



Multi-point Gas Calibration – Coupling of a GasMix with a 490 Micro GC

Remko van Loon
Application Specialist Micro GC
Agilent Technologies

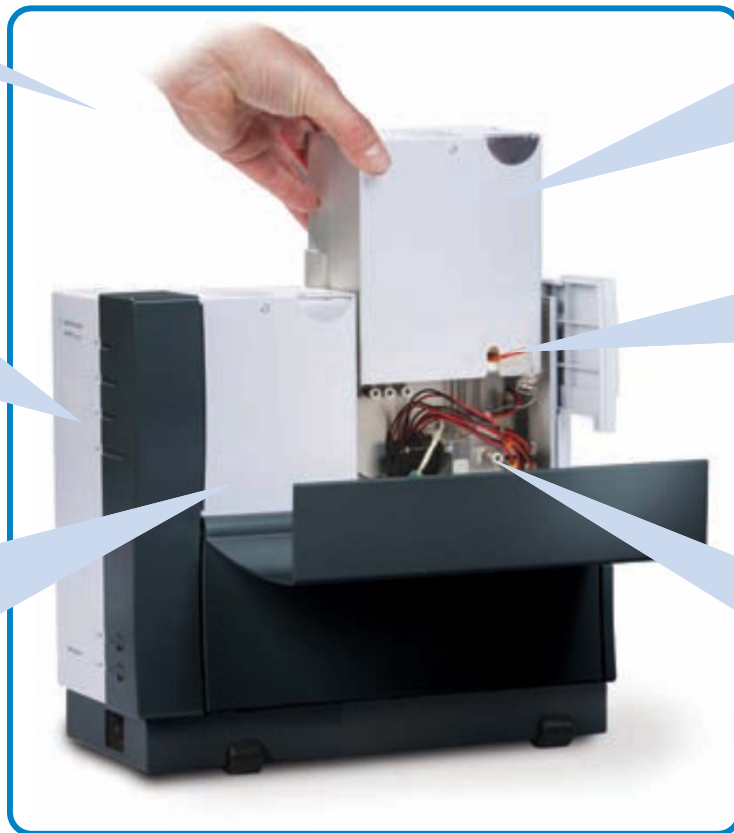
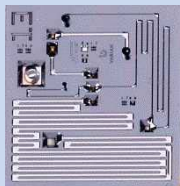
June 3, 2014

Agilent 490 Micro GC

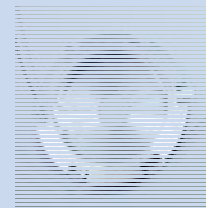
Fast and portable
gas analysis
platform

One to four
independently
controlled, micro-
machined, plug
and play GC
channels

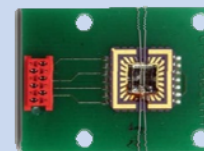
Micro machined
injector



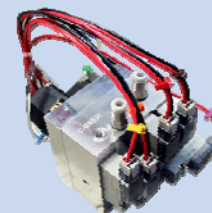
Narrow-bore column



Micro Thermal
Conductivity Detector

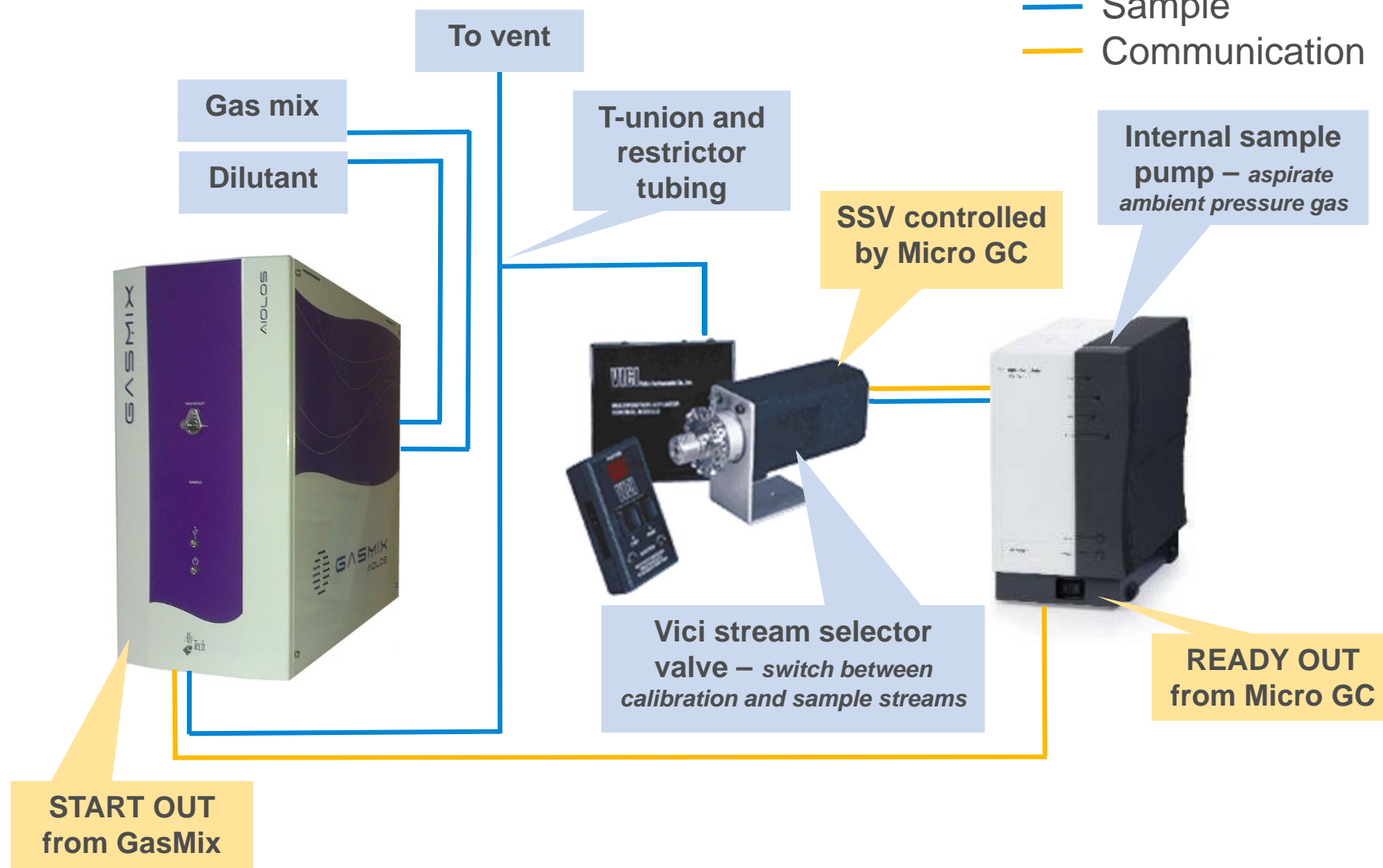


Electronic gas control



Coupling GasMix with 490 Micro GC

— Sample
— Communication



Coupling GasMix with 490 Micro GC

User selectable sampling time Micro GC

Micro GC start trigger EXTERNAL

GasMix uses a relay to START the Micro GC

Mixing time – user selectable for homogenous mixing and sample line/injector flushing

GasMix waits until Micro GC is READY

Instrument Setup

Agilent 490 Micro GC | Trigger

Common | Channel 2 | Events

Stabilizing time: 0 s

Sample time: 20 s

Sample line temperature: 60 °C

Used	Range (Nml/min)
<input checked="" type="checkbox"/>	1.900 .. 49.800
<input checked="" type="checkbox"/>	11.300 .. 506.300

2:N2_pure

Analyte	Initial concentration	Desired concentration	Unit
CARBON DIOXIDE	Channel 1: 300.000 ppm	50.000	ppm
NEON	Channel 1: 20.000 ppm		ppm
NITROGEN	Channel 2: 100.000 %		ppm

Trigger Type: External

Calculated flow
33.333
Channel 2: 166.667

Total computed flow: 200.000

Analyte	Calc. concentr.	Uncertainty	Unit
CARBON D...	50.000	2.504	ppm
NEON	3.333		
NITROGEN	833333		

Cycle events:

Pause + mixture Mixture only Mixture + pause

Relays

	ON	OFF
	hh mm ss	hh mm ss
<input checked="" type="checkbox"/> 1	00 : 00 : 30	00 : 00 : 35
<input type="checkbox"/>	00 : 00 : 00	00 : 00 : 00
<input type="checkbox"/>	00 : 00 : 00	00 : 00 : 00
<input type="checkbox"/>	00 : 00 : 00	00 : 00 : 00

Pause time: 00 : 00 : 00

Mixture time: 00 : 1 : 00

Pause time: 00 : 01 : 05

Sequence start

From the beginning of sequence

From line #

Immediately

Date / Time: Today 14 : 14 : 53

UDP

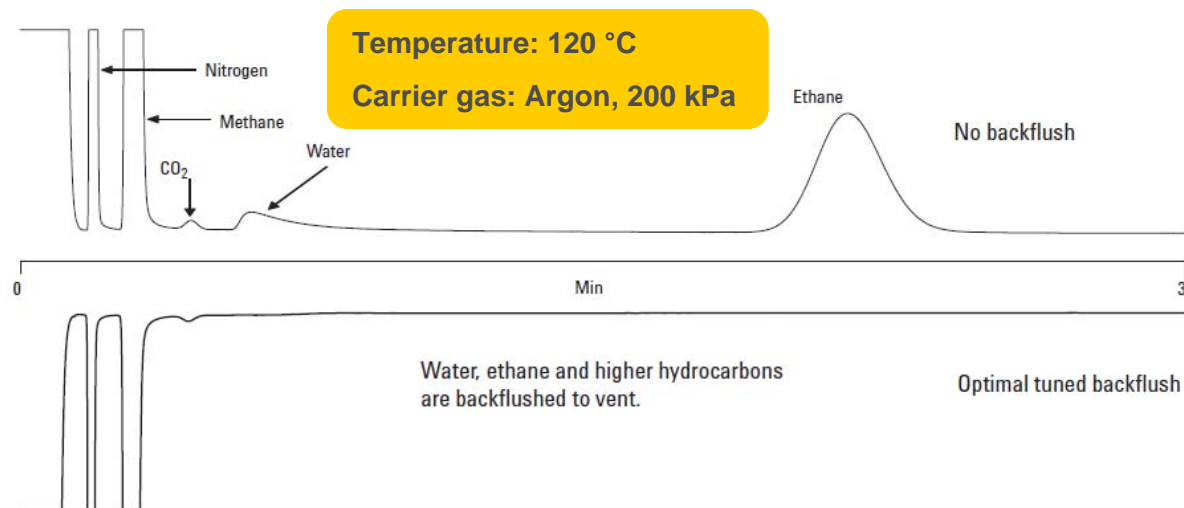
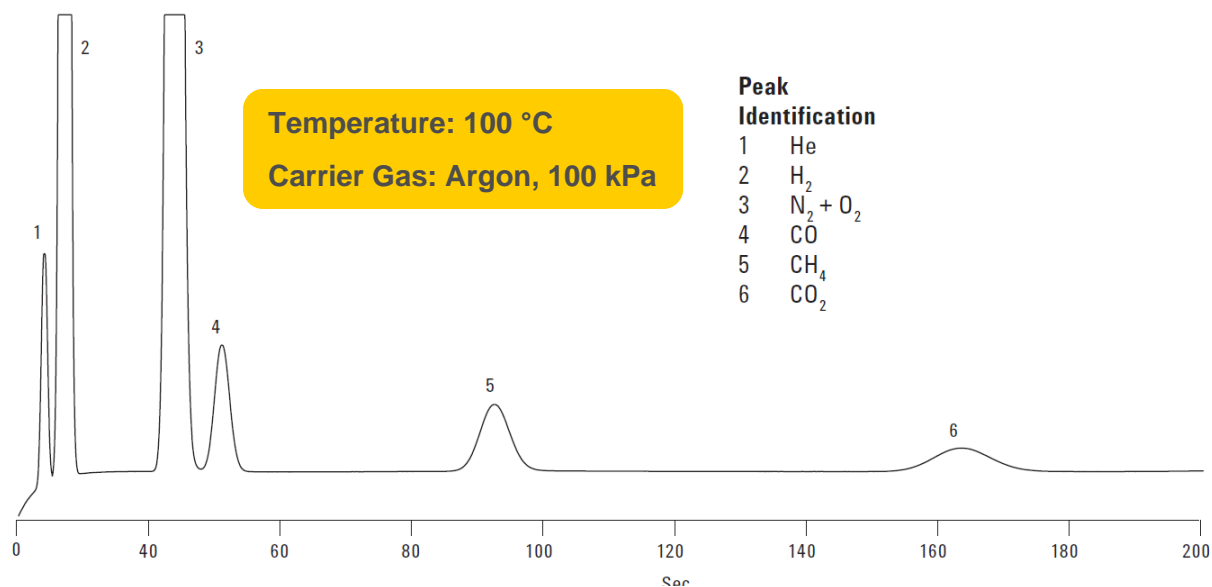
Input #1: 0V 5V

