Atmospheric
Chemistry
and Physics

Supplement of

Measurement report: Atmospheric new particle formation in a coastal agricultural site explained with binPMF analysis of nitrate CI-APi-TOF spectra

Miska Olin et al.

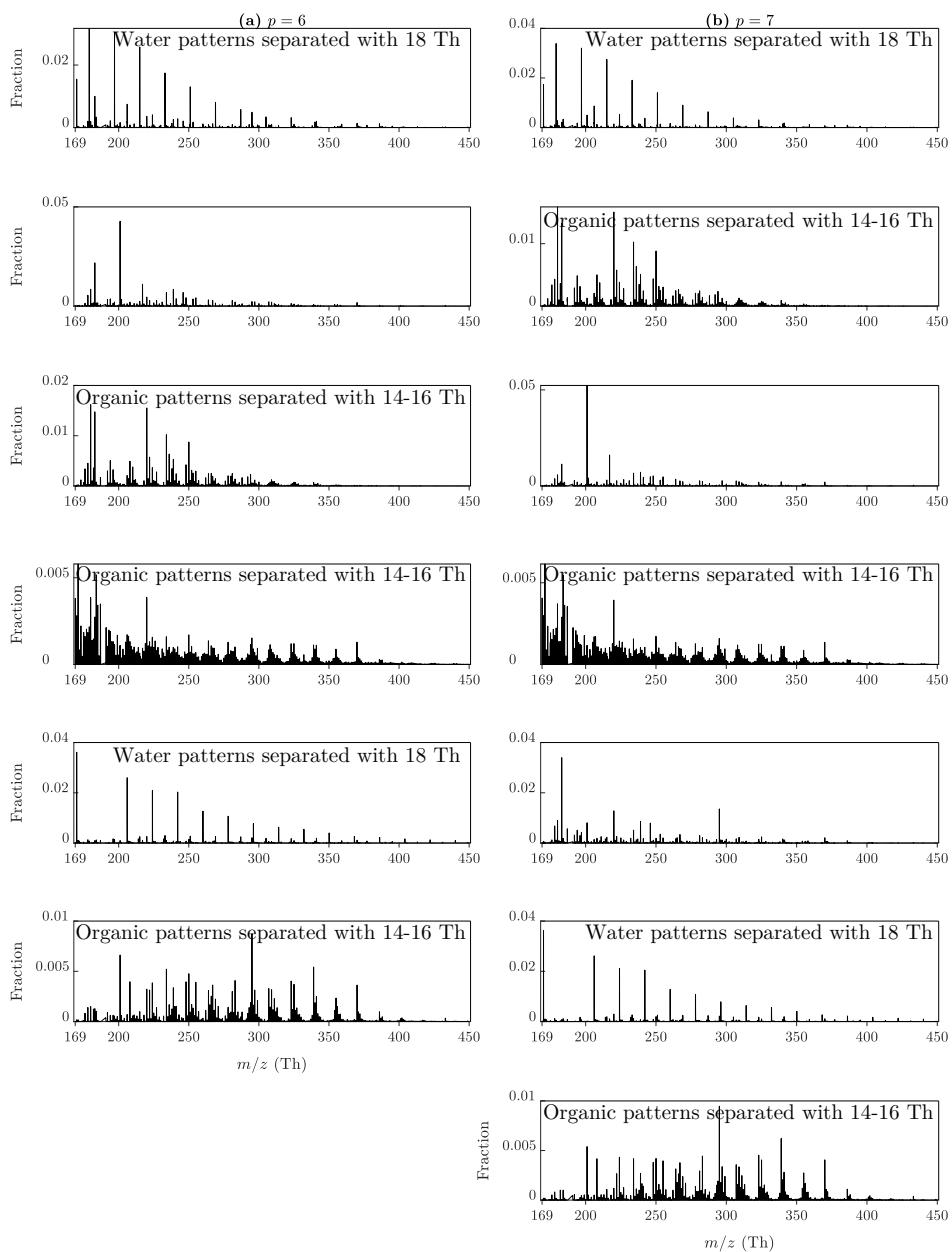*Correspondence to:* Miska Olin (miska.olin@tuni.fi)

