

Using Laser-based Technology to Quantify Fugitive Methane Emission Rates Quickly and Easily

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The United States is home to what is estimated to be the largest known shale gas reserves in the world. Often referred to as the “bridge fuel” that will aid in the country’s energy transition from coal to renewable sources like wind and solar, natural gas production is growing at the fastest pace in U.S. history. This expansion involves the introduction of hundreds of thousands of new natural gas wells and processing facilities all across the U.S. Of primary concern is the potentially damaging impact of natural gas drilling on human health due to increased pollution exposure.

Picarro has developed a new instrument called the Plume Scanner which uses laser-based technology to measure natural gas fugitive emission flux rates from natural gas facilities quickly and easily. As the Plume Scanner vehicle drives through the plume at the speed of traffic, the air is sampled at four different heights along the axis of the vehicle. These gas samples are continuously stored in the vehicle along with wind and vehicle velocity information. When a plume is detected, the stored gas samples are redirected into the inlet of a cavity ringdown spectrometer where the methane concentration are processed and synchronized to produce an intensity map or a so-called “scanned” plume image. In this way, fugitive emission rates of highly localized sources such as natural gas facilities can be made quickly and easily providing greater transparency to stakeholders.

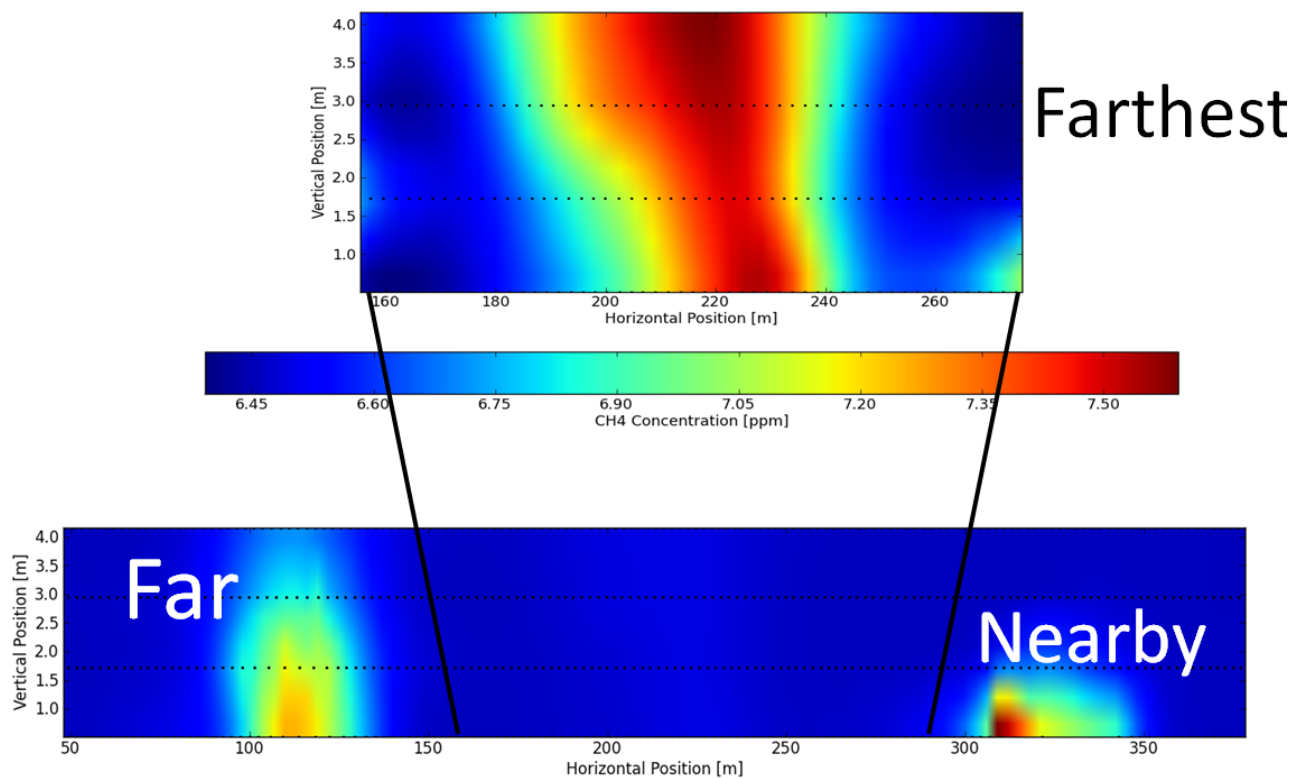


Figure 1. Example of a scanned plume image collected in the Uintah Basin, Utah. The emission rate from the “nearby” and ‘far’ sources is 1.3 liters / second and 3.4 liters / second of methane, respectively. The ‘farthest’ source is a very large plume that is not fully captured by the instrument. From the portion that is captured, we estimate that the emission rate for this distant plume is no less than 0.3 liters / second.