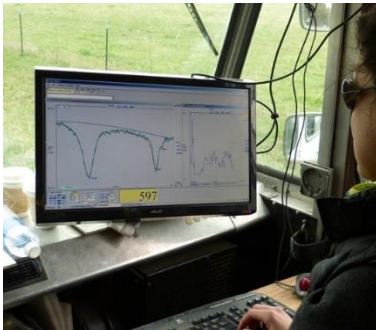




**AERODYNE RESEARCH, Inc.**

## Ethane Mini Trace Gas Monitor

*Fast and precise measurement of ethane and methane.*



Field measurements of ethane.

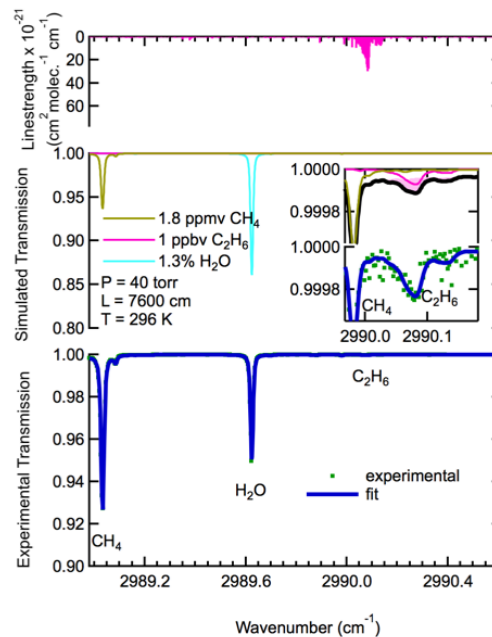
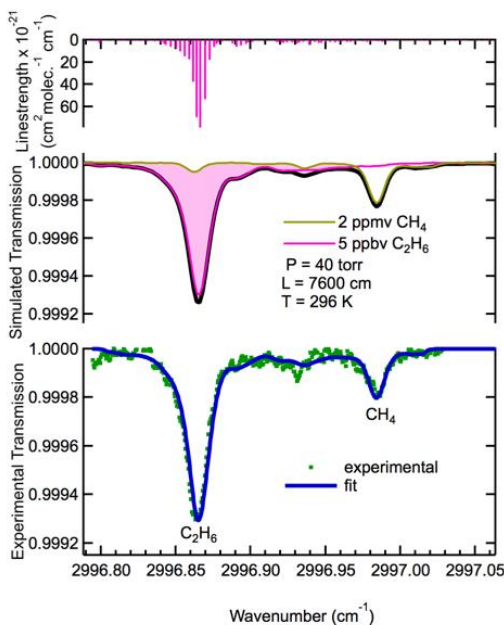


### APPLICATIONS

- Immediately differentiate biogenic (eg. cow rumination) and thermogenic (eg. natural gas) emissions in field studies.
- Identify and characterize methane sources using the ethane/methane ratio.
- Ethane/methane ratios complement and enhance methane isotope studies.
- Natural gas leak-detection vehicles and aircraft.
- Ambient air monitoring in regions with active oil and gas activities, with installation in towers, vehicles or aircraft.
- Oil and gas emissions studies from individual facilities up to entire regions.
- Pipeline leak detection.

### ADVANTAGES

- Fast measurement (1 second or less) provides significant benefits over canister measurements.
- Ethane mini can be installed in a 19" rack for mobile or laboratory measurements.
- Simultaneous monitoring of ethane and methane possible with the  $2990\text{ cm}^{-1}$  laser.
- Typical ethane content of natural gas is much greater than the natural abundance of carbon-13 in methane, allowing source characterization with lower signal to noise.



| Ethane Only       |                               |
|-------------------|-------------------------------|
|                   | C <sub>2</sub> H <sub>6</sub> |
| 1 s               | 25 ppt                        |
| 60 s              | 8 ppt                         |
| Measurement Range | 25 ppm                        |

| Ethane plus Methane |                               |                 |                  |
|---------------------|-------------------------------|-----------------|------------------|
|                     | C <sub>2</sub> H <sub>6</sub> | CH <sub>4</sub> | H <sub>2</sub> O |
| 1 s                 | 50 ppt                        | 300 ppt         | 10 ppm           |
| 60 s                | 15 ppt                        | 100 ppt         | 3 ppm            |
| Measurement Range   | 50 ppm                        | 100 ppm         | 10%              |

## 2 spectroscopic regions available:

The ethane-only option offers enhanced precision and a lower detection limit. This region is recommended in applications where methane and water are being measured by a secondary instrument or for high precision monitoring of low concentration ambient ethane levels (e.g. 0 – 4 ppb ethane).

Ethane and methane can be measured together with a small increase in ethane measurement noise. Recommended in applications where total instrumentation size or weight is limited and for measurements of ethane and methane “plumes” with significant enhancements above background (e.g. 50 ppb ethane).

## References:

### Instrument and Technology

Yacovitch, T. I.; Herndon, S. C.; Roscioli, J. R.; Floerchinger, C.; McGovern, R. M.; Agnese, M.; Pétron, G.; Kofler, J.; Sweeney, C.; Karion, A.; Conley, S. A.; Kort, E. A.; Nähle, L.; Fischer, M.; Hildebrandt, L.; Koeth, J.; McManus, J. B.; Nelson, D. D.; Zahniser, M. S.; Kolb, C.E. Demonstration of an ethane spectrometer for methane source identification. *Environ. Sci. Technol.* 2014, 48, 8028; DOI: 10.1021/es501475q.

Nähle, L.; Belahsene, S.; von Edlinger, M.; Fischer, M.; Boissier, G.; Grech, P.; Narcy, G.; Vicet, A.; Rouillard, Y.; Koeth, J.; Worschech, L. Continuous-wave operation of type-I quantum well DFB laser diodes emitting in 3.4 μm wavelength range around room temperature. *Electron. Lett.* 2011, 47, 46; DOI: 10.1049/el.2010.2733.

Harrison, J. J.; Allen, N. D. C.; Bernath, P. F. Infrared absorption cross sections for ethane (C<sub>2</sub>H<sub>6</sub>) in the 3 μm region. *J. Quant. Spectrosc. Radiat. Transfer.* 2010, 111, 357; DOI: 10.1016/j.jqsrt.2009.09.010.

### Applications

Tzompa-Sosa, Z. A.; Mahieu, E.; Franco, B.; Keller, C. A.; Turner, A. J.; Helmig, D.; Fried, A.; Richter, D.; Weibring, P.; Walega, J.; Yacovitch, T. I.; Herndon, S. C.; Blake, D. R.; Hase, F.; Hannigan, J. W.; Conway, S.; Strong, K.; Schneider, M.; Fischer, E. V. Revisiting global fossil fuel and biofuel emissions of ethane. *J. Geophys. Res.* 2017, 122, 4; 10.1002/2016JD025767.

Kintisch, E. Hunting a climate fugitive. *Science* 2014, 344, 1472. DOI: 10.1126/Science.344.6191.1472.

Roscioli, J. R.; Yacovitch, T. I.; Floerchinger, C.; Mitchell, A. L.; Tkacik, D. S.; Subramanian, R.; Martinez, D. M.; Vaughn, T. L.; Williams, L.; Zimmerle, D.; Robinson, A. L.; Herndon, S. C.; Marchese, A. J. Measurements of methane emissions from natural gas gathering facilities and processing plants: Measurement methods. *Atmos. Meas. Tech.* 2015, 8, 5, 2017. DOI: 10.5194/amt-8-2017-2015.