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Supplement of

Development and evaluation of an improved offline aerosol mass spectrometry technique

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S1. Patras 2020 winter campaign

Figure S1: Map of the sampling site for the Patras campaign. The map was obtained by Google maps.

Figure S2: Ambient temperature and relative humidity time series for the Patras 2020 campaign.
S1.1 On-line

Figure S3: Organic mass spectra of the on-line PMF solution for the Patras 2020 winter campaign.
Figure S4: Time series of the on-line PMF solution for the Patras 2020 winter campaign.
Figure S5: Average diurnal profile of the factors derived from the on-line PMF analysis during the winter of 2020 campaign in Patra. The shaded regions show the standard deviation of the mean.
S1.2 Off-line

*Figure S6*: Off-line bootstrap analysis for the Patras 2020 winter campaign.
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**Figure S8**: Comparison of off-line and on-line spectra of the PMF solution for the Patras 2020 winter campaign.

**Figure S9**: Off-line to on-line ratio for specific UMR HOA markers.
Figure S10: Comparison between the off-line and the on-line organic mass spectra for the day with the best and the worst agreement. The theta angle is also depicted. The ambient OA mass concentration was 7 μg m⁻³ during the first day case (best correlation between on-line and off-line) and 3 μg m⁻³ for the second (worst correlation between on-line and off-line).

Figure S11: Atomic oxygen to carbon ratio (O:C) comparison between the off-line and the on-line results.
S2. Summer campaign Patras 2019

Figure S12: Map of the sampling site for the Patras 2019 summer campaign. The map was obtained by Google maps.

Table S1: Average Temperature per month for the Patras 2019 summer campaign

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>16</td>
</tr>
<tr>
<td>April</td>
<td>18</td>
</tr>
<tr>
<td>May</td>
<td>18</td>
</tr>
<tr>
<td>June</td>
<td>26</td>
</tr>
</tbody>
</table>
S2.1 On-line

Figure S13: Time series of the three factors derived from the PMF analysis of the on-line measurements.

Figure S14: Organic mass spectra of the on-line PMF solution for the summer 2019 campaign.
**Figure S15:** Diurnal profiles of the three factors derived from the on-line PMF analysis for the summer 2019 campaign.

**S2.2 Off-line**

**Figure S16:** Off-line bootstrap analysis for the summer 2019 campaign.
Figure S17: Organic mass spectra of the off-line PMF results for the summer 2019 campaign.

Figure S18: Spectra comparison between the on-line and the off-line PMF solution for the summer 2019 campaign.
Figure S19: Comparison of off-line and on-line AMS spectra for the summer 2019 Patras campaign.

S3. Athens campaign 2019

Figure S20: Map of the sampling site for the Athens 2019 winter campaign. The map was obtained by Google maps.

Table S2: Average temperature per month for the Athens 2019 winter campaign

<table>
<thead>
<tr>
<th>Month</th>
<th>Average Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>9</td>
</tr>
<tr>
<td>February</td>
<td>9</td>
</tr>
<tr>
<td>March</td>
<td>13</td>
</tr>
</tbody>
</table>
S3.1 On-line

Figure S21: On-line bootstrap analysis of the Athens 2019 winter campaign.
Figure S22: Time series of the 5 factors derived from the unconstrained on-line PMF solution for the Athens 2019 winter campaign.
Figure S23: Organic mass spectra of the 5 factors derived from the unconstrained on-line PMF solution for the Athens 2019 winter campaign.
S3.2 Off-line

Figure S24: Comparison between the average on-line and the average off-line organic mass spectrum for the Athens 2019 winter campaign.
Figure S25: Spectra comparison between the on-line and the off-line PMF solution for the Athens 2019 winter campaign.
Figure S26: Off-line bootstrap analysis of the Athens 2019 winter campaign.
Figure S27: Organic mass spectra of the 5 factors derived from off-line UMR PMF solution for the Athens 2019 winter campaign.
**Figure S28:** Comparison of the contribution of each factor to the total OA between the on-line the HR off-line and the UMR on-line PMF analysis for the Athens 2019 winter campaign.

**S5. Measurements of suspended particles in the water extract**

**Figure S29:** Derived count rate for the samples and the blank measured with the Zetasizer.
Figure S30: Calibration curve for the 100 nm PSL.

Equation: $y = 145 + 1.03E-6 \times x$

$R^2 = 0.99$