CSU CHILL NATIONAL RADAR FACILITY

ABOUT THE CSU-CHILL RADAR

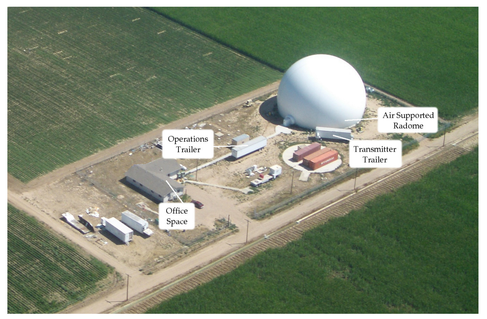
The CSU-CHILL National Weather Radar Facility, located in Greeley, CO, is an advanced, transportable dual-polarized S-band weather radar system. The facility is funded by the National Science Foundation and Colorado State University, and is hosted by the Departments of Atmospheric Science and Electrical and Computer Engineering.

Features

- Dual offset, dual-wavelength low sidelobe Gregorian antenna system
- Easy-to-use, remotely accessible radar control interface
- Polarization-agile dual-Klystron 1 MW transmitter at S-band
- Simultaneous-transmit 25 kW Magnetron transmitter at X-band
- Dual-channel software-defined digital-IF receiver
- Flexible signal processor, customizable to project needs
- Comprehensive calibration subsystem
- VCHILL Real-time control and distribution of radar data
- Dual-doppler capability with CSU-Pawnee S-band radar

User Access

- NSF-funded projects reviewed by Observing Facilities Allocation Panel (OFAP)
- Cost-recovery non-NSF projects, also reviewed by OFAP
- Small scale "20-hour" projects, conducted at Greeley
- Live virtual tours of the radar facility



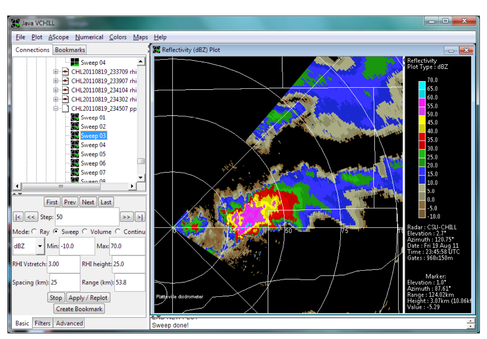
CSU-CHILL Radar Site

THE VIRTUAL CHILL - VCHILL

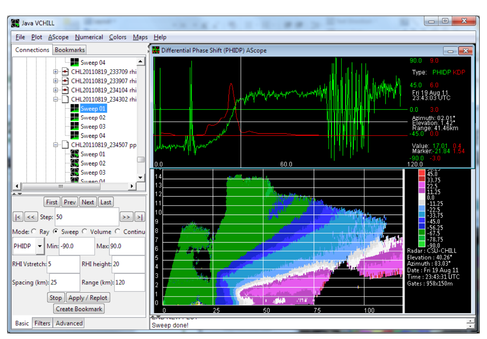
The Virtual CHILL, or VCHILL system allows remote users to display data both from the CHILL archives as well as from real-time operations.

Features

- Free download from the CHILL website
- Interactive viewing of archived data collected by CSU-CHILL
- Real-time access to live CSU-CHILL data stream
- Cross platform Java-based application
- Incorporates educational bookmarks with featured case studies



Reflectivity from convective Precipitation on Aug 19, 2011



RHI through the same storm, showing Ψ_{dp} and KDP a-scope plots

This facility is sponsored by NSF cooperative agreement no: AGS1138116

EDUCATIONAL ACTIVITIES

The facility is an integral element of engineering and atmospheric science programs at CSU and institutions nationwide.

Research Activities

- Advanced signal processing techniques
- Radar hardware research and design
- Advanced polarimetric rainfall analysis
- Automated hydrometeor identification algorithms

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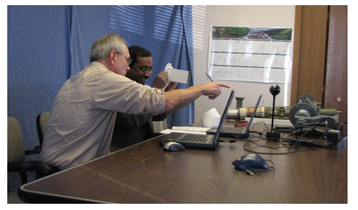
Classroom Activities

- A rich collection of radar data in support of classroom activities
- Tutorials with guided interpretations of polarimetric radar cases
- Short courses which integrate the CSU-CHILL Facility

Virtual Radar Tours

- Internet streaming video from multiple on-site cameras
- Close-up views of the antenna structure
- Walk-around of the transmitter/receiver subsystems
- Remote presentation via video by CSU-CHILL staff



REU Students at CSU-CHILL

Research Experience for Undergraduates

- Hands-on experience with radar hardware and operations
- Individual mentoring by facility staff
- Majors in Physics, Engineering, Computer Science and Atmospheric Science

Visitors at the Radar

Educational Field Trips

- Tours conducted for small groups of visitors
- Includes introduction to radar, visits to radar hardware and a live demo

DUAL-WAVELENGTH ANTENNA

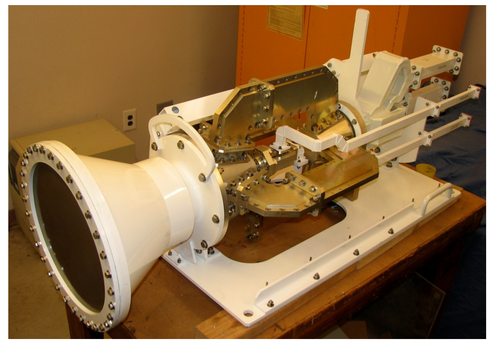
The CSU-CHILL radar features a unique dual offset-feed antenna with dual-wavelength capability

