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Interactive comment on "Nitrogen oxides emission from two beech forests subjected to different nitrogen loads" *by* B. Kitzler et al.

Anonymous Referee #2

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General comments:

The paper reports continuous measurements over two climatically contrasting years of NO and N_2O emission from the soils of two beech forests receiving different amounts of nitrogen from the atmosphere. The paper thus reports a very large amount of data. The seasonal variation in the emissions were found to be closely related to the soil temperature and short-time events of high emission could be related to rainfall and sudden changes in soil moisture. It has thus been demonstrated that in order to provide a reliable annual estimate of nitrogen oxides emissions, continuous long-term measurements are needed. It was also demonstrated that nitrogen deposition had a strong impact on nitrogen oxides emissions. The use of an advanced time series model (GARCH) has improved the reliability of predictions and has shown that some parameters have a lag in their effects on nitrogen oxides emissions. The paper pro-

vides a lot of useful information and is innovative in the use of the GARCH model. It is definitely within the scope of Biogeosciences and certainly merits publication.

Specific comments:

p. 1386, l. 19: I miss some more information about the (dynamic) chambers used for NO emission measurements such as size and flow rate (it seems to be 1 l/min given on page 1387). The sentence "The chambers were closed for 5 min when steady state was reached" is not immediately understandable. The chambers have to be closed for some time before steady state is reached. This time depends on the flow rate and the volume of the chamber. A measurement should then be made for some time during the period of steady state.

p. 1386, l. 20: I think it is possible to discuss in some more detail, the difference between using synthetic air for the NO flux chambers (year 1) and correcting for O_3 (year 2).

p. 1394: N_2O emissions: I miss some information (and discussion) about the difference in N_2O fluxes measured by the automatic system (AGPS) and the manual boxes. Measurements with the automatic system were made at 6 a.m. (where the flux is supposed to be largest). At what time of the day were the other measurements made (presumably sometime during mid-day or early afternoon)? What were the differences between the fluxes measured by the two systems? Were the annual estimates based on manual chambers or automatic chambers? Theoretically the AGPS should give a higher flux due to its ability to measure short-term high flux events after rain. In addition, the measurements were made at 6 a.m. where the emission was normally found to be highest (although soil temperature is probably lowest at this time).

p.1395, l. 28: Was a similar lag found for parameters controlling N_2O emission? If not, I would like some discussion of the possible differences.

p. 1402, l. 19: Some extra information is given here about the spatial variations.

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Very little is given under results. I would like to see some more details about this. A statement is also given in the Conclusions (p. 1403, l. 11). Which results have lead to the statement about the necessary scale of the measurements?

p. 1402, l. 21: The statement about measurements in the soil under each chamber is a little bit strange. It would probably make the fit between model and observations better, but it would not be useful for true predictions, since these would be based on a much less dense set of measurements.

Interactive comment on Biogeosciences Discussions, 2, 1381, 2005.