RADAR Technology Workshop 2026

NSF Facilities for Atmospheric Research and Education (FARE)

RADAR SYSTEMS

NSF FARE Program

To facilitate fundamental research in the atmospheric sciences, the National Science Foundation supports state-of-the-art instruments and facilities through the **Facilities for Atmospheric Research and Education (FARE) Program**. The FARE Program includes the **Lower Atmosphere Observing Facilities (LAOF)** and the **Community Instruments and Facilities (CIF)**. For more information, please visit the NSF website.

The following radar systems are available through the FARE Program:

AIRBORNE RADARS

- NSF NCAR HIAPER Cloud Radar (HCR)
- University of Wyoming Cloud Radar (WCR)
- University of Wyoming Ka-band Profiling Radar (KPR)

GROUND-BASED RADAR (TRANSPORTABLE/FIXED)

- NSF NCAR S-Band Dual Polarization Doppler Radar (S-Pol)
- Colorado State University Sea-Going and Land Deployable Polarimetric radar (SEA-POL)

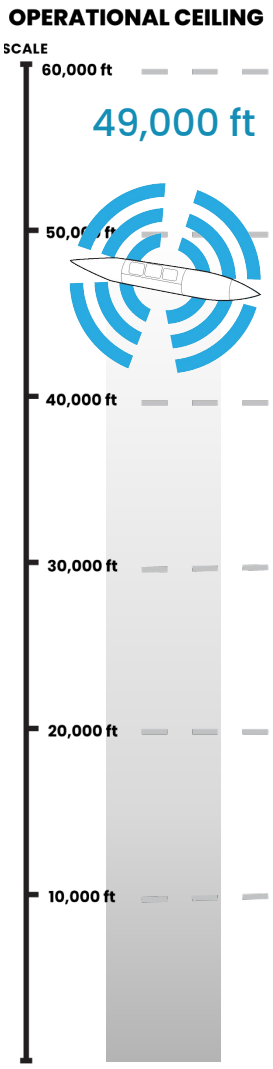
MOBILE RADAR

- University of Oklahoma Rapid Scan X-band Plarimetric Radar (RaXPol)
- University of Alabama - Huntsville Flexible Array of Radars and Mesonets (FARM)
- University of Alabama - Huntsville Mobile Atmospheric Profiling Network (MAPNet)

The **Facility and Instrumentation Request Process (FIRP)** solicitation describes the mechanism by which the research community can propose projects that require access to instrumentation and facilities sponsored by the FARe Program. For more information, please visit the NSF website.

Point of Contact: Nick Anderson (nanderso@nsf.gov)

NSF NCAR HCR



The **NSF NCAR HIAPER Cloud Radar (HCR)** is an airborne, polarimetric, millimeter-wavelength Doppler radar that provides high-resolution observations of cloud and precipitation processes from the NSF NCAR HIAPER aircraft. By operating at altitudes up to 47,000 ft, HCR enables observations of cloud structure and evolution not achievable with space-borne or ground-based radars, supporting research on weather systems and cloud microphysics.

HCR provides unique observations of the formation, structure, and evolution of clouds. Its high sensitivity (capable of detecting cloud reflectivities on the order of −30 dBZ) allows for precise measurements of both liquid and ice clouds, advancing understanding of how clouds influence regional and global weather and climate.

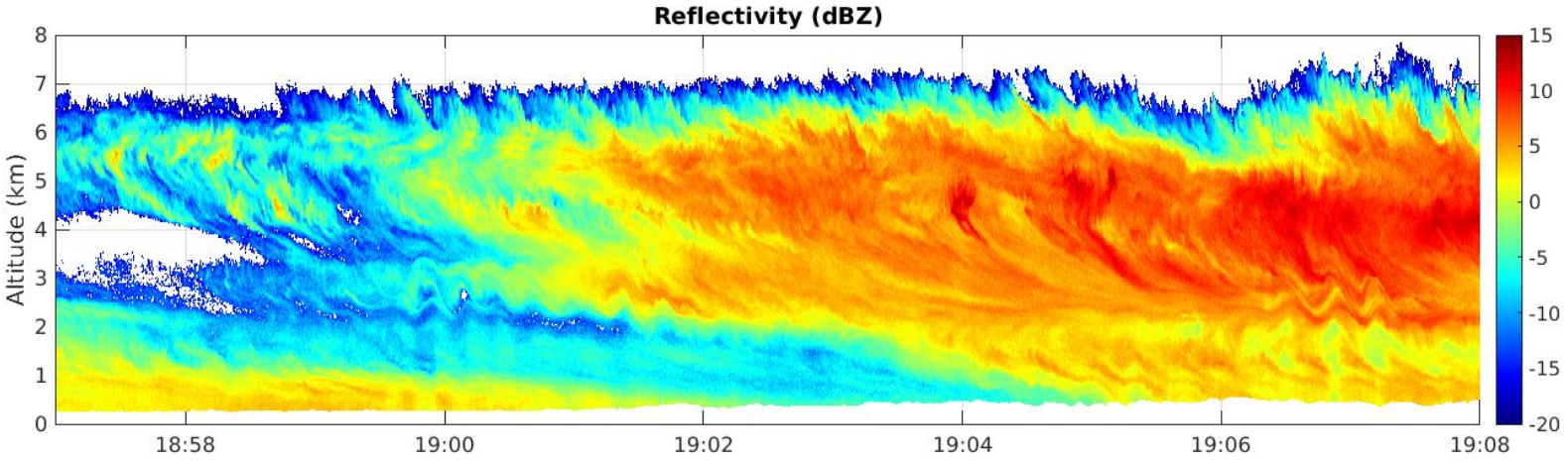
A suite of derived products including melting layer altitude, convective and stratiform echo classification, and hydrometeor particle identification, provides additional insight into cloud and precipitation processes observed during research flights.

HCR Specifications

- Wavelength: 3 mm (W-band)
- Antenna Diameter: 0.3 m
- Range Resolution: 20-180 m
- Peak Power: 1.6 kW
- Beamwidth: 0.73°
- Maximum Range: 15 km

The HCR is mounted in an under-wing pod on the HIAPER aircraft. A lens antenna illuminates a rotatable reflector, enabling 240° cross-track scanning, as well as fixed staring modes (e.g., zenith or nadir). In staring mode, the radar beam is stabilized every 20 ms to correct for aircraft roll and pitch, ensuring high data quality in turbulent conditions..

Radar measurements - including reflectivity, Doppler velocity, and dual-polarization variables - are produced with approximately 20 m range resolution (mode-dependent, up to ~180 m) and 10 Hz temporal resolution, allowing HCR to resolve fine-scale cloud and precipitation structures.



Fine-scale cloud and precipitation structure observed by HCR during its maiden flight within a major Northeast US snow storm in February 2015.

Additional Information:

https://www.eol.ucar.edu/instruments/hiaper-cloud-radar-hcr

University of Wyoming
Wyoming Cloud Radar

The Wyoming Cloud Radar (WCR) is an airborne polarimetric Doppler radar operating at W-band (94.94 GHz). The WCR frequency is optimal for observing cloud particles and small precipitation particles. WCR performs best in ice-dominated conditions where liquid attenuation is low. Up to 4 antennas are deployable and can be configured to observe targets above and below the aircraft. The WCR provides high-resolution measurements of reflectivity and radial velocity, along with the capability of measuring differential reflectivity and linear depolarization ratio. It is deployable aboard both the NSF King Air and the NSF NCAR C-130 research aircraft. The WCR transmits a short pulse, 100 to 250 ns in length, that is amplified with a Klystron amplifier to achieve a peak power up to 1.6 kW. Two receiver channels measure the backscattered power for the calculation of single- and/or dual-Pol variables.

Figure 1. WCR Field of View on the UWKA and NCAR C-130 aircraft.

WCR is used in research projects where it is desired to describe weather events such as clouds, precipitation, and aerosol, and to provide specific information of these targets. The typical antenna configuration of the WCR observes a plane, or vertical curtain, along the flight track of the aircraft. By simultaneously using two antennas in this plane (e.g. one in the vertical plane and one forward of vertical), dual-Doppler analysis is possible. Coupled with the in situ observations of hydrometeors and air motions from the same aircraft these data yield unique information for analysis of cloud and precipitation processes.

