band decreases from autumn to spring for both observational intervals whereas no clear seasonal dependence in OH luminosity behavior has been found. A springtime transition of the atmosphere is seen well in the temporal series of OH and O_2 average night intensities. After the intensity increasing by 2-3 times at the end of March – the beginning of April, the OH intensity decreases up to the initial level. The O_2 intensity continues to be decreased up to the registration noise level at the end of April.