Seasonal and diurnal variations of particulate nitrate and organic matter at the IfT research station Melpitz

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Figure 1. Comparison of the measured ammonium with the predicted ammonium concentration assuming a fully neutralization by nitrate, sulfate and chloride for the three different campaigns.
Figure 2. Comparison of the average organic mass spectra for each season, color code stand for the main organic categories (Top) and the main elements (C, H, and O) (bottom). The pie charts represent the average mass fraction of the different ion categories and elemental composition of each mass spectrum.
Figure 3. Diurnal variations of the organic aerosol tracers (m/z 44, m/z 43, f44, f43), OM/OC, O/C and H/C ratios and ozone concentration for (a) summer, (b) autumn and (c) winter.
Figure 3. (continued)
Figure 4. Comparison of the f44 and OM/OC time series with the OH radical concentration and NO$_2$ photolysis rate for the summer campaign.
Figure 5. An example of a typical summer night and day particle size distribution as measured on 7 June 2008. Night referred from midnight to 04:00 and day from noon to 18:00.
Figure 6. Diurnal cycle of the carbon oxidation state for each season.
Figure 7. Diurnal variations of the nitrate concentration and its thermodynamic constants for (a) summer, (b) autumn and (c) winter.
Figure 7. (continued)
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Figure 8. Time series of the nitrate concentration and the theoretical equilibrium constants $(K_p(T)$ and $K_{deliq}(T))$ for pure ammonium during the three measurement periods ((a) summer, (b) autumn and (c) Winter). The insert scatter plots is the relation between $K_p(T)$ and the particulate ammonium to sulfate ratio colored by the nitrate concentration.
Figure 8. (continued)
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Figure 9. Maximum nitrate formation rate and concentration expected from nighttime chemistry simulation for each season (left) and the comparison between the measured (line) and the simulated (dots) ozone and NO₂ concentrations (right). The colored surface area on the right side corresponds to the solar radiation and can be used to distinguish nighttime from daytime chemistry.
Figure 9. (continued)
Figure 10. The comparison of measured and simulated nitrate concentrations for each season.

**Summer**

Slope = 0.47 ± 0.02  
$r^2 = 0.97$

**Autumn**

Slope = 0.36 ± 0.02  
$r^2 = 0.96$

**Winter**

Slope = 0.47 ± 0.02  
$r^2 = 0.97$
Figure SI 1. Comparison of the AMS sulfate concentration and daily PM$_1$ filters samples.
Figure SI 2. Diurnal profiles and mass fractions of the high resolution organic fragments composing m/z 43, 55 and 57.
Figure SI 2. (continued)
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Figure SI 3. Correlation plots of the diurnal organic tracers (a: f44, b: f43 and c: OM/OC) and ozone for the different seasons.
Figure SI 3. (continued)

- **Summer** \( r^2 = 0.98 \)
- **Autumn** \( r^2 = 0.96 \)
- **Winter**