

Cosmic Factors Influence on the Inter-Annual Variations of the Green 557.7 Nm Line and Red 630.0 Nm Line Nightglow Intensities and their Possible Coupling with Cloud Covering at Abastumani (41.75°N, 42.82°E)

Maya TODUA and Goderdzi G. DIDEBULIDZE

Abastumani Astrophysical Observatory at Ilia State University, Tbilisi, Georgia
e-mails: mayatodua@iliauni.edu.ge, didebulidze@iliauni.edu.ge

A b s t r a c t

We studied the inter-annual distributions of the nightglow intensities of the thermosphere atomic oxygen red 630.0 nm and green 557.7 nm lines observed from Abastumani during cloudless nights, the planetary geomagnetic Ap index, solar $F_{10.7}$, and galactic cosmic rays (GCRs) flux. It is demonstrated that: on magnetically weakly disturbed/quiet conditions ($A_p < 12$) in equinoctial months the red line intensities are minimal, while those of the green line are maximal; the red line intensity increases in May–July and is comparatively low in June, where, unlike most mid-latitude regions, the green line intensity is maximal. The red and green line intensities increase with growing solar activity but their behaviors stay the same, which is considered as a possible regional manifestation of lower and upper atmosphere vertical coupling. It was also detected that, for cloudless nights in June, the number of magnetically disturbed day-nights is maximal and the decrease of the GCRs flux is the biggest during a year.

Key words: airglow, lower and upper atmosphere-ionosphere coupling, solar and geomagnetic activity, galactic cosmic rays.