Figure S1. Normalized spectra of all binPMF factors if (**a**) $p = 6$ or (**b**) $p = 7$ were used. Both of these factor sets have three factor profiles having organic patterns, whereas $p = 8$ results in four factor profiles having organic patterns and is further analyzed in this study.
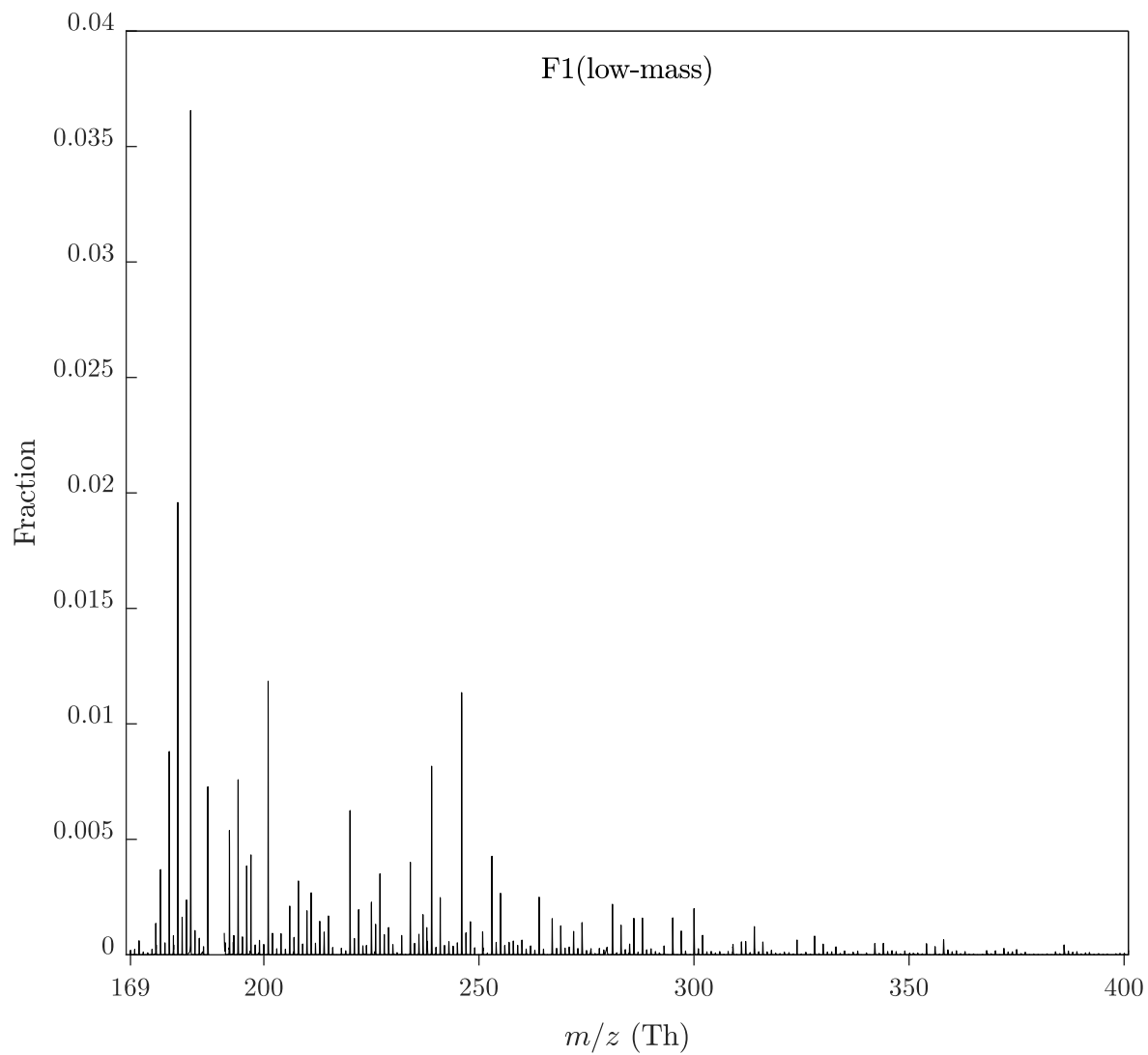
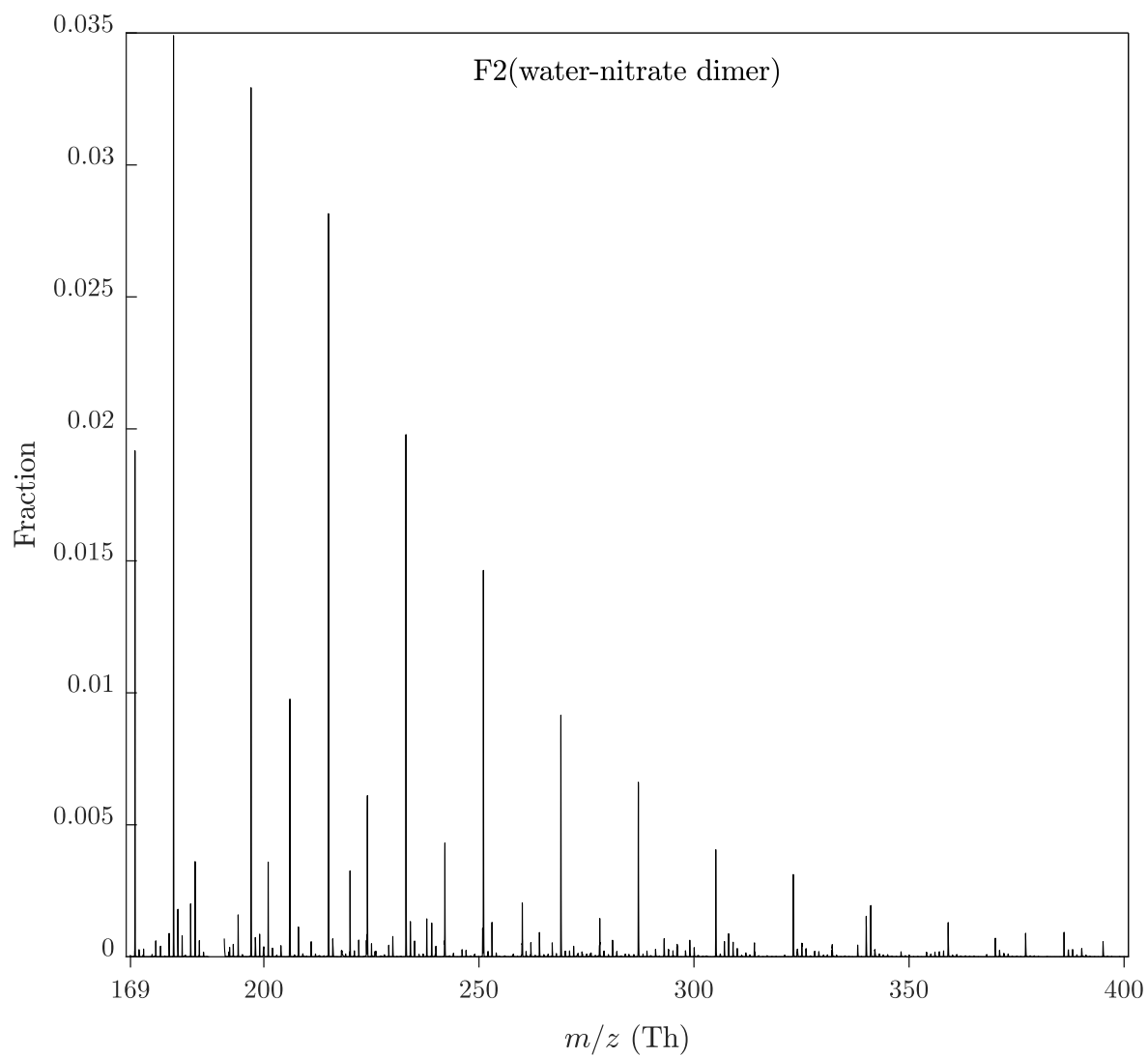**Figure S2.** Normalized spectrum of the binPMF factor F1(low-mass) up to 400 Th.

