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Supplement of

Iodide CIMS and m/z 62: the detection of HNO_3 as NO_3^- in the presence of PAN, peroxyacetic acid and ozone

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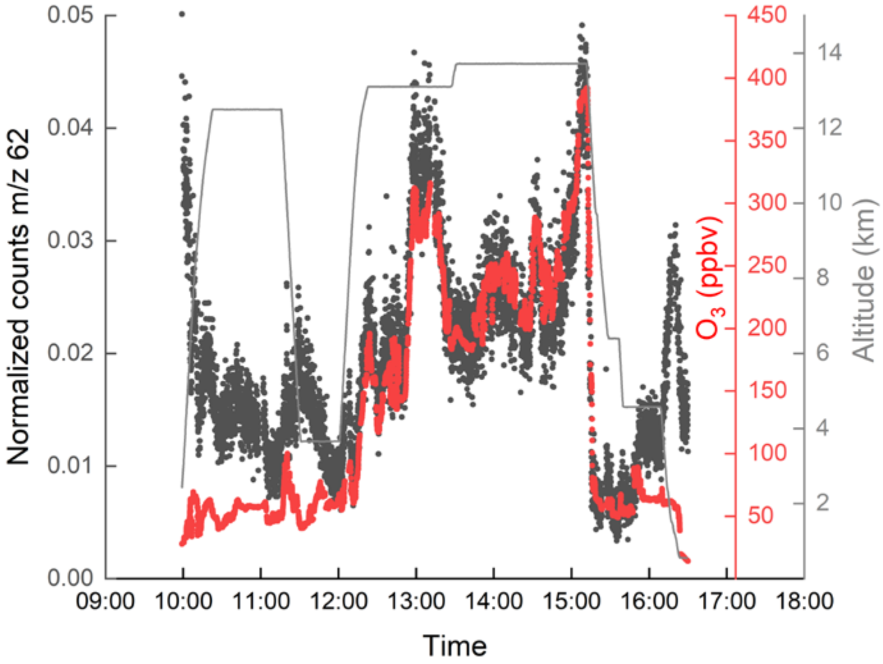

Figure S1. Signal at *m/z* 62 and O_3 mixing ratios during airborne operation of the I-CIMS during the HALO campaign “CAFE-Africa”.

