

1    **Supplementary information**

2    **S.1 Experimental Setups and Workflows**

3    Below, we provide a detailed description of the specific setup and conditions for each experiment conducted.

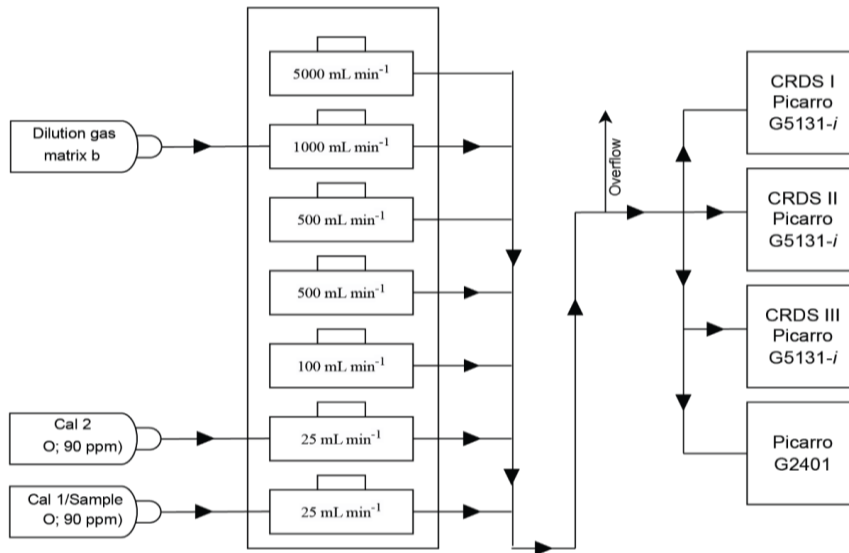
4    **S.1.1 N<sub>2</sub>O non-linearity (Exp. 1)**

5    The experimental setup for Exp. 1 was designed to investigate the effect of N<sub>2</sub>O concentrations on apparent  $\delta$ -values. Nitrous  
6    oxide target concentrations were set in the range of 0.33 to 1.200 ppm, depending on the CRDS investigated (See Section 3.1  
7    for details). The target concentrations were achieved by adjusting calibration and dilution gas flows while maintaining a  
8    constant total flow of 1000 mL min<sup>-1</sup> (Table S1). Each mixture was measured in triplicate across three independent experiments  
9    to ensure reproducibility. A schematic of the gas mixing and measurement system is provided in Fig. S1.

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11    **Table S1: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 1**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>Sample 7</i>
<i>Target concentrations</i>								
N <sub>2</sub> O (ppm)	0.35	0.425	0.5	0.575	0.65	0.725	0.8	0.99
<i>Target flows</i>								
Cal 1 / Cal 2	3.9	4.7	5.6	6.4	7.2	8.1	8.9	11.0
Dilution Gas	996.1	993.8	991.3	986.3	976.3	966.3	956.3	989.0
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments.*



**Figure S1: Schematic illustration of the experimental setup used for Exp. 1**

### S.1.2 CH<sub>4</sub> spectral interference (Exp. 2)

The experimental setup for Exp. 2 was designed to investigate the effect of CH<sub>4</sub> concentrations on apparent  $\delta$ -values of N<sub>2</sub>O. Nitrous oxide target concentrations were set to 0.330, 0.660, and 0.990 ppm, while CH<sub>4</sub> were changed in the range from 0.5 to 10 ppm, and was achieved by adjusting calibration and dilution gas flows while maintaining a constant total flow of 1000 mL min<sup>-1</sup> (Table S2–S4). Each mixture was measured in triplicate across three independent experiments to ensure reproducibility. A schematic of the gas mixing and measurement system is provided in Fig. S2.

