

Engineering Student Technology Committee

<http://www.engr.colostate.edu/ESTC>

College of Engineering

1. Title of Proposal: Improving student opportunities with meteorological instrumentation

2. Proposal Participants:

Primary Contact for Proposal

Name: Russ Schumacher

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Department/Major: Department of Atmospheric Science

Check One: Faculty Staff Student

Additional proposal participants

Name: Atmospheric Science Graduate Student Representatives (Janice Bytheway, Aryeh Drager, David Duncan, Christopher Slocum)

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3. Proposal Abstract (limit to 100 words):

Graduate students often have limited exposure to research grade meteorological instrumentation unless involved in a field campaign. Even then, most equipment is rented from a national research center. This arrangement hinders the ability of students to explore how instrumentation can be applied to their research and future projects. To address this issue, we would like to extend the instrumentation resources in the Department of Atmospheric Science available for student use. Extensions include radiosondes to use with the Department's upper-air sounding unit, and all-in-one weather stations, for sampling severe weather, class projects and demonstrations, as well as student led research.

4. Proposal Budget

List of items to purchase and cost of each

Description	Quantity	Unit Price	Total	Priority
Met One all-in-one (AIO) weather sensor including automet datalogger and tripod	2	\$4,635	\$9,270	1 - 1 st station 3 - 2 nd station
Vaisala radiosondes with pressure sensor (RS41-SGP) [box of 20]	2	\$5,375	\$10,750	2
Meteorological balloons (TA200) [box of 25]	2	\$550	\$1,100	2
HOBO Micro Station with temperature & relative humidity sensors	4	\$460	\$1,840	4
Kestrel 5500 weather meters	4	\$400	\$1,600	5
Grand Total			\$24,560	

Dollar or percentage amount requested from ESTC:

\$18,560 (75%). The Department of Atmospheric Science is contributing \$6,000 towards this proposal. The Met One AIO price includes a 10% educational discount. The Department has already made a substantial investment in this system (see below). Our priority for partial funding of the requested equipment is given in the last column in the table above with 1 being highest the priority.

5. Full description of proposal:

The Department of Atmospheric Science is requesting to purchase instrumentation to enhance opportunities for graduate students across the College interested in meteorological research. Students that do not have the opportunity to participate in field campaigns rarely get exposure to meteorological instrumentation. Instrumentation resources are not readily available for graduate students in an instructional setting or for designing student led research projects. The new instrumentation would enhance the quality of data collected with the Department's sounding system, improve classroom learning experiences by providing hands-on experience with research grade equipment, and expand opportunities for student led research projects throughout College of Engineering. The meteorological instrumentation proposed here will expose atmospheric science students and any student enrolled in at least 15 undergraduate, masters, and PhD level courses¹ to research quality instrumentation and data.

The Department recently purchased a Vaisala DigiCORA Sounding System MW31 (\$80K MSRP) for taking vertical profiles of the atmosphere. This system is available for graduate students to use during interesting weather events, student led research, and trainings for field campaigns. The sounding system has been used for graduate student led outreach to grade school classes and science teacher trainings. The funds requested to purchase radiosondes and balloons make this resource available to students interested in collecting vertical profiles during classroom instruction and student led projects over a two-year period. Currently, the sounding system is lacking a standalone weather sensor system that is necessary to calibrate the radiosondes prior to launch. The addition would generate high-quality vertical profiles of atmospheric data as well as a continuous log of surface conditions. Without this station, the quality of the profiles restricts how the data is used in student research projects.

In this proposal, we are requesting two surface weather stations so that they can be deployed for class projects and student research to study atmospheric conditions in Colorado's complex terrain. In addition to the Met One AIO, we would like to start a collection of HOBO temperature and relative humidity sensors and Kestrel weather meters to sample small-scale spatial changes in meteorological conditions to further enhance the instructional value of information collected regarding boundary and surface layer dynamics. The Kestrels will replace broken units that are currently available for checkout with Engineering Network Services.

Enhancing the meteorological instrumentation available to the graduate students at Colorado State University will assist students in understanding the complexities of sampling the atmosphere. Students can access these instrumentation resources through a reservation system on the Department of Atmospheric Science website. On the site, a calendar will list instrumentation availability and demonstrations/trainings. Any College of Engineering student interested in atmospheric science is welcome to attend demonstrations/trainings (e.g., Electrical Engineering students have used our instrumentation to calibrate their systems and fill voids in data-sparse regions and would benefit from attending). Having radiosondes and balloons for the sounding system, quick deploy weather stations, HOBO temperature and relative humidity sensors and Kestrel weather meters will open many doors for future research and educational opportunities for the students of Atmospheric Science and the College of Engineering.

¹ These courses are taught by Elizabeth Barnes, Thomas Birner, Jeff Collett, Scott Denning, Sonia Kreidenweis, Steve Rutledge, Russ Schumacher, Susan van den Heever.