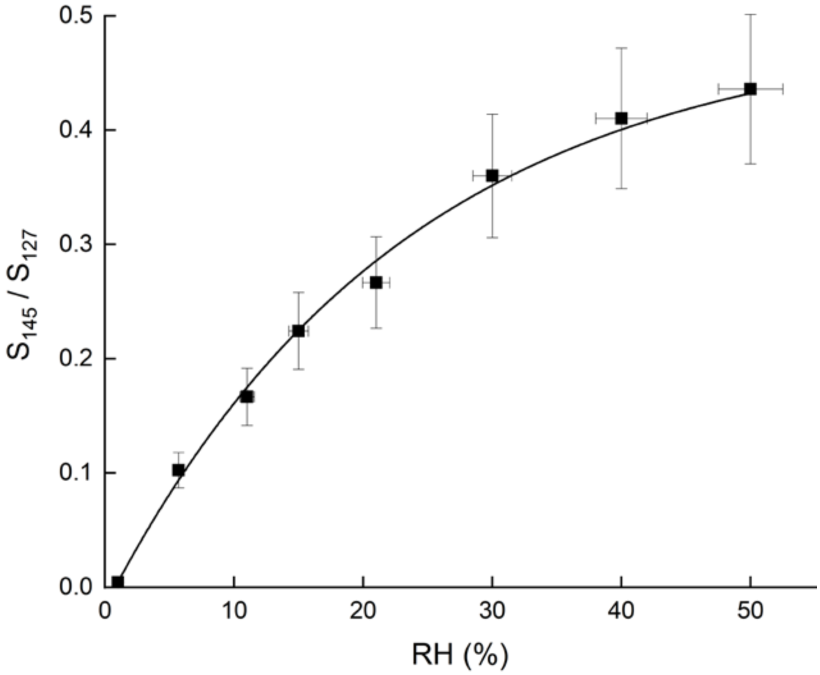

Figure S2. Dependence of the ion-signal ratio *m/z* 145 / *m/z* 127 (corresponding to $I^-(H_2O)$ and I^-, respectively) on the degree of humidification of zero-air entering the inlet. The relative humidity (RH) was monitored with a hygrometer (Testo 625) at a pressure of 1 bar and a temperature of 298 K. The regression line is: RH = -24.616 $ln\{0.969 - (1.923 \times S_{145} / S_{127})\}$.

Using the expression above RH can be converted to a mixing ratio (MR), pressure (P, in mbar) or concentration (C, in molecule cm^{-3}) of H_2O in the IMR via:

$$\mathrm{MR} = \frac{\left(\frac{\mathrm{RH}}{100} \times 31.7\right)}{1000} \times \frac{1200}{2000}$$

where 31.7 is saturation vapour pressure (mbar) of H_2O at 298 K, 1000 is ambient pressure (mbar), 1200 and 2000 are the humidified and total flows (in sccm), respectively into the IMR.

$P(H_2O) = MR \times 24$

Where 24 is the pressure (in mbar) in the IMR

$C(H_2O) = P(H_2O) \times 2.43 \times 10^{16}$

Where 2.43×10^{16} is a conversion factor for mbar into molecule cm^{-3} at 298 K

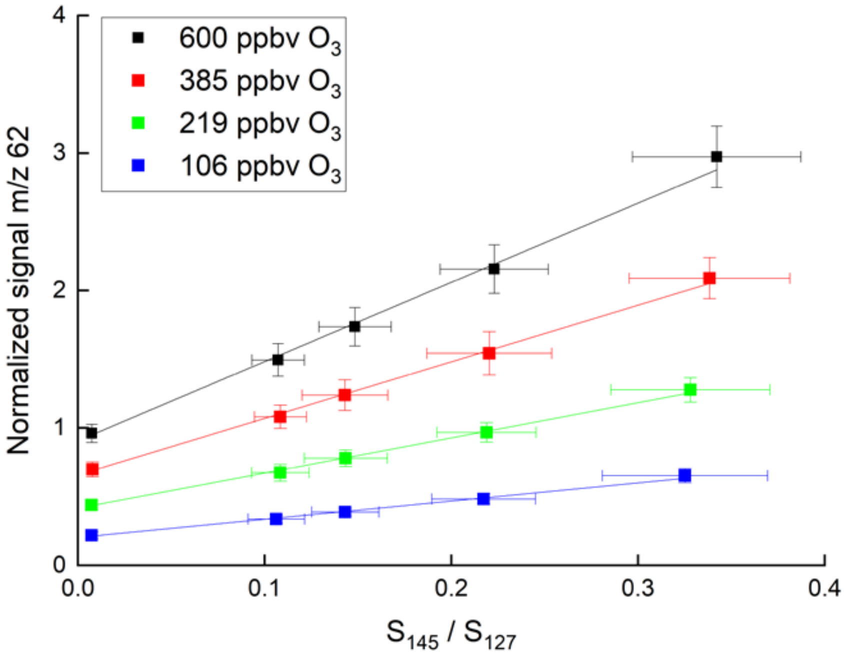

Figure S3. Dependence of the signal at *m/z* 62 from 38.5 ppb of HNO_3 on the amount of H_2O in the IMR (as indicated by the ratio of signals of I^- (*m/z* 127) and its water cluster (*m/z* 145). The error bars are 1σ statistical uncertainty in the signal at *m/z* 62, *m/z* 127 and *m/z* 145

