

Interactive comment on “Ozone, Carbon monoxide and Nitrogen oxides time series at four Alpine GAW mountain stations in Central Europe” by S. Gilge et al.

Anonymous Referee #2

Received and published: 27 September 2010

General Comments

The paper presents continuous long term data series of O₃, NO₂ and CO from four Global Atmospheric Watch (GAW) stations in the alps and surrounding area. The paper goes into great detail on the quality assurance of the data, including traceability of calibration standards. There is a large section discussing the long term statistical trends of the data from all 4 sites, including analysis of seasonal trends, as well as trends in different wind sectors. The authors then speculate as to possible reasons for the observed trends (changing emissions, changing meteorology).

Generally the paper is well written and interesting. The discussion of measurement

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techniques and data quality control is a very good one and gives the reader confidence in the data discussion later in the paper. Whilst the paper does not contain particularly firm scientific reasons for the observed trends (global and regional models would be required for this), I feel it will be of great value for the scientific community to see these long term trends from the 4 sites. I have no doubt that this publication will lead on to many others by this group and others.

In summary I recommend publication of the manuscript in ACP subject to the minor changes suggested below.

Paper length and Structure

I did find the paper long and at times difficult to follow. I do wonder if the authors would be better to combine sections 3 and 4 (data description and discussion). While reading section 4 I found myself constantly flicking backwards to the relevant part of section 3 to look at the description of the data that was being discussed, It may be easier for a reader to follow if the discussion of each part came immediately after the data description. A conclusions section could then follow this. I also wonder why the order of the species in the data description and data discussion are different (this added to the difficulty in following the paper).

Figures

I find the figures showing the annual percentiles and linear trends (e.g. figure 4) quite small and difficult to read. Could they be stretched in the vertical to allow the author to more clearly see the trends in the different percentiles?

Specific Comments

Page 19077 Line 15: the description off the different CO instruments sued does not appear to match the information given in table 2. Could the authors please make clearer which instruments were used at the different sites for different time periods?

Page 19080 Line 20-25: It should be made clear to the reader that an NO standard

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is used to calibrate the NO₂ measurement (conversion efficiency of the converter and sensitivity of the NO detector) by way of gas phase titration. This is in fact mentioned in the section about the JFJ measurement, however it should be made clear at this point.

Page 19085 Line 18: If the period 1995-2007 is being considered throughout the paper doesn't this make figure 1 unnecessary? There are a large number of figures in the paper and it may make sense to combine figures 1 and 3.

Page 19087 Line 29: It is stated that the seasonal trends show very similar values in winter / spring and summer / autumn for the high sites. Looking at figure 10 this does not appear to be the case for the ZUG site where the spring / winter values are very different. This is also the case for JFJ between 1998 and 2000. the authors should rewrite this paragraph to it better describes what is shown in figure 10.

Page 19087 Line 5-10: the authors should speculate as to why the observed trends on NO₂ do not replicate emission changes from Italy and for Germany / Switzerland. For instance, could this be due to inaccurate emissions data?

Minor comments

Page 19074, line 28: larger not lager

Page 19075, line 8: should be enables 'us' line 15: 'The' is needed at the start of the sentence

Page 19076 Line 26: I do not understand this sentence. Do the authors mean freely advected 'to' from all sides? Please clarify

Page 19078 Line 13: Please rephrase this sentence

Page 19084 Line 16: the formula would be better in the centre of the page not within the text.

Page 19085 Line 22: 'are' is missing from the sentence

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Page 19086 Line 26: should read 'being' re-evaluated

Page 19092 Line 15: should be 'unusually'

Page 19093 Line 1-5: this sentence needs restructuring

Page 19096: Line 20: 1970's not 1970ies Line 21: after not since Line 25: should read 'the' most pronounce increases. . . .

Page 19097: Line 21 why is (photo-) in brackets?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19071, 2010.

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