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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Accounting for local meteorological effects in the ozone time-series of Lovozero (Kola Peninsula)" *by* O. A. Tarasova and A. Yu. Karpetchko

Anonymous Referee #2

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The authors present a statistical analysis the relation between ozone measurements and meteorological parameters made at a high latitude site (northern Russia, close to Scandinavia) for the period 1999-2000.

The authors investigate the role of meteorology on ozone variations by calculating correlations of ozone with different parameters and applying different regression and filtering methods to distinguish variations on different timescales.

The choice of the station/location is significant and interesting, since surface measurements of ozone at high latitude sites are not very densly distributed around the globe. Moreover, high latitude sites are not typical in the sense that diurnal and annual cycles will be very different from mid-latitude and tropical sites, mostly because of the ab-

sence of photochemical activity (no sunlight) during winter and an almost continuous photochemical activity during summer (no sunset). These processes will also affect local meteorology.

In its current format I do not think the article can be published. There are two major issues that need to be addressed.

(1)

There is a detailed description of the dataset missing and/or which is not referenced to. Without this description, the interpretation of the statistical analysis is not really possible. The description of the dataset should be a first qualtitative analysis and should include the typical variations of ozone and the meteorological parameters. Such an analysis should address at least the following issues:

What are the typical values for the chosen parameters?

What are the annual cycles (amplitude, timing)?

What are the diurnal cycles (amplitude, timing)?

How do the diurnal cycles vary with the season?

Can we understand all these variations at qualitatively?

What are the typical meteorological circumstances (=weather) during the different seasons (temperature, pressure, humidity, clouds, precipitation, snow cover, wind speed and wind direction etc.).

I would like to emphasize again that this is a not your typical site. Here, there is a long, cold, dark winter during which little photochemical activity takes place, and a summer during which nights are short or even absent for a period, so that there is almost continuous photochemical activity. This will also have affect on both ozone and the meteorological parameters. Furthermore, it is also known that the presence of snow strongly affects the structure of the atmospheric boundary layer, the deposition

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of ozone at the surface and obviously the radiation budget. These variations are thus expected to have a strong effect on ozone.

(2)

With regard to the statistical analysis the following. The authors choice of parameters which the ozone measurements are compared with are based on a more or less similar analysis technique applied to a set of urban sites (Bloomenfield et al., 1996; see article). They analyzed the full spectrum of meteorological measurements and concluded that for the urban sites the main parameters affecting ozone are temperature (a proxy for photochemical production/destruction/deposition), wind speed (a proxy for mixing and advection of ozone precursors) and humidity (a proxy for photochemical destruction). One would expect that for an urban site ozone is mostly determined by local parameters. For a remote-site like Lovorenzo this is possibly not the case. Thus, it can be expected that other parameters than those from Bloomenfield [1996] also play a role (like for example wind direction ==> advection of air masses with a different chemical composition). It is therefor necessary to at least justify why the choice of parameters is also allowed for this station, and possible extend the analysis for a few more parameters (if available).

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 655, 2003.