

NCAR MPD data

Version 1.0

This dataset contains MicroPulse Differential Absorption Lidar (MPD) data collected from five MPDs starting in March 2018 in several locations. It is an engineering dataset which contains a mix of testing and field campaign data and should only be used in collaboration with the NCAR lidar group for scientific analysis.

Instrument description

The diode-laser-based (DLB) lidar architecture developed by NCAR in collaboration with Montana State University (MSU) uses continuous wave seed lasers that are amplified into pulses (5-10 $\mu\text{J}/\text{pulse}$) at high repetition rates (5-10 kHz)¹. For high quality daytime operation, suppression of the solar background is achieved with a narrow receiver field of view (100 μrad) and extremely narrow-band (10-20 pm full width half max) optical filters. The transmitted laser beam is eye-safe and invisible (Class 1M) and the receiver uses single photon counting detectors.

The differential absorption lidar (DIAL) technique uses two separate laser wavelengths: an absorbing wavelength (online) and a non-absorbing wavelength (offline). The ratio of the range-resolved backscattered signals between the online and offline wavelengths is proportional to the amount of water vapor in the atmosphere. The technique requires knowledge of the absorption feature (obtained from molecular absorption database) and estimates of the atmospheric temperature and pressure (obtained from surface measurements and standard atmosphere models). For more information, see Spuler et al. (2015) and <https://www.eol.ucar.edu/mpd>.

MPD Specifications	
Parameter	Specification
Wavelength	828.2 nm
Pulse length	1 μs (150 m)
Pulse repetition rate	7 kHz
Vertical resolution (sample grid)	37.5 m
Vertical resolution (effective)	150 m
Vertical range	400 - 6000 m
Temporal resolution (sample grid)	1 minute
Temporal resolution (effective)	5 minute

References

1. Spuler et al., Field-deployable diode-laser-based differential absorption lidar (DIAL) for profiling water vapor, *Atmos. Meas. Tech.*, 8, 1073-1087, 2015.
2. Kalnay et al., The NCEP/NCAR 40-year reanalysis project, *Bull. Amer. Meteor. Soc.*, 77, 437-470, 1996.

Citation

When using this data set please cite

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Contact

EOL Data Support eol-datahelp@ucar.edu
UCAR/NCAR - Earth Observing Laboratory
Remote Sensing Facility