**Table S2: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 2**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>Sample 7</i>
<i>Target concentrations</i>								
CH <sub>4</sub> (ppm)	0	0.5	1	2	4	6	8	10
N <sub>2</sub> O (ppm)	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
<i>Target flows</i>								
Cal 1 / Cal 2	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
Interferent test gas (CH <sub>4</sub> )	0	2.5	5	10	20	30	40	50
Dilution Gas	996.3	993.8	991.3	986.3	976.3	966.3	956.3	946.3
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments.*

25 **Table S3: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 2**

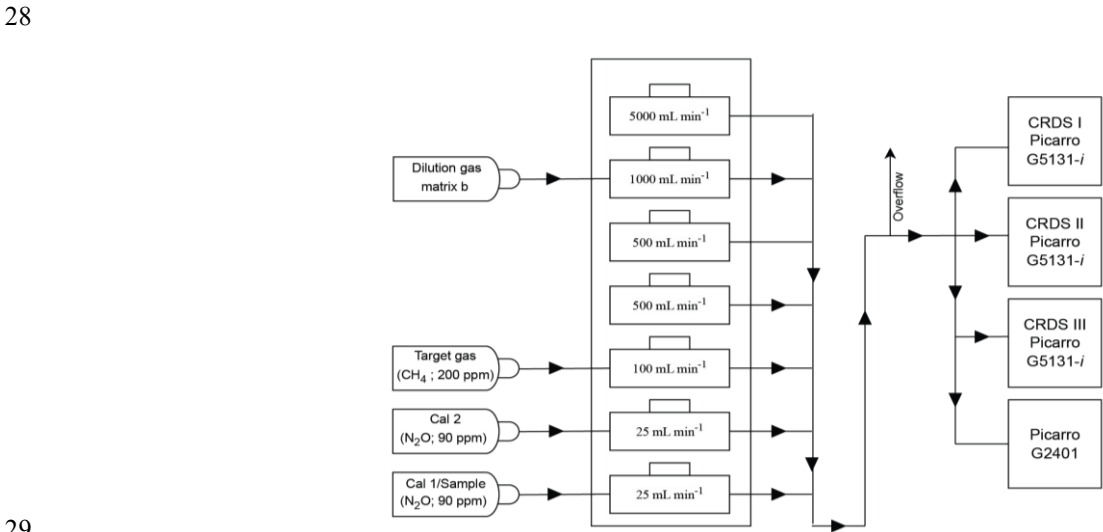
<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>Sample 7</i>
<i>Target concentrations</i>								
CH <sub>4</sub> (ppm)	0	0.5	1	2	4	6	8	10
N <sub>2</sub> O (ppm)	0.330	0.666	0.666	0.666	0.666	0.666	0.666	0.666
<i>Target flows</i>								
Cal 1 / Cal 2	3.67	7.33	7.33	7.33	7.33	7.33	7.33	7.33
Interferent test gas (CH <sub>4</sub> )	0	2.5	5	10	20	30	40	50
Dilution Gas	992.7	990.2	987.7	982.7	972.7	962.7	952.7	942.7
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

Each sample configuration was measured three times in three independent experiments.

26  
27 **Table S4: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 2**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>Sample 7</i>
<i>Target concentrations</i>								
CH <sub>4</sub> (ppm)	0	0.5	1	2	4	6	8	10
N <sub>2</sub> O (ppm)	0.33	0.990	0.990	0.990	0.990	0.990	0.990	0.990
<i>Target flows</i>								
Cal 1 / Cal 2	3.67	11	11	11	11	11	11	11
Interferent test gas (CH <sub>4</sub> )	0	2.5	5	10	20	30	40	50
Dilution Gas	992.7	986.5	984.0	979.0	969.0	959.0	949.0	939.0
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

Each sample configuration was measured three times in three independent experiments.



**Figure S2: Schematic illustration of the experimental setup used for Exp. 2**

### 31 S.1.3 CO<sub>2</sub> spectral interference (Exp. 3)

32 The experimental setup for Exp. 3 was designed to investigate the effect of CO<sub>2</sub> concentrations on apparent  $\delta$ -values of N<sub>2</sub>O.  
 33 Nitrous oxide target concentrations were set to 0.330, 0.660, and 0.990 ppm, while CO<sub>2</sub> were changed in the range from 0 to  
 34 2000 ppm, and was achieved by adjusting calibration and dilution gas flows while maintaining a constant total flow of 1000  
 35 mL min<sup>-1</sup> (Table S5–S7). Each mixture was measured in triplicate across three independent experiments to ensure  
 36 reproducibility. A schematic of the gas mixing and measurement system is provided in Fig. S3.

