

CH₄ CO₂

High resolution Methane and Carbon Dioxide diffuse flux meter

Two technicians engaged in a campaign of biogas flux measurements in a landfill. The new fluxmeter, on the left, is larger than the traditional one due to the size of the multipass cell (Herriott cell), which is needed to ensure the high sensitivity of the new instrument

High resolution CH₄ and CO₂
portable Fluxmeter



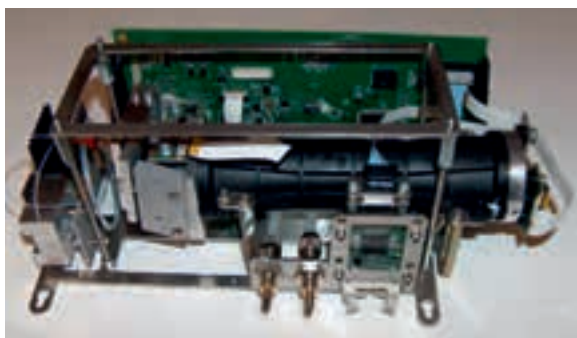
WEST Systems

www.westsystems.com

CH₄ CO₂

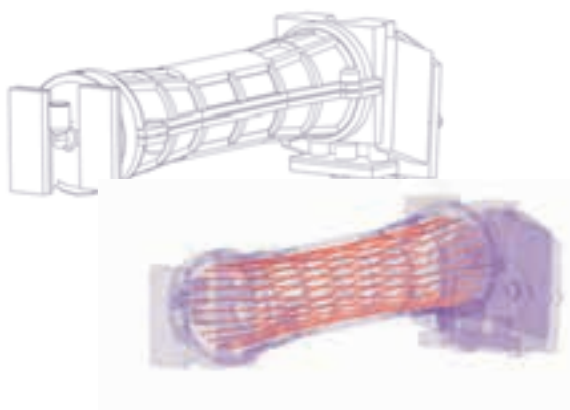
High resolution Methane and Carbon Dioxide diffuse flux meter

The methane diffuse emissions measurement requires, for most applications, a very high sensitivity and selectivity to methane. The classical instrumentation we produce, based on near infrared absorption and typically used for the measurement of uncontrolled biogas emissions from landfills is not sufficient to meet the needs of scientists and engineers engaged in the determination of gas exchange related to soil respiration and seepage from natural or artificial reservoirs of natural gas.



To meet the needs of the market, WEST Systems has developed a specific detector, with the sensitivity, selectivity and stability necessary to measure diffuse flux down to extremely low levels, but maintaining the portability and autonomy that distinguish our products.

sensitivity and selectivity



The detector is based on Tunable Diode Laser Absorption Spectroscopy (TDLAS) combined with a Herriot multipass cell to increase the length of the optical path and consequently the sensitivity of the detector. The advantage of TDLAS over other techniques for concentration measurement is its ability to achieve very low detection limits: LDL= 100ppb.

The detector has two full scale values: 150 ppm and 10% with automatic selection of the most suitable one. In the pictures above the Herriot cell and its multiple reflections of laser beam are shown.

accuracy

The accuracy of measurements is function of the flux:

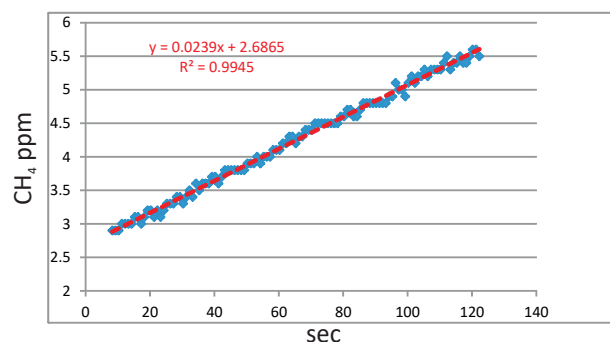
Methane TDLAS

- Range from 0.5 to 1500 millimoles / m²·day : ± 25%
- Range from 1.5 to 1000 moles / m²·day : ± 10%

