Backscatter and depolarization retrievals from the SPARC HSRL

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1. Data set overview

This dataset contains the retrieved aersol backscatter and depolarization from the University of Wisconsin's High Spectral Resolution Lidar (HSRL) that was mounted to the Space Science and Engineering Center (SSEC) Portable Atmospheric Research Center (SPARC), a mobile, ground-based, in situ and remote observing platform. During the experiment, SPARC was deployed at many locations throughout the central United States. This dataset covers the entirety of the PECAN experiment, from 2 June – 16 July (in UTC).

Data collected from IOPs are from the following locations:

IOP1	2 June	39.186	-100.872	Oakley KS
IOP2	3 June	38.5536	-99.5657	McCracken KS
IOP3	4 June	39.2919	-96.8305	Rielly KS
IOP4	5 June	39.1966	-99.1587	Codell KS
IOP5	6 June	38.5803	-100.0687	Ness City KS
IOP6	8 June	37.809	-100.346	Cimarron KS
IOP7	10 June	38.5536	-99.5658	McCracken KS
IOP8	11 June	40.4824	-97.3877	Milligan NE
IOP9	12 June	37.524	-99.760	Kingsdown KS
IOP10	15 June	36.993	-98.653	2 km s Hartner NE
IOP11	17 June	40.533	-100.384	Stockville NE
IOP12	20 June	38.5535	-99.5658	McCracken KS
IOP13	22 June*	38.5535	-99.5658	KcCracken KS
IOP14	24 June	40.0112	-98.0582	Superior NE
IOP15	25 June*	41.0218	-95.2286	Red Oak IA
IOP16	26 June	37.8273	-96.2809	Eureka KS
IOP17	1 July	38.6857	-96.4927	Council Grove KS
IOP18	4 July	38.4883	-100.4664	Dighton KS

IOP19	5 July*	40.6873	-100.400	Moorefield NE
IOP20	6 July	43.1547	-97.7103	Scotland SD
IOP21	9 July	split deployment, participated in IOP22 instead		
IOP22	9 July	40.1329	-99.8334	Beaver City NE
IOP23	10 July	split deployment, participated in IOP24 instead		
IOP24	10 July	39.1105	-97.7154	Minneapolis KS
IOP25	11 July	39.3756	-99.7850	Hill City, KS
IOP26	12 July	did not participate due to repositioning		
IOP27	13 July	42.6401	-92.0384	Fairbank, IA
IOP28	14 July	did not participate due to repositioning		
IOP29	14 July	did not participate due to repositioning		
IOP30	15 July	38.4745	-100.8961	Scott City KS
IOP31	16 July	38.3623	-98.3308	Chase KS

* Dates with an asterisk had missions that actually started before 0000 UTC on the date listed. Therefore they officially began on the day before the listed date, but the preponderance of observations are on the listed date. Beginning with the second week of the experiment, when SPARC was not on an official deployment, it was powered on and the AERI was collecting data while parked at the supplies garage on the northern edge of Hays, Kansas (approx. location: 38.9079, -99.3169).

Note that the HSRL was malfunctioning for the first several days of the experiment. The first observations were recorded on 11 June.

Additional information about SPARC can be found at the system's website: www.ssec.wisc.edu/sparc. Additional information about HRSL can be found at the instrument website: lidar.ssec.wisc.edu.

2. Instrument description

HSRL is a ground-based lidar (Eloranta 2005) that provides absolutely calibrated vertical profiles of optical depth, backscatter cross-section depolarization, and backscatter phase function. HSRL is unique compared to other lidars in that the absolute calibration facilitates measurement of these quantities without requiring assumptions about atmospheric scattering properties. HSRL operates as a frequency-doubled Nd:YAG laser, producing wavelengths that are visible to the naked eye and meets eye-safety criteria.

3. Data collection and processing

Data submitted to the EOL archive were processed to be averaged over 30 s and 30 m intervals. Users who wish for finer averaging intervals are encouraged to use the interface available at hsrl.ssec.wisc.edu, selecting the active site at Madison, WI (BagoHSRL, named after the instrument's previous home in the AERIbago, a

Winnebago-style mobile home converted into an atmospheric science laboratory).

4. Data format

Data are stored in netCDF format with one file representing one day of observations. The measurements of greatest scientific interest are:

od	optical depth
extinction_aerosol	aerosol extinction
beta_a_backscat	backscatter cross section

Users are encourage to look at the metadata within the netCDF file to learn more about the data attributes.

5. Data remarks

Due to a malfunctioning computer within the HSRL assembly, the system was unable to operate for the beginning portion of the campaign. Observations began in earnest after then. Credit goes to Ilya Razenkov, who travelled to rural Kansas to troubleshoot and repair HSRL while the SPARC was on deployment.

6. References

Eloranta, E. W., 2005: High spectral resolution lidar. *Lidar: Range-Resolved Optical Remote Sensing of the Atmosphere,* K. Weitkamp, Ed., Springer-Verlag 143–163.