



The results of spectral analysis application to the surface ozone variability at the North Caucasus

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In the paper an analysis of the simultaneous measurements of the surface ozone concentration at two sites at the Northern Caucasus region, namely at Kislovodsk High Mountain Station (KHMS) with Dasibi 1008-AH ozone gas analyzer and in the town of Kislovodsk with ELCO electro-chemical gas analyzer are presented. The measurements of the surface ozone are accompanied by the measurements of the submicron aerosols at the both locations with identical nephelometers. Spectral analysis of the aerosol measurements showed that the parameters of the aerosols including its mass concentration are characterized by the variability with periods out 11, 14, 20, 25, 30, 45 and 60 days. The same periods are observed in the variability of the small gaseous compounds and meteorological parameters. This result was obtained by application of FFT analysis to the simultaneous measurements of aerosol, surface ozone concentration and meteorological parameters at two sites for the period of 2005-2006. The observed variations have non-stationary properties and exhibit themselves through a separate sets containing between 2 and 7 waves.

Taking into account the non-stationary properties of the surface ozone variability at KHMS, to obtain the general properties of the 12-years time series, the dataset of the measurements was subjected to local spectral analysis, namely wavelet transformation. A quasi-periodical structures were determined with periods of the synoptical scale variability of 6-9 days. There were well-ordered structures detected at the scales of 13-15 days, 23-27 days. The most brightly these cycles are seen at the several parts of the scales and they are likely to be induced by 27-days Solar cycle. Quasi-periodical structures were seen at the compositional scales of 40 days.