File contains 30-min averages of aerosol microphysical parameters measured by 3 particle counters and a Tapered Element Oscillating Microbalance (TEOM) set up at SIRTA, Zone 1.

.alt=160 m asl
.lat=48.713
.lon=2.209

For information concerning those files: sirtadata @ lmd.polytechnique.fr
Processing by thierry.elias@lmd.polytechnique.fr . January 2009.

flags

0 = data not available;
1 = data is OK (within physically possible limits);
2 = data is questionnable (beyond extreme limits)

01: Date and Time UT (yyyy-mm-ddThh:mm:ssZ)

02-12 averaged values

02: N_4 (cm^{-3}) aerosol number concentration measured by CPC, for diameter D < 3 μm.
03: N_1 (cm^{-3}) ultra fine aerosol number concentration measured by SMPS (D<0.5 μm)
04: N_2 (cm^{-3}) accumulation mode aerosol number concentration measured by WELAS-2000 (0.4<D<2 μm)
05: N_3 (cm^{-3}) fog droplet number concentration measured by WELAS-2000 (D>2 μm)

06: M_4 ($\mu g/m^3$) aerosol mass measured by TEOM
07: M_1 ($\mu g/m^3$) ultra fine aerosol mass measured by SMPS (D<0.5 μm)
08: M_2 ($\mu g/m^3$) accumulation mode aerosol mass measured by WELAS-2000 (0.4<D<2 μm)
09: M_3 ($\mu g/m^3$) fog droplet mass measured by WELAS-2000 (D>2 μm)

10: R_1 (μm) ultra fine aerosol effective radius measured by SMPS (D<0.5 μm)
11: R_2 (μm) accumulation mode aerosol effective radius measured by WELAS-2000 (0.4<D<2 μm)
12: R_3 (μm) fog droplet effective radius measured by WELAS-2000 (D>2 μm)

13-23 standard deviation values

13: N_4 (cm^{-3}) aerosol number concentration measured by CPC, for diameter D < 3 μm.
14: N_1 (cm^{-3}) ultra fine aerosol number concentration measured by SMPS (D<0.5 μm)
15: N_2 (cm^{-3}) accumulation mode aerosol number concentration measured by WELAS-2000 (0.4<D<2 μm)
16: N_3 (cm^{-3}) fog droplet number concentration measured by WELAS-2000 (D>2 μm)

17: M_4 ($\mu g/m^3$) aerosol mass measured by TEOM
18: M_1 ($\mu g/m^3$) ultra fine aerosol mass measured by SMPS (D<0.5 μm)
19: M_2 ($\mu g/m^3$) accumulation mode aerosol mass measured by WELAS-2000 (0.4<D<2 μm)
20: M_3 ($\mu g/m^3$) fog droplet mass measured by WELAS-2000 (D>2 μm)

21: R_1 (μm) ultra fine aerosol effective radius measured by SMPS (D<0.5 μm)
22: R_2 (μm) accumulation mode aerosol effective radius measured by WELAS-2000 (0.4<D<2 μm)
23: R_3 (μm) fog droplet effective radius measured by WELAS-2000 (D>2 μm)

24-34 flags
24: aerosol number concentration measured by CPC, for diameter D < 3 μm.
25: ultra fine aerosol number concentration measured by SMPS (D<0.5 μm)
26: accumulation mode aerosol number concentration measured by WELAS-2000 (0.4<D<2 μm)
27: fog droplet number concentration measured by WELAS-2000 (D>2 μm)

28: aerosol mass measured by TEOM
29: ultra fine aerosol mass measured by SMPS (D<0.5 μm)
30: accumulation mode aerosol mass measured by WELAS-2000 (0.4<D<2 μm)
31: fog droplet mass measured by WELAS-2000 (D>2 μm)

32: ultra fine aerosol effective radius measured by SMPS (D<0.5 μm)
33: accumulation mode aerosol effective radius measured by WELAS-2000 (0.4<D<2 μm)
34: fog droplet effective radius measured by WELAS-2000 (D>2 μm)

-- more detailed description --

avr=average, sdv=standard deviation

Integrated number concentration N_4, measured by CPC, in cm-3.

We consider no measurement is made when:
- the data does not exist,
- the instantaneous value is set to 0,
- the instantaneous data is set to NaN.

In these 3 cases, measurement is not used to compute the average.

If no instantaneous data available for computation of average: avr=0, sdv=0, flag=0
Example: 20070320.

If instantaneous number smaller than 100 cm^{-3}: avr=-9999.9, sdv = -9999.9, flag=2
Example: 20070109

Aerosol mass M_4 measured by the TEOM, in μg/m3.

We consider no measurement is made when:
- the data does not exist,
- the instantaneous value is set to 0 (example 20070102).

In these 2 cases, measurement is not used to compute the average.

If no instantaneous data available for computation of average: avr=0, sdv=0, flag=0

If instantaneous measurement smaller than 1 mg/m3 (and even negative): avr=-99.9, sdv=-99.9, flag=2
Example: 20070320

Mass is corrected by evaporated nitrate ammonium, as estimated by Airparif.

Ultra fine aerosol number concentration N_1, mass M_1, and effective radius R_1 measured by SMPS

Aerosol number n(i), in units of cm^{-3}, is measured in 108 size bins i, from 0.01 to 0.50 μm diameter.

Instantaneous measurements are corrected by instrumental accidents, detected as:

if N(i=107, i=108)>100 cm-3, ***then*** N(i) is forced to 0.
Examples: 20070107 125702 and 20070107 191701

if N(i) > 1000 cm-3 ***and*** N(i)/N(i-1) > 5 ***and*** N(i)/N(i+1) > 5, ***then*** N(i) is forced to 0.
Examples: 20070128 003101 and 173101

No flag is affected by such operations.

Number N_1 is computed by integrating n(i) over all size bins.
Mass M_1 is computed by multiplying total aerosol volume by assumed aerosol density, set to 1.5 g/cm^3. Volume is computed by integrating n(i)*4/3*pi*r(i)**3 over all size bins.
Effective radius R_1 is computed as aerosol surface divided by aerosol volume.

Averaging is made on instantaneous values of N1, M1, and R1.

No unphysical value of N1, M1, R1 has been observed.

No data for averaging computation: flag=0

Aerosol number, mass, and size measured by PALAS WELAS-2000 (CNRM owner)

Aerosol number n(i), in units of cm^{-3}, is measured in 65 size bins i, from 0.41 to 40.7 μm diameter.

Instantaneous measurements are corrected by instrumental accidents, detected as:

For diameter > 10 μm (i>46):
if n(i)=1 cm^{-3}, ***while*** n(i-2)=n(i-1)=n(i+1)=n(i+2)=0 ***then*** n(i) is forced to 0.
Examples: 20070218 021453

For diameter > 6 μm (i > 39):
if n(i)=1 cm^{-3}, after 5 consecutive values of n(i)=0 ***then*** n(i), n(i+1), n(i+2) are forced to 0.
Examples: 20070218 122452

Number, mass, and effective radius are computed for 2 size bins.
Number N_2 (N_3) is computed by integrating n(i) over the bins of the 0.41-2 μm (2-40.7 μm) size interval.

Mass M_2 and M_3 are computed by multiplying total aerosol volume by assumed aerosol density, set to 1.5 g/cm3. Volume is computed by integrating n(i)*4/3*pi*r(i)**3 over the two size intervals.
Effective radius R_2 and R3 are computed as aerosol surface divided by aerosol volume.

Averaging is made on instantaneous values of N, M, and R.

No unphysical value of N, M, R has been observed.

No data for averaging computation, flag=0