

## Request for use of the NSF Facilities for Education at Western Illinois University

### Western Illinois University DOW Radar Observations (**WIUDOW**)

#### **Introduction**

Western Illinois University (WIU) is requesting a 19-day campus deployment of the Doppler on Wheels (DOW) radar from September 16 to October 4, 2013. The DOW radar will be used for classroom instruction in our courses, including the Principles of Meteorological Instrumentation, Dynamic Meteorology, Synoptic Meteorology and Meteorological Data Analysis. At least two outreach events will be planned, including outreach for the university and Macomb community and local schools. Data collected from the DOW radar will then be used for research by both undergraduate meteorology majors and graduate physical geography Master's degree students.

#### **Background**

WIU is a teaching university located in rural West-central Illinois. A variety of Bachelor's and Master's degree programs are offered, including a Bachelor's degrees in Meteorology and Geography, and a Master's degree in Geography. The majority of students at WIU are first-generation college students. About half of these students come from the Chicago area and the other half come from the farming communities of Illinois. This creates a culturally and ethnically diverse student population. Nearly half of our student population is women and the largest ethnicity, besides Caucasian, is Hispanic. Because WIU draws from both rural and urban areas we also have a diverse range of student experiences, which greatly enhances the learning environment. Since WIU does not have a PhD program, it is rare for our students to be exposed to state of the art instrumentation and for the majority of our students, this will be a once in a lifetime experience.

#### **Proposed use of the DOW Radar**

The DOW radar will be deployed from Western Illinois University in Macomb, IL to various sites within a one hour radius of the university to conduct field observations. The nature of each field trip will depend on the weather events that occur while the DOW radar is at Western Illinois University. During active weather days, the DOW radar will be used to examine various late summer and early winter weather phenomena, including frontal passages and precipitation events. During quiet weather days, the DOW radar will be used to examine characteristics of the interaction between the Mississippi River and the boundary layer. Ideally, dual polarization scans at various elevations will allow us to create vertical profiles of hydrometeor types (on active weather days) and boundary layer characteristics (on quiet weather days). It may also be possible to observe insect, bird and bat movements along the Mississippi River ahead of cold fronts. I have worked with Dr. Kenneth McCravy in the Department of Biological Sciences and he (and his students) can help with the field planning for more biological/entomological projects.

## Educational Objectives and Student Engagement

There are two primary objectives for the educational portion of this proposal. They are (1) to enhance instruction in meteorology courses and (2) to provide data for student research projects.

The DOW radar will be used to enhance learning in our meteorology courses by incorporating these instruments into the classes (see Table 1). Our Introduction to Weather and Climate courses currently talk about interpretation of radar images. These classes, along with others, will be invited to tour the DOW radar and see how it works. Students in our more advanced classes will plan and participate in field observations. This planning will include forecasting and nowcasting, site selection, and observation strategies for various types of weather events. The types of weather events that will be investigated depend on the weather that occurs while the DOW radar is at WIU. Students will go in the field to learn how to operate the DOW radar. Students will also monitor data collection to learn characteristics of the instruments themselves. Once the data are collected, the data will be analyzed using data visualization software, including SOLO. Students will also keep a log of their activities, observations and personal impressions about the educational opportunity. I plan to check their log books weekly to ensure that students are getting the most out of this opportunity.

**Table 1: Summary of student participation**

<b>Course Title and Name</b>	<b>Description of involvement</b>	<b>Anticipated enrollment</b>
GEOG 120: Introduction to Weather and Climate	Introduction to interpretation of radar images and tour of the DOW radar	256
GEOG 300: Principles of Meteorological Instrumentation	Design field campaigns that take into consideration instrument characteristics/limitations while studying various weather events	25
GEOG 322: Synoptic Meteorology I	Forecasting support for field experiments during the 0-48 hour period before a field trip	30
GEOG 329: Dynamic Meteorology I	Design field campaigns to study the dynamics and thermodynamics of frontal passages and boundary layer interactions	25
GEOG 333: Meteorological Data Analysis	Analyzing collected data using various software packages (i.e. SOLO, GrADS, Vis5D)	25

The data gathered from the DOW will be used in both undergraduate and graduate research projects, as well as classroom assignments. Undergraduate projects may be used for partial completion of the Senior Thesis course that is required for all Meteorology and Geography majors. These projects can then be presented at the WIU Undergraduate Research Day, the

regional National Weather Association conference and the Illinois Geographical Society meeting. Some of the projects will likely be presented during the Student Conference at the American Meteorological Society meeting.

As an aside: I am hoping to find graduate student among our new fall students who is interested in the interaction between the Mississippi River and the boundary layer. A former Master's student, Amanda Wertz, looked at squall line evolution as they cross the Mississippi River. She categorized different evolution patterns and determined how often each evolution type occurred. I would like to find another graduate student to look at the nature and extent (vertical and up/down wind of the river) of the River-boundary layer interaction. (Yet another graduate student is needed to determine if Amanda's results were simply part of a rapidly evolving system and not related to the river at all, but DOW radar data are not needed for that part of the study.)

### **Outreach**

Several outreach events are planned for the period when the DOW radar is at Western Illinois University. Our local student chapter of the AMS (Severe Weather Club) currently organizes weather awareness events for the local 2<sup>nd</sup> and 3<sup>rd</sup> grade classes, so they will help with organization of the outreach events. We are planning to go to the local middle/high school and allow students and teachers to tour the DOW radar. We will also host a Weather Appreciation Day for Macomb and surrounding communities. This event will be held on a Saturday and the local newspapers, TV and radio stations will be used to advertise the event. The university public relations office will likely help promote the community-wide event.

### **Summary**

We request the use of the DOW radar for education purposes at Western Illinois University. This facility will be used to enhance education in several of our core meteorology courses. We will also offer tours of the DOW radar to the students in the General Education meteorology and physical geography courses, which may increase student diversity by drawing underrepresented students to the meteorology major. We are also planning a Weather Appreciation Day as a community outreach event to draw people from Macomb (and surrounding areas) and school trips to introduce K-12 students to the DOW radar.

## Facility Request Form for Educational Activities

### Part I: General Information

Requestor Name	Redina Herman
Institution and Address	Department of Geography Western Illinois University 1 University Circle Macomb, IL 61455
Phone and Email	(309)298-1764 RL-Herman@wiu.edu
Faculty Advisor Name (if student requestor)	NA

### Part II: Project Description

Project Title	Western Illinois University DOW Radar Observations (WIUDOW)
Project Location	Macomb, IL
Start and End Dates of Field Deployment	September 16 - October 4
NSF Facilities requested (type and # of systems)	1-Doppler on Wheels
Number of Expendables requested (if applicable)	

### Part III: Educational Activities Description

Number of students actively involved	Graduate:1-3 Undergraduate: directly, 30 indirectly, 350
Desired training activities conducted by Facility Staff including time in the field	Training to operate the DOW and run SOLO software to do basic analysis
Desired teaching activities conducted by Facility Staff including time in the field	One general talk on DOW related research
Additional special requirements that pertain to Facility support	
Ancillary/Opportunistic Outreach Activities	University Students: General Education meteorology and physical geography students will tour the DOW K-12: DOW will visit local schools on at least one occasion Public: Weather Appreciation Day will be organized to involve local and surrounding communities

### Part IV: Operational Requirements

Please specify data access needs (e.g., real time)	
Please specify data analysis needs	
Please specify communications needs	