

DIFFERENTIAL ABSORPTION LIDAR FOR REMOTE METHANE DETECTION

Innovative DIAL LIDAR permitting remote methane detection and 3D concentration mapping at distances larger than 1 km.



SUGGESTED APPLICATIONS

- ▶ **Management of accidental methane releases** at offshore oil and gas production sites, natural gas liquefaction sites and regasification terminals, refineries;
- ▶ **Continuous safety monitoring** at gas pipelines, underground methane storage facilities, gas distribution networks;
- ▶ **Monitoring of accidental methane emissions at biogas production sites;**
- ▶ **Monitoring of geological methane emissions** (post mine management, geothermal power plants, CO₂ geologic storage), climate studies.



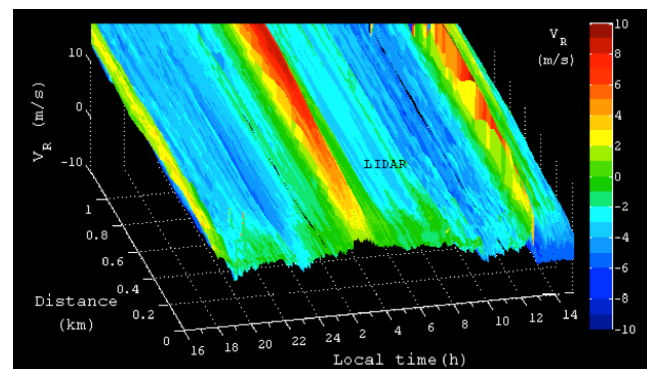
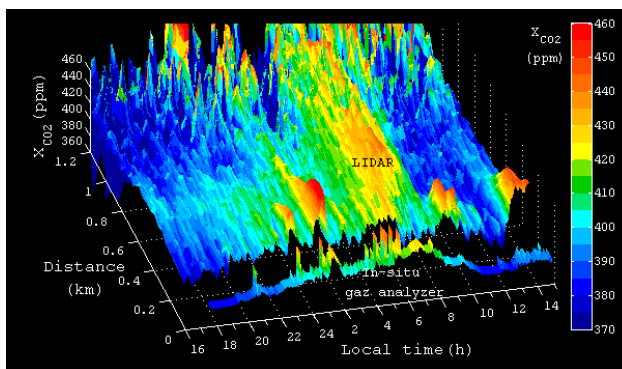
ADVANTAGES

- ▶ **Rapid and efficient fugitive methane emission detection** on a wide area (up to 10 km²);
- ▶ **Real-time 3D methane concentration mapping** for discrimination of safe/unsafe areas;
- ▶ **Potential simultaneous CH₄ absorption and wind speed measurement** for anticipation of plume propagation and better safety management;
- ▶ **High precision and accuracy of measurement; no interference with water vapor absorption.**



EXPECTED LIDAR PERFORMANCES

- ▶ **Detection distance: up to 2 km;**
- ▶ **Detection range: 20 ppb (1%) – 10 000 ppm CH₄** (off center laser wavelength locking for large CH₄ concentration);
- ▶ **Measurement accuracy: 1%;**
- ▶ **Spatial resolution: 75 m** (linked to laser pulse duration);
- ▶ **Acquisition time : 1min.**



Examples of directional CO₂ concentration (left) and wind speed (right) real time monitoring performed with similar LIDAR operating at 2 μ m.

DEMONSTRATED LASER PERFORMANCES

- ▶ **Dual wavelength single-mode; tuning range: 1645.0-1645.6 nm** (eye-safe);
- ▶ **Laser emission linewidth: 1 MHz, spectral jitter 100 kHz @ 10s, M₂<1.4;**
- ▶ **Pulse frequency 0.5-2 kHz; pulse duration 300-700 ns; pulse energy 1-3 mJ.**