Data Products

Common WCR data products include:

- Reflectivity (single, linear polarization)
- Radial Velocity (from quasi-vertical and slant antennas)
- Spectrum Width

Capabilities dependent on WCR Configuration:

- Doppler Spectra
- Dual-Pol Reflectivity and associated variables
- Dual-Doppler wind (along-track horizontal and vertical components)

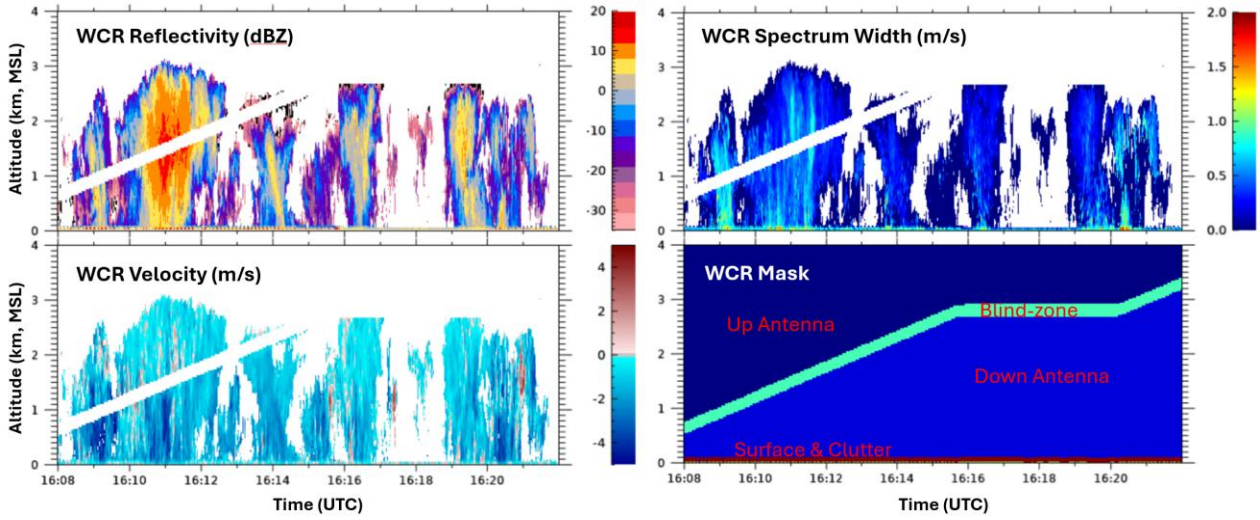


Figure 2. Example WCR L2 data from the RF07 on March 16, 2024 during the CAESAR experiment.

Data Availability

The King Air facility maintains a data archive of past projects and missions. WCR data prior to 2024 is only available by request, fill out the King Air Data Request form online (https://www.uwyo.edu/atsc/research-facilities/uwka/instruments/data-request.html) or email Coltin Grasmick (cgrasmic@uwyo.edu). For projects that utilized the EOL data services, WCR data should be requested from the EOL Data Archive (https://data.eol.ucar.edu/).

Standard quicklooks and QA plots from recent projects are available for viewing online at www.uwyo.edu/atsc/research-facilities/uwka/instruments/wcr/radar_projects.html.

Table 1. Table of general WCR specifications

System Specification	
Transmit Frequency	94.940 GHz
Amplifier	Extended Interaction Klystron (EIK)
Peak Power / Duty Cycle	1.6 kW / 1%
Pulse Length	100, 200, 250 ns
Pulse Repetition Freq.	1 – 20 kHz
Polarization	Single linear or Dual linear (H & V)
Transmit Pulse	1 – 12 sequenced pulses
Number of Antennas	UW King Air: Up to 4 antennas NCAR C-130: 3 antennas
Antenna Types	1. Conical horn lens 2. Cassegrain dish 3. GOLA (dual-pol)
Antenna HP Beamwidths	1. 0.75° 2. 0.63° and 0.5° 3. 0.75°
Antenna Configuration (UWKA)	1. Zenith and 30° forward of zenith 2. Nadir and 30° forward of nadir 3. 30° forward of zenith or nadir
Antenna Configuration (C-130)	1. Nadir and 30° aft of nadir 2. Zenth 3. N/A
Measurement Specification	
Maximum Range	6-10 km (typical)
Along-beam Sampling	7.5 – 37.5 m
First Range Gate	111 m
Maximum (Nyquist) Velocity	14.3 m/s (typical)
Typical Dwell-time (along-track sampling)	49.5 ms (4-5 m)
Minimum Detectable Signal @ 1 km	-35 dBz (typical)

Table 2. List of UWKA Facility projects that have used the WCR

Past Projects that used the UWKA Facility WCR		
Project Name	Description	Location
CAESAR24	Cold Air Outbreak Experiment in the Sub-Arctic Region	Kiruna, Sweden
DILBERT21	Deployable Instruments – Laramie Based – Research Test Flights	Laramie, WY
APEX19	The All-Phase Water Probe Experiment	Laramie, WY
TECPEC19	Terrain Effect on Clouds and Precipitation - an Educational Campaign	Laramie, WY Salt Lake City, UT
SNOWIE17	Seeded and Natural Orographic Wintertime clouds—the Idaho Experiment	Boise, ID
RADFIRE16	Rapid-Deployments to Wildfires Campaign	Laramie, WY

See https://www.uwyo.edu/atsc/research-facilities/uwka/projects-data.html for a full list of projects.

University of Wyoming
Ka-band Profiling Radar

The Ka-band Profiling Radar (KPR) is an airborne Doppler radar operating at Ka-band (35.64 GHz). The KPR frequency is optimal for observing small to medium sized precipitation particles and has low attenuation when liquid precipitation is present. Particles will produce Rayleigh scattering up to 1.5 mm in diameter, and larger particles Mie scattering. The KPR head contains two antennas and can be enabled to observe targets above and below the aircraft. The KPR provides high-resolution measurements of reflectivity and radial velocity. It transmits in a single, linear polarization and so is not capable of dual-Pol products. It is deployable aboard the NSF UW King Air, the NSF/NCAR C-130 research aircraft, and other aircraft that support standard PMS-style canister mounts. The KPR uses a Solid State Power Amplifier (SSPA) and slotted waveguide antennas to transmit a short pulse, 247 to 618 ns in length, followed by a frequency modulated pulse (compression pulse or “chirp”) that has a compression ratio of 10. The SSPA achieves a peak power up to 10 W.

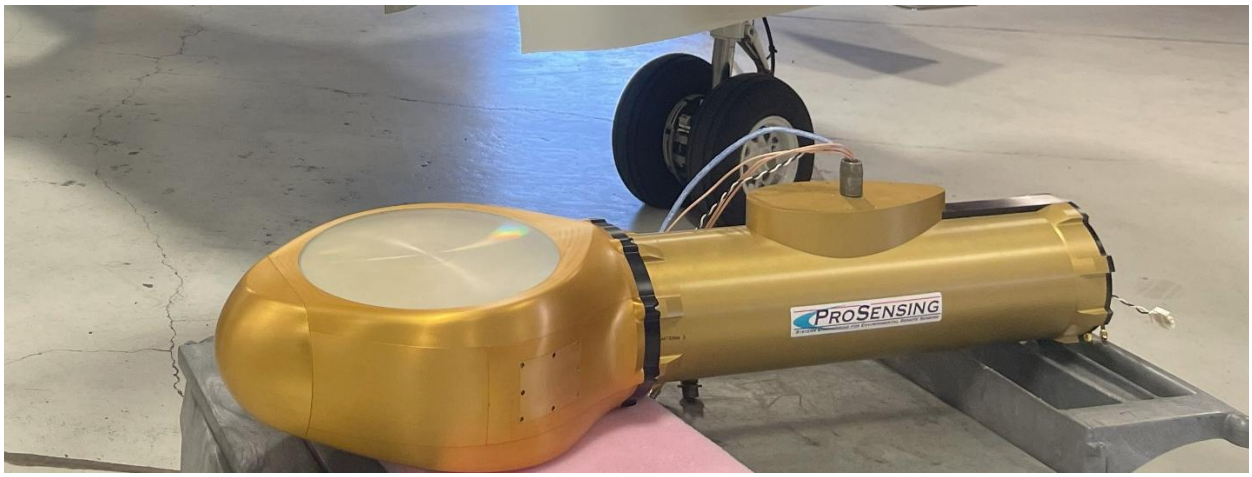


Figure 1. KPR canister and large antenna head.

