

Ultrafine Particles in Urban Air

23 – 24 October 2007
Dresden, Germany

Jiri Novak
Czech Hydrometeorological Institute
Prague, Czech Republic

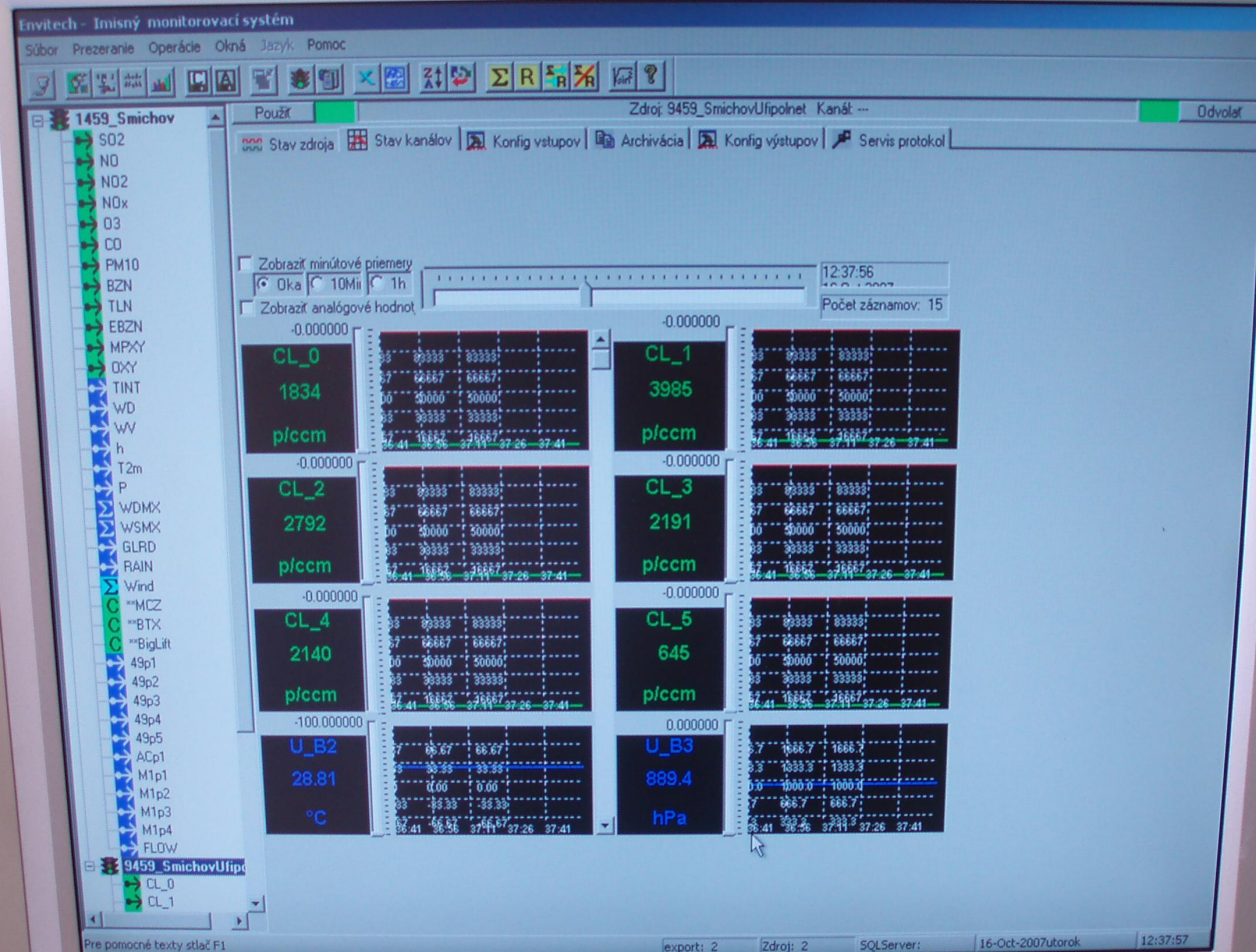
One of the places selected for the testing of the new instrument UFP330 for automated monitoring of the number of particles in various size classes, within the EU Project UFIPOLNET, is Prague, and namely the ambient air measuring station (AMS) in Prague, the AMS Strahov Tunnel station.



