

Estimation of air quality in Warsaw agglomeration on the example of nitrogen dioxide and troposphere ozone

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Episodes of high level of air pollution concentration are not induced by the abrupt increase of emission. The main reason of the episodes is adverse meteorological conditions. Fundamental matter of this work is to find the most significant factors including meteorological elements contribute to concentration values of pollutants on analyzed area.

The paper presents spatial and time variability of nitrogen dioxide concentration and troposphere ozone concentration in the Warsaw agglomeration. Analysis of the results was carried out on the base of hourly values of mentioned pollutants concentrations. Data used in the analysis comes from atmospheric monitoring stations situated in various parts of Warsaw and concern the whole three years period from 1 January 2008 to 31 December 2010. Estimation of air quality of analyzed area in regard for troposphere ozone and nitrogen dioxide concentration relies on permissible level concentration, average 8 hour concentration and average of growing season (from 1 May to 31 July) for ozone average 1 hour concentration for nitrogen dioxide, and frequency of concentration for each month, season, half-year period (warm and cold one) and year. The days with characteristic course of troposphere ozone concentration against meteorological conditions were selected and variability of ozone concentration against fluctuations of nitrogen dioxide concentration and meteorological elements as air temperature, relative humidity and wind velocity was presented. In order to assessment of relationship between ozone concentration and entertained elements regression analysis was used. Correlation coefficients of pairs were calculated for data from each month and also multiple regression equations which best described the relationship were determined.

In conclusions strong correlation between troposphere ozone concentration and meteorological elements as air temperature and relative humidity is stated. Multiple regression equations are statistically significant on the level 1 % and have high values of correlation coefficients.