KPR is used in research projects where it is desired to describe weather events such as clouds and, especially, precipitation and to provide specific information about these targets. The typical antenna configuration of the KPR observes a plane, or vertical curtain, along the flight track of the aircraft. Coupled with the in situ observations of hydrometeors and air motions from the same aircraft these data yield unique information for analysis of cloud and precipitation processes.

Data Products

Common KPR data products include:

- Reflectivity (single, linear polarization)
- Radial Velocity (quasi-vertical)
- Spectrum Width

Capabilities dependent on KPR Configuration:

- Doppler Spectra
- Dual-frequency differences (when deployed with another radar like WCR)

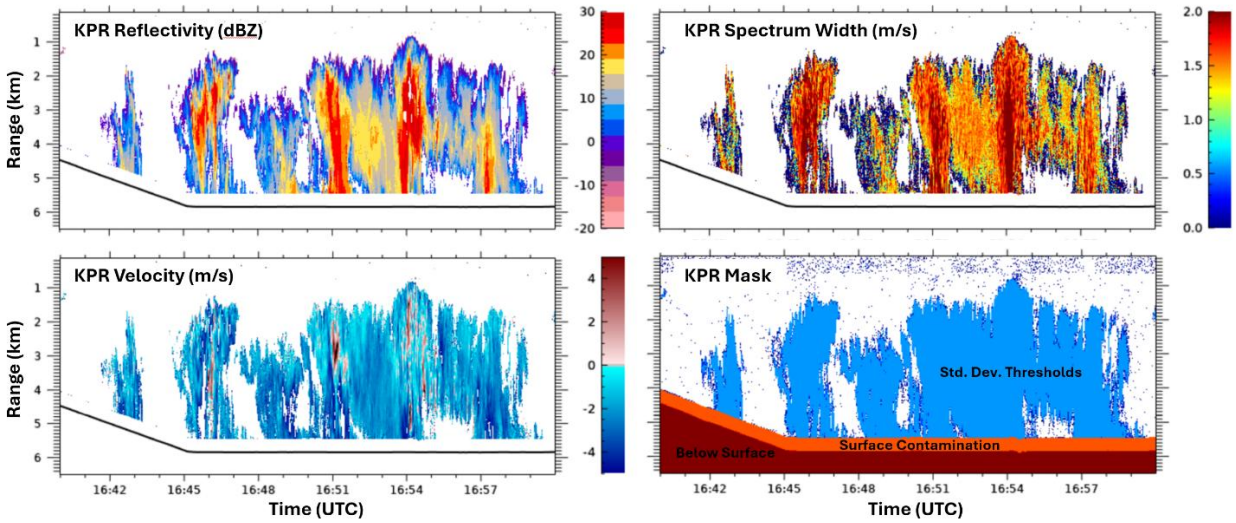


Figure 2. Example KPR L1 data from the RF07 on March 16, 2024 during the CAESAR experiment.

Data Availability

The King Air facility maintains a data archive of past projects and missions. KPR data prior to 2024 is only available by request, fill out the King Air Data Request form online (https://www.uwyo.edu/atsc/research-facilities/uwka/instruments/data-request.html) or email Coltin Grasmick (cgrasmic@uwyo.edu). For projects that utilized the EOL data services, KPR data should be requested from the EOL Data Archive (https://data.eol.ucar.edu/).

Standard quicklooks and QA plots from recent projects are available for viewing online at www.uwyo.edu/atsc/research-facilities/uwka/instruments/wcr/radar_projects.html.

Table 1. Table of general KPR specifications

System Specification	
Transmit Frequency	35.64 GHz (center), 35.61 GHz (pulse), 35.67 GHZ (chirp)
Amplifier	Solid State Power Amplifier (SSPA)
Peak Power / Duty Cycle	10 W / 10-46%
Pulse Length	247, 494, 618 ns
Pulse Repetition Freq.	1 – 20 kHz
Polarization	Single linear
Transmit Pulse	3 linearly polarized pulses
Number of Antennas	2 vertically pointing antennas (up & down)
Antenna Types	Slotted waveguide
Antenna HP Beamwidths	2.1° (small ant.), 4.2° (large ant.)
Antenna Configuration	Zenith and Nadir
Measurement Specification	
Maximum Range	6-10 km (typical)
Along-beam Sampling	15.0 – 37.5 m
First Range Gate	127 m (pulse), 254 m (chirp), 34 m (qpc)
Maximum (Nyquist) Velocity	41.5 m/s (typical)
Typical Dwell-time (along-track sampling)	150 ms (12 – 15 m)
Minimum Detectable Signal @ 1 km	-2 dBz (typical pulse) & -14 dBz (typical chirp)

Table 2. List of UWKA Facility projects that have used the WCR

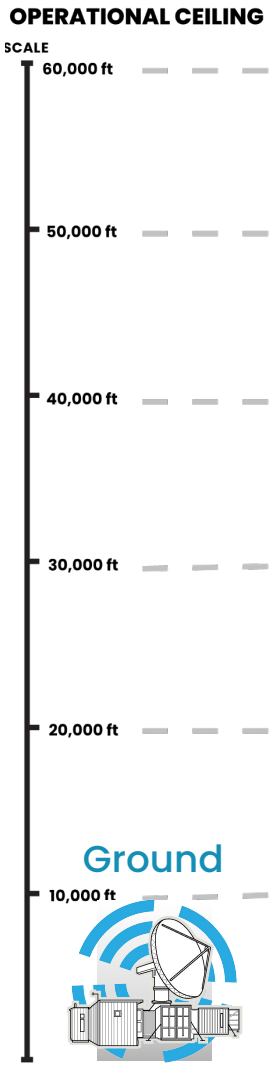
Past Projects that used the UWKA Facility WCR		
Project Name	Description	Location
CAESAR24	Cold Air Outbreak Experiment in the Sub-Arctic Region	Kiruna, Sweden
DILBERT21	Deployable Instruments – Laramie Based – Research Test Flights	Laramie, WY
TECPEC19	Terrain Effect on Clouds and Precipitation - an Educational Campaign	Laramie, WY Salt Lake City, UT
SNOWIE17	Seeded and Natural Orographic Wintertime clouds—the Idaho Experiment	Boise, ID

See https://www.uwyo.edu/atsc/research-facilities/uwka/projects-data.html for a full list of projects.

