Supplementary material

An uncertainty methodology for solar occultation flux measurements: ammonia emissions from agriculture

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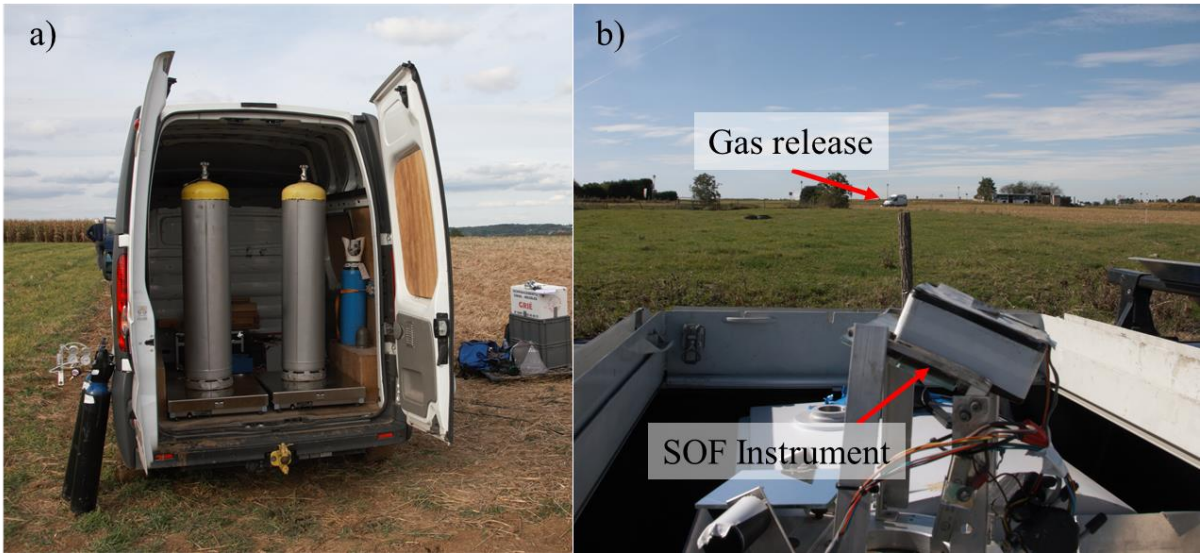

Fig. S1: NH_3 emission validation experiment in Grignon, France. a) Two NH_3 gas cylinders positioned on high-precision scales. A pressure regulator and a critical orifice were used to ensure a steady flow. B) Picture shows the gas release point and the distance to the SOF measurement while measuring (28-September).

