Influence of the solar activity on the green atmospheric airglow emission

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Middle latitude airglow emissions are sensitive to thermal and helio-geophysical conditions, including atmospheric gravity waves, vertical perturbations and conductivity, seismic activity, etc. The investigation of their variability presents an effective method of studying physical and physico-chemical properties of the middle and upper Earth's atmosphere.

The nighttime airglow emissions from the upper mesosphere and lower thermosphere are dominantly produced through reactions driven by the recombination of atomic oxygen to its molecular form. Intensities of the O(^{1}S) 5577Å emission has been observed at Stara Zagora, Bulgaria by zenith tilting photometer during the period of July 2001 – May 2002 (23^{rd} Solar Cycle maximum). Measurements from 143 nights have been used to analyse the nocturnal, day to day and seasonal variations of the oxygen green emission line. In order to avoid the dynamical influence of tides on the daily variations, monthly mean values have been derived from averaged night intensities taken in 2 hour time interval (21-23UT).

The same analysis has been conducted using data measured at Irkutsk, Russia, at 50° latitude and 70° difference in geographic longitude, in the same time period. Semi-annual oscillations have been well outlined in the two emissions showing equinoctial maxima. The large green line intensity observed at Irkutsk in December and partly in January is associated with the stratospheric warming. Correlation between green line intensities**,** relative sunspot number and F10.7 radio emission flux of the Sun has been investigated and the results are compared with those of other authors. Monthly mean values of the green line mesospheric component have been plotted against the observed values of 10.7cm Solar flux. Periodic variations have been compared with that during the maximum of the 20^{th} Solar cycle.

Data for the nocturnal variation of the green airglow intensities before, during and after several solar events in the examined period were selected for studying geomagnetic effects on the region of photometric measurements.

Database with oxygen emission intensities will give the possibility of comparing them with satellite data and confidently identify processes and phenomena in the Earth's

atmosphere and magnetosphere.