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 38 **Table S5: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 3**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>sample 7</i>
<i>Target concentrations</i>								
CO <sub>2</sub> (ppm)	0	0	250	500	750	1000	1500	2000
N <sub>2</sub> O (ppm)	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Interferent test gas (CO <sub>2</sub> )	0.0	0.0	6.3	12.5	18.8	25.0	37.5	50.0
Dilution Gas	996.3	996.3	990.1	983.8	977.6	971.3	958.8	946.3
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments.*

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 40 **Table S6: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 3**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>sample 7</i>
<i>Target concentrations</i>								
CO <sub>2</sub> (ppm)	0	0	250	500	750	1000	1500	2000
N <sub>2</sub> O (ppm)	0.330	0.660	0.660	0.660	0.660	0.660	0.660	0.660
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Interferent test gas (CO <sub>2</sub> )	0.0	0.0	6.3	12.5	18.8	25.0	37.5	50.0
Dilution Gas	996.3	992.7	986.4	980.2	973.9	967.7	955.2	942.7
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

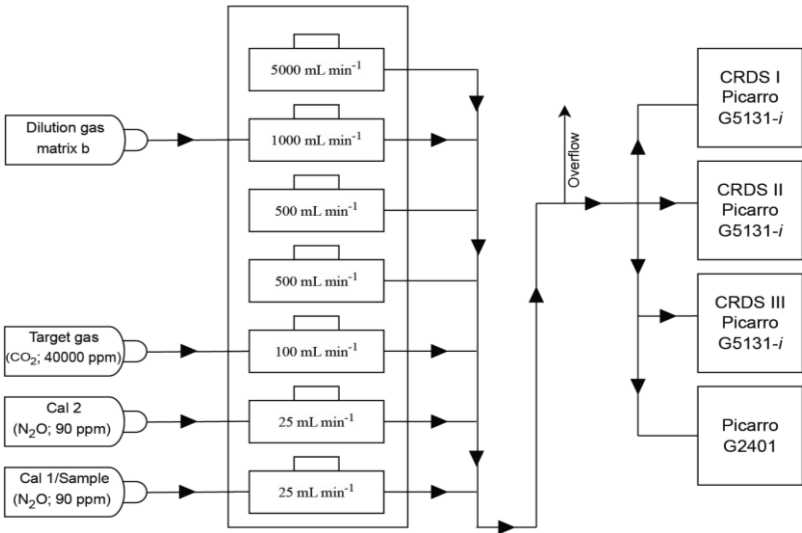
*Each sample configuration was measured three times in three independent experiments.*

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 42 **Table S7: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 3**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>sample 7</i>
<i>Target concentrations</i>								
CO <sub>2</sub> (ppm)	0	0	250	500	750	1000	1500	2000

N <sub>2</sub> O (ppm)	0.330	0.990	0.990	0.990	0.990	0.990	0.990	0.990
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Interferent test gas (CO <sub>2</sub> )	0.0	0.0	6.3	12.5	18.8	25.0	37.5	50.0
Dilution Gas	996.3	989.0	982.8	976.5	970.3	964.0	951.5	939.0
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

Each sample configuration was measured three times in three independent experiments.



**Figure S3: Schematic illustration of the experimental setup used for Exp. 3**

#### S.1.4 O<sub>2</sub> spectral interference (Exp. 4)

The experimental setup for Exp. 4 was designed to investigate the effect of O<sub>2</sub> concentrations on apparent  $\delta$ -values of N<sub>2</sub>O. Nitrous oxide target concentrations were set to 0.330, 0.660, and 0.990 ppm, while O<sub>2</sub> were diluted down from 21 to 0%, achieved by adjusting calibration and dilution gas flows while maintaining a constant total flow of 1000 mL min<sup>-1</sup> (Table S8–S10). Each mixture was measured in triplicate across three independent experiments to ensure reproducibility. A schematic of the gas mixing and measurement system is provided in Fig. S4.

**Table S8: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 4**

Parameter	Cal 1 / Cal 2	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	sample 7
<i>Target concentrations</i>								
O <sub>2</sub> (ppm)	0	0	120000	140000	160000	180000	200000	207000

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N <sub>2</sub> O (ppm)	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Interferent test gas (O <sub>2</sub> )	0.0	0.0	572.8	668.3	763.7	859.2	954.7	988.1
Dilution Gas (N <sub>2</sub> )	996.3	996.3	423.5	328.1	232.6	137.1	41.7	8.3
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments, and all flows are in mL/min*

**Table S9: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 4**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>sample 7</i>
<i>Target concentrations</i>								
O <sub>2</sub> (ppm)	0	0	250	500	750	1000	1500	2000
N <sub>2</sub> O (ppm)	0.330	0.660	0.660	0.660	0.660	0.660	0.660	0.660
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Interferent test gas (O <sub>2</sub> )	0.0	0.0	572.8	668.3	763.7	859.2	954.7	988.1
Dilution Gas (N <sub>2</sub> )	996.3	992.7	419.9	324.4	228.9	133.5	38.0	4.6
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments, and all flows are in mL/min*

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**Table S10: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 4**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>	<i>Sample 6</i>	<i>sample 7</i>
<i>Target concentrations</i>								
O <sub>2</sub> (ppm)	0	0	250	500	750	1000	1500	2000
N <sub>2</sub> O (ppm)	0.990	0.990	0.990	0.990	0.990	0.990	0.990	0.990
<i>Target flows</i>								
Cal 1 / Cal 2	3.7	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Interferent test gas (O <sub>2</sub> )	0.0	0.0	572.8	668.3	763.7	859.2	954.7	988.1
Dilution Gas (N <sub>2</sub> )	996.3	989.0	416.2	320.7	225.3	129.8	34.3	0.9
Total flow	1000	1000	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments, and all flows are in mL/min*

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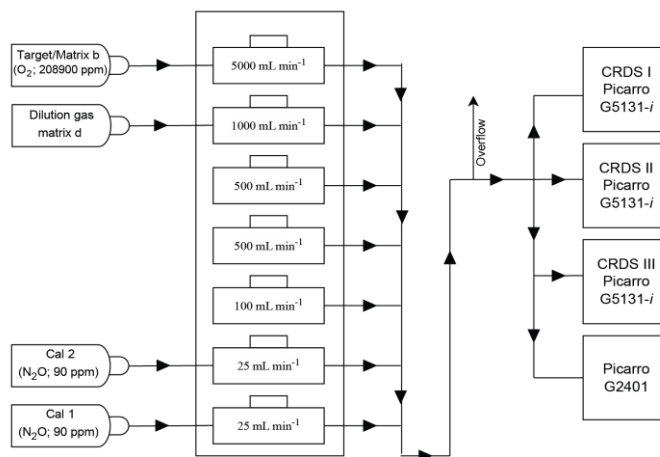


Figure S4: Schematic illustration of the experimental setup used for Exp. 5

### S.1.5 Validation experiments to test combined effects of N<sub>2</sub>O, CH<sub>4</sub> and CO<sub>2</sub> concentration changes (Exp. 5)

The experimental setup for Exp. 5 was designed to investigate the combined effects of CO<sub>2</sub> and CH<sub>4</sub> on apparent  $\delta$ -values of N<sub>2</sub>O. Nitrous oxide target concentrations were set to 0.330 and 0.660. Carbon dioxide and methane were simultaneously varied from 0 to 2000 ppm and 0 to 10 ppm, respectively, over five steps (Table S11–S12). Each mixture was measured in triplicate across three independent experiments to ensure reproducibility. A schematic of the gas mixing and measurement system is provided in Fig. S5.

