

**Geoscience Education and Outreach of Weather in New York using the DOW
at Hobart & William Smith Colleges (GEO-WIND-HWS) Project**

Neil F. Laird and Nicholas D. Metz
Department of Geoscience
Hobart & William Smith Colleges
Geneva, NY

1. Introduction

Hobart and William Smith Colleges (HWS) is requesting a 17-day (February 13 - March 1, 2013) on-campus deployment of one of the dual-polarimetric Doppler on Wheels (DOW) radars, managed by the Center for Severe Weather Research (CSWR), for the purposes of

- a. Education: Nearly 70 students from four atmospheric science courses offered by Drs. Laird and Metz during the spring 2013 semester will have opportunities to gain first-hand knowledge of the DOW radar system through field work and exercises integrated into courses. Approximately 30 of these students will be Geoscience majors/minors. This subset of students will gain valuable experience with the planning, deployment, collection, and analysis of DOW measurements along with accompanying meteorological measurements from HWS mobile sounding and mesonet facilities during GEO-WIND-HWS project. The remaining 40 students, enrolled in an Introduction to Meteorology course (GEO-182), will complete in-class exercises using DOW radar data and have an opportunity to tour the DOW facility.

and

- b. Outreach: Several outreach events are planned both on the HWS campus and at regional universities and K-12 schools. These events will provide students, staff, and faculty, as well as the general public an opportunity to tour the DOW facility and learn about weather research. Additionally, the HWS admissions and communications offices plan to publicize the on-campus events and invite television and other media outlets within the western and central New York region (Syracuse, Ithaca, and Rochester). We also plan to coordinate outreach events and data collection operations with the National Weather Service Forecast Offices (NWSFOs) in Binghamton, NY and Buffalo, NY.

We have included a preliminary calendar of the 17-day deployment for the GEO-WIND-HWS project to demonstrate the balanced schedule between education and outreach. The calendar is included in section 4 of the request.

2. Educational Activities and Benefits

The Department of Geoscience at HWS has a rich history of incorporating field labs and research into its student educational experience. For example, the location of HWS on Seneca Lake provides unique opportunities for field-based pedagogy; we routinely incorporate the William Scandling, the Colleges' 65-ft steel-hulled research vessel, into course- and research-related hands-on data collection experiences. With the recent growth of atmospheric science at

HWS, we have acquired mobile sounding and mesonet facilities that are being utilized in conjunction with several different course offerings. The use of the DOW in tandem with these other observational platforms will allow students to better understand and appreciate the work involved in a meteorological field project. Dr. Laird has previously been involved with several meteorological field projects and has experience with performing radar analyses using a variety of software tools, including Solo.

The deployment period in mid-to-late February of the spring 2013 semester will be ideal because students will have had a few weeks prior to the arrival of the DOW to learn background skills in radar and mesoscale meteorology. Given the location of HWS within the Finger Lakes region of New York State and close proximity to the eastern Great Lakes (Ontario and Erie), we anticipate being able to collect DOW radar measurements during a variety of weather situations, such as lake-effect snow bands over an individual Finger Lake or Great Lake, ice storms, frontal passages, and mesoscale snow bands embedded within snowfall from a synoptic-scale cyclone. Additionally, we anticipate being able to collect DOW radar measurements to examine non-meteorological targets, such as wind turbines, terrain and vegetation, and bird migration. In addition to DOW deployment sites in Buffalo, Binghamton, and Ithaca, New York that will be coordinated with combined data collection from dual-polarimetric WSR-88D radars and/or outreach events, we anticipate identifying at least three sites in the Finger Lakes and eastern Great Lakes regions for DOW deployments during the GEO-WIND-HWS project (see section 5).

Activities and measurements related to the DOW deployments will be used in the following four atmospheric science courses at HWS in the spring 2013 semester and in subsequent years.

