

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

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**1. Introduction**

Hobart and William Smith Colleges (HWS) is requesting an 18-day (February 19 - March 8, 2015) deployment for one dual-polarimetric Doppler-on-Wheels (DOW) radar, 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 2015 semester will have opportunities to gain first-hand knowledge of the DOW radar system through field work and exercises integrated into courses during the GEO-WIND-HWS-II project. Approximately 25 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 the HWS mobile sounding system and mobile mesonets. The remaining 45 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, at regional universities and K-12 schools, at regional science museums and science centers, and at the 40<sup>th</sup> Annual Northeastern Storm Conference. These events will provide students, 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- and off-campus events and invite television and other media within the western and central New York region (Buffalo, Syracuse, Ithaca, and Rochester) to the various events. We also plan to coordinate outreach events and data collection operations with the National Weather Service Forecast Offices (NWSFOs) in Binghamton, NY and/or Buffalo, NY.

We have included a preliminary calendar of the 18-day deployment for the GEO-WIND-HWS-II 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, specifically the mobile sounding system, will allow students to better understand and appreciate the work involved in a meteorological field project. Drs. Laird and Metz have previously been involved with several meteorological field projects and have experience with performing radar analyses using a variety of software tools, including Solo.

The deployment period in February and March of the spring 2015 semester will be ideal because students will have had several 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 near Buffalo and Binghamton, NY that will be coordinated with data collection from dual-polarimetric WSR-88D radars, we have identified at least three sites in the Finger Lakes and eastern Great Lakes regions for DOW deployments during the GEO-WIND-HWS-II project (see section 5). Several of these sites were used for DOW radar deployment during the recently completed NSF-supported Ontario Winter Lake-effect Systems (OWLeS) field project in the winter of 2013/2014.

Activities and measurements related to the DOW deployments will be used in the following four atmospheric science courses at HWS in the spring 2015 semester and in subsequent years.

- **GEO-265: Weather Measurements & Computing (12 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-II operations and completing a case study using DOW radar measurements.
- **GEO-260: Weather Analysis (12 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. Metz):** This course not only serves as a survey course in meteorology, but has also historically been used to recruit students into the growing 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. Metz will use in-class exercises from our previous DOW project 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 be trained on DOW operations and work alongside other student DOW operators.

### 3. Outreach Activities

- There are a number of regional colleges and universities (SUNY Oswego, SUNY Brockport, SUNY Oneonta, 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 outreach events or 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, 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. During the GEO-HWS-WIND-I project, HWS students developed 12 poster banners with information about severe weather systems and radar meteorology. These banners will again be used in tandem with the DOW radar during outreach events to provide a wealth of information about meteorology.

- 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 various outreach events and the HWS campus to tour the DOW. The media coverage for outreach events during the GEO-HWS-WIND-I project was very good.
- 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 HWS to tour the DOW radar as part of a public outreach event on the HWS campus. This presentation will be planned for Friday, February 27 (see calendar in section 4).
- During GEO-WIND-HWS-I we coordinated a very successful public outreach event with the Rochester Museum and Science Center and WROC Channel 8 TV in Rochester. Over 400 people visited the DOW on the Rochester Museum campus and HWS students and faculty discussed the NSF-funded educational DOW project during interviews with WROC. We plan to work with the Rochester Museum and WROC to plan a similar event for the GEO-WIND-HWS-II project. Additionally, we will plan a similar public outreach events to be hosted at the Buffalo Museum of Science and the Sciencenter in Ithaca, NY.
- The Northeastern Storm Conference (NESC) is the largest and longest running student-run conference in the nation. The 40<sup>th</sup> annual NESC is scheduled for 6–8 March 2015 in Saratoga Springs, NY. The conference is organized and run by Lyndon State College meteorology students and draws over 300 students and professionals from around the country to share their knowledge and experience through presentations and panel discussions. Saratoga Springs, NY is located about 200 miles east of HWS. The conference begins in the evening on Friday, 6 March and ends by 12 PM on Sunday, 8 March. We plan to coordinate several outreach events on 6 March with schools near the NESC location (e.g., Saratoga High School, Burnt Hill-Ballston Lake High School). The NESC location will be in the city of Saratoga Springs and we plan to have the DOW available for public tours on both 7 & 8 March in downtown Saratoga Springs. This city location, near the NESC, is likely to draw 500-1000 people during the two days.