Ultrafine Particles in Urban Air, 23-24 October Dresden



Ultrafine Particles in Urban Air, 23-24 October Dresden





Ultrafine Perticles in Urban Air, 23-24 October Dresden



Ultrafine Particles in Urban Air, 23-24 October Dresden



Ultrafine Perticles in Urban Air, 23-24 October Dresden



Ultrafine Particles in Urban Air, 23-24 October Dresden



Ultrafine Particles in Urban Air, 23-24 October Dresden

Ultrafine Particles in Urban Air, 23-24 October Dresden

AMS Strahov Tunnel station is not a classical traffic AMS in accordance with the criteria-requirements of the EU Directives (e.g. It is not located 4 meters from the centre of the traffic lane); it is located above the Strahov Tunnel where air quality is influenced mainly by the cars leaving the Mrazovka Tunnel and entering the Strahov Tunnel. This traffic area in Prague 5 is a part of the constructed Prague bypass. As stated above, orography of the area in the valley in Prague 5 did not enable to locate the AMS strictly in accordance with EU rules for traffic measuring stations.

Nevertheless the AMS Strahov Tunnel is a good representative of the impact of traffic on air quality in this enclosed part of Prague 5 and therefore it can be/could be (with the above reservations) taken as a traffic measuring station.

If the basic emissions from the traffic are NO, NO₂, CO and VOC as gaseous components-pollutants, then particle matter is another significant pollutant, in case of traffic, mainly fine and ultrafine particles. Therefore it is useful to monitor and assess the correlations between these pollutants, in spite of the fact that there are available only short series of measurements up to now.

To demonstrate the results of the six-month measurements the month of August and September 2007 were selected.

Table 1

August 2007

	PM10	NO	NO2	NOx	CO	O3	SO2	BZN	TLN	EBZN	MPXY	OXY
CL0	0.17	0.42	0.33	0.42	0.42	0.12	0.21	0.06	0.19	0.22	0.18	0.18
CL1	0.29	0.65	0.61	0.69	0.65	-0.10	0.11	0.21	0.21	0.44	0.47	0.34
CL2	0.35	0.75	0.74	0.81	0.75	-0.29	0.01	0.31	0.20	0.57	0.67	0.46
CL3	0.38	0.80	0.78	0.86	0.79	-0.32	-0.03	0.33	0.20	0.58	0.71	0.49
CL4	0.44	0.84	0.74	0.88	0.78	-0.18	0.01	0.29	0.18	0.49	0.57	0.42
CL5	0.57	0.36	0.43	0.42	0.44	-0.16	-0.04	0.54	0.26	0.37	0.41	0.33