Figure S3. Normalized spectrum of the binPMF factor F2(water–nitrate dimer) up to 400 Th.
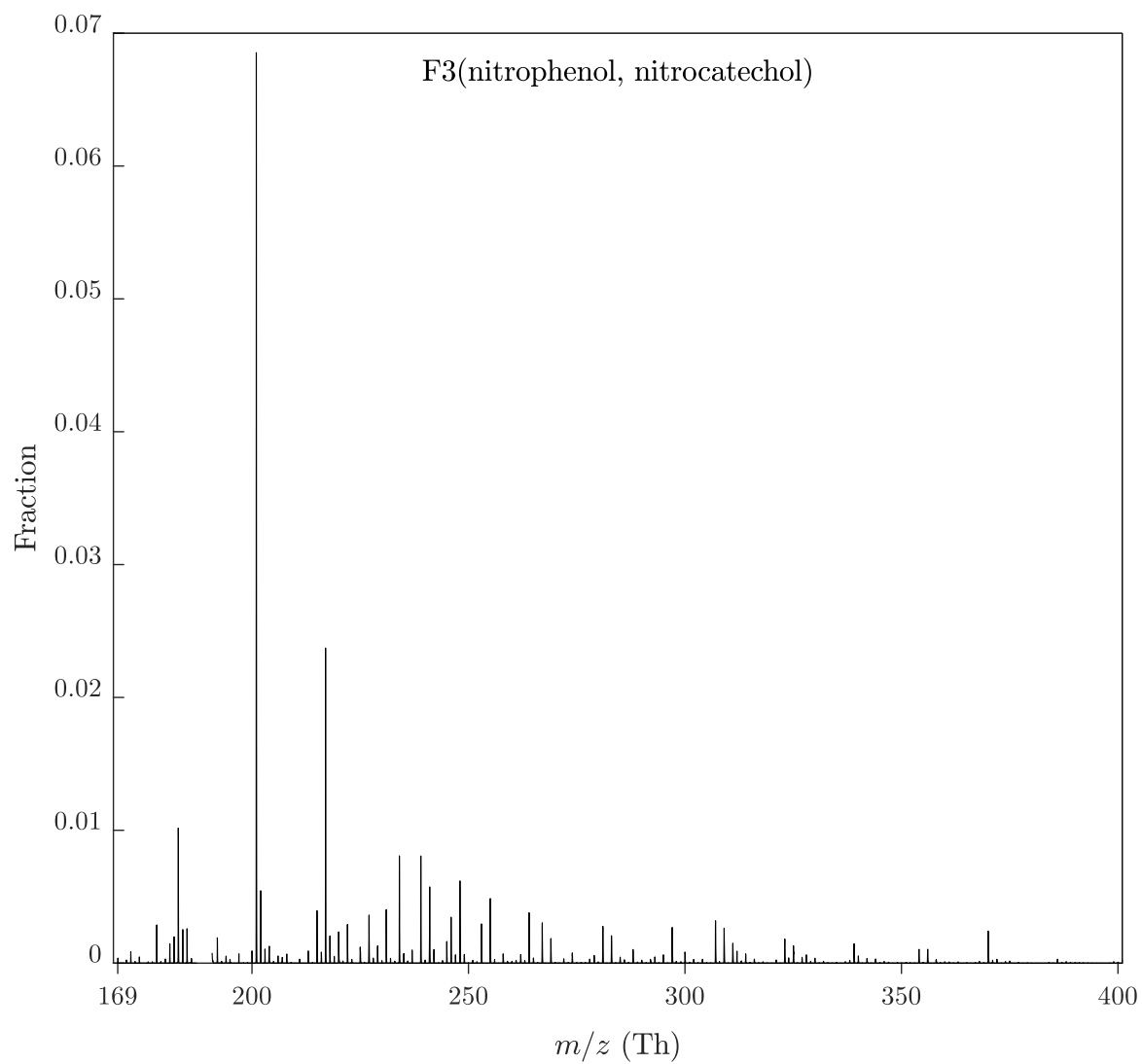
Figure S4. Normalized spectrum of the binPMF factor F3(nitrophenol, nitrocatechol) up to 400 Th.

Figure S5. Normalized spectrum of the binPMF factor F4(OOMs) up to 400 Th.

Figure S6. Normalized spectrum of the binPMF factor F5(mized) up to 400 Th.

Figure S7. Normalized spectrum of the binPMF factor F6(water–nitrate monomer) up to 400 Th.