Table S11: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–5) Exp. 5a

Parameter	Cal 1 / Cal 2	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
<i>Target concentrations</i>						
CH <sub>4</sub> (ppm)	0	0	2.5	5	7.5	10
CO <sub>2</sub> (ppm)	0	0	500	1000	1500	2000
N <sub>2</sub> O (ppm)	0.330	0.330	0.330	0.330	0.330	0.330
<i>Target flows</i>						
Cal 1 / Cal 2	3.7	3.7	3.7	3.7	3.7	3.7
Interferent test gas (CH <sub>4</sub> )	0.0	0.0	12.8	25.6	38.4	51.2
Interferent test gas (CO <sub>2</sub> )		0.0	12.7	25.4	38.0	50.7
Dilution Gas	996.3	996.3	970.9	945.4	919.9	894.4
Total flow	1000	1000	1000	1000	1000	1000

Each sample configuration was measured three times in three independent experiments, and all flows are in mL/min

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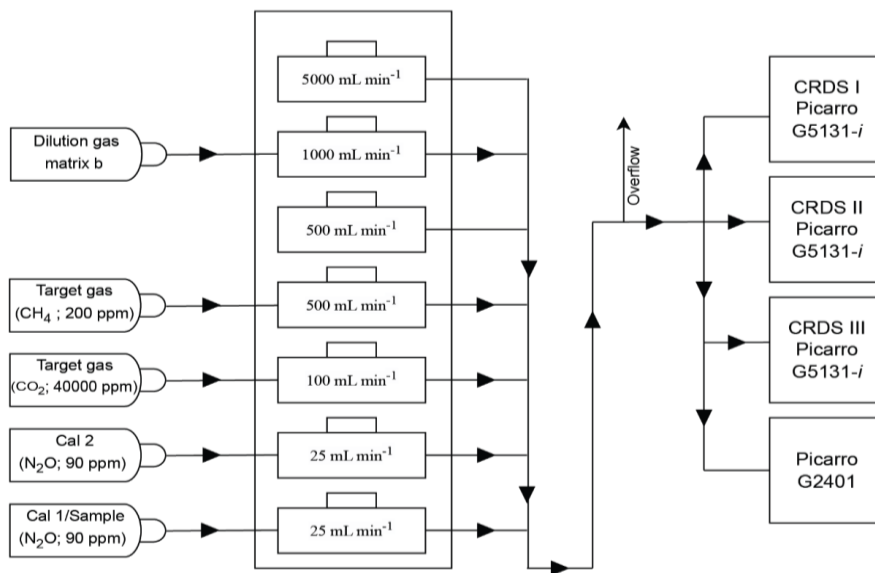
74 **Table S12: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–5) in Exp. 5b**

<i>Parameter</i>	<i>Cal 1 / Cal 2</i>	<i>Sample 1</i>	<i>Sample 2</i>	<i>Sample 3</i>	<i>Sample 4</i>	<i>Sample 5</i>
<i>Target concentrations</i>						
CH <sub>4</sub> (ppm)	0	0	2.5	5	7.5	10
CO <sub>2</sub> (ppm)	0	0	500	1000	1500	2000
N <sub>2</sub> O (ppm)	0.660	0.660	0.660	0.660	0.660	0.660
<i>Target flows</i>						
Cal 1 / Cal 2	7.3	7.3	7.3	7.3	7.3	7.3
Interferent test gas (CH <sub>4</sub> )	0.0	0.0	12.8	25.6	38.4	51.2
Interferent test gas (CO <sub>2</sub> )		0.0	12.7	25.4	38.0	50.7
Dilution Gas	992.6	992.6	967.2	941.7	916.2	890.8
Total flow	1000	1000	1000	1000	1000	1000

*Each sample configuration was measured three times in three independent experiments*

*All flows are in mL/min*

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**Figure S5: Schematic illustration of the experimental setup used for Exp. 5**



79 **S.1.6 Validation of dynamic versus static dilution of reference gases (Exp. 6)**

80 The experimental setup for Exp. 6 was designed to test the difference between dynamic and static dilution of the same reference  
 81 gas. Nitrous oxide was diluted down to ambient concentrations from a pure N<sub>2</sub>O standard (RM-1-1<sub>pure</sub>). This was achieved  
 82 using a custom-built two-step diluter provided by the Swiss National Metrology Institute (METAS), followed by a third  
 83 dilution step with standalone MFC boxes. A schematic of the gas mixing and measurement system is provided in Fig. S6,  
 84 while Table S13 provides an overview of the dilution process.

