Marshall S-PolKa radar moments data, Ka-band, Version 1.0

Overview

This dataset contains selected time periods of radar moments data in CfRadial format, collected by the S-PolKa radar at the Marshall field site in Colorado. S-PolKa is usually run at the Marshall field site for testing and maintenance purposes so the data in this dataset contains data from various different instrument states. It is not quality controlled. If you would like to use this data set for research purposes, please contact us first at the email address below.

Instrument description

NCAR/EOL's S-PolKa radar is an advanced, transportable, ground-based dual-polarized, dual-wavelength, Doppler weather radar. S-PolKa transmits 10 cm wavelength (S-band) and 0.86 cm wavelength (K_a-band) simultaneously with matched beamwidths and range resolution. The dual-polarimetric capabilities of S-PolKa lead to improved precipitation estimates over what is available on conventional radars, as well as real-time identification of hydrometeor types. The absolute phase measurements from S-PolKa can be used to compute and monitor in real time the low-level humidity by measuring changes in refractive index between fixed ground targets. The added capabilities afforded by the dual-wavelength radar measurements currently include boundary layer humidity profiles and cloud liquid water content estimates that are independent of drop size distribution.

The S-PolKa transmitter can be switched instantly between fast alternating of horizontal and vertical polarizations and simultaneous transmit mode. Also, time series In-phase and Quadrature (I and Q) data can be recorded for signal processing research, algorithm development and verification.

An innovative system design eliminates the need for a radome and allows for S-PolKa to be packed into seven standard 20 ft shipping containers that provide a base when the radar is unpacked and set up. The radar needs only minimal surface site preparation and its relative ease of transport makes S-PolKa a valuable tool for studying precipitation and cloud processes at remote sites around the world. S-Polka has been deployed on four continents.

For more information on S-PolKa see www.eol.ucar.edu/instrumentation/remote-sensing/s-pol.

S-PolKa Radar Characteristics	S Band	Ka Band
Transportation	7, 20 ft. containers	--
Site requirements	leveling and access	--
Power	Diesel generator	--
Transmitter	2.7 -- 2.9 GHz	34.7 GHz
Pulse width	1.0 to 1.5 µsec-tapered	0.3 to 0.5 µsec
PRF	30 -- 1300 Hz	800 – 1000 Hz
Peak power	>600 kW	50 kW
Receivers (2)	H & V simultaneously	H & V simultaneously

Noise power	-114 dBm	-104 dBm
Radar Noise figure	3 dB	5.3 dB
Dynamic range	90 dB	76 dB
Bandwidth	1 MHz, typical	2 MHz, typical
Minimum detectable dBZ at 50km/1km	-10.4 dBZ/-44.4 dBZ	-6.3 dBZ/-40.4 dBZ
Polarization switching	H-V alternating, H-V simultaneous or H or V only	Transmit H, receive H and V or H-V simultaneous
Mechanical switch isolation	47 dB measured	--
Antenna	Parabolic, center feed	Parabolic, center feed
Gain	44.5 dB including waveguide loss	45.9 dB
Diameter	8.5 m (28 ft.)	0.7m (28”)
Beamwidth	0.92 degrees	0.93 degrees
First sidelobe	better than -28 dB	-26 dB
Isolation (ICPR)	better than -31 dB	better than -22 dB
Scan rate	Up to 12°/s for PPIs; 6 deg/s for RHIs	--
Wind limit	30 m/s, operation / 54 m/s, survivability	--
Data system	RVP8	NCAR SD3C
Number of range gates	Maximum: 3092; Typically: 992	Typically: 1000
Gate spacing	37.5 -- 150m	45 – 75m
Number of samples	64-1024	64-1024
Clutter filter	50 dB suppression	50 dB suppression
Times series (I/Q) capability	Yes	Yes
Real time scientific display	CIDD, Jazz	CIDD, Jazz
Recorded variables	PHH, PVV, V, W, fDP, rHV, NCP, ZH, ZDR, LDR, Kdp, raw covariances	ZH,V,W,SNR,(ZDR or LDR)
Recording medium	RAID, CfRadial format	RAID, CfRadial format

Data description

The Ka-band moments data described here are available at http://data.eol.ucar.edu/dataset/100.033 in CfRadial format. The S-band moments data are available at http://data.eol.ucar.edu/dataset/100.032 in CfRadial format and the time series data is available at http://data.eol.ucar.edu/dataset/100.031. For more information on CfRadial see www.ral.ucar.edu/projects/titan/docs/radial_formats/CfRadialDoc.pdf.

Contact

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