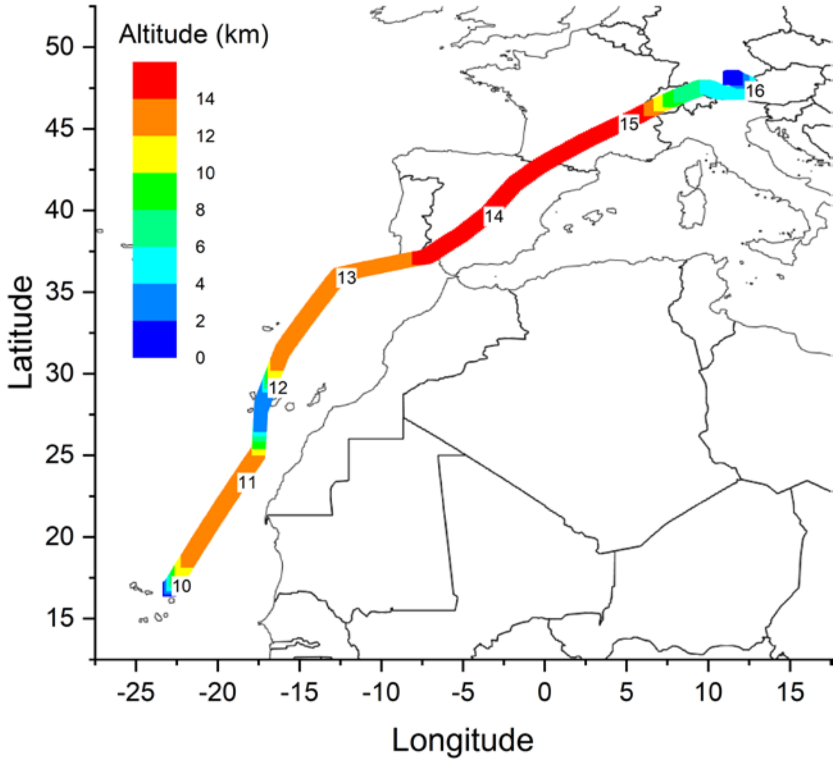

Figure S4. Flight track (colour coded with altitude) during the return leg (Cap Verde Islands to Oberpfaffenhofen) of the HALO-campaign “CAFE-Africa”. The numbers on the track indicate the time (UTC).