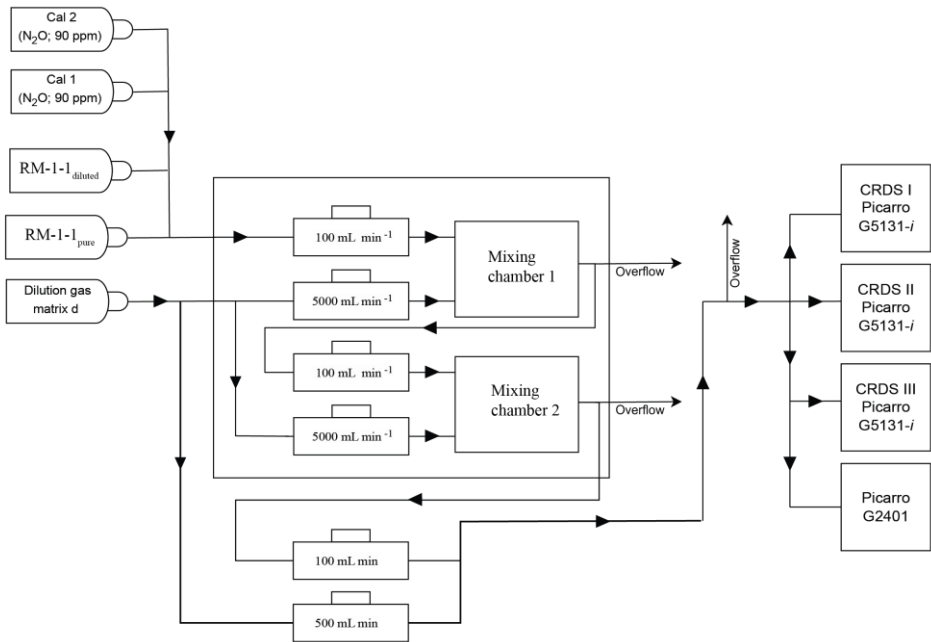
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86 **Table S13: Target concentrations and flow settings for calibration and sample mixtures (Samples 1–7) in Exp. 6**

Dilution device	Step	RM-1-1 <sub>pure</sub> (N <sub>2</sub> O ppm)	Target (N <sub>2</sub> O ppm)	Total flow	MFC #1, (RM-1-1 <sub>pure</sub> )	MFC #2 (Matrix b)
two-step diluter (Metas)	1.1 (Ch. #1)	1000000	3000	5005	15	4985
	1.2 (Ch. #2)	3000	10	5000	17	4983
MFC (Vögtlin Instruments)	2 (Extra dil.)	10	0.330	500	16.5	483.5