Table 2

September 2007

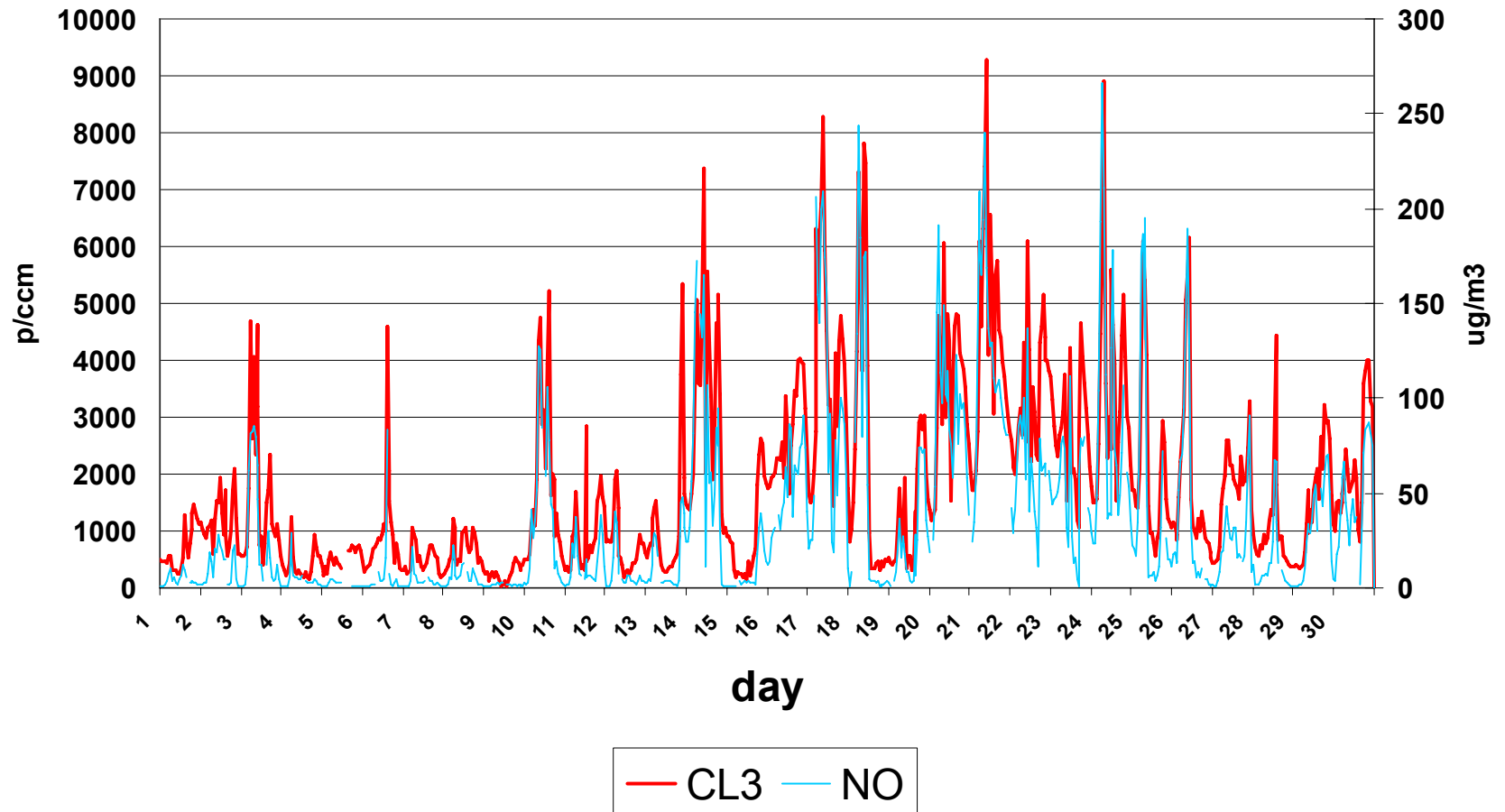
	PM10	NO	NO2	NOx	CO	O3	SO2	BZN	TLN	EBZN	MPXY	OXY
CL0	0.46	0.86	0.77	0.87	0.73	-0.39	0.46	0.64	0.47	0.59	0.58	0.57
CL1	0.53	0.92	0.84	0.93	0.81	-0.39	0.44	0.72	0.53	0.67	0.65	0.64
CL2	0.54	0.92	0.87	0.94	0.84	-0.39	0.42	0.76	0.55	0.71	0.70	0.68
CL3	0.57	0.91	0.88	0.94	0.87	-0.40	0.41	0.80	0.56	0.75	0.73	0.72
CL4	0.62	0.90	0.88	0.93	0.86	-0.34	0.42	0.80	0.53	0.74	0.73	0.72
CL5	0.61	0.71	0.68	0.73	0.74	-0.46	0.33	0.78	0.49	0.72	0.71	0.67

The first results show none of the size fraction of the ultrafine particles correlate with PM₁₀, as we know from the literature. On the contrary, there is a significant correlation with NO, NO₂ and CO in September 2007 for CL1-CL4, i.e. for the ultrafine particles with the size from 20 nanometers (nm) to 200 nm.