Specifications

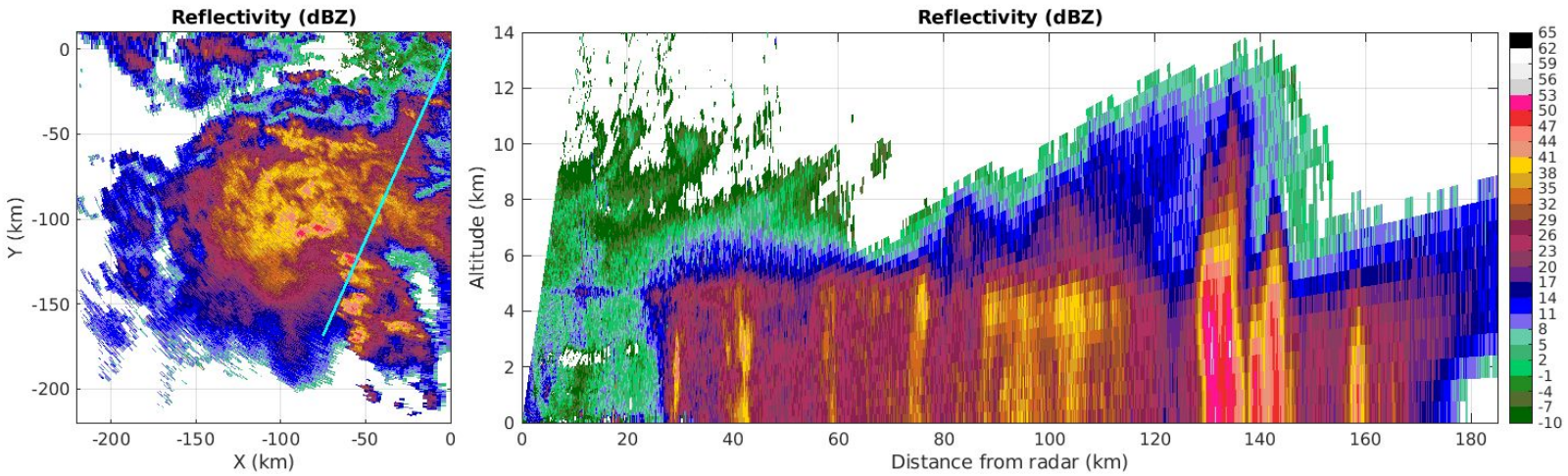
- Wavelength: 10.7 cm (S-band)
- Transmitter: Klystron
- Antenna Diameter: 8.5 m
- Range Resolution: 150 to 225 m
- Peak Power: >600 kW
- Beamwidth: 0.92°
- PRT Range: 0.8 to 12 ms
- Sensitivity: -44 dBZ at 1 km

NSF NCAR S-Pol



The **NSF NCAR EOL S-band Dual Polarization Doppler Radar (S-Pol)** is a research-grade, ground-based, S-band (10 cm), dual-polarized, Doppler weather radar. S-Pol is installed at the Marshall Field Site near Superior, CO, where it provides continuous, high-quality radar observations in support of atmospheric research, technology development, and education. The radar can be operated and monitored remotely, provided sufficient high-speed internet connectivity..

As an S-band radar, S-Pol is sensitive to a broad range of echo types and particle sizes, from clear air returns (primarily insects) and cloud echoes to intense precipitation associated with severe storms, including rain and hail. Its research-quality, dual-polarization Doppler data provide detailed information on precipitation rates, microphysical processes, storm structures, and storm kinematics. The radar has supported a wide range of research, including weather and climate prediction, monsoon rainfall studies, and convection initiation.



S-Pol has capabilities comparable to the Doppler radars of the U.S. National Weather Service's Next Generation Weather Radar (NEXRAD) network, and is used as a test bed for development of algorithms aimed at improving NEXRAD data quality and interpretation. Unlike operational NEXRAD radars, S-Pol is optimized for research applications, allowing flexible scan strategies and advanced signal processing.

Several characteristics distinguish S-Pol from operational weather radars: It operates without a radome. The radar predominantly operates in fast-alternating dual-polarization mode, enabling measurements such as Linear Depolarization Ratio (LDR) and cross-correlation coefficient for enhanced microphysical interpretation. Real-time hydrometeor type identification and rainfall estimates are available along with time series data recording. S-Pol's Range Height Indicator (RHI) mode provides high-resolution detail of storm vertical structure. The absolute phase measurements can be used to infer low-level humidity through refractive index changes between fixed ground targets. Advanced signal processing software, along with the option to scan more slowly than surveillance radars, produces data quality that is significantly superior to standard weather radars.

In addition to its research applications, S-Pol serves as a valuable educational and training platform, enabling students and early-career scientists to gain practical experience in radar operations, data analysis, and interpretation of dual-polarization measurements.

Additional Information:
https://www.eol.ucar.edu/observing_facilities/s-pol

CSU SEA-POL

The **Colorado State University Sea-Going and Land Deployable Polarimetric radar (SEA-POL)** is a C-band, dual-polarization Doppler radar, and the only advanced, community-requestable, sea-going precipitation radar facility currently available. SEA-POL supports a wide range of maritime and land-based atmospheric research, including studies of tropical and mid-latitude weather systems, cloud microphysics, convective storm dynamics, and extreme weather impacts. SEA-POL also contributes to interdisciplinary research in oceanography, hydrology, and water resources..

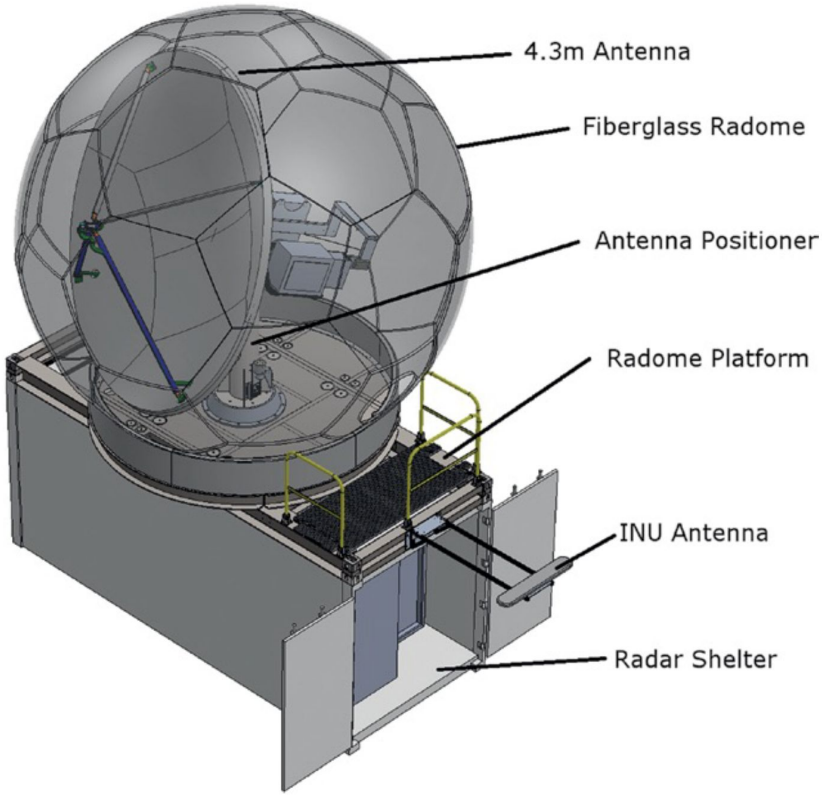
SEA-POL is designed to be portable and rugged, both mechanically and electrically, allowing reliable operations in harsh environments. The radar can be deployed aboard research vessels or at remote land-based field sites worldwide.

For ocean deployments, SEA-POL provides platform stabilization, maintaining high-quality polarimetric capabilities across a wide range of sea states. This capability enables research-grade precipitation measurements in regions and conditions where such observations are otherwise unavailable.

The radar is based in Greeley, CO.