*All flows are in mL/min*

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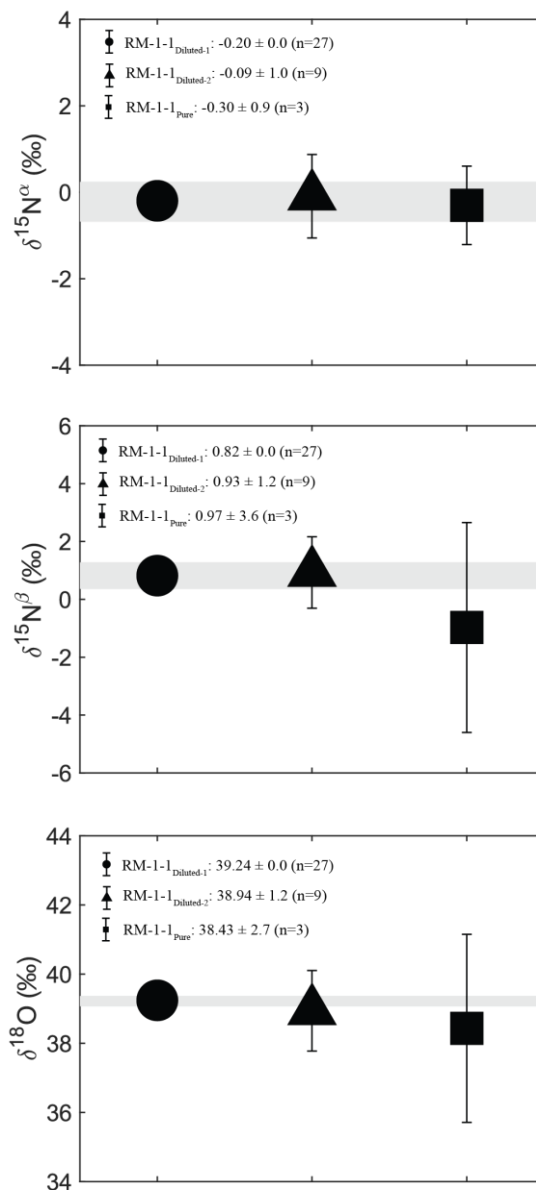
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89 **Figure S6: Schematic illustration of the experimental setup used for Exp. 6**

## S2 Validation of dynamic versus static dilution of reference gases (Exp. 6)

We conducted a study to validate the preparation of statically diluted standards (RM-1-1<sub>Diluted-1</sub> and RM-1-1<sub>Diluted-2</sub>; Table 1), which might be subject to fractionation effects during preparation, against dynamically prepared gases starting from the same pure N<sub>2</sub>O reference gas (RM-1-1<sub>Pure</sub>; Table 1). To facilitate dynamic dilution from pure gases to ambient concentrations (330 ppb N<sub>2</sub>O), i.e. by a factor of  $3.3 \times 10^6$ , a custom-built two-step diluter provided by the Swiss Federal Institute of Metrology (METAS), was applied. Given the very low flows of pure N<sub>2</sub>O provided, an extensive stabilisation period of 1 hour was applied, with data from the last 5 minutes used for further analysis. The statically diluted standard gases were measured for 15 minutes, with data from the final 5 minutes used for subsequent data analysis. In a similar fashion to the interference experiments, pre - and post-calibration blocks (phases 1 and 3), in which RM-1-1<sub>Diluted-1</sub> and Cal 2.1<sub>330ppb</sub> were bracketing the measuring phase (phase 2). During the measuring phase, each sample gas measurement was flanked by standard gas measurements (RM-1-1<sub>Diluted-1</sub>) to continuously assess the analyser's stability and post-correct for any analytical drift.

Results from comparing dynamic versus static dilutions of the same initial pure N<sub>2</sub>O gas (RM-1-1<sub>Pure</sub>) show no significant differences between the two approaches (Fig. S7). For  $\delta^{15}\text{N}^{\alpha}$ , both the statically diluted N<sub>2</sub>O gas (RM-1-1<sub>Diluted-2</sub>) and the dynamically diluted N<sub>2</sub>O gas (diluted from RM-1-1<sub>Pure</sub>) fall within the assigned value of  $-0.22 \pm 0.46 \text{ ‰}$  (SD), with RM-1-1<sub>Diluted-2</sub> registering at  $-0.09 \pm 1 \text{ ‰}$  (SD) and RM-1-1<sub>Pure</sub>  $-0.30 \pm 0.9 \text{ ‰}$  (SD). Concerning  $\delta^{15}\text{N}^{\beta}$ , the statically diluted N<sub>2</sub>O gas agrees better with the original pure N<sub>2</sub>O, with a value of  $0.93 \pm 1.2 \text{ ‰}$  (SD) relative to the assigned value of  $0.82 \pm 0.46 \text{ ‰}$  (SD), while the dynamically diluted N<sub>2</sub>O gas displays large variability within  $-0.97 \pm 3.6 \text{ ‰}$  (SD). Lastly, a similar trend is seen for  $\delta^{18}\text{O}$ , where the static dilution approach exhibits a value of  $38.94 \pm 1.2 \text{ ‰}$  (SD), in line with the assigned value of  $39.22 \pm 0.15 \text{ ‰}$  (SD), while the dynamic dilution displays a slightly lower number of  $38.43 \pm 2.7 \text{ ‰}$  (SD). For the dynamically diluted calculations, only data points where the post-processed data had a standard deviation below 8 ‰ were included in the analyses. In summary, no significant offsets in isotopic composition between statically and dynamically prepared ambient concentration N<sub>2</sub>O reference gases were detected, which indicates the absence of substantial fractionation effects. Dynamically prepared N<sub>2</sub>O reference gases, however, display large variability in N<sub>2</sub>O isotopic composition, in particular for  $\delta^{15}\text{N}^{\beta}$ . This effect might not be a fractionation effect, which is supposed to impart all isotopic dimensions but an apparent effect due to variability in the gas composition (e.g. N<sub>2</sub>O concentration), provided the very high dilution ratios. Results also indicate that the applied two-step dynamic dilution is no suitable approach to provide N<sub>2</sub>O reference gases at 330 ppb N<sub>2</sub>O at sufficient stability to perform instrument calibration.



