



Total Nitrogen Dioxide Content Variations Observed in the Northern Caucasus for Twenty Five Years

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The results of 25-year monitoring of the total atmospheric nitrogen dioxide content at the Kislovodsk High-Mountain Scientific Station (KHMSS) located at a height of 2070 m a.s.l. to the south of the town of Kislovodsk are presented. The NO₂ content has been routinely analyzed since 1981 by spectrometric method with an MDP-3 spectrometer through absorption of direct solar radiation in the 430-455-nm spectral region with a resolution of 0.4 nm.

The seasonal and daily variations in the total NO₂ content were studied. Quasi-biennial NO₂-content oscillations correlating well with the 11-year solar-activity variations and an NO₂-content substantial decrease (by about 40%) associated with the Punatubo eruption (the summer of 1991) are discovered. This decrease was much greater than that after the El-Chichon eruption, and the NO₂ content did not return to its background level until 2000.

The method of NO₂-content retrieval based on direct-radiation measurements offers few advantages over that based on scattered-radiation measurements. First, the aerosol attenuation distorts the results of the former method much less than the results of the latter method. Second, the former method allows nighttime measurements under moon radiation and, thus, it allows revealing the NO₂-content daily variation. Using the last advantage, we revealed some parameters of the NO₂-content daily variation. For example, we found that the ratios between the sunrise and sunset NO₂-contents and between the midnight and midday NO₂-contents are 0.75 ± 0.05 and about 2.0, respectively.

The NO₂ contents were also obtained for the periods of solar eclipses. In the period of 1981 solar eclipse with a maximum phase of 0.925, the total NO₂ content increased by

40-60% relative to its background level. Similar NO₂-content variations were obtained for the periods of other eclipses.

The NO₂-content variations that occurred over the KHMSS on March 29, 2006 in the period of full solar eclipse will be presented.