At each line

Repeat sequence indefinitely

Start Cancel

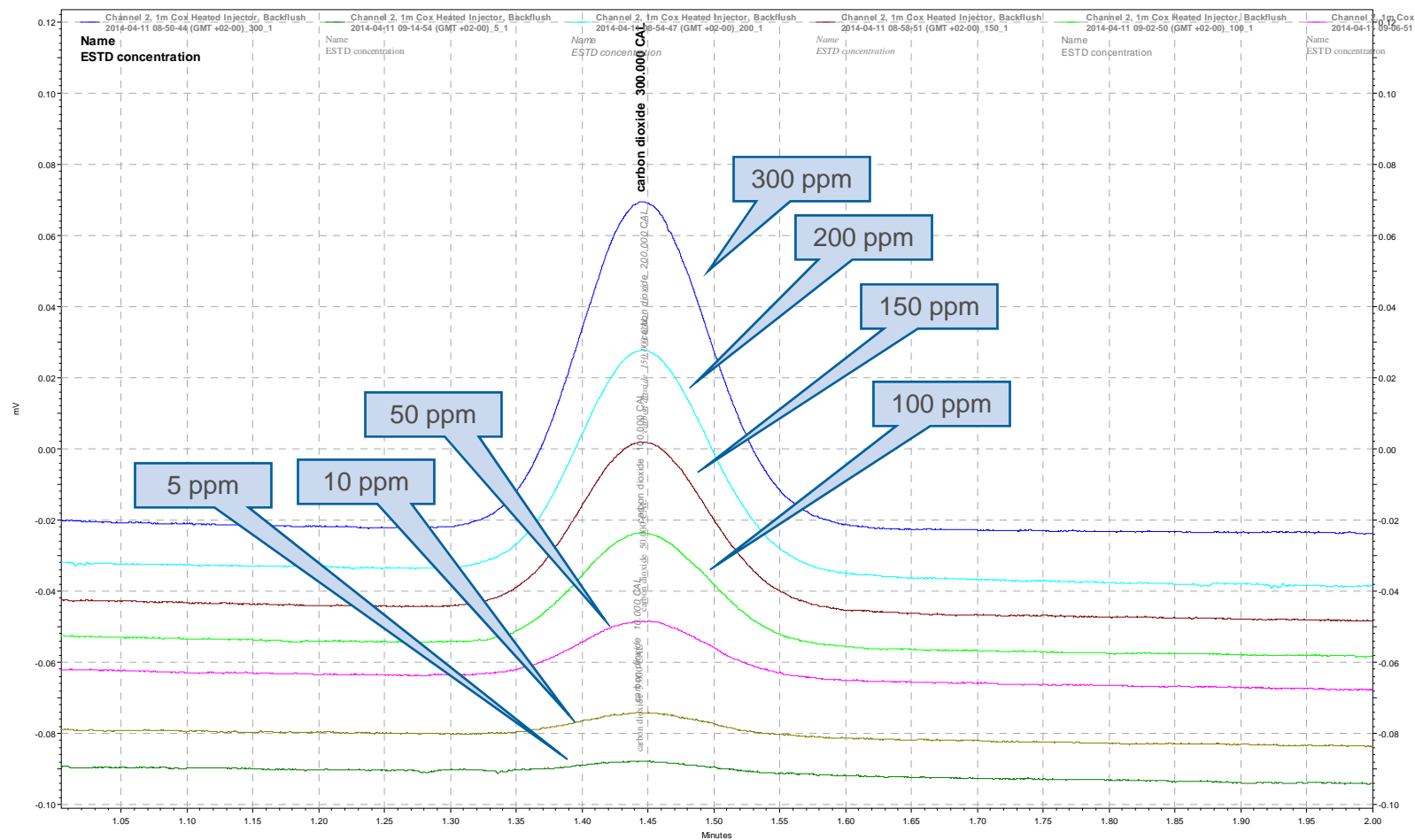
Permanent Gas Analysis using COx column



- Micro packed column
- No Nitrogen and Oxygen separation
- **Carbon dioxide** will elute from this column
- **No regeneration needed**