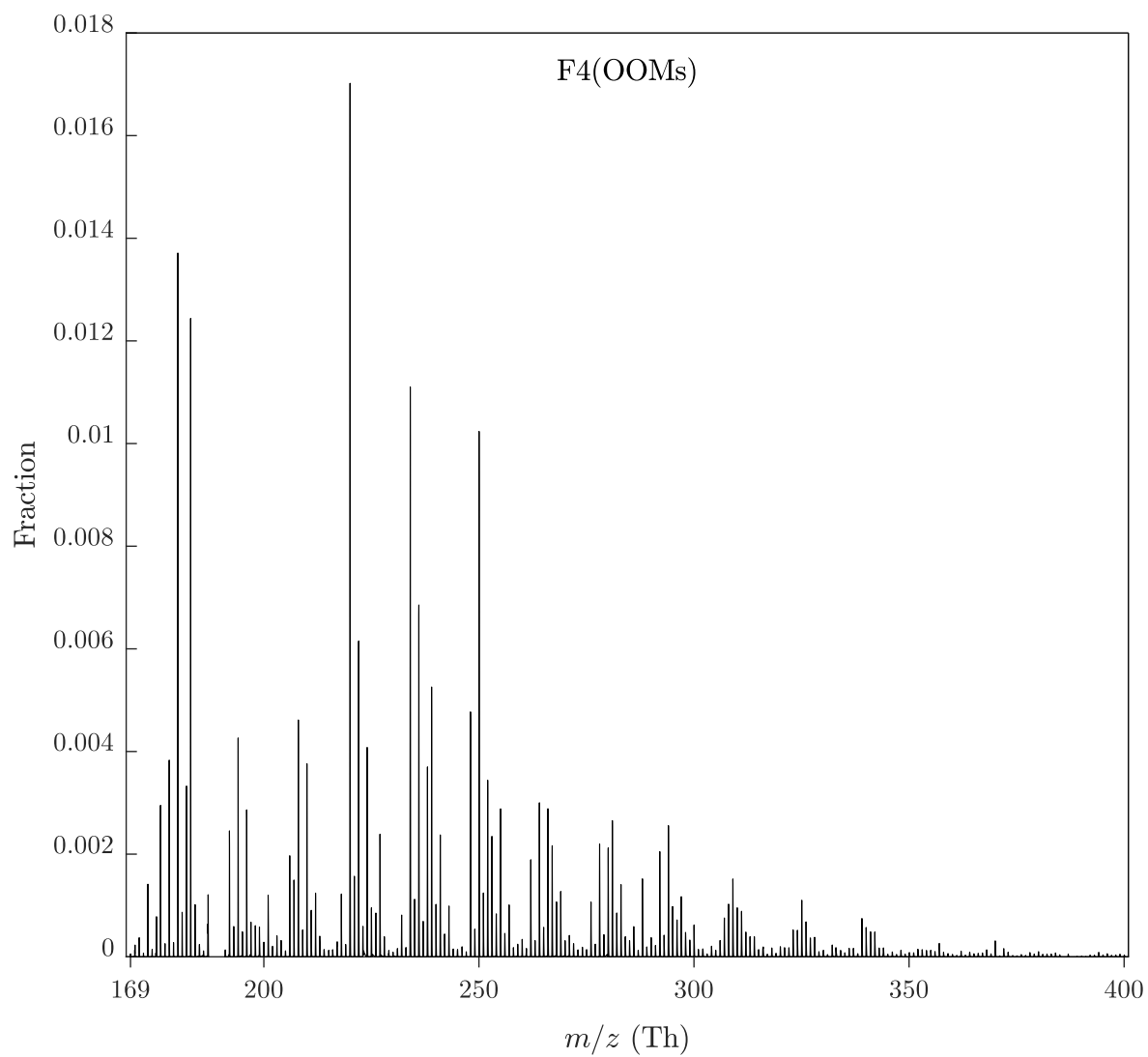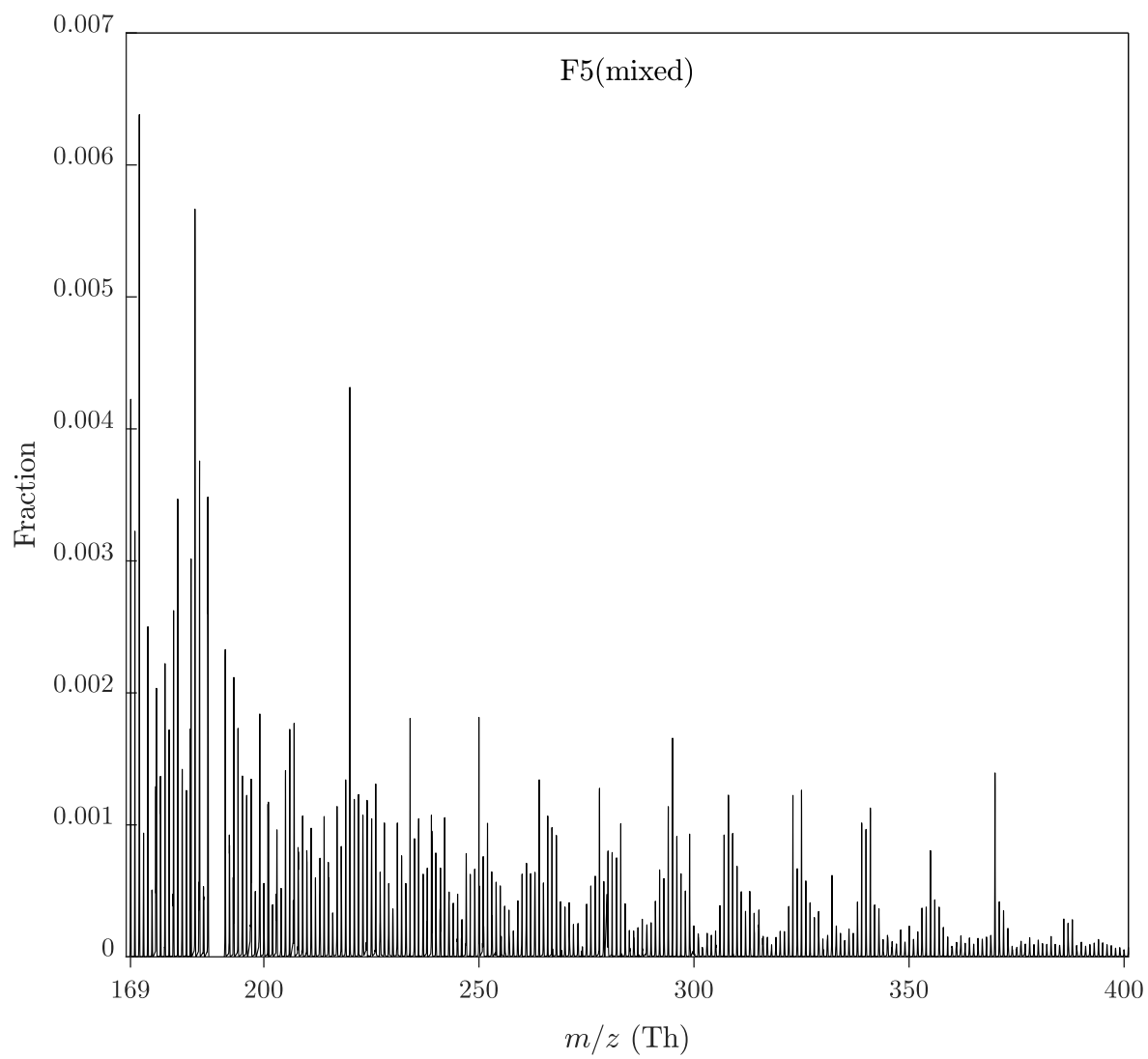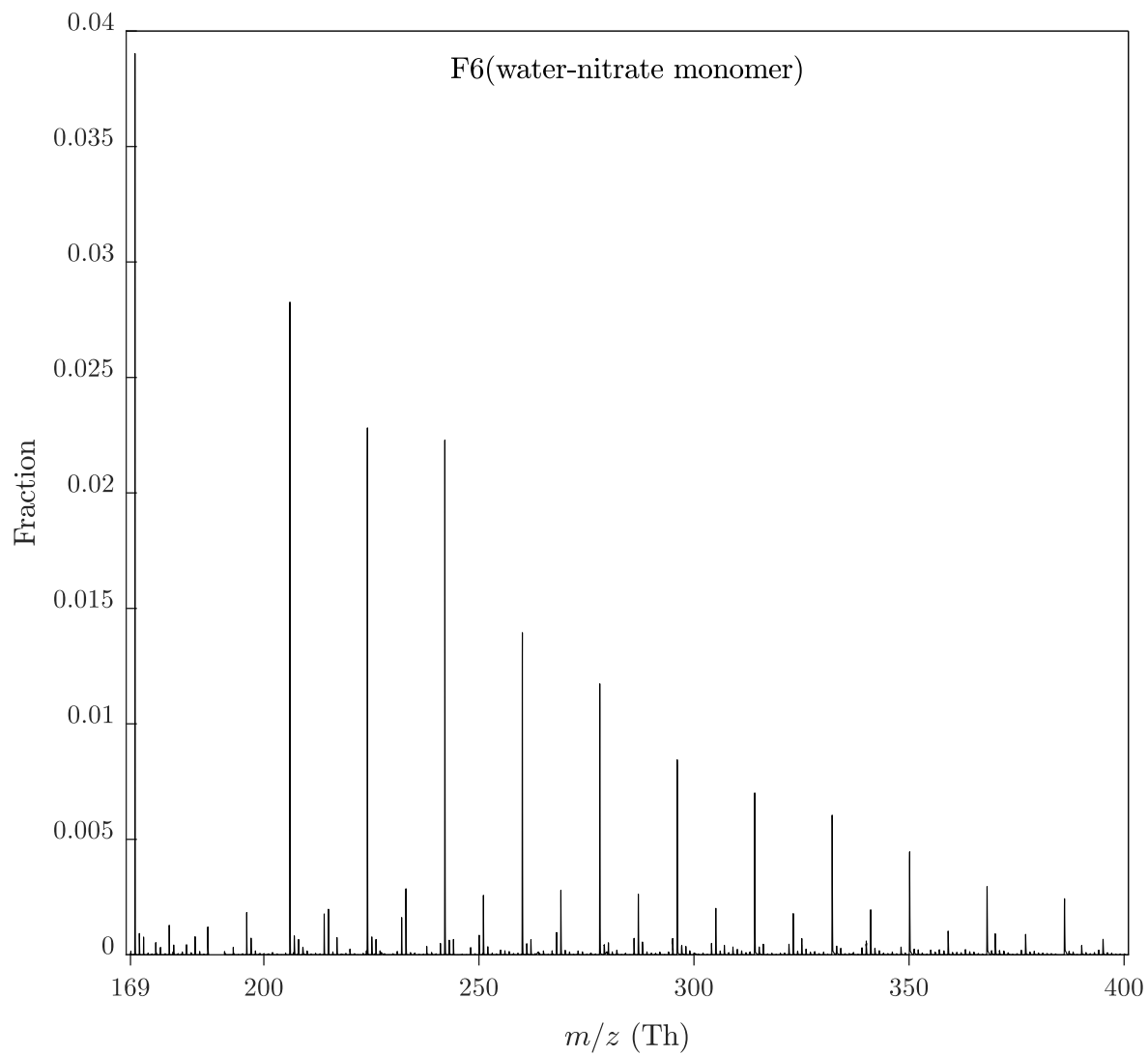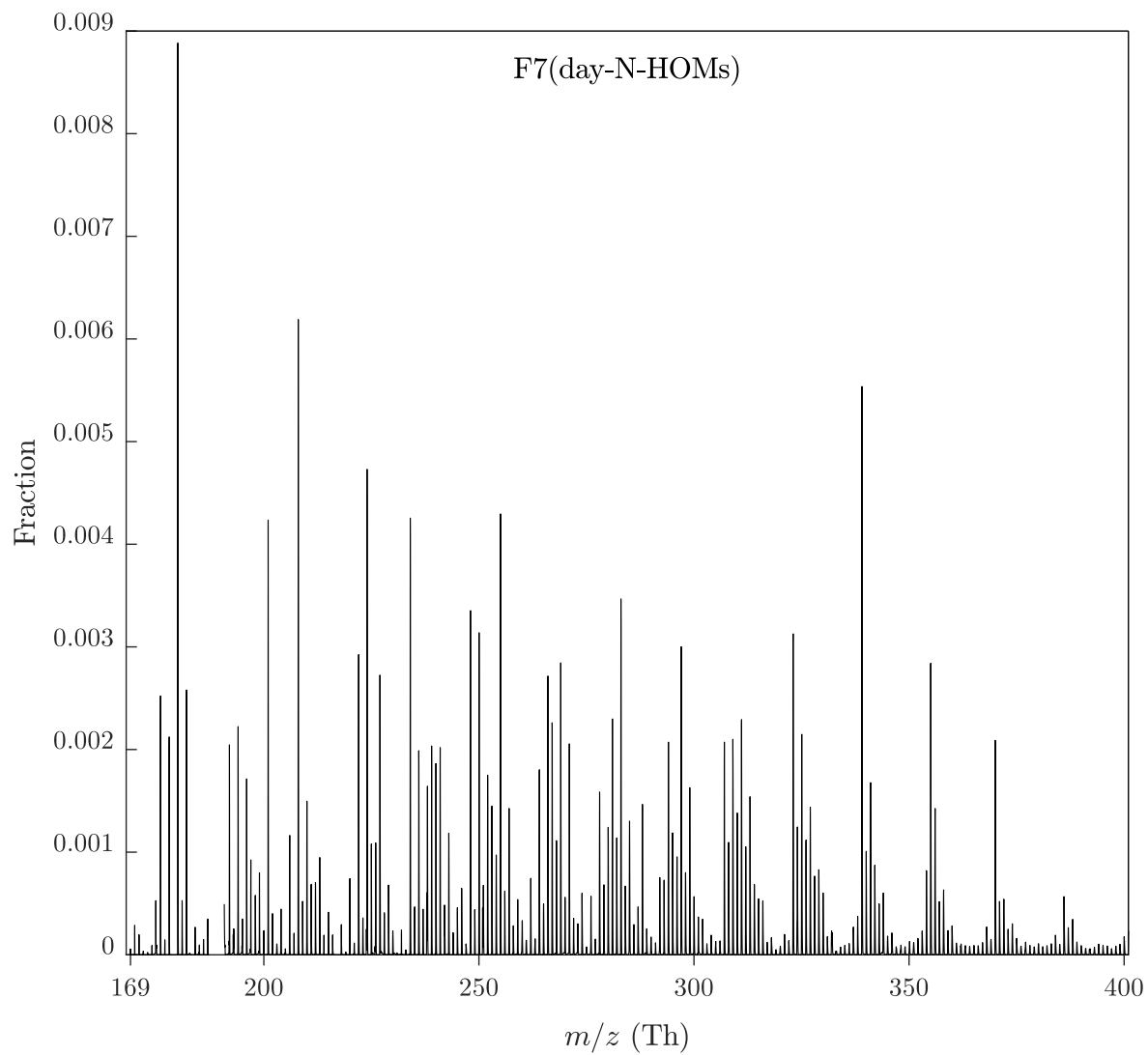**Figure S8.** Normalized spectrum of the binPMF factor F7(day-N-HOMs) up to 400 Th.
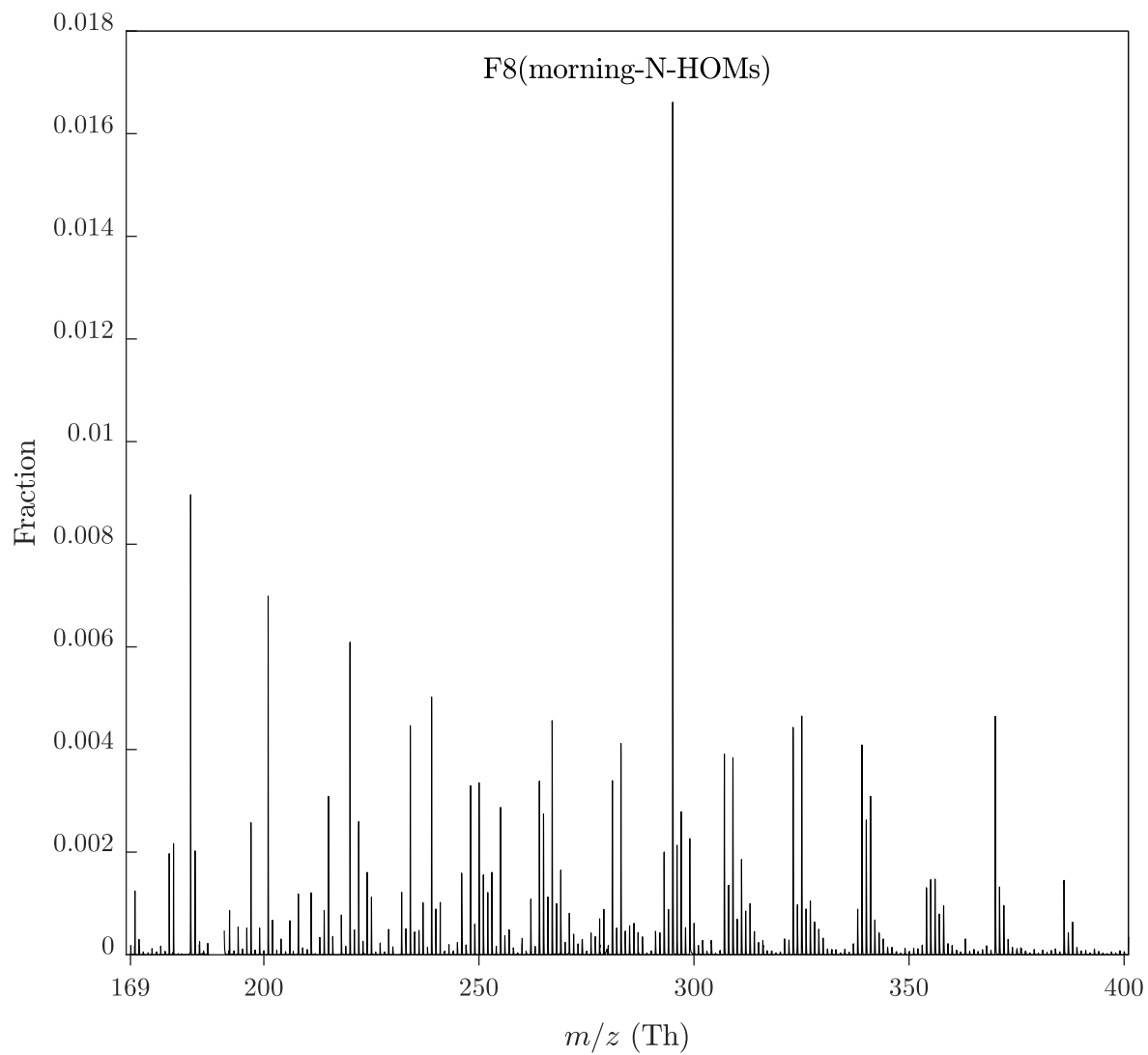
Figure S9. Normalized spectrum of the binPMF factor F8(morning-N-HOMs) up to 400 Th.
