Some Properties of Long-term Variations of the Oxygen red 630 nm Line Nightglow Intensity and the Ionosphere F2 Layer

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Long-term data sets of total nightglow intensity of the oxygen red 630.0 nm line observed at Abastumani (41.75^oN, 42.82^oE) and the ionosphere F2 layer critical frequency (f_0F2) , observed at Almaty (43.25^oN, 76.92^oE) during the period of 1957-1993 have been investigated. The comparison of the annual mean value of the red line intensity and the ionospheric F2 layer maximum electron density (*NmF2*) reveals the following properties: a) the dominant long-term variation for both parameters has a characteristic period of 11-year consistent with the solar cycle. The amplitude of the red line nightglow intensity deviation from its mean value at the solar maximum/minimum phase is greater than that of the *NmF2* during the same period of night. b) The long-term trends of these variations are different for the period following twilight (pre-midnight) and that after midnight. The long-term trend of the red line intensity is about one order of magnitude greater than that of the *NmF2*. c) The second order regression equation (with solar indices) for *NmF2* gives a small increase of the correlation coefficient between the theoretical and observational values. The third order regression equation (with different solar indices) is considered convenient for describing long-term variations in the mean annual red line intensity.