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Accounting for local meteorological effects in the ozone time-series of Lovozero (Kola Peninsula)

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Abstract. The relationship between local meteorological conditions and the surface ozone variability was studied by means of statistical modeling, using ozone and meteorological parameters measured at Lovozero (250 m a.s.l., 68.5°N, 35.0°E, Kola Peninsula) for the period of 1999-2000. The regression model of daily mean ozone concentrations on such meteorological parameters as temperature, relative humidity and wind speed explains up to 70% of day-to-day ozone variability in terms of meteorological condition changes, if the seasonal cycle is also considered. A regression model was created for separated time scales of the variables. Short-term, synoptical and seasonal components are separated by means of Kolmogorov-Zurbenko filtering. The synoptical scale variations were chosen as the most informative from the point of their mutual relation with meteorological parameters. Almost 40% of surface ozone variations in time periods of 11-60 days can be explained by the regression model on separated scales that is 30% more efficient than ozone residuals usage. Quantitative and qualitative estimations of the relations between surface ozone and meteorological predictors let us preliminarily conclude that at the Lovozero site surface ozone variability is governed mainly by dynamical processes of various time scale rather than photochemistry, especially during the cold season.

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