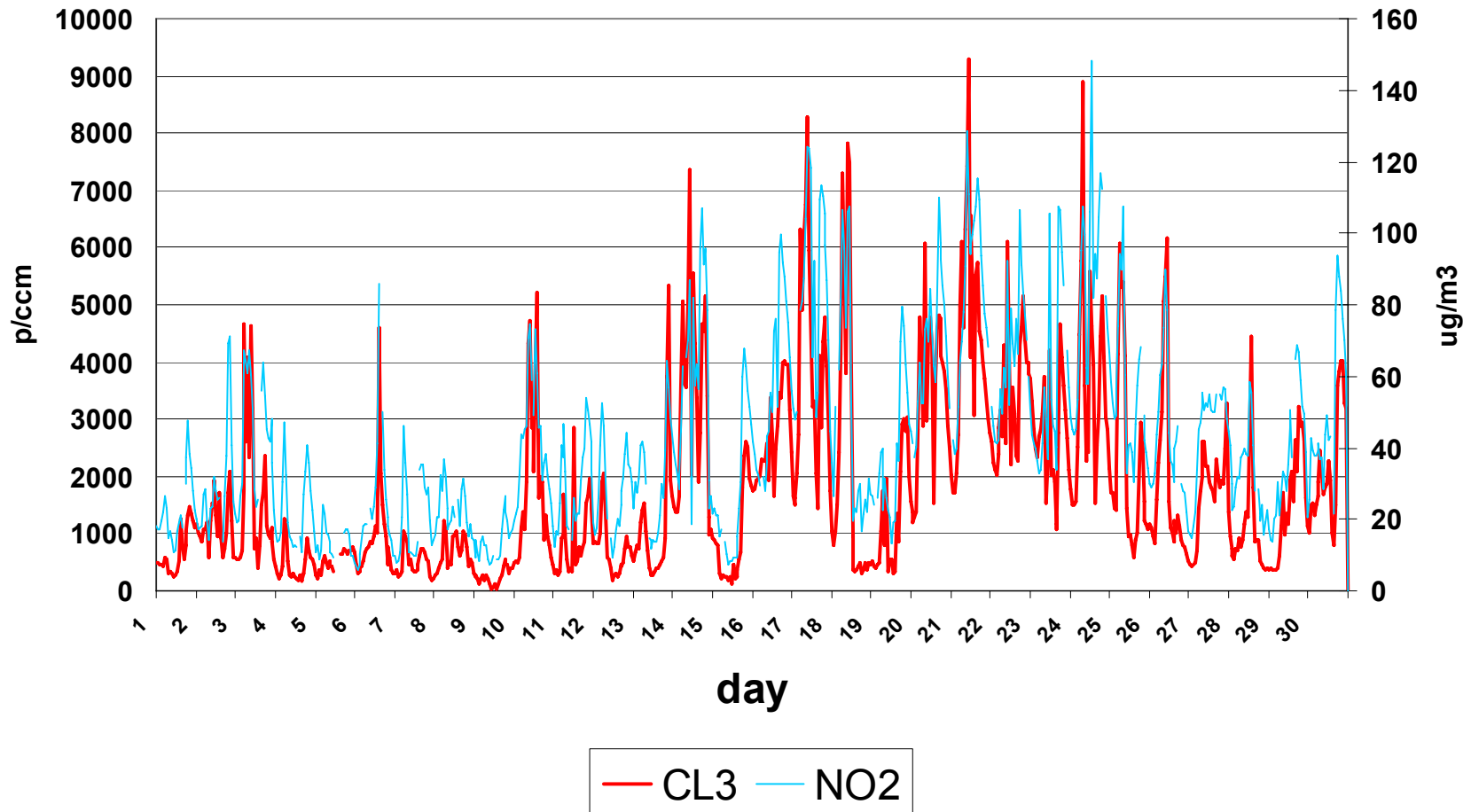
Interesting correlation are with BZN (and similar with EBZN and Xylenes); in September the correlation was very high, and similar with NO, NO₂ and CO, but in August there was not found such a significant correlation for the classes of ultrafine particles CL1-CL4.

To highlight the course of concentrations and number of ultrafine particles we chose one class of ultrafine particles – CL3.