- Available with **Backflush** for extended column lifetime
- Good alternative for the MolSieve 5A column

Linearity and Limit of Detection

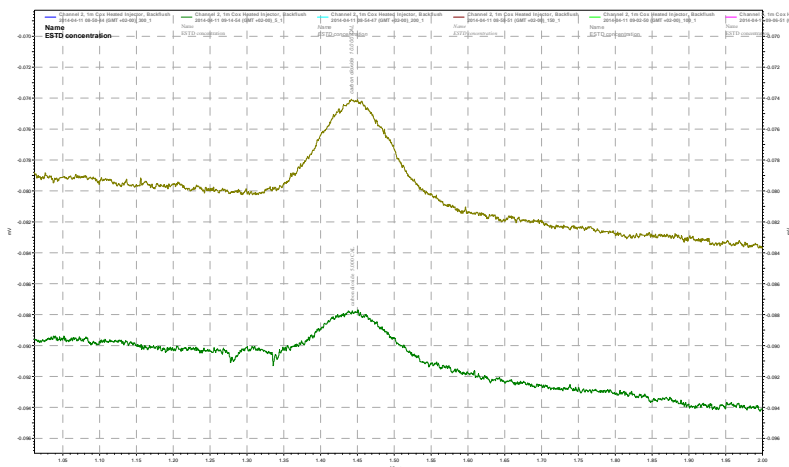
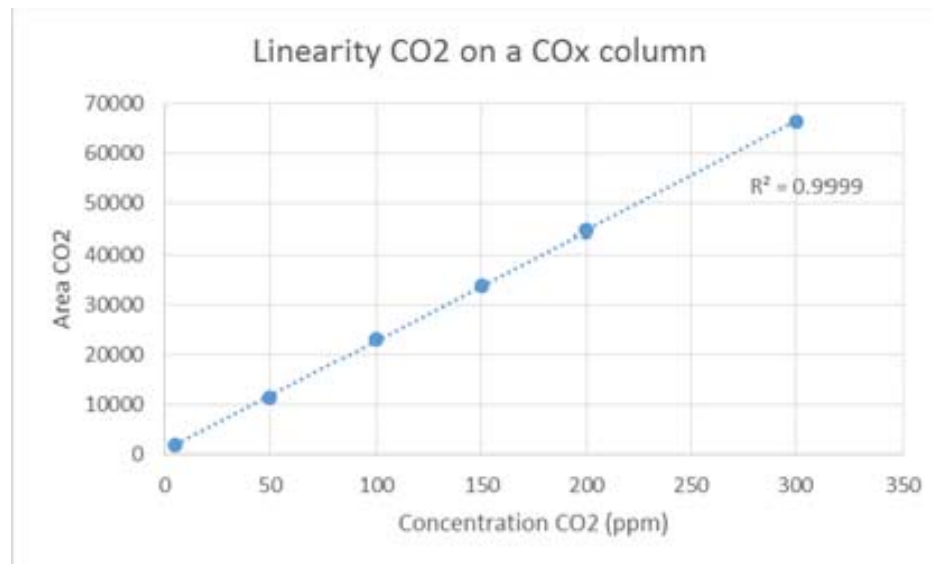
GasMix used to dilute calibration gas



