Igniting a passion for climate

By taking a multi-faceted approach **Dr Lesley-Ann Dupigny-Giroux** hopes to create new openings for minority students from high school to graduate levels who wish to study climate sciences

How and why do you plan to change the perception of climate sciences, and make it a viable career path for young people from a range of backgrounds?

Many students have a very limited idea of what the science behind climatology is all about, who practices them and where they are based. We begin by advertising the field and our work, and by revealing ourselves as successful researchers in this area of expertise. Our very presence immediately expands their horizons and allows them to listen to our message. We provide viable career examples, tangible opportunities, accessible mentors and role models, networks and contacts and alternatives to traditional cultural barriers related to climatology and the climate sciences.

How is this network reaching out to young people in the surrounding areas?

We reach out to high school students in the Bronx area of New York City as part of the University of Vermont Admissions Office programming. I also work with the Burlington High School in the greater Burlington, Vermont area. When engaging with high school students, the venue was found to be the most important contributor to success. Interactions as part of a regularly scheduled class were the most effective across grade levels, while engaging with Grade 12 students during the 'Discovering UVM' campus visits were the least so. In addition my colleague, Dr Marilyn Raphael, holds seminars with a subset of the students who enroll in the University of California-Los Angeles Academic Advancement Program to introduce them to climatