Characterising the U9 Milan background site that links together radiation and pollution measurements.

A. Comi[1], F. Degni[1], C.F. Cutellè[1], S.Cogliati[1], C. Rizzi[1], M. Casati[1], G. Sangiorgi[1], M.G. Perrone[1], B. Di Mauro[1], G.
Močnik[2], E. Bolzacchini[1] and L. Ferrero[1]

[1]Department of Earth and Environmental Sciences, University of Milano-Bicocca, Piazza della Scienza 1, 20126, Milan, Italy.
[2]Aerosol d.o.o, Kamniška 41, SI-1000 Ljubljana, Slovenia.
Keywords: Black Carbon, Aerosol, Radiation, Pollution.
Presenting author email: a.comi10@campus.unimib.it

Linking aerosol trends with environmental measures such as radiation is essential in order to evaluate how much urban pollution impacts on the atmospheric heating (Ferrero et al., 2014). Therefore a sampling site in Milan was set up: it is located on the building roof of the University of Milan-Bicocca, in an urban background area. The incoming solar radiation is not obstructed by higher buildings.

In the site there are different instruments in order to characterize particulate matter PM. In particular the site is equipped with the following equipment:

1. An Aethalometer (Magee Scientific AE31) to perform measurements about black carbon (BC) concentration and its light attenuation at 7 different wavelenghts (370, 470, 520, 590, 660, 880 and 950 nm);
2. Two Optical Particulate Counter (OPC 1.107 Environcheck, Grimm) in order to obtain both count distribution of PM in the range between 0.25 and 32 µm and PM_1, $PM_{2.5}$ and PM_{10} concentrations in the atmosphere surrounding the site; one of the OPCs samples the PM at high relative humidity, while the other is linked with a bin full of silica gel, allowing sampling of dry particulate matter;
3. One Condensation Particle Counter (CPC, TSI 3775): these allow us to have a count of the particles by first using them as condensation nucleus ($d_{50\%}$=4 nm);
4. DualSampler Hydra (FAI Instrument) with two european sampling heads (sampling flow 38.33 L/min) was settled. For PM 2.5. were utilized 47m-diameter quartz-fiber filters. Samples were analysed using ion chromatography, after 20 minutes extraction in ultra pure water by ultrasonic bath (SOLTEC SONICA).The chromatography system used was the coupled ICS90/ICS2000 (Dionex);
5. A LSI Lastem meteorological station was installed. This can record data about RH, air temperature, atmospheric pressure, global radiation and diffused one (for which a shadow band is used) beyond wind speed and direction;
6. The automatic field spectrometer MRI (Multiplexer Radiometer Irradiometer) (Cogliati et al., 2015) detects the incoming radiation in the visible to near-infrared spectral range (300-1100 nm) in 3648 spectral bands. A custom-designed shadow-band allows to collect both total (direct + diffuse) and diffuse downward radiation. The spectra collected provide accurate information to study the interactions between solar radiation and aerosols at the different spectral regions.

All of these instruments are turned on day and night and have a sampling time of 5 minutes, in order to obtain a high-resolution dataset with integrated measures.

As preliminary results we obtained monthly mean for principal environmental parameters, such as relative humidity (RH), temperature, global radiation, $PM_{2.5}$ and black carbon (BC) concentrations (Table 1).

Monthly Average Values For Enviromental Datas					
Month	**RH [%]**	**T [°C]**	**Global Rad [W/m2]**	**BC [ng/m3]**	**PM 2.5 [ng/m3]**
March	45.6 ± 0.5	15.6 ± 0.1	159.8 ± 4.0	1800.3 ±19.5	24285.0 ± 0.3
April	49.9 ± 0.2	15.5 ± 0.04	219.8 ± 3.2	1274.8 ± 12.1	31036.8 ± 0.1
May	60.7 ± 0.2	19.7 ± 0.1	240.7 ± 3.8	970.8 ± 7.2	39667.8 ± 0.1
June	52.3 ± 0.3	25.7 ± 0.1	291.4 ± 6.5	1403.4 ± 11.3	50698.9 ± 0.2

Table 1 - Environmental average values for the most important parametres.

Furthermore correlation between solar radiation and black carbon was plotted.

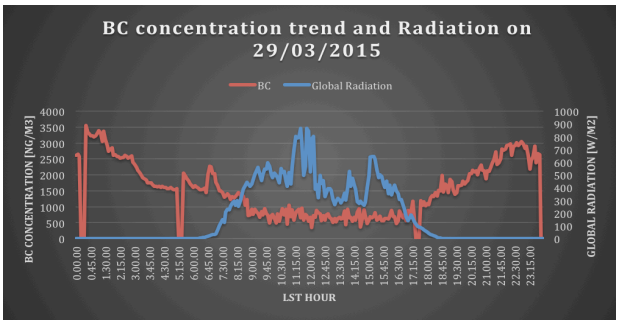

Figure 1 - Correlation between BC concentration and incoming solar radiation.

For future applications could be considered the study concerning the relationship between aerosol concentration and radiative forcing, according to study its direct effect in the atmosphere.

L. Ferrero, M. Castelli, B. S. Ferrini, M. Moscatelli, M. G. Perrone, G. Sangiorgi, L. D'Angelo, G. Rovelli, B. Moroni, F. Scardazza, G. Mocˇnik, E. Bolzacchini, M. Petitta, and D. Cappelletti, 2014, *Impact of black carbon aerosol over Italian basin valleys: high-resolution measurements along vertical profiles, radiative forcing and heating rate,* Atmos. Chem. Phys., 14, 9641–9664.