

## ***Interactive comment on “Controls over N<sub>2</sub>O, NO<sub>x</sub> and CO<sub>2</sub> fluxes in a calcareous mountain forest soil” by B. Kitzler et al.***

### **Anonymous Referee #2**

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#### General comments

The paper reports on two years of N<sub>2</sub>O, NO and CO<sub>2</sub> flux measurements at a forest site in Austria. Time series of gas fluxes, soil temperature, soil moisture and N-deposition were analysed in different auto-regression models. It is concluded that soil moisture, temperature and N-deposition control N-emissions and that most N is emitted in form of N<sub>2</sub>, only little in form of NO or N<sub>2</sub>O.

These insights are not new. The only new aspect that I could find in the study was that N<sub>2</sub>O emissions might be influenced by events that happened up to 12 weeks previously. Possible mechanisms for such a phenomenon are not mentioned. This is representative of the way in which data are interpreted throughout the study. Much emphasis is given to the statistical procedure and to levels of significance, little or none to understanding functional relations. The last paragraph of point 3.3.1 is an illustrative

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example. It states: "The most influencing parameters controlling CO<sub>2</sub> emissions were soil temperature (...) and air temperature (...). Furthermore, a positive correlation could be detected with N-deposition. A negative relationship was found between CO<sub>2</sub> emissions and soil moisture in the upper 5 cm (...). All correlations were highly significant." The interested reader might glean at Figure 2 and find that N-deposition is larger during summer than during winter and that precipitation, besides increasing soil moisture, also reduces soil temperature (Figure 3). Therefore, the statistically highly significant correlations between CO<sub>2</sub> flux and N deposition or soil moisture in the upper 5 cm might as well be of no functional significance, but purely the result of changes in these two parameters coinciding with changes in temperature. Apart from this fundamental concern regarding the modelling aspect, I must say that my patience was stretched reading throughout the paper of 4 (!) versions of the GARCH (?) model and results of two runs with the Pnet-N-DNDC model which are neither explained in enough detail nor accessible in the literature. One of them is cited as Butterbach-Bahl, pers. comm. Since when is it possible to cite a co-author's pers. comm.?

#### Specific comments

Under point 2.2, it is stated that automatic sampling was scheduled for 6 am because previous experiments had shown largest emissions during morning dew. If this is so, then the annual budgets based on these measurements are an over-estimate of the real situation.

Point 2.2, last paragraph: "A calibration gas of 5 [ppm] N<sub>2</sub>O (Linde Gas) and N<sub>2</sub> in ECD quality with a flow rate of 30 ml min<sup>-1</sup> served as carrier-gas." I assume only the N<sub>2</sub> served as carrier gas and the 5 ppm N<sub>2</sub>O served as standard? If so, how could a calibration curve be constructed with only one standard? I am not aware of any ECD with a linear response up 5 ppm N<sub>2</sub>O.

Language: There is a notorious shortage of semi-colons (which I am not willing to correct individually). If this manuscript gets published, it should be checked by a native

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English speaker first. Also sentences such as "In the two investigation years of investigation..." and "..., whereas concentration of NH<sub>3</sub> deposition..." (both point 3.2), or the sentence starting with "PH of the litter layer..." (point 3.1) should be re-formulated. Emissions are neither "high" nor "low", they are "large" or "small". Accuracy is "better than" not "better as" (point 4.4), and so on.

Table 1: A soil density of 0.3 g cm<sup>-3</sup> is shown. Assuming this relates to the top 15 cm and assuming a particle density of 2.3 g cm<sup>-3</sup> (at 15% Corg), it would indicate a pore volume of 87%. Could this extreme value please be explained.

Figure 1: Labels on y-axes are incomplete.

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Interactive comment on Biogeosciences Discussions, 2, 1423, 2005.

**BGD**

2, S602–S604, 2005

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