Linearity and Limit of Detection

Linearity

- R^2 : 0.9999
- Range: 5 – 300 ppm



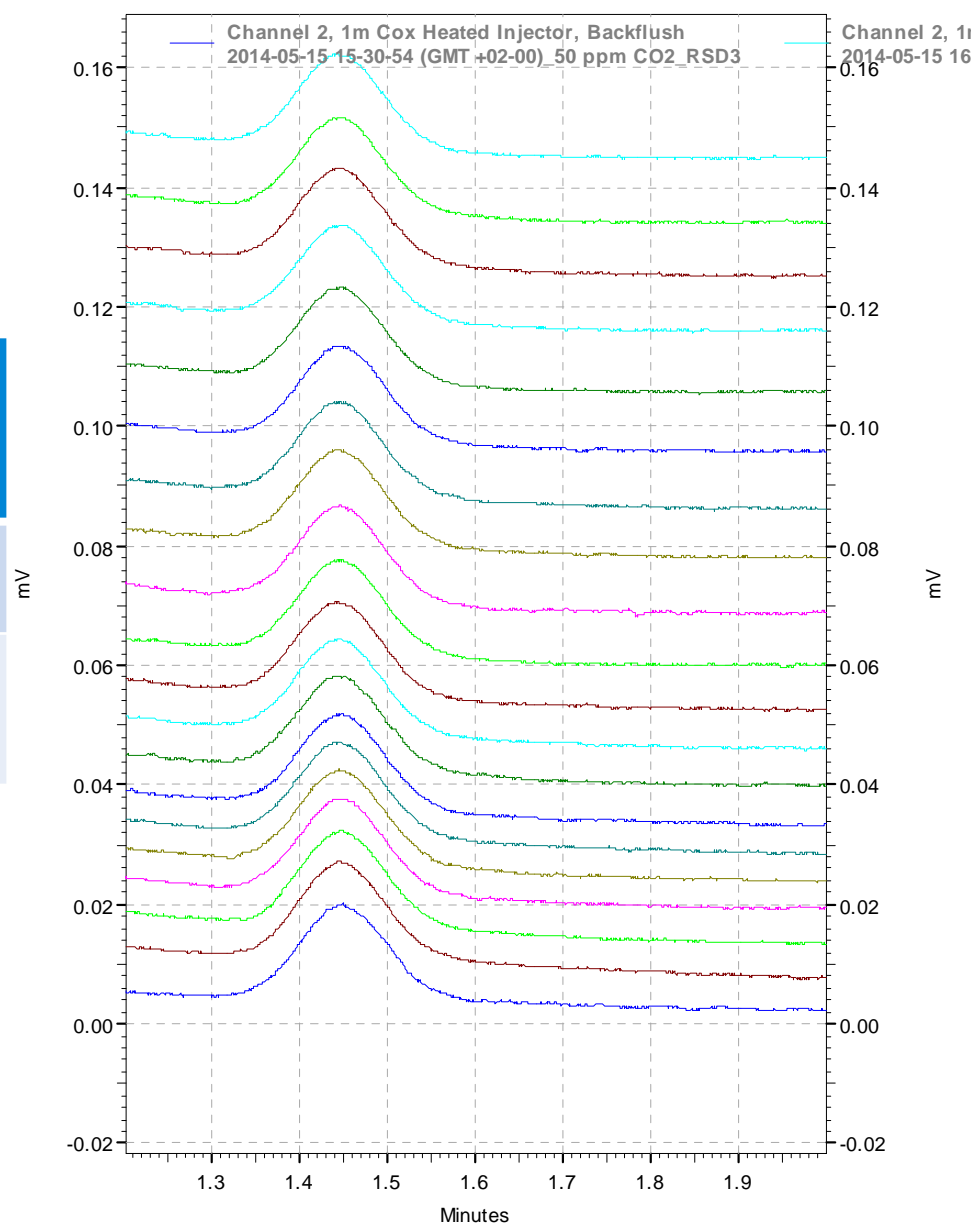
Detection limit

- 5 ppm
- Micro-packed COx column results in peak broadening
- The GasMix was used to the systems LOD



Repeatability

Carbon dioxide; 50 ppm	RSD % (n = 20)
Retention time	0.16 %
Concentration; external standard method	2.6 %



Summary

- **Easy and convenient coupling of Micro GC and GasMix is possible**
- **Bidirectional communication of Micro GC (OpenLAB CDS) and GasMix (separate software)**
- **Excellent linearity, Retention time RSD % and Concentration RSD%**





Agilent Technologies

