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field notes

The Polar Field Services Newsletter



Promoting Diversity in Science



Dr. Linda Hayden (left) and colleagues at the 2013 National Science Foundation Gender Summit. Pictured, from left to right: Hayden, Loretta Moore, Cynthia Winston, Sonya Smith, Kelly Mack. Photo: courtesy NSF

Head north into the Arctic and you'll find a self-selected crew of researchers devoting their field seasons to uncovering the mysteries and facts of the region. Look closely and you can't help but notice these scientists are primarily white and male.

Minorities and Women in Science

But efforts are afoot to diversify the Arctic research community, and at the helm is Linda Hayden, Professor of Computer Science at Elizabeth City State University (ECSU) in Elizabeth City, North Carolina. Fourteen years ago, Hayden spearheaded the effort to recruit and provide opportunities to minorities and women interested in polar science and climate. Today, her efforts have taken on a life of their own.

“The idea is to build collaborations that enhance diversity in polar science and engage those who do not self-identify as future polar scientists. I want students to understand that we need them and their talents and their skill sets to solve challenges in polar research,” says Hayden. “Like other areas of science, polar science greatly benefits from diversity, which balances bias, enlivens problem solving and expands on methods, explanations and approaches. So, any strategy that engages the next generation of polar scientists must actively engage diverse participants, including arctic people, underrepresented minorities and women.

Scientific Opportunities for Underrepresented Undergraduates



Participating in one of the workshops spearheaded by Dr. Hayden has been life changing for some students. Photo: Linda Hayden

ECSU is a “teaching-focused, community-engaged” Minority-Serving Institution in northeastern North Carolina. Located near the Atlantic Ocean, ECSU has long studied marine and coastal environments, especially through remote sensing techniques. In 2002 Hayden founded the Center of Excellence in Remote Sensing Education and Research (CERSER), part of ECSU’s Mathematics and Computer Science Department. As CERSER’s director, Hayden works diligently to provide opportunities for students in STEM fields.

Over the last 14 years the Arctic and Antarctic Research Experience for Undergraduates (AaA-REU) program has evolved with funding from the U.S. Navy, the University of Kansas’ [Center for Remote Sensing of the Ice Sheets](#) (CReSIS), with whom ECSU has a long-standing relationship, and the National Science Foundation.

The REU objective is simple: promote professional development of historically underrepresented undergraduate students (African American, Hispanic Americans, Native Americans, Pacific Islanders, and women) through facilitating their participation in polar, ocean and marine science research.

Drawing from Personal Experience

“I think that in my role as an African American woman that it’s important that these opportunities are made available at least to the groups within my reach. Even if they know they are available they don’t see themselves as being participants. Sometimes, however, just helping them understand that opportunities are available is all it takes,” Hayden said in an interview with the Renaissance Computing Center, UNC Chapel Hill.

Admission by Application

Each year Hayden and faculty mentors select twenty-five undergraduate students. This includes 20 REU students and 5 pre-service teachers in the Research Experience for Teachers (RET) component. Ultimately, Hayden hopes to build a group from a wide range of disciplines and backgrounds.

Typically, applicants are majors in mathematics, computer science, geosciences, biology, and physics. Students are required to have completed thirty hours of coursework by the start of the program and have a GPA of 3.0 or higher. Any student who meets these criteria is eligible for the program, but students who are in groups traditionally underrepresented in science are highly encouraged to apply. Each participant receives a stipend of \$3600, travel costs, on-campus room and board and college credit, depending on the school through which they are partnered.

Summer Immersion

The Association of Computer and Information Science Engineering Departments at Minority institutions ([ADMI](#)), a professional organization, will select and support an additional 8-10 REU students. During the 8-week summer internship (late May-late July) participants will work in teams of 2-5 with a faculty mentor.

Several teams will be based in Elizabeth City. Others who work with faculty at a partnering institution spend a week or two at the institution to become familiar with their project and develop a relationship with their team. Partnering institutions for 2014 include: University of Kansas, Indiana University, Pennsylvania State University, and the University of Washington. Students engage daily with mentors and their team. Seminars, lunch meetings, and social functions promote sharing and bonding.

Mentoring

Projects fall within one of four broad areas including cyberinfrastructure, wherein students work with faculty to develop innovative techniques for sharing data with polar scientists, Arctic and Antarctic science, and STEM education. Projects depend on the expertise of the faculty. Students must present a final oral presentation, poster, or paper at summer's end.

Student-mentor relationships continue after the program with on-line mentoring and follow-up during the academic year. Post internship opportunities may include participation in national conferences, field work in the Polar Regions, and graduate studies.

"One thing that makes this REU unique is that we have a 2-tier system. Students can enter the program at the start of their freshman year and build a polar science vocabulary while learning about climate change science through their research project. Some do three years and then usually go on to grad school at that point. Some students return to mentor other students in following years," Hayden says.

Life Changing Experience

One such student, Jerome Mitchell, now a graduate student at Indiana University who completed the program in 2006, cites his experience as a turning point in his career.

"Conducting quality research as an undergraduate is a privilege, but many are unable to participate in [these] rich experiences. My experiences as an undergraduate provided a gateway to conducting research in Antarctica and have provided a solid foundation for thinking independently and writing technical literature, which has been a necessity for me to thrive in a Ph.D. program. I partially owe my successes as a student researcher to undergraduate research programs, and I highly recommend [them]!"

To date, the REU has been increasingly successful. About half of participants are women and three-quarters minorities. Hayden hopes project funding will continue. —**Marcy Davis**

For more information about the REU or to become a faculty mentor visit <http://nia.ecsu.edu/>

To apply submit an **application**, current transcript, resume, a one page statement of goals, and one letter of recommendation by April 23, 2014, to:

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This entry was posted in Alaska, Arctic, Chemistry, Cryosphere, Greenland, Instrument Development, Meteorology & Climate, National Science Foundation, Outreach & Education, Polar Field Services, Social & Human Sciences and tagged Alaska, diversity, Linda Hayden, Marcy Davis, National Science Foundation, remote sensing, Science, women on April 5, 2014 [<http://polarfield.com/blog/promoting-diversity-in-science/>] by Rachel.