Improved methane emission estimates using AVIRIS-NG and an Airborne Doppler Wind Lidar

Thorpe, Duren, et al. (2021) RSE (https://doi.org/10.1016/j.rse.2021.112681)

NASA CMS CARBON MONITORING SYSTEM

Science Question

Can we improve AVIRIS-NG methane emission estimates using winds measured with an Airborne Doppler Wind Lidar (ADWL)?

Analysis

Combined airborne measurements to quantify emissions, including the use of imaging spectrometer AVIRIS-NG (JPL) and TODWL (Naval Postgraduate School).

Results

- Emissions characterized for controlled release and from multiple emission sectors.
- ADWL winds agreed closely with ultrasonic anemometer and meteorological stations.
- ADWL derived emissions sometimes more accurate than using anemometer/modelled winds.

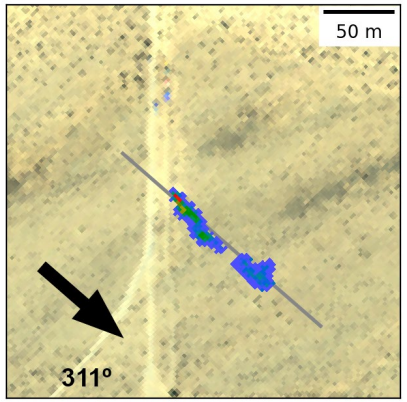
Significance

Integrating both instruments on single aircraft would reduce emission uncertainty and permit the use of measured winds, rather than relying on modelled winds.

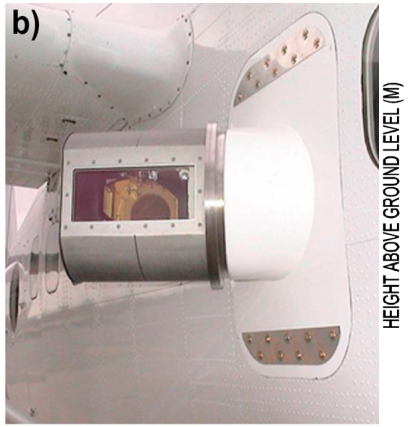
Funding

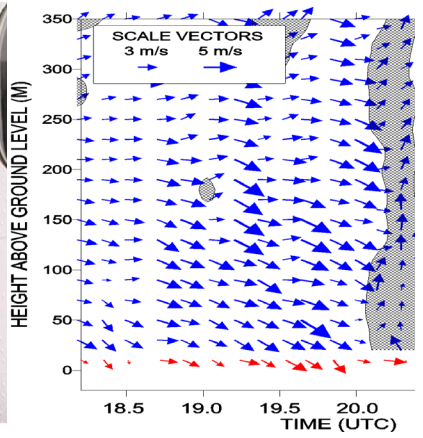
- Analysis funded by NASA Carbon Monitoring System program (Caltech under contract with NASA, NNN12AA01C: CA Prototype Methane Monitoring System and Multi-tiered Carbon Monitoring System).
- AVIRIS-NG flights funded by the California Air Resources Board, California Energy Commission, and NASA's Earth Science Division as part of the California Methane Survey.

AVIRIS-NG: Quantitative CH_4 plume mapping



Twin Otter Doppler Wind Lidar: 3D winds





Evaluate performance