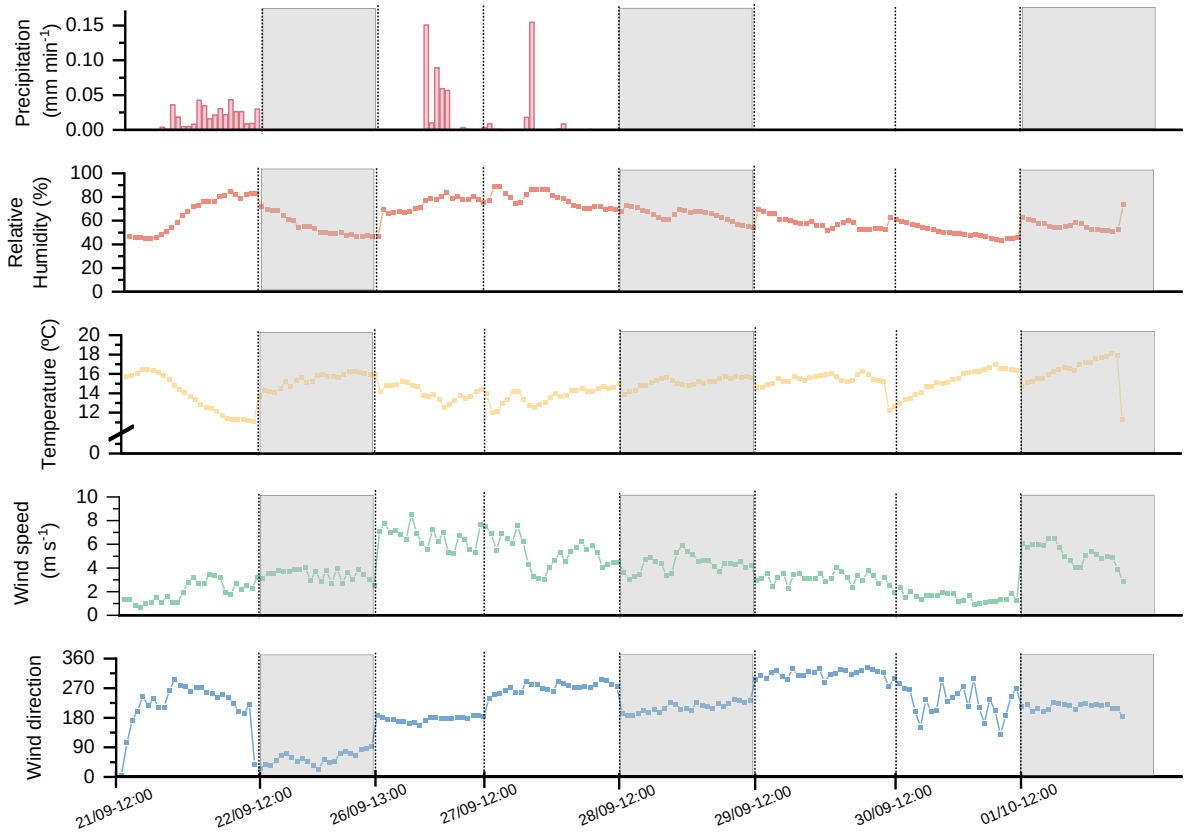

Figure S2: Weather information in the validation campaign. This information corresponds to measurements from only 12:00 to 18:00, approximately. The shadowed graphs correspond to the measurement days.

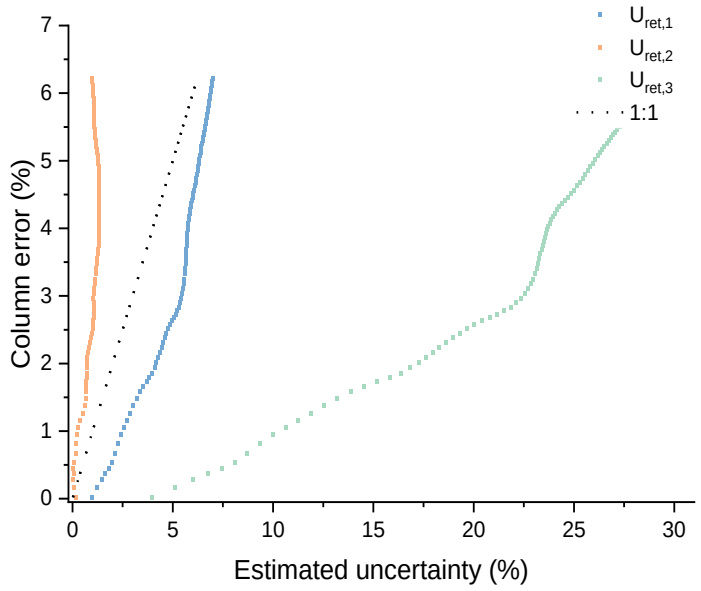

Figure S3: Error introduced by varying the wavenumber shift of -0.2 + 0.2 cm^{-1}.