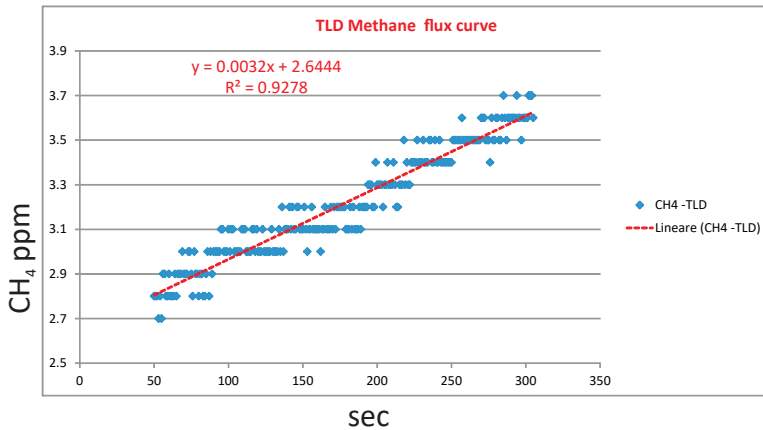
Carbon dioxide: LICOR LI820 or LI840

- Range from 1 to 1500 millimoles / m²·day : ± 25%
- Range from 1.5 to 300 moles / m²·day : ± 10%

Optionally, the instrument also carries out the measurement of hydrogen sulphide diffuse flux.



In the figure a methane flux curve, recorded in an Italian rice paddy, of 24 ppb/sec, equivalent to 8.5 millimoles/m²·day



A methane flux curve of 3.2 ppb/sec equivalent to a flux of 1 millimole per square meter per day is shown on the figure. The minimum detectable flux value (LDL) can be evaluated in 500 micromoles/square meter per day. The «stair-steps» shape of the curve depends on detector resolution: 100ppb.

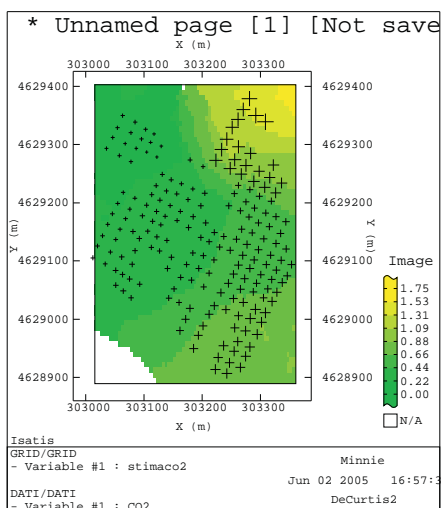
long battery duration



The power supply requirement of the TLDAS methane detector is very low: 2 Watt. It allows a very long operating time by using a single light and inexpensive NiMH battery.

The total weight of the instrument, including the backpack, battery and accumulation chamber is less than 10 kg. The instrument is supplied with 2 batteries, easily interchangeable to ensure a long activity.

managing and mapping



The fluxmeter is managed by a handheld computer (PDA) that allows geo-referencing of acquired data. By choosing the correct PDA you can achieve the geo-referencing precision you need. Standard metric precision (Err <= 10 meters) can be achieved with all PDAs, sub metric precision (Err < 1 meter) can be achieved by using our optional (r) Trimble GNSS module.

The fluxmeter is provided with a software suite that allows data post processing and data exporting in a (r) Excel format.

West Systems is a division of



.....

Firenze

Viale Giannotti, 24 - 50126 Firenze (FI)
Via Bonifacio Lupi, 1 - 50129 Firenze (FI)
Via Livorno, 8/37 - 50142 Firenze (FI)

Pontedera

Via Don Mazzolari, 25
Zona Industriale La Bianca
56025 Pontedera (PI)

Milano

Via delle Groane, 58
20024 Garbagnate
Milanese (MI)

Roma

Via Acerra, 30
00132 Roma (RM)

Napoli

Viale G.Marconi, 193
80020 Casavatore (NA)

.....