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Different long-term trends of the oxygen red 630 nm line nightglow intensity as a result of lowering the ionosphere F2 layer

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Long-term variations in the mean annual value of the oxygen red 630.0 nm line total nightglow intensity observed at Abastumani (41.8^{o}N, 42.8^{o}E) in 1957-1993 and the ionospheric F2 layer electron density peak value (*NmF2*) with its height (*hmF2*) measured from the Tbilisi (41.7^{o}N, 44.8^{o}E) ionosphere station in 1963-1986 are studied. It is shown that a positive trend (0.82 R/year) of the red line mean annual intensity after astronomical twilight and a negative trend (-1.62 R/year) at/after midnight could be the result of lowering the ionosphere F2 layer electron density peak height *hmF2* (-0.27 km/year) after midnight. A possible increase in the thermosphere northward meridional wind velocity after twilight is considered to be the cause of the revealed long-term variations in the ionosphere F2 region parameters and the corresponding red 630.0 nm line total nightglow intensity. The model estimation is done by using a simple Chapman-type layer (damping in time) for the ionosphere F2 layer electron density height distribution. The long-term changes in the ionosphere F2 region parameters and their explanation are considered to be important for understanding the current dynamical and structural changes, some of which were predicted on the basis of the TIGCM model under the assumption of a density increase of the greenhouse gases (CO_2, CH_4) in the lower atmosphere.