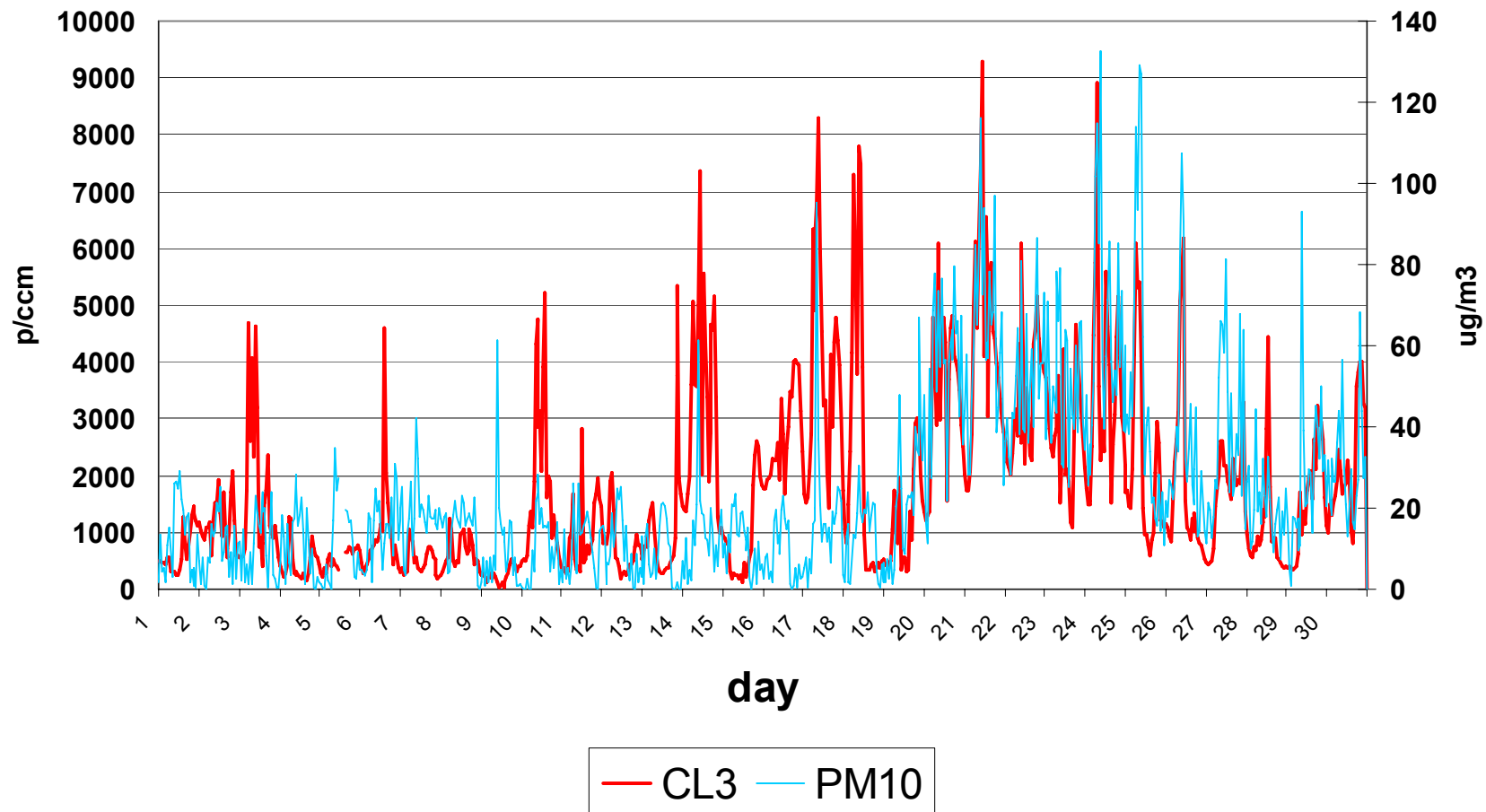
CL3 - NO



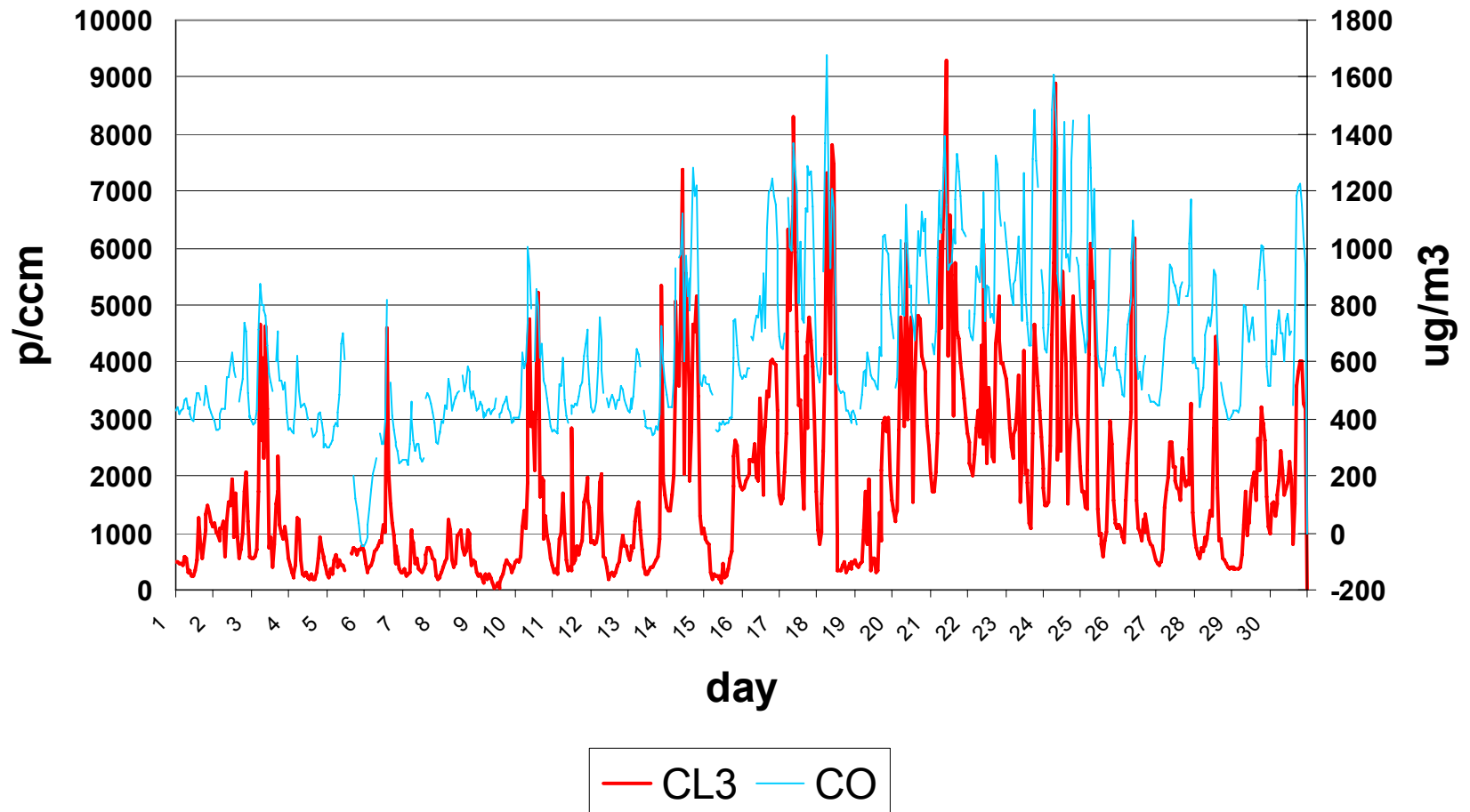
CL3 - NO2



CL3 - PM10



CL3 - CO



The figures show quite clearly the relation between the number of ultrafine particles with gaseous pollutants of traffic emissions, from which the ultrafine particles are formatted through physical-chemical processes. It is evident that these primary measurements are regarded as test measurements, but we hope that we will be able to assess the measured data from the year 2008 not only for gaseous pollutants from the traffic but also in connection with meteorological conditions of the respective days (T,P,RH), the hours of measurements etc. It will be surely be useful to carry out study measurements of the contents of EC/OC at this AMS station which we prepare for the year 2008.

Thank you for your attention