

## HIAPER Cloud Radar (HCR) data (time series), Version 1.0

### Overview

This dataset contains HIAPER Cloud Radar (HCR) data collected during the MEOW (Make Everything Operate Well) project. During MEOW HCR was operated on the ground in the GV pod. It was located in the parking lot of the Foothills Lab 1 building of the NCAR campus in Boulder, Colorado, USA. The testing took place from May 10 to June 27, 2024 and consisted of 11 Intensive Operation Periods (IOPs). For more information on MEOW, see [https://www.eol.ucar.edu/field\\_projects/meow](https://www.eol.ucar.edu/field_projects/meow).

IOP	Start date	Start time UTC	End date	End time UTC
IOP01	2024-05-10	16:25	2024-05-10	21:15
IOP02	2024-05-20	20:00	2024-05-21	00:35
IOP03	2024-05-21	18:25	2024-05-22	01:35
IOP04	2024-05-29	18:25	2024-05-29	20:40
IOP05	2024-05-30	21:10	2024-05-30	22:25
IOP06	2024-06-07	21:00	2024-06-07	23:20
IOP07	2024-06-10	20:45	2024-06-10	23:50
IOP08	2024-06-14	18:20	2024-06-14	22:20
IOP09	2024-06-20	20:50	2024-06-20	23:20
IOP10	2024-06-24	20:20	2024-06-24	23:15
IOP11	2024-06-27	15:30	2024-06-27	17:00

### Instrument description

HCR is a polarimetric, millimeter-wavelength (W-band) radar that serves the atmospheric science community by providing cloud remote sensing capabilities to the NSF/NCAR G-V (HIAPER) aircraft and on the ground. HCR detects drizzle, and ice and liquid clouds, and collects Doppler radial velocity measurements, which at vertical incident include the vertical wind speed and particle fall speed.

A single lens antenna is used for both transmit and receive. The transceiver uses a two-stage up and down conversion superheterodyne design. The transmit waveform, from a waveform generator, passes through the two-stage up-conversion to the transmit frequency of 94.40 GHz. It is then amplified by an extended interaction klystron amplifier (EIKA) to 1.6 kW peak power. System performance on transmit and receive paths are closely monitored using a coupler and a noise source. Raw in-phase and quadrature information are archived in HCR. For more information, see [www.eol.ucar.edu/instruments/hiaper-cloud-radar-hcr](http://www.eol.ucar.edu/instruments/hiaper-cloud-radar-hcr)

### Data description

During MEOW we tested a new Dual-PRT mode which alternates 100 pulses of length 256 ns with a PRT of 0.1  $\mu$ s (short pulse) with 66 pulses of length 512 ns with a PRT of 0.15  $\mu$ s (long

pulse). The short pulse provides higher range resolution while the long pulse provides 6 dB better sensitivity. The two pulses combined result in a nyquist velocity of 15 m/s.

<b>HIAPER Cloud Radar Specifications</b>	
<b>Parameter</b>	<b>Specification</b>
Antenna	0.30 m, lens
Antenna gain	46.21 dB
Antenna 3 dB beam width	0.73°
Transmit Polarization	Linear (V)
Transmit frequency	94.40 GHz
Transmitter	Klystron
Peak transmit power	1.6 kW
Pulse length	256 and 512 ns
PRT	0.1 and 0.15 $\mu$ s
System noise power	-101 dBm
Receiver noise figure	8.9 dB
Receiver Bandwidth	20 MHz
Receiver Dynamic Range	76 dB
First IF	156.25 MHz
Second IF	1406.25 MHz
Range resolution	20 m
Unambiguous range	14 km
Typical reflectivity uncertainty	1 dB
Sensitivity	-35.0 dBZ at 1 km and 256 ns pulse
Unambiguous velocity	$\pm$ 15 m/s
Typical radial velocity uncertainty	0.2 m/s at W=2 m/s
Dwell time	100 ms

### **Data processing and quality control**

Time series data is the raw collected field data. It is not quality controlled and will remain unchanged.

**Citation**

NCAR/EOL HCR Team. 2024. MEOW: NCAR HCR radar time series data. Version 1.0.  
UCAR/NCAR - Earth Observing Laboratory. <https://doi.org/10.26023/GCBF-2M5T-PG0W>.  
Accessed <insert data download date>.

**Contact**

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