**Figure S7:** Isotopic composition,  $\delta^{15}\text{N}^\alpha$ ,  $\delta^{15}\text{N}^\beta$ ,  $\delta^{18}\text{O}$  in  $\text{N}_2\text{O}$  reference gases prepared by static dilution (RM-1-1<sub>Diluted-2</sub>) and dynamic dilution from a pure  $\text{N}_2\text{O}$  gas (RM-1-1<sub>pure</sub>) (see Table 1) measured on CRDS II. The grey box represents the isotopic composition  $\pm$  its uncertainty ( $\delta^{15}\text{N}^\alpha = -0.22 \pm 0.46$  ‰,  $\delta^{15}\text{N}^\beta = 0.82 \pm 0.46$  ‰,  $\delta^{18}\text{O} = 39.22 \pm 0.15$  ‰) of a statically diluted  $\text{N}_2\text{O}$  reference gas used for comparison (RM-1-1<sub>Diluted-1</sub>).

### S3 Uncertainty Evaluation and Error Propagation

Calibration-based measurement models, commonly used for CRDS analysers and similar devices, present the challenge that each applied correction introduces its own inherent uncertainty. To better understand and pinpoint the primary sources of error and gain deeper insight into their influence on the overall measurement uncertainty, we conducted an uncertainty evaluation using the error propagation of up to 7 parameters per delta value. These parameters include the regression slopes ( $m_{\text{N}_2\text{O}}$ ,  $m_{\text{CH}_4}$ ,  $m_{\text{CO}_2}$ ) used for the trace gas-related corrections ( $\text{N}_2\text{O}$ ,  $\text{CH}_4$  and  $\text{CO}_2$ ), the  $\delta$ -values of the applied isotopic reference gases, and an additional term due to poorly-understood effects, related to instrumental drifts and other uncharacterised aspects of the measurement system. This could be expressed by the standard deviation of repeated target gas analyses. The uncertainties were evaluated using the GUM guideline (BIPM et al., 2008; JCGM, 2008) and using the law of propagation of uncertainty to yield the combined standard uncertainty

$$\sigma^2 (f(x_i)) = \sum_{i=1}^N \left( \sigma^2(x_i) * \left( \frac{\partial f}{\partial x_i} \right)^2 \right) * u^2(x_i)$$

Where  $f$  is the mathematical model reported in Table 4,  $x_i$  is the input quantity, and  $u(x_i)$  the uncertainty of each of the input variables. The partial derivatives are provided in Table 4 and describe how sensitive the measurand responds to changes in a given input variable. In the implemented error analysis, we anticipate that the applied mathematical measurement model is correct, i.e. correction terms are additive and constant in time. As spectral interferences were observed to be non-additive and the  $\text{N}_2\text{O}$  non-linearity was found to be variable in time (see Section 3), the uncertainty evaluation implemented in the MATLAB code is only valid for a best case and should be taken with care.

149     **References**

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