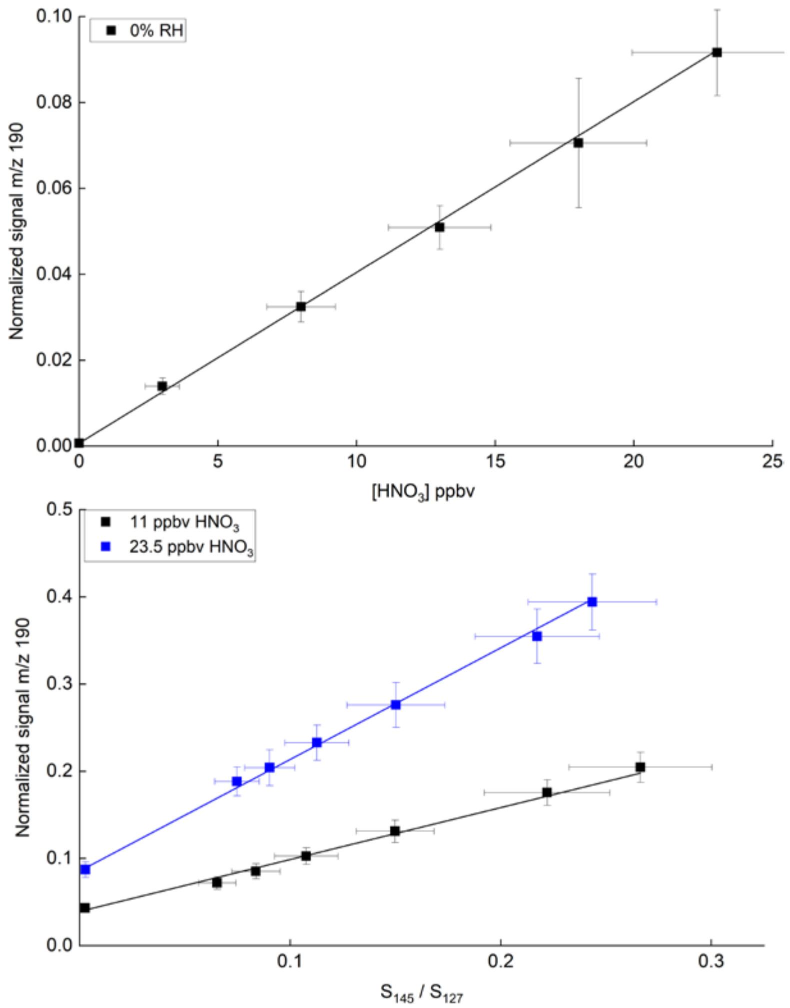

Figure S5. Upper panel: Dependence of the signal at *m/z* 190 due to the $I^{-}(HNO_3)$ cluster on the HNO_3 mixing ratio . Lower panel: Dependence of the signal at *m/z* 190 on the relative humidty (S_{145} / S_{127}).

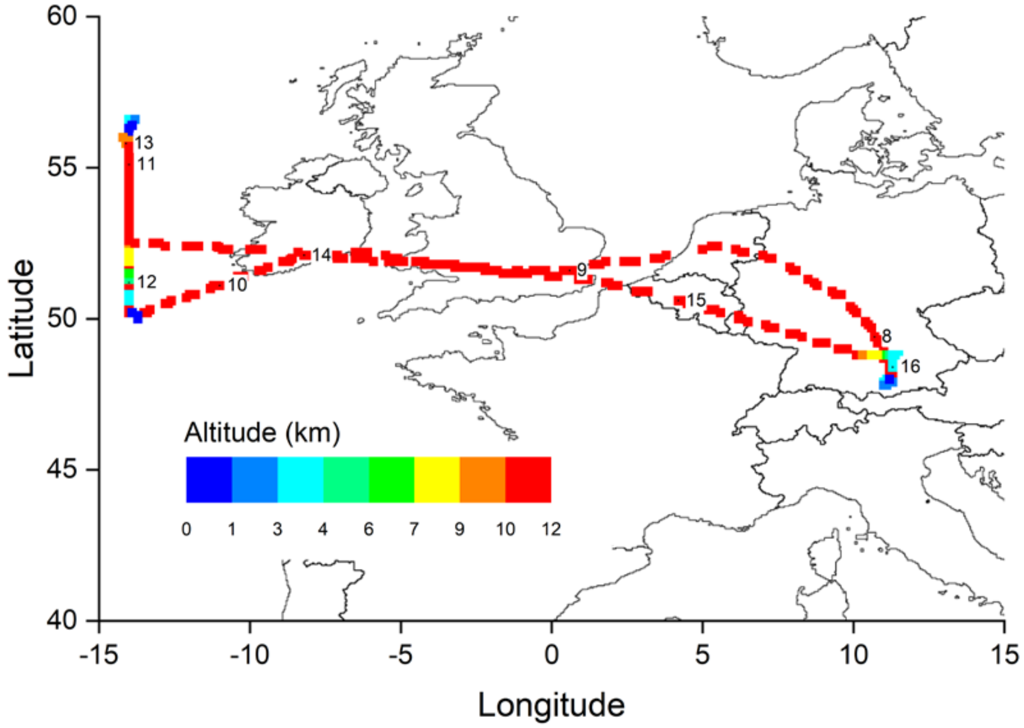

Figure S6. Flight track (colour coded with altitude) during a flight (30.05.2020) over Europe of the HALO-campaign “CAFE-EU”. The numbers on the track indicate the time (UTC).