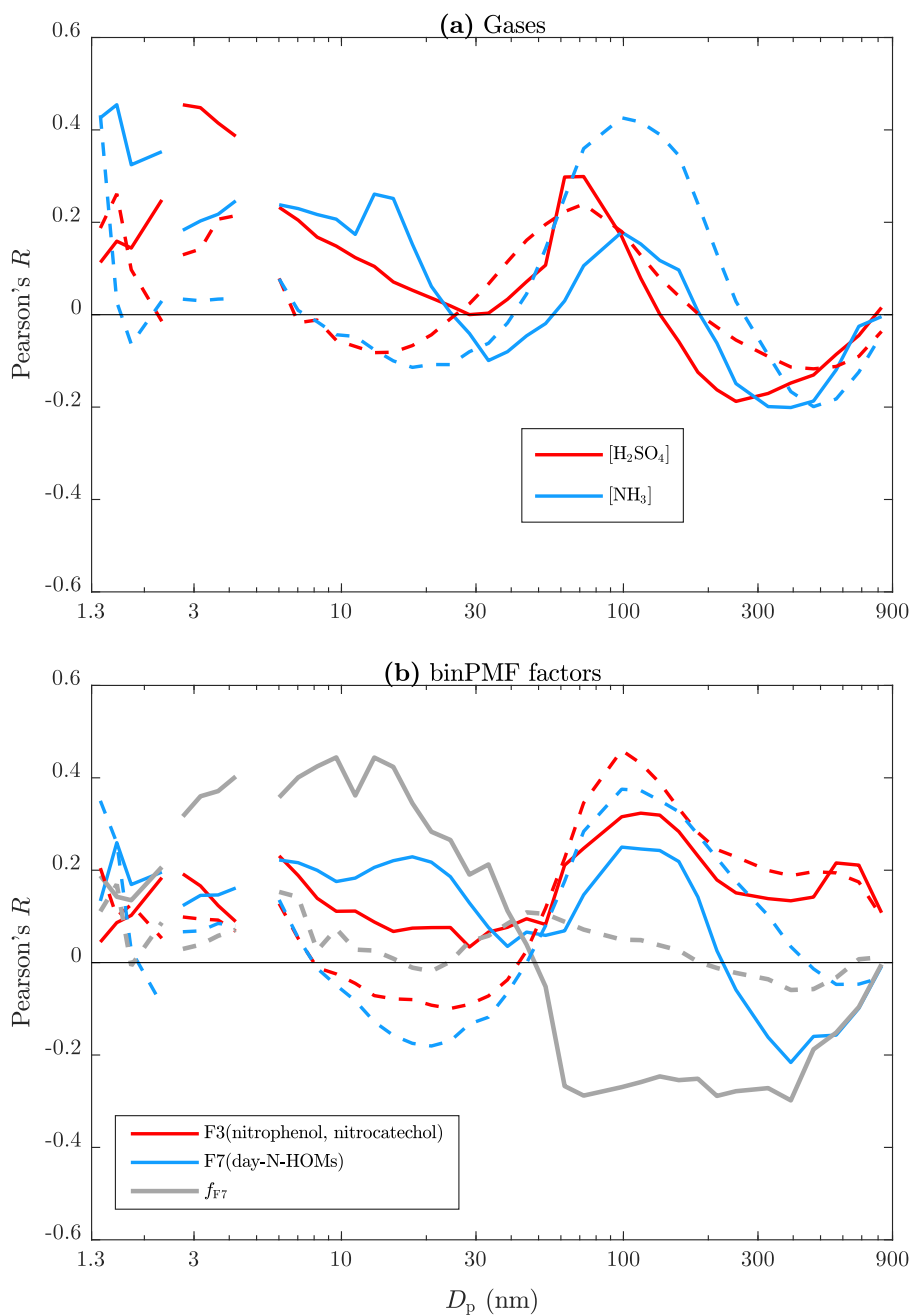
Figure S10. Pearson's correlation coefficient (R) between all particle size bins and **(a)** the concentrations of sulfuric acid ([H_2SO_4]) and ammonia ([NH_3]) and **(b)** binPMF factors 3 and 7, together with the variable f_{F7}. Data below 3 nm are from a PSM, over 5 nm are from the DMPS, and the remaining part between them are from the NAIS. Solid lines denote data from the days with NPF events and dashed lines from the days with no NPF event. Due to a relative low amount of the data in these plots, the lines are shown regardless of their statistic significance.