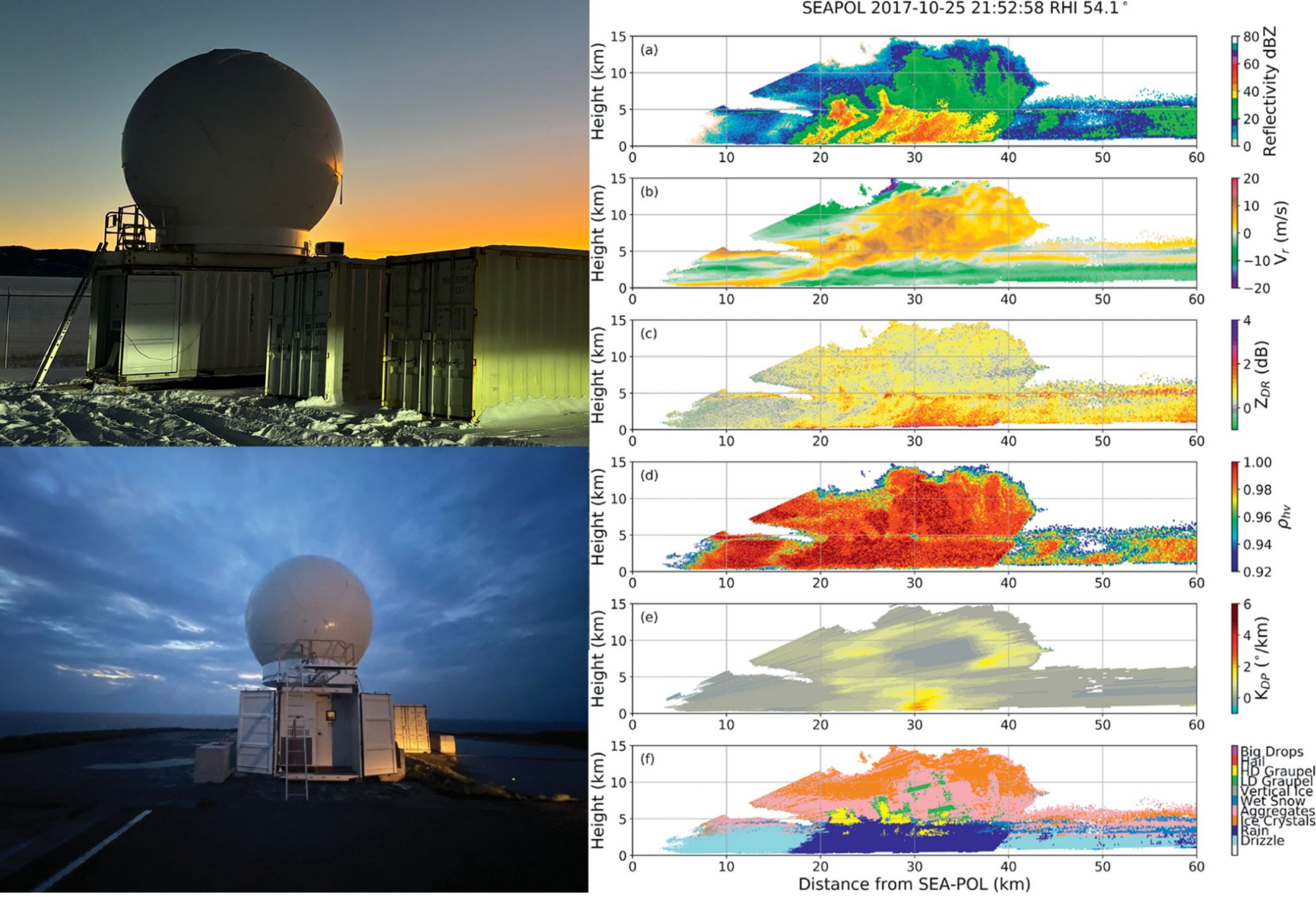
Features:

- 250 kW Magnetron transmitter, low-maintenance solid-state modulator
- Rugged design with radome able to withstand high winds and harsh environments
- Dynamic platform stabilization using internal navigation system for shipborne deployments
- 1° beamwidth antenna
- Containerized system that is transportable worldwide
- State of the art polarimetric signal processor
- Remotely operable
- Frequency agility to avoid interference



SEA-POL SPECIFICATIONS

SEA-POL operates at C-band (5.65 GHz, 5-cm wavelength) and measures dual-polarization Doppler data over ranges exceeding 200 km. The radar is equipped with a 4.3 m stabilized antenna system, with ship motion measured by an inertial navigation unit that provides real-time compensation for platform roll and pitch. Doppler velocity measurements are also corrected for ship motion, ensuring accurate kinematic retrievals during ocean operations. The radar operates in both simultaneous transmit-and-receive mode and horizontal-only modes, and achieves a sensitivity of approximately -7 dBZ at 100 km. The radome is designed to withstand wind loads of up to 115 mph. A variety of pulse widths, pulse repetition frequencies, and scanning strategies are supported, allowing SEA-POL to be tailored to specific science objectives. For transportability and ease of deployment, the system is packaged in three ISO-668 1C containers.



Above: (Left) Photos of SEA-POL in Steamboat Springs, Colorado during S2noCliME 2025 (top) and on Yonaguni island, Japan during PRECIP 2022 (bottom). (Right) Range–height indicator (RHI) data from SPURS-2 shipborne deployment of (a) reflectivity, (b) Doppler radial velocity corrected for storm motion, (c) differential reflectivity, (d) copolar correlation coefficient, (e) specific differential phase, and (f) dominant hydrometeor class at 2152:58 UTC 25 Oct 2017 (Rutledge et al. 2019)

Points of Contact:
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Dr. V. Chandrasekar
chandrasekaran.venkatachalam@colostate.edu

Request Form:
https://seapol.colostate.edu/request/

OU RaXPol

The **University of Oklahoma Rapid Scan X-band Polarimetric Radar (RaXPol)** is a truck-mounted, rapid-scan, highly flexible, dual-polarization radar that provides observations needed for the study of high impact and fast evolving events such as tornadogenesis, deep convection and electrification, post-wildfire hydrology and flash floods, lake-effect and orographic snowstorms, and tropical cyclones.

This mobile radar also serves as an excellent educational and outreach tool, providing opportunities for students to interact with state-of-the-art instrumentation.

RaXPol is maintained by the Advanced Radar Research Center (ARRC) at the University of Oklahoma (OU), which has long-standing experience in design and operation of complex radar systems.

RaXPol provides rapid updates of direct and reliable dual-polarization weather observations, which are much needed for the study of high impact and fast evolving weather events. It can be rapidly deployed with real-time data transmission capabilities and offers flexibility in scanning strategies to focus observations on areas of interest at high spatio-temporal resolution. The mobile RaXPol facility can travel to different locations for scientific exploration and research which allows diverse institutions and underrepresented groups to engage in learning experience with hands-on activities.

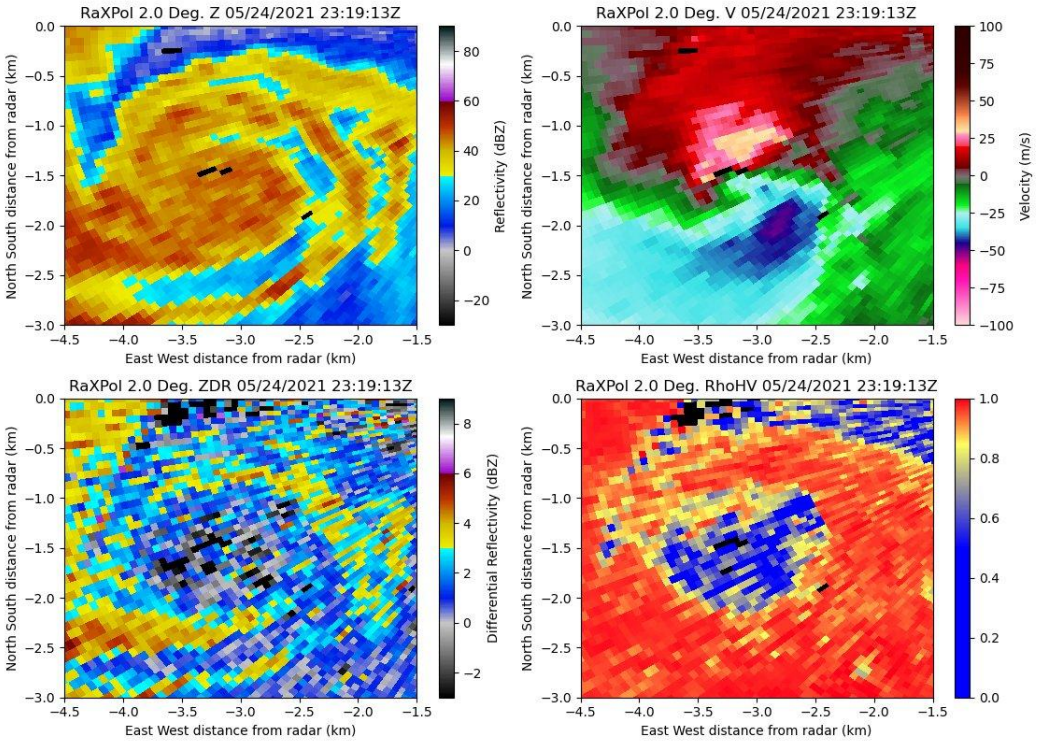
RaXPol Specification	
Transmitter	
Frequency	9.73±0.02 GHz
Peak Power	20 kW (TWT)
Pulse Width	0.1 – 40 μs
waveforms	Frequency Hopping, LFM/NLFM
Polarization	Dual-linear (STAR)
PRT	Uniform or staggered
Antenna	
Diameter	2.4 m
Beamwidth	1.0°
Gain	44.5 dB
Scan Rate	180° s^{-1} in az 36° s^{-1} in el
Products	$Z, v, \sigma_v, Z_{DR}, \rho_{HV}, \phi_{DP}$

