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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The impact of weather and atmospheric circulation on O_3 and PM_{10} levels at a mid-latitude site" *by* M. Demuzere et al.

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The authors use statistical analysis of measurements of meteorological and air quality quantities in order to create models that predict O_3 and PM_{10} concentrations in Cabauw, The Netherlands. They use local measurements of ozone, PM, other pollutants, and meteorology as well as ECMWF meteorology. Both multiple regression and a weather-type classification scheme are used. The multiple regression models had some success in capturing measured ozone and PM concentrations, while the weather-type approach, while still better than using climatological averages, was less accurate than regression approach. While this work does present interesting methodologies, most of the paper discusses predicting air quality over one small town. As such, I believe this paper would need major revisions before being published.

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Interactive Discussion

Discussion Paper

In my opinion, the major contribution of this work is the approach that the authors take in creating their models; the actual model predictions over one small town are of rather minor importance to a general audience. Multiple-regression models of air quality are rather common; the real contribution of this work appears to be the weather-type model and the comparison of the weather-type model to other kinds of models (including the multiple regression model).

Additionally, there are a large number of grammatical errors and poor choices of words; extensive copy-editing is necessary for this paper.

General comments

1. Many similar papers have run multiple regressions of ozone as a function of various meteorological independent variables. The correlation and regression sections of this paper (4.1 and 4.2) do not appear to contribute much to the current body of knowledge. Given how common analyses like these are, these results should probably be de-emphasized / shortened. The weather-type approach is more novel, and I believe this is the major contribution of the paper. (Also, these kinds of analysis are rarer for PM than for ozone.) Keeping the focus on the more original contributions of the paper (weather-type), while de-emphasizing the commonly done parts (correlation and regression), would make the paper seem more original, rather than just an application of multiple regression to yet another location.

2. The number of grammatical errors is quite distracting to the reader. These are just a few examples:
The authors use both “Lamb” and “lamb” to describe the weather-type approach.
There are several places where adjectives and adverbs are confused.
Uncommon introductory words like “hereby” and “thereby” are not quite used correctly and are rather distracting.

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Specific comments
Abstract:
Some quantitative results would be useful here. This may be a good place to compare R values to show how the models performed.

Data:
1. What is meant by “2 m (dew point) temperature”? Does this mean both 2 m temperature and dew point temperature? This is confusing. This is also the case in a few other places where parentheses are used in a similar manner.
2. What is KNMI? This is never introduced.
3. The chemical reactions in 2.3 are probably not necessary.
4. Table 2: Is all this information necessary?

Results and discussion:
1. Sections 4.1 and 4.2 do not seem to add much to what is already known about ozone and PM. These sections should probably be made much shorter.
2. Table 4 is probably not necessary.
3. Figures 6 and 7: These could use either a legend or more explanation in the caption, explaining what the weather type abbreviations are. Also, something happened to Figure 7 to make it less clear.

Validation:
Table 6 has numbers with anywhere between 1 and 4 significant digits, such as “4” and “27.98” respectively. These should all have the same number of significant digits. (I would suggest 2 or 3.)

Conclusion: It is a stretch to say that “both multiple linear regression modes provide

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suitable results for the forecasting O_3 and PM_{10} for Cabauw", given the models' R^2 values in Tables 5 and 6. There are more accurate methods (albeit, more computationally expensive ones), such as chemical transport modeling.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 21037, 2008.