

Abstract: The present study deals with the changing amount of incoming direct solar radiation and the optical state of the atmosphere in Mikołajki in the years 1971–1980 and 1991–2000. The highest level of solar irradiance in these two decades occurred on 23rd June 1977 and amounted to $1043.9 \text{ W} \cdot \text{m}^{-2}$. Compared to the first decade analysed, the percentage of the solar constant reaching the Earth in the second decade was higher. The spectral structure of the radiation also changed – the share of the shortest waves ($\lambda < 525 \text{ nm}$) increased, whereas the amount of waves with a wavelength of 710 nm or more decreased. In both study periods the annual course of solar extinction (expressed in terms of Linke’s turbidity factor) turned out to have been typical, with the highest values in summer and the lowest in winter. In the years 1991–2000, in all seasons, a lower atmospheric turbidity was observed in comparison with the years 1971–1980. The atmospheric turbidity was also analysed with relation to the air masses. In both decades in question the lowest turbidity occurred in arctic air masses and the highest in tropical air masses. An improved optical state of the atmosphere was observed in all considered air masses, though the biggest decrease in turbidity was found in polar air masses, particularly in the polar maritime old air (T_{LAM2} dropped by 0.75) and polar continental air (by 0.70).

Key words: direct solar radiation, Linke’s turbidity factor, Mikołajki