Table S1. Classifications of the measurement days in terms of new particle formation events, according to the behavior of the measured particle size distributions.

Day	Classification	Day	Classification	Day	Classification
		May 1	unclear	Jun 1	no event
		May 2	no event	Jun 2	no event
Apr 3	no event	May 3	event	Jun 3	no event
Apr 4	no event	May 4	unclear	Jun 4	no event
Apr 5	no event	May 5	uncertain	Jun 5	no event
Apr 6	no event	May 6	no event	Jun 6	no event
Apr 7	no event	May 7	no event	Jun 7	no event
Apr 8	no event	May 8	event	Jun 8	no event
Apr 9	no event	May 9	event	Jun 9	unclear
Apr 10	no event	May 10	event	Jun 10	event
Apr 11	event	May 11	no event	Jun 11	event
Apr 12	event	May 12	no event	Jun 12	unclear
Apr 13	uncertain	May 13	event	Jun 13	unclear
Apr 14	uncertain	May 14	event	Jun 14	no event
Apr 15	event	May 15	event	Jun 15	no event
Apr 16	event	May 16	event	Jun 16	no event
Apr 17	event	May 17	event	Jun 17	unclear
Apr 18	event	May 18	event	Jun 18	unclear
Apr 19	unclear	May 19	no event	Jun 19	unclear
Apr 20	unclear	May 20	no event	Jun 20	unclear
Apr 21	no event	May 21	no event	Jun 21	unclear
Apr 22	no event	May 22	unclear	Jun 22	no event
Apr 23	no event	May 23	no event	Jun 23	unclear
Apr 24	no event	May 24	unclear	Jun 24	event
Apr 25	unclear	May 25	no event	Jun 25	event
Apr 26	no event	May 26	unclear		
Apr 27	no event	May 27	event		
Apr 28	event	May 28	no event		
Apr 29	event	May 29	unclear		
Apr 30	event	May 30	unclear		
		May 31	event		