System Overview

RaXPol boasts extremely rapid pedestal speeds, which enable a volume scan to be completed in as little as 20 seconds. The truck-based platform can quickly maneuver to a target area, deploy, operate, and depart with minimal preparation. While these advantages make RaXPol well-adapted to observation of severe weather phenomena, the arbitrary transmit waveform and raw I/Q data recording capabilities also allow for experiments with pulse compression and innovative radar signal processing.

RaXPol addresses a well-established scientific community priority to have a community-accessible radar that provides high-temporal resolution measurements (< 1 min). Such rapid-scan data are essential to understanding processes leading to the formation and evolution of severe weather and capturing fine-scale microphysical and dynamic processes.

The truck-mounted RaXPol radar offers an agile experimental platform to create highly customized radar experiments for research and education. OU's team of scientists and engineers are deeply experienced in conducting radar field experiments around the world and can assist with field experiment planning, in-field coordination, and post-deployment data quality control, curation, and analysis.



Research

RaXPol is well-suited to studying severe weather hazards such as tornadoes, hail, hurricanes, and damaging windstorms. As part of the CIF, NSF users can formally request RaXPol to study severe weather throughout the United States and worldwide. In addition to severe weather research, significant scientific potential exists in deep convection and precipitation in turbulent environments with rapid-scan systems to capture elusive microphysical and dynamic processes that are not observed with 2 – 3 min volume scans of existing mobile radars. Transformative research opportunities exist to better understand the evolution of deep convection, storm electrification, winter storms, flash floods, and wildfires using RaXPol. Such high spatio-temporal data could also push the limits of data assimilation schemes and provide critical observations to improve numerical models.

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Request Form:
https://arrc.ou.edu/cif.html

UAH FARM

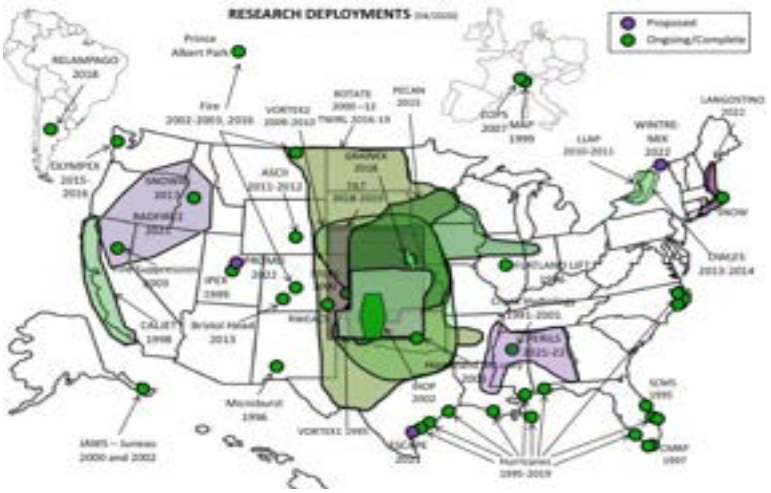
Radars, Mesonets, Pods/Poles, Soundings:
One-Stop Shop for adaptable/targetable observing

The **University of Alabama - Huntsville Flexible Array of Radars and Mesonets (FARM)** uniquely combines an extensive network of radars with a multi-capacity network of in-situ observation systems. **FARM** includes:

- several mobile radars, including quick-scanning dual-polarization C-band, X-band, and Rapid-Scan systems,
- an array of mobile mesonets, quickly deployable weather stations (PodNet) and pole-mounted instruments (PoleNet), and disdrometers
- several upper air and swarm sounding systems.

FARM is the only configurable, multiple-Doppler, dual-polarization, multiple frequency, mobile radar network available to the NSF observational community. FARM provides field logistical support for tactical management of adaptable/targeted instrumentation arrays, including GURU real-time awareness displays.

FARM instruments have uniquely broad applicability to winter, tropical, alpine, orographic, and severe mesoscale studies. FARM has been used as core instrumentation in many dozen field programs, resulting in hundreds of publications. FARM instrumentation including Doppler on Wheels (DOWs) and C-band COWs are student-operable and well-suited for educational use. FARM brings over 30 years of experience, common instrument maintenance and operation, and data quality control protocols maximizing reliability in the field, calibrations, and production of the highest quality data.

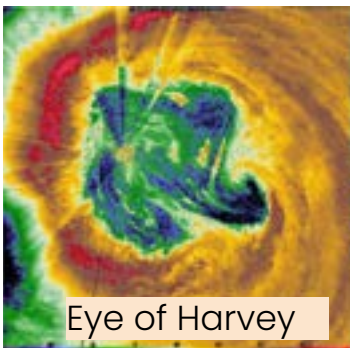


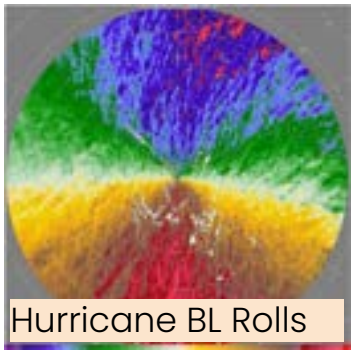
FARM aspires to expand capabilities with S-band multiple-Doppler networks (SOW-NET), Ground-DORA Rapid-Scan, and Bistatic Networks

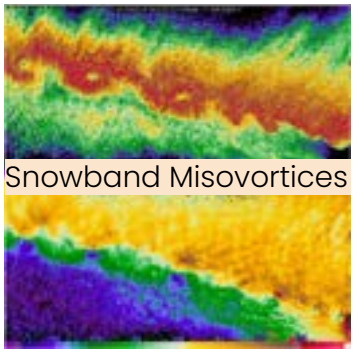
DOW multiple-Doppler (X-band, dual-pol, dual-frequency)

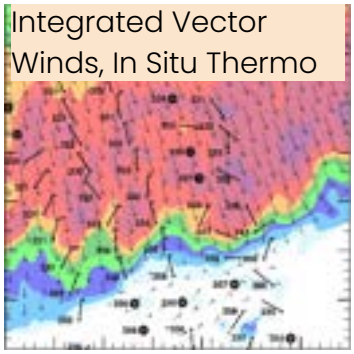
2 x 250 kW Dual-Frequency Dual-Polarization 2 x 45 deg or H & V (for LDR) Gating: 12.5 - 150 m Beamwidth: 0.93 deg	Pulsing to 6,000 Hz Staggered: Nyquist > 100 m/s Scan rate: 50 deg/sec (7s/swp)	Processing: TITAN Simultaneous stagger with Dual-Pol: LDR, V, Z, Rho-HV, ZDR, Phi-DP Time-series clutter filtering Spectral Processing Two independent frequencies Full time-series recording

DOW A and **DOW B**, comprise the only dual-polarization, mobile/targetable radar network, employing narrow-beam, fast-scanning, dual-frequency radars. Dual-frequency, dual-polarization allows either double-fast scanning or simultaneous collection of LDR, rho-HV, and phi-DP. Together or individually, or in combination with other FARM radars (COW, mini-COW, DOW8, Rapid-Scan DOW) and with other FARM instrumentation, are used in a range of atmospheric studies including alpine, winter, agricultural, severe convection, mesoscale, tropical, fire, and purely education missions.

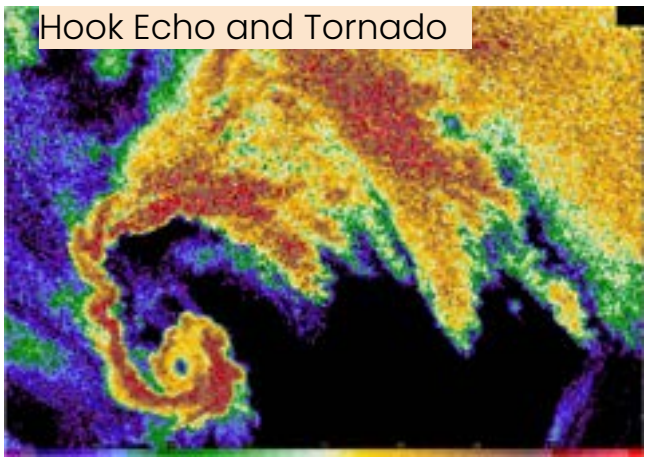

Eye of Harvey


Hurricane BL Rolls


Snowband Misovortices


Integrated Vector Winds, In Situ Thermo

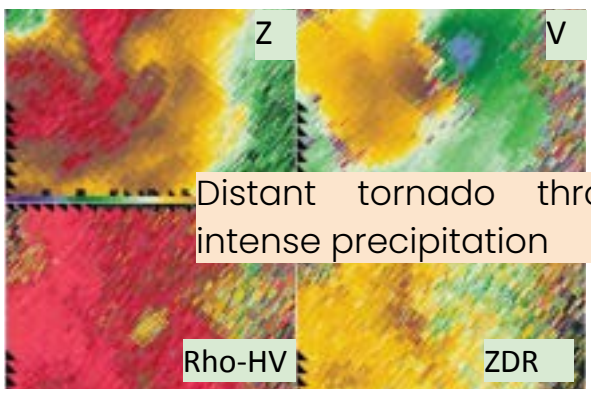
Above: Images of DOWs in alpine environments, observing wildfires, and a tornado. Data images of of hurricane eye, hurricane boundary layer rolls, snowband misovortices; and Dual-Doppler integrated with FARM in-situ measurements.


Hook Echo and Tornado

C-band multiple-Doppler, dual-pol
COW: 1-deg quickly-deployable, dual-frequency
mini-COW: 1.5-deg mobile, quick-scanning

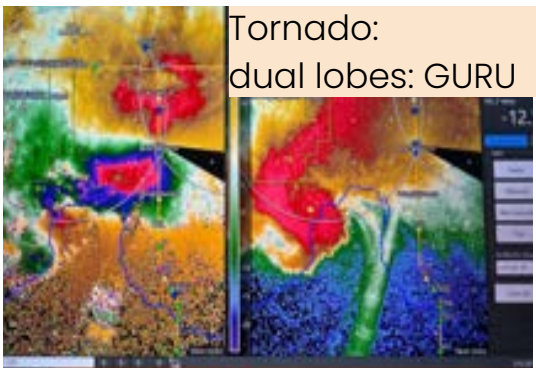
2 x 1 MegaWatt: COW 1 MegaWatt: mini-COW Dual-Frequency: COW Dual-Pol: COW and mini-COW 2 x 45 deg or H & V (for LDR): COW 45 deg: mini-COW Gating: 12.5 - 150 m	Pulsing to 6,000 Hz Staggered: Nyquist > 100 m/s Scan rate: 50 deg/sec (7s/swp): mini-COW 34 deg/sec: COW 1-deg beamwidth: COW 1.5-deg beamwidth: mini-COW	Processing: TITAN Simultaneous stagger with Dual-Pol: LDR, V, Z, Rho-HV, ZDR, Phi-DP Time-series clutter filtering Spectral Processing Two independent frequencies: COW Full time-series recording

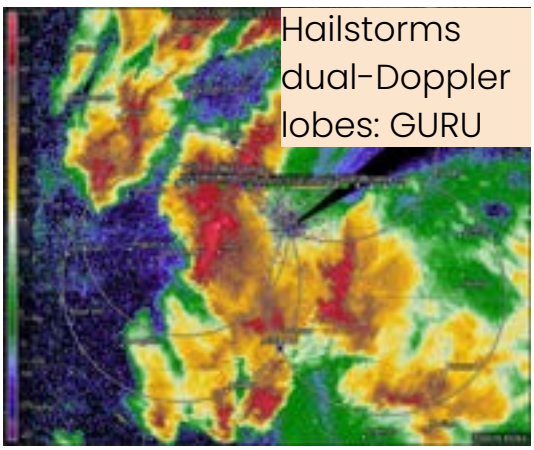
COW is the only narrow-beam (1-deg) and most powerful C-band, dual-polarization, dual-frequency quickly-deployable targetable radar. Unique among narrow-band C-bands, COW is set up in 2 hours, permitting redeployment for every IOP. COW can be an anchoring radar to a mobile DOW/mini-COW network, or paired with stationary radars. COW can be used in a range of atmospheric studies including alpine, winter, agricultural, mesoscale, tropical, and purely education missions. Dual-frequency, dual-polarization allows either double-fast scanning or simultaneous collection of LDR, rho-HV, and phi-DP. Full time-series recording. C-band provides good penetration through intense precipitation.



Distant tornado through intense precipitation

Mini-COW is the most powerful, fastest-scanning, dual-polarization mobile C-band radar. It can be deployed individually, or in multiple-Doppler networks to observe myriad meteorological systems, from winter, alpine, tropical, and warm season convection. C-band provides good penetration through intense precipitation.


Tornado:
dual lobes: GURU

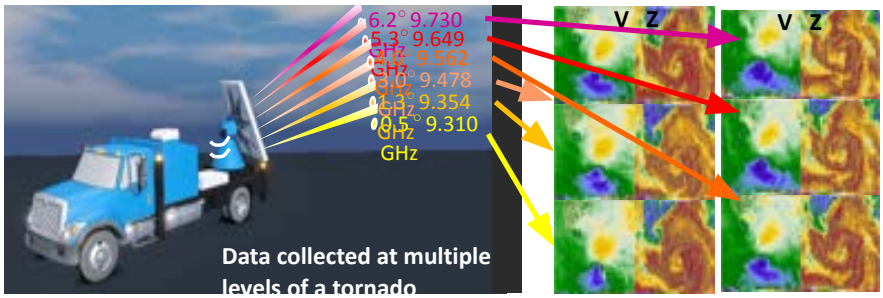

Hailstorms
dual-Doppler
lobes: GURU

Rapid-Scan DOW (RSDOW)

Transmits: 45 kW Single Pol Gating: 11 - 150 m	Beamwidth: 0.8 x 0.9 deg Pulsing up to 6,000 Hz Staggered Nyquist > 100 m/s	Scan rate: 6 x 50 deg/sec for 7 s volumes Processing: TITAN V, Z, SW

RSDOW is the narrowest-beam rapid scan mobile radar. RSDOW's 0.8 x 0.9 deg beams permit the sharpest spatial data. Six simultaneous beams, scanned at 50 deg/sec, produce 7 s volumetric data. Sub-1 deg beams combined with 7 second volumes produce the best match of ultra-fine spatial and temporal observations.