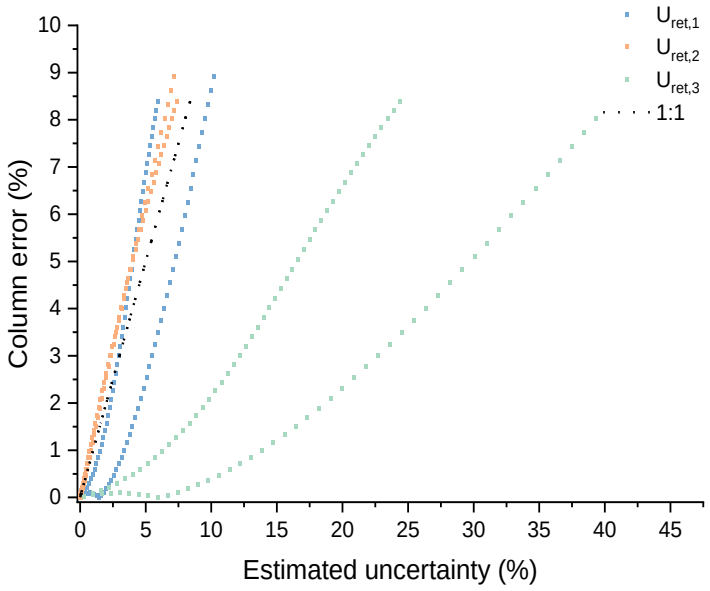

Figure S4: Error introduced by varying the resolution scale.

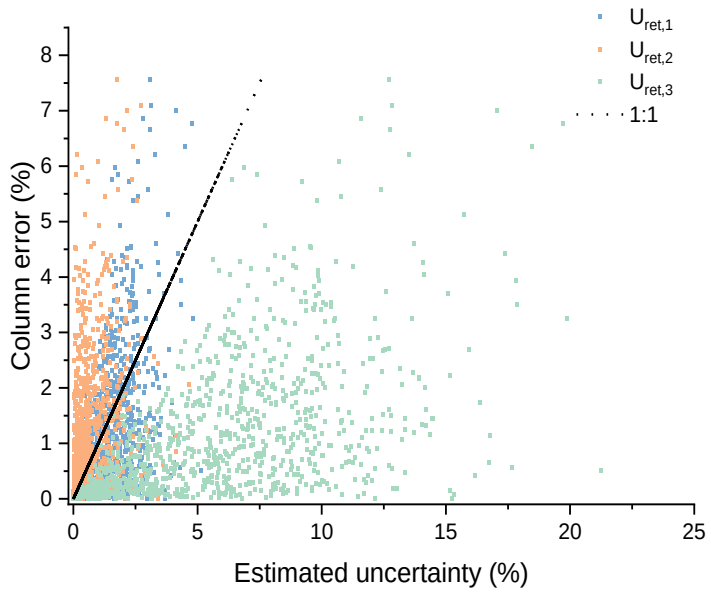

Figure S5: Error introduced by multiplying the cross-sections by 1 + normal distributed noise with the standard deviation varied from 0 to 0.1.

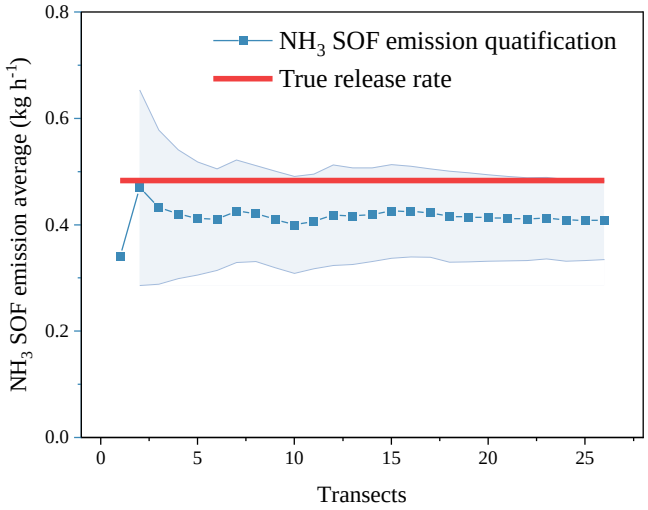

Fig. S6: The differences between measured mean and controlled emission, in the test performed on 1-October, and the standard deviation (blue shadowed area) according to the number of measured transects. In Fig. S6, we observe the effect of increasing the number of transects in the averaged measured flux. Random errors are canceled out by increasing the number of transects. After five to six transects, the standard deviation becomes lower and constant. However, there is still a difference between the measured flux (Fig. S6 blue dots) and the actual release (Fig. S6 red line). This error remains even with 25 transects, indicating potential systematic errors.