Table S2. List of the 10 tallest peaks in the binPMF factors. The values denote m/z (in Th) of the peaks in ascending order. The tallest peaks are marked in bold.

F1 (low-mass)	F2 (water–nitrate dimer)	F3 (nitrophenol, nitrocatechol)	F4 (OOMs)	F5 (mixed)	F6 (water–nitrate monomer)	F7 (day-N-HOMs)	F8 (morning-N-HOMs)
178.0124	170.0531	182.9971	180.0173	169.0690	**170.0531**	**180.0156**	182.9943
180.0171	**179.0170**	**201.0171**	182.9899	170.0254	206.0747	201.0157	201.0159
182.9960	197.0278	202.0200	208.0300	**171.0606**	224.0849	208.0159	220.0477
186.9861	206.0718	217.0109	**220.0465**	179.0216	242.0948	224.0156	220.0477
192.0182	215.0387	234.0615	222.0456	179.9922	260.1054	234.0614	239.0192
194.0262	224.0849	239.0162	234.0535	183.0787	278.1149	248.0509	267.0465
201.0153	233.0494	241.0585	236.0449	183.9966	296.1236	255.0276	**295.0749**
220.0494	251.0581	248.0504	239.0190	185.0550	314.1326	283.0417	323.0654
239.0191	269.0695	255.0434	248.0564	187.0077	332.1426	323.0650	325.0703
246.0000	287.0777	264.0093	250.0571	220.0135	350.1475	339.0585	370.0555

Table S3. Pearson's correlation coefficients (R) between the most important binPMF factors and UMR data. The bold values denote the most suitable UMR tracers for the binPMF factors. A perfectly selective UMR tracer for a factor would have R equal to the ones in footnotes (and $R = 1$ between the factor and the tracer). R for the other factors not shown here for these selected UMR tracers are less than 0.40.

UMR	220	236	285	271	339	295	265
F4(OOMs)	**0.98**	**0.97**	0.65[a]	0.64[a]	0.59[a]	0.43[b]	0.62[b]
F7(day-N-HOMs)	0.54[a]	0.63[a]	**0.91**	**0.89**	**0.87**	0.37[c]	0.54[c]
F8(morning-N-HOMs)	0.47[b]	0.36[b]	0.36[c]	0.42[c]	0.52[c]	**0.95**	**0.82**

[a] $R = 0.47$ between F4(OOMs) and F7(day-N-HOMs)

[b] $R = 0.30$ between F4(OOMs) and F8(morning-N-HOMs)

[c] $R = 0.25$ between F7(day-N-HOMs) and F8(morning-N-HOMs)