Supplement of

Sources and mixing state of summertime background aerosol in the north-western Mediterranean basin

Jovanna Arndt et al.

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Figure 1. Schematic overview of ATO FMS data analysis.

 Thousands of single particle mass spectra

 K-means algorithm

 Groups similar mass spectra together

 Particle types

 Similar mass spectra, size and temporal profiles
 Nomenclature based on dominant ions (usually positive e.g. K) or likely source (e.g. sea salt)

 Scaling factors

 Single particle numbers scaled up to numbers from particle counting instruments (SMPS/OPS)
 Requires conversion of aerodynamic diameter to volume equivalent diameter so size bins from each instrument can be directly compared
 Conversion requires selection of density value → single value = average density of ambient aerosol → applied to all particles

 Reconstructed mass concentrations

 Calculate volume & then mass of scaled up particle numbers
 Requires selection of density value (different ones used for different particle classes) & particles assumed spherical
Table 1. Pearson’s correlation coefficient ($R^2$) between mass concentrations from ATOFMS (PM$_{2.5}$), TEOM (PM$_{10}$ & PM$_{1}$), ACSM (PM$_{1}$), PILS (PM$_{10}$) and MAAP (PM$_{2.5}$) measurements and OPS number concentrations (#/cm$^3$) for the full sampling period, and during specific periods.

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<thead>
<tr>
<th></th>
<th>ATOFMS total</th>
<th>ATOFMS EC-rich</th>
<th>ATOFMS K-rich</th>
<th>PM$_{10}$</th>
<th>PM$_{1}$</th>
<th>BC</th>
<th>ACSM total</th>
<th>ACSM SO$_4^{2-}$</th>
<th>ACSM NH$_4^+$</th>
<th>ACSM SV-OOA</th>
<th>ACSM LV-OOA</th>
<th>PILS-K SO$_4^{2-}$</th>
<th>PILS-K NH$_4^+$</th>
<th>PILS-OPS 0.3-0.579 µm particles</th>
<th>*PILS Oxalate</th>
<th>*WSOC</th>
<th>**ATOFS fresh sea salt</th>
<th>**OPS 0.579-2.156 µm particles</th>
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<th>**PILS MSA</th>
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*Correlations calculated from 21st June - 4th August.

**Correlations calculated from 20-27th June.

***Correlations calculated from 23rd July - 5th August
Figure 2. Individual HYSPLIT 120-hour back trajectories for each cluster for Period 1 during ADRIME and SAF-MED.
Figure 3. Daytime average aerosol optical depth at 550 nm (AOD$_{550}$) derived from MSG/SEVIRI (Thieuleux et al., 2005) from 17th to 20th June 2013 showing a dust plume transport over the western Mediterranean basin (produced by http://www.icare.univ-lille1.fr). Land and cloudy pixels in dark and light grey, respectively.