RSDOW sends simultaneous beams

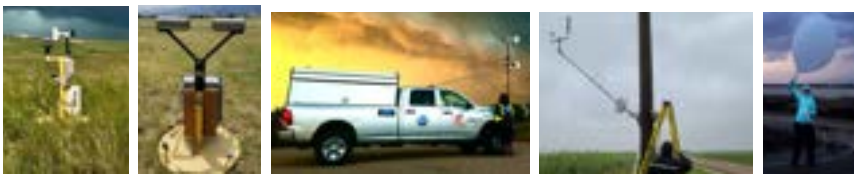


Simultaneous observations at multiple elevations

In-Situ Networks (Pods, Poles, Mesonets, Disdrometers, Soundings)

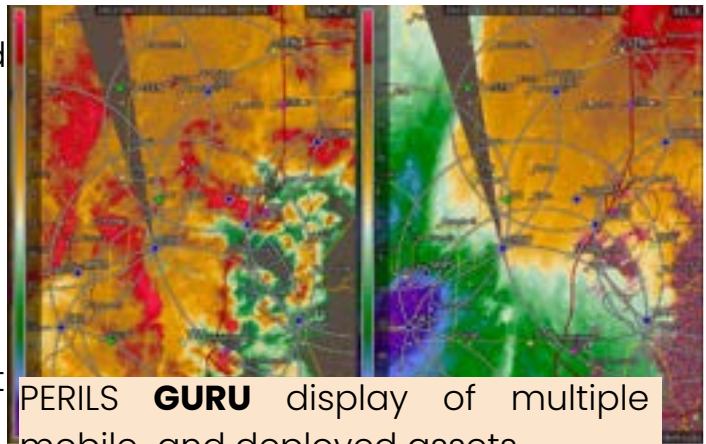
Pods: 20 1-2 m Poles: 4 3-6 m Mesonets: 4 mobile 3.5 m	6 upper-air sounding systems 1 Windsonde Driftsonde 4 Disdrometer	T, RH, Wind (blade and ultrasonic), Pressure, Imagery

PODNET, POLENET, MOBILE-MESONET, DISDROMETERs, SOUNDINGS: FARM provides a one-stop-shop of varied networked in-situ instrument arrays, often integrated with FARM radars. Common field and QC management facilitate quality science



GURU Tactical Awareness System

GURU provides the most capable tactical awareness display for targeted/adaptable and stationary missions. Looping, real-time, multi-panel displays of radar data, instrument deployments, upper air soundings facilitate mission safety and logistics.



PERILS **GURU** display of multiple mobile and deployed assets

FARM Permanent Data Archive

FARM maintains a triply-redundant permanent FTP data archive since 1995: tornadoes, alpine, hurricanes, winter, fire, and other datasets.

Point of Contact:
Dr. Karen Kosiba
kakosiba@farmfacility.org

Request Instruments:
http://www.farmfacility.org/contents/requestdows.php

Request Data:
http://www.farmfacility.org/contents/requestdows.php

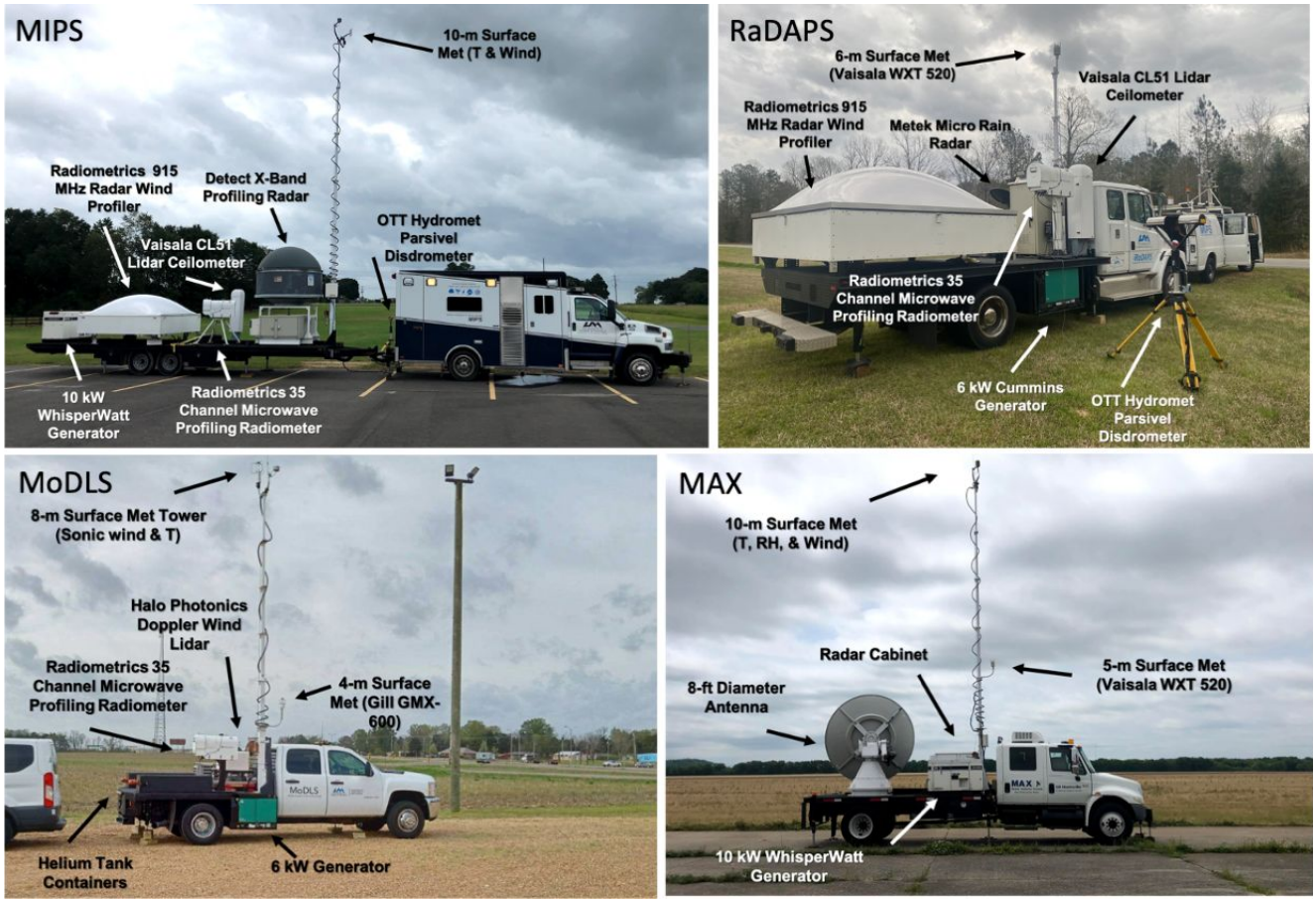
UAH MAPNet

The **University of Alabama in Huntsville Mobile Atmospheric Profiling Network (MAPNet)** consists of four mobile platforms, each with a suite of instruments that specialize in remotely retrieving temperature, moisture, wind, and other properties, ranging from precipitating systems to the fair-weather atmospheric boundary layer. MAPNet has been used to study a variety of topics, including boundary layer processes, severe thunderstorms and their rapidly-evolving environments, landfalling hurricanes, and winter weather.

MAPNet consists of the

- **Mobile Integrated Profiling System (MIPS)**
- **Rapidly Deployable Atmospheric Profiling System (RaDAPS)**
- **Mobile Doppler Lidar and Sounding system (MoDLS)**
- **Mobile Alabama X-band radar (MAX)**

Collectively, the MAPNet instruments include two 915 MHz radar wind profilers, three microwave profiling radiometers, three lidar ceilometers, an X-band profiling radar, a micro-rain radar, a Doppler lidar, three balloon sounding systems, a scanning X-band dual polarization radar, and surface instrumentation, including sonic anemometers for high resolution measurements and turbulent flux estimates. These instruments provide temporal resolution of 1-300 s and varying vertical resolution (15-100 m).



The combination of radar wind profilers, lidars, microwave radiometers, and other instruments can be integrated to provide high-resolution profiles of wind, temperature, humidity, aerosols, cloud base, and precipitation from the atmospheric boundary layer (BL) to middle tropospheric heights, over a broad range of fair to inclement weather conditions.

The UAH profiling facilities have been used over the past 25 years in field campaigns addressing a variety of topics such as air quality, convective initiation, bores and internal gravity waves, severe weather, tropical cyclones, and winter storms. New and current areas of science where the MAPNet instruments are useful include impacts of surface heterogeneities on the ABL, temporal transitions in the ABL fog, cloud electrification/lightning studies, and investigations of biological flyers.

More Information: https://www.nsstc.uah.edu/mapnet/facilities