#### 4. Potential Deployment Locations and Geography of Central and Western New York



The Buffalo, NY and Binghamton, NY deployment sites will be collocated, or in near proximity, with the dual-polarimetric WSR-88D radars allowing students an opportunity to compare near simultaneous measurements collected from both platforms. Deployment at the other locations will allow the DOW to collect measurements on a variety of mesoscale phenomena. The actual deployment location will depend upon daily meteorological conditions. Several of the identified DOW sites were used by DOW radars during the Ontario Winter Lake-effect Systems (OWLeS) field project during the winter of 2013/2014.

### 5. Preliminary GEO-WIND-HWS-II Project Calendar

Date	Day	Morning Event(s)	Afternoon Event(s)	Evening Event(s)
Feb. 19	Thursday	DOW arrival & training	DOW arrival & training	DOW arrival & training
Feb. 20	Friday	DOW training	DOW training	DOW training
Feb. 21	Saturday	Possible DOW deployment HWS students	Rochester Museum & Science Center public outreach event	Possible DOW deployment HWS students
Feb. 22	Sunday	Possible DOW deployment HWS students	NWSFO Binghamton deployment and public outreach	NWSFO Binghamton deployment and public outreach
Feb. 23	Monday	GEO 186 HWS students	GEO 182 HWS students	Possible DOW deployment HWS students
Feb. 24	Tuesday	DOW school outreach events (Geneva) with GEO-265 students	DOW school outreach events (Waterloo) with GEO-265 students	Possible DOW deployment HWS students
Feb. 25	Wednesday	Possible DOW deployment HWS students	Possible DOW deployment HWS students	Possible DOW deployment HWS students
Feb. 26	Thursday	DOW school outreach event (Phelps-Clifton Springs) with GEO-265 students	DOW school outreach event (Newark) with GEO-265 students	Possible DOW deployment HWS students
Feb. 27	Friday	Possible DOW deployment HWS students	HWS Faculty Lunch Presentation and public outreach event @ HWS	Possible DOW deployment HWS students
Feb. 28	Saturday	Buffalo Museum of Science public outreach event	Buffalo Museum of Science public outreach event	NWSFO Buffalo deployment
Mar. 1	Sunday	Possible DOW deployment HWS students	Ithaca Sciencenter public outreach event	Possible DOW deployment HWS students
Mar. 2	Monday	Possible DOW deployment HWS students	Possible DOW deployment HWS students	Possible DOW deployment HWS students
Mar. 3	Tuesday	DOW school outreach event (Pittsford) with GEO-265 students	DOW school outreach event (Fairport) with GEO-265 students	Possible DOW deployment HWS students
Mar. 4	Wednesday	Possible DOW deployment HWS students	Possible DOW deployment HWS students	Possible DOW deployment HWS students
Mar. 5	Thursday	DOW school outreach event (Victor) with GEO-265 students	Possible DOW deployment HWS students	Possible DOW deployment HWS students
Mar. 6	Friday	DOW school outreach event (Burnt Hills)	DOW school outreach event (Saratoga)	Northeastern Storm Conf.
Mar. 7	Saturday	Northeastern Storm Conf. & Saratoga Springs outreach	Northeastern Storm Conf. & Saratoga Springs outreach	Northeastern Storm Conf. & Saratoga Springs outreach
Mar. 8	Sunday	Northeastern Storm Conf. & Saratoga Springs outreach	Northeastern Storm Conf. & Saratoga Springs outreach	Project End

## Facility Request Form for Educational Activities

### Part I: General Information

Requestor 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-II) Project
Project Location	Western and Central New York Region centered on Geneva, NY
Start and End Dates of Field Deployment	February 19 – March 8, 2015
NSF Facilities requested (type and # of systems)	Doppler-on-Wheels (DOW) 1 truck; Dual-Polarization; Dual-wavelength
Number of Expendables requested (if applicable)	

### Part III: Educational Activities Description

Number of students actively involved	Graduate: none Undergraduate: 20-30
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/Oppportunistic Outreach Activities	Several outreach events are planned both on the HWS campus, at regional universities and K-12 schools, and at regional science museums and science centers (Rochester, Buffalo, Ithaca). These events will provide students, as well as the general public opportunities to tour the DOW facility and learn about weather research. Additionally, the HWS admissions and communications offices plan to publicize the on-campus and off-campus events, as well as invite television and other media 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. Lastly, we plan to have the DOW radar available for outreach events during the 40 <sup>th</sup> Annual Northeastern Storm Conference in Saratoga Springs, NY.
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#### 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