- **GEO-265: Weather Measurement (10 students; Dr. Laird):** One of the main topics in this course is radar meteorology. GEO-265 students will be largely responsible for operating the DOW and managing DOW deployment. This will bring to life main topics discussed in class, such as scanning strategies, dual-polarimetric radar parameters, and issues related to radar measurements and data quality. Additionally, GEO-265 students will gain experience working with collection and analysis of radar data through GEO-WIND-HWS operations and completing a case study using DOW radar measurements.
- **GEO-260: Weather Analysis (10 students; Dr. Metz):** A cornerstone of this course involves teaching students meteorological analysis techniques by focusing on the forecasting process. Students regularly make real-time forecasts and lead current weather discussions. While the DOW is deployed at HWS, students will work with Dr. Metz to provide the necessary forecasts to determine the potential for DOW operations each day. Following DOW operations, the observed conditions along with details of the DOW deployment will be reviewed and assessed to discuss the forecast quality. GEO-260 students interested in being part of the DOW measurement deployments will also have an opportunity to work as student DOW operators.
- **GEO-355: Mesoscale & Severe Weather (12 students; Dr. Metz):** This course focuses on an advanced understanding of mesoscale phenomena. Data collected during DOW deployments will be integrated into classroom discussions and mesoscale weather briefings, as well as student projects. With the potential of collecting DOW measurements

for a variety of mesoscale weather situations, students will gain experience with the collection and interpretation of an important source of data that can contribute to a better understanding of mesoscale phenomena. Additionally, GEO-355 students will assist with forecasting and nowcasting activities to improve their knowledge of the challenges and complexities associated with real-time mesoscale operational forecasting. GEO-355 students interested in being part of the DOW measurement deployments will also have an opportunity to work as student DOW operators.

- **GEO-182: Introduction to Meteorology (36 students; Dr. Laird):** This course not only serves as a survey course in meteorology, but has also historically been used to recruit students into the atmospheric science concentration in the Department of Geoscience. A large number of in-class exercises are utilized in this course to provide an active learning environment – primarily within the classroom because of the larger enrollment in this course. Consistent with this previously successful approach, Dr. Laird plans to develop multiple new in-class exercises for students that would be coupled with an overview and tour of the DOW facility. GEO-182 students interested in being part of the DOW measurement deployments will also have an opportunity to work alongside other student DOW operators.

3. Outreach Activities

- There are a number of regional colleges and universities (SUNY Oswego, SUNY Brockport, Cornell University, Buffalo State College) within a 2–3 hour drive of HWS that have atmospheric science departments or teach a number of meteorology classes. Students from these departments will be invited to visit HWS to tour the DOW. Additionally, students from local community colleges (Finger Lakes Community Colleges, Onondaga Community College, and Monroe Community College) will also be invited to tour the DOW facilities. These visits will not only introduce many additional students to the DOW facilities but also foster teaching and research relationships among the local institutions.
- HWS has a rich history of working closely with local high schools. Thus, HWS students and faculty will make arrangements to take the DOW to several schools in local districts (Geneva, De Sales, Phelps-Clifton Springs, Waterloo) for demonstrations and tours. Since the DOW experience is focused on education, these tours will also give HWS students a chance to teach K-12 students about the DOW and atmospheric science.
- HWS offers multiple on-campus events during the spring semester for prospective students and their parents. The HWS admissions office will publicize the presence of the DOW facilities for all campus open houses during the on-campus DOW deployment. Atmospheric science students will staff the DOW facilities, offering tours and discussions about the DOW and atmospheric science at HWS.
- Geneva, New York is located nearly equidistant between the cities of Rochester, Syracuse, and Ithaca, New York. Thus, television stations in each market would provide a far-reaching opportunity for outreach in western and central New York. The communications office plans to contact local media in each market and invite them to the HWS campus to tour the DOW.

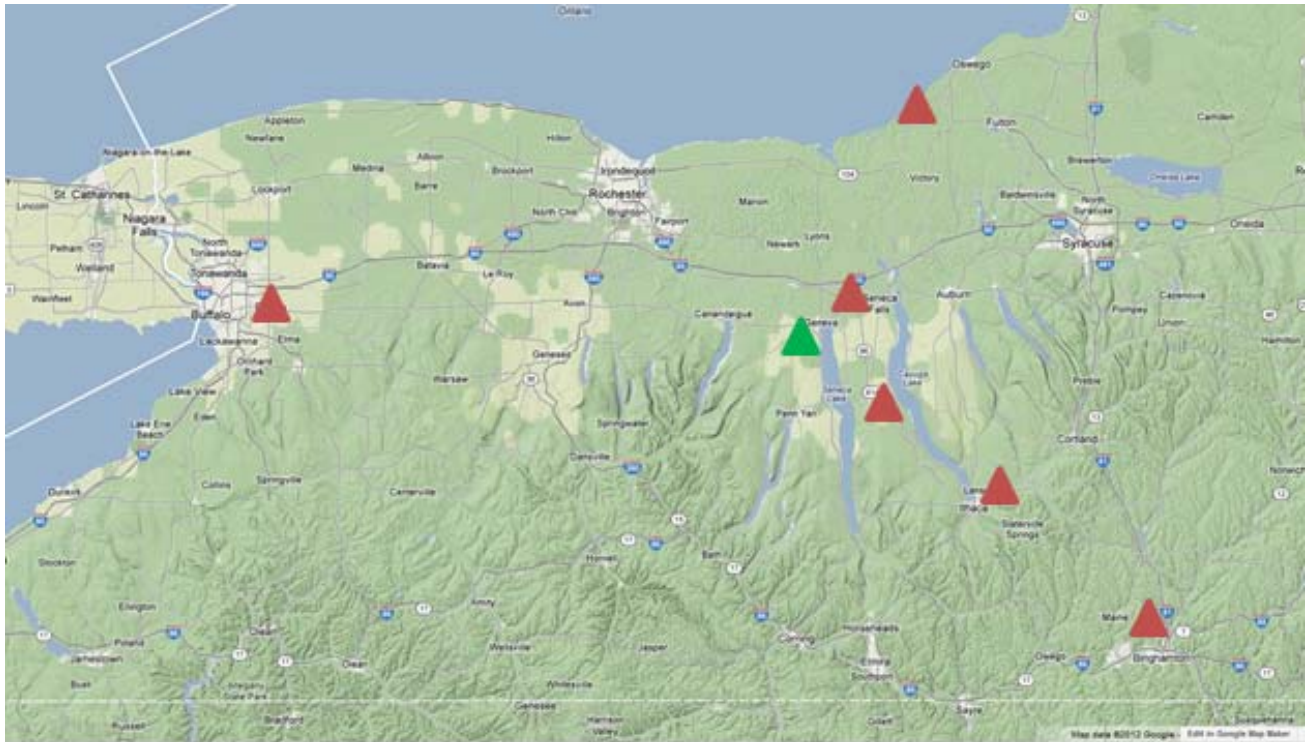
Facility Request for Educational Activities [GEO-WIND-HWS Project]



- HWS has a long-standing tradition where professors from a wide variety of departments and programs offer *Friday Faculty Lunch Talks* that pertain to research or teaching practices. The DOW deployment will offer an opportunity for Drs. Laird and Metz to give one of these talks and provide both an overview of the DOW facilities and allow science, humanities, and social science faculty at the Colleges to tour the DOW radar. This presentation will be planned for Friday, February 15 (see calendar in section 4).

4. Preliminary GEO-WIND-HWS Project Calendar

Date	Day	Morning Event(s)	Afternoon Event(s)	Evening Event(s)
Feb. 13	Wednesday	DOW arrival & training	DOW arrival & training	DOW arrival & training
Feb. 14	Thursday	DOW Deployment (GEO-265 & GEO 355)	Possible DOW deployment	Possible DOW deployment
Feb. 15	Friday	Possible DOW deployment	HWS Faculty Lunch Presentation and DOW tours	Possible DOW deployment
Feb. 16	Saturday	Possible DOW deployment	Possible DOW deployment	Possible DOW deployment
Feb. 17	Sunday	Possible DOW deployment	DOW deployment (Binghamton) combined with NWSFO BGM outreach	DOW deployment (Binghamton) combined with NWSFO BGM outreach
Feb. 18	Monday	Possible DOW deployment	DOW GEO-182 course exercise and tour	Possible DOW deployment
Feb. 19	Tuesday	DOW school outreach events (Geneva & De Sales) with GEO-265 students	DOW deployment (Ithaca) combined with Cornell Univ. outreach event	DOW deployment (Ithaca) combined with Cornell Univ. outreach event
Feb. 20	Wednesday	Possible DOW deployment	Possible DOW deployment	Possible DOW deployment
Feb. 21	Thursday	DOW school outreach event (Phelps-Clifton Springs) with GEO-265 students	Possible DOW deployment	Possible DOW deployment
Feb. 22	Friday	Possible DOW deployment	Possible DOW deployment	Possible DOW deployment
Feb. 23	Saturday	Possible DOW deployment	HWS on-campus outreach event and DOW tours	Possible DOW deployment
Feb. 24	Sunday	Possible DOW deployment	DOW deployment (Buffalo) combined with NWSFO BUF outreach	DOW deployment (Buffalo) combined with NWSFO BUF outreach
Feb. 25	Monday	Possible DOW deployment	DOW GEO-182 course exercise	Possible DOW deployment
Feb. 26	Tuesday	DOW school outreach event (Waterloo) with GEO-265 students		HWS on-campus outreach event and DOW tours
Feb. 27	Wednesday	Possible DOW deployment	Possible DOW deployment	Possible DOW deployment
Feb. 28	Thursday	DOW Deployment (GEO-265 & GEO 355)	Possible DOW deployment	Possible DOW deployment
Mar. 1	Friday	Possible DOW deployment	Possible DOW deployment	DOW departure

5. Potential Deployment Locations and Geography of Central and Western New York



-  Possible DOW deployment locations for GEO-WIND-HWS
-  Hobart & William Smith Colleges

The Buffalo, NY and Binghamton, NY deployment sites will be collocated, or in near proximity, with the recently upgraded dual-polarimetric WSR-88D radars allowing students an opportunity to compare near simultaneous measurements collected from both platforms. Deployment at the other four locations will permit the DOW to collect measurements on a variety of mesoscale phenomena. The actual deployment location will depend upon daily meteorological conditions.

Facility Request Form for Educational Activities

Part I: General Information

Requestor(s) Name	Neil Laird & Nicholas Metz
Institution and Address	Hobart & William Smith Colleges Department of Geoscience 300 Pulteney Street Geneva, NY 14456
Phone and Email	(315) 781-3603 laird@hws.edu
Faculty Advisor Name (if student requestor)	

Part II: Project Description

Project Title	Geoscience Education and Outreach of Weather in New York using the DOW at Hobart & William Smith Colleges (GEO-WIND-HWS) Project
Project Location	Western and Central New York Region centered on Geneva, NY
Start and End Dates of Field Deployment	February 13 - March 1, 2013
NSF Facilities requested (type and # of systems)	Doppler on Wheels (DOW) 1
Number of Expendables requested (if applicable)	

Part III: Educational Activities Description

Number of students actively involved	Graduate: none Undergraduate: 30
Desired training activities conducted by Facility Staff including time in the field	Show faculty and students how to operate the DOW and collect/save/backup data during operations period
Desired teaching activities conducted by Facility Staff including time in the field	none
Additional special requirements that pertain to Facility support	none

Ancillary/Opportunistic Outreach Activities	Several outreach events are planned both on the HWS campus and at regional universities and K-12 schools. These events will provide students, staff, and faculty, as well as the general public an opportunity to tour the DOW facility and learn about weather research. Additionally, the HWS admissions and communications offices plan to publicize the on-campus events and invite television and other media outlets within the western and central New York region (Syracuse, Ithaca, and Rochester). We also plan to coordinate outreach events and data collection operations with the National Weather Service Forecast Offices (NWSFOs) in Binghamton, NY and Buffalo, NY.
---	---

Part IV: Operational Requirements

Please specify data access needs (e.g., real time)	Real-time data access for deployments
Please specify data analysis needs	none
Please specify communications needs	none