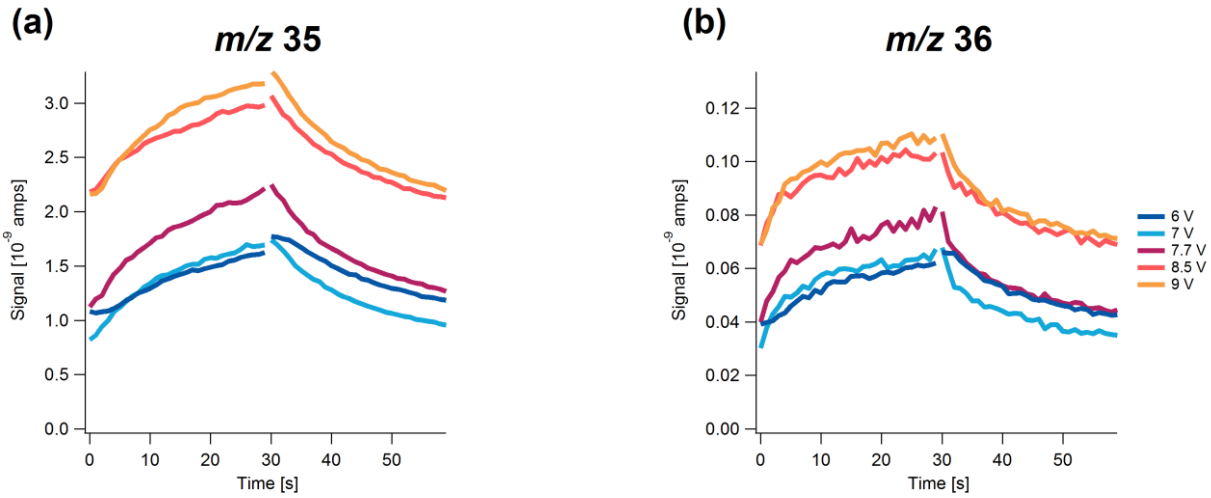

Figure S1. Highly time-resolved signal of (a) *m/z* 35 and (b) *m/z* 36 for NaCl under different vaporizer temperatures.

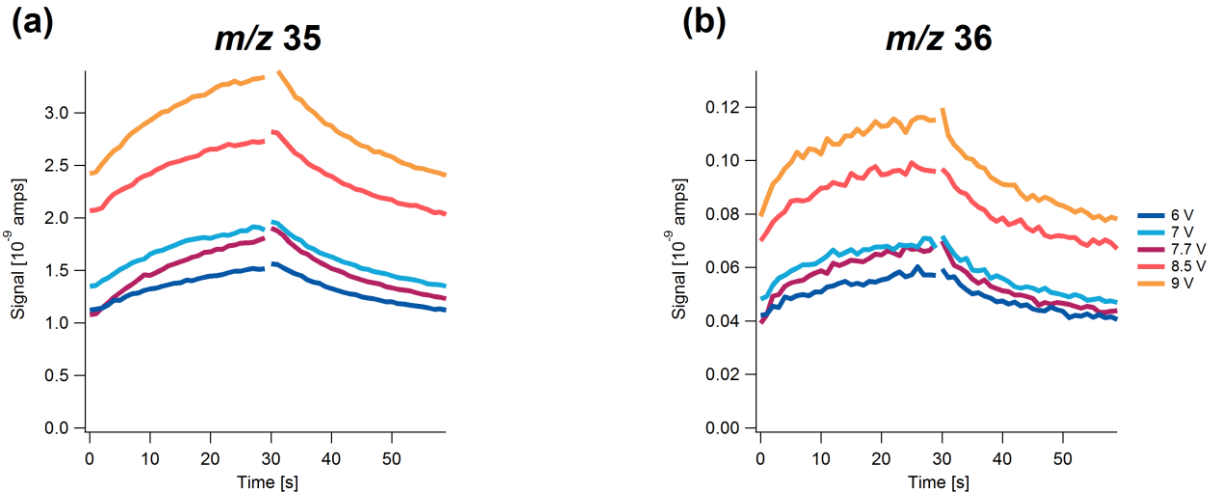

Figure S2. Temporal evolution of (a) ***m/z* 35 and** (b) ***m/z* 36 of KCl under different vaporizer temperatures.**

S1 RIE calculation

The RIE calculation is done on the raw signal of the species in amps (not in µg m^{-3}). There are two ways to calculate the RIEs in the ACSM. They result in the same RIEs, however, we recommend the approach that is first presented here, as it is much cleaner, being solely based on the measured signal and the molar weight of the salts that are used in the calibration.

Approach 1 (recommended)

The RIE_{NH4} is defined as

$$RIE_{NH_4} = slope\ of\ \left(Signal_{NH_4} \cdot RIE_{NO_3} \cdot MW_{NO_3}\right)\ vs\ \left(Signal_{NO_3} \cdot MW_{NH_4}\right) \quad (S1)$$

The RIE_{NO3} is introduced as the IE calibration is only based on *m/z* 30 and 46 and not on the total signal of NO_3. Before the calculation of the RIE_Chl' is calculated, the fragmentation table is adapted as described in Section 3.3, so that only frag_HCl is taken into account for the chloride signal. Similarly to RIE_{NH4} then the RIE_Chl' is calculated:

$$RIE\_Chl' = slope\ \left(Signal_{Chl'} \cdot RIE_{NH_4} \cdot MW_{NH_4}\right)\ vs\ \left(Signal_{NH_4} \cdot MW_{Chl}\right) \quad (S2)$$

Approach 2

The other possibility is to calculate the RIEs based on a RF for each substance. As this includes CPC concentrations in each step, it is not as clean as the approach mentioned above. Nevertheless, it results in the same RIEs within uncertainties.

From the RF calibration with NH_4NO_3, the RIE_{NH4}, noted here as $RIE_{NH4,\ NO3}$, is determined:

$$RIE_{NH_4,NO_3} = \frac{RF_{NH_4}}{RF_{NO_3}} \quad (S3)$$

Similarly, the $RIE_{NH4,\ Chl'}$ can be calculated, based on the calibration with NH_4Cl. For this calibration, the updated fragmentation table was used, so that only the frag_HCl signals are taken into account for the determination of the $RF_{Chl'}$.

$$RIE_{NH_4,Chl'} = \frac{RF_{NH_4}}{RF_{Chl'}} \quad (S4)$$

To determine the $RIE_{Chl'}$, which is the ratio of the electron impact ionization efficiency of chloride to the measured ionization efficiency of nitrate on a per unit mass basis, Eq. (S3) and Eq. (S4) are combined:

$$RIE\_Chl' = \frac{RIE_{NH_4,NO_3}}{RIE_{NH_4,Chl}} \quad (S5)$$