Features

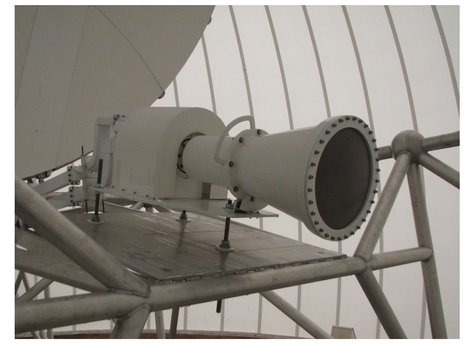
- Three feed horn options available (Dual wavelength, 10 cm and 3 cm)
- Beam width of 1.0 degree at 10 cm (S-band), 0.3 degree at 3 cm (X-band)
- Symmetric OMT design, LDR limit exceeds 40 dB (S-band)
- Low sidelobe levels improve clutter rejection at low elevation sweeps
- Flexible antenna controller supports sector scans and RHIs
- Protected by air-supported radome

Air-supported Radome

Dual Reflector Assembly

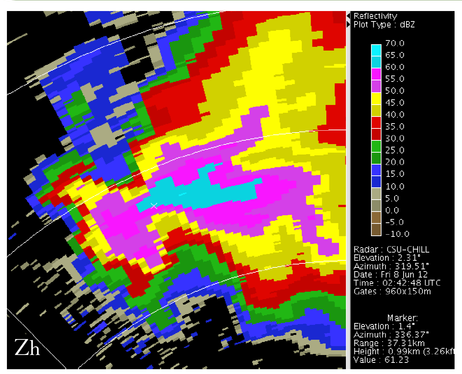


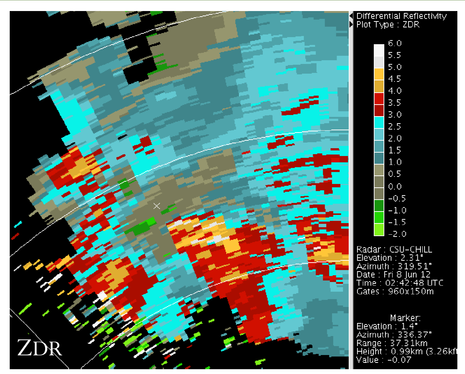
Dual-wavelength Feed Assembly

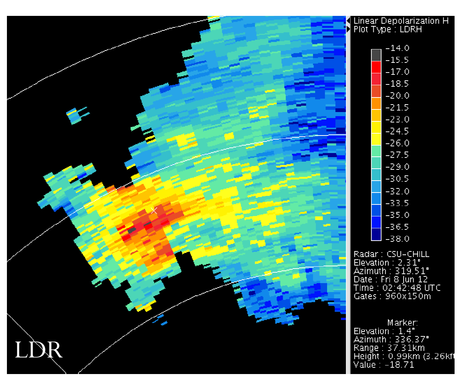


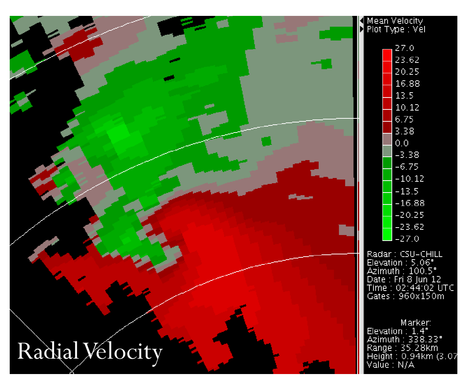
10-cm (S-band) Feed Assembly

EXAMPLE MEASUREMENTS WITH THE CSU-CHILL RADAR



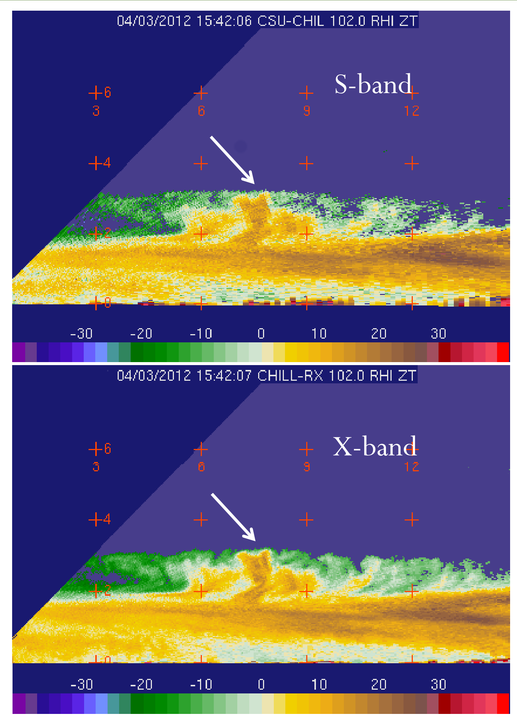






Severe thunderstorm observed during the DC3 project on the evening of June 7, 2012. This storm produced widespread damaging hail. Near 0 dB differential reflectivity values were observed in the reflectivity core, coincident with observations of large hail shown below. The hail area also displayed enhanced linear depolarization levels. At a slightly higher elevation angle, a mesocyclone circulation was present.

Hailstones observed from this storm
Picture courtesy Mark Lindquist



Dual-wavelength measurements in snow