

Request Form

Part I: General Information

Requestor Name	Bob Rauber
Institution and Address	Department of Atmospheric Sciences University of Illinois 105 S. Gregory St. Urbana, IL 61801
Phone and Email	(217)359-5383 r-rauber@illinois.edu

Part II: Project Description

Project Title	The University of Illinois DOW Education and Research Project (UIDOW)
Project Location	Urbana, IL
Start and End Dates	April 8-28, 2012
NSF Facilities Requested	1 - Doppler on Wheels
Number of Expendables Requested	None

Part III: Educational Activities Description

Number of Students Involved	Education: 30 Undergraduates, 15 Graduates Outreach: ~200 Undergraduates Research: 4-6 Undergraduates
Desired Training Activities Conducted by Facility Staff	2 days of training to operate the DOW. One technician will also remain in Urbana during the deployment if possible.

Part IV: Operational Requirements

Data Needs	Archived radar data in DORADE format
Data Analysis Needs	Processing with Solo software and dual-Doppler analysis may require limited assistance following the project
Communication Needs	No special communication needs

The University of Illinois DOW Education, Research and Outreach (UIDOW) Project

The University of Illinois at Urbana-Champaign is requesting a 21-day campus deployment of a Doppler on Wheels (DOW) for classroom-instruction (in ATMS 410, Radar Meteorology), outreach (We will give tours of the facility to hundreds of undergraduates in ATMS 100, General Meteorology and ATMS 120, Severe and Hazardous Weather), and research (4-6 undergraduates will use the data for ATMS 492, Capstone Undergraduate Research Experience, in Fall 2012 following the deployment).

The University of Illinois DOW Education, Research and Outreach (UIDOW) Project has three principal objectives:

1. Enhance instruction in ATMS 410, *Radar Meteorology*, ATMS 505, *Weather Systems*, ATMS 313, *Synoptic Weather Forecasting*, ATMS 314 *Mesoscale Dynamics*, and ATMS 201 *General Physical Meteorology*

The primary course to use the DOW will be ATMS 410, radar meteorology. ATMS 410 is a comprehensive radar meteorology course that covers principles of radar, including conventional, Doppler, and polarization radar, precipitation measurement and microphysical interpretation of radar data, Doppler processing including VAD analysis, dual Doppler radar analysis, radar profiling, airborne meteorological radars and spaceborne meteorological radars. A fundamental deficiency of this course in the past has been lack of access to a radar facility where students could actually see the components of a radar and operate and collect radar data. The University of Illinois recently completed a comprehensive field campaign studying winter storms, but even here we could only expose a few undergraduates to field operations with the ground based radars because of safety limitations in harsh winter conditions, remote distant deployments, and requirements to have trained operators on site (limiting available seats in the facilities). Placing a DOW on campus would allow us to introduce an entire class of 40-50 students to radar operations in the context of early winter precipitation events. These data would also allow the students to exercise software such as SOLO and CEDRIC that would allow them to experience the basics of radar processing. We can arrange to have the Lincoln WSFO scan using VCP-11 so that limited dual Doppler data could be collected, albeit on a long baseline. We expect about 35 undergraduates and 15 graduates to enroll in the course. The course will have a teaching assistant familiar with radar processing that will help with student activities. The radar will be used to illustrate concepts taught in class such as, for example, the relationship between maximum unambiguous range, the Nyquist velocity and the PRF, velocity folding, antenna size and its impact on beam width, bright band identification, ground clutter, anomalous propagation, reflectivity in snow vs. rain, the relationship of reflectivity to precipitation rate etc. Data from the radar will also be used in class projects. The nature of these will depend on the weather and clear air conditions encountered during the deployment. The course is taught by Professor Rauber, who has used sophisticated radars in his research projects for over 20 years, and has taught radar meteorology at the University for most of that period.

We also plan to have students in four other classes visit the radar, and learn how radar technology enhances forecasting, understanding of mesoscale circulations, and atmospheric processes. Professors Frame, Snodgrass, and Nesbitt plan to use the radar as part of their

respective courses and will take selected groups of students on short deployments as part of their instruction.

2. Introduce a broad spectrum of students to state of the art meteorological radar technology

We propose to place the DOW on the University of Illinois campus near the Department of Atmospheric Sciences and give tours of the facility to our large survey classes, ATMS 100 and ATMS 120. These courses, taught by Dr. Jeffery Frame (who rode with the DOWs in VORTEX II for two years) and Mr. Eric Snodgrass (who operated and analyzed data from NCAR's SPOL radar as part of the UI led Rain in Cumulus over the Ocean (RICO) experiment), have close to 1000 students enrolled across several course sections. We will arrange for all of them to see the facility. We will introduce the facility in the classroom before hand so that the student's best utilize their time on the tour. We expect that this experience alone may draw some students toward becoming atmospheric science majors or minors.

3. Provide data for research analysis in ATMS 492 Capstone Experience for Seniors

Every graduate in Atmospheric Sciences at the University of Illinois is required to have a senior capstone research or professional experience. Formally, students register for ATMS 492 and receive 4 credit hours for this experience. We propose to use the DOW as a vehicle to conduct research experiences for 4-6 undergraduates. These students would learn to operate the radar during its stay at the University, operate during a storm during the 3 week period, and subsequently analyze the data to study some aspect of storm structure. The study would be tailored to scientific questions related to the observed storm modes. For example, if a winter cyclone passed through, the focus may be on banding; if an arctic front passed through the radar domain, the focus may be on frontal structure; if late season convection occurs, the focus may be on mesoscale structure of the observed convective system. Professors Rauber, Nesbitt, Frame and Snodgrass would all be involved in the supervision of these students. All of these professors have worked with radar systems and each has particular complementary interests that would enhance the experience of the undergraduates working with them. The Capstone projects are a semester long. Students would register for ATMS 492 in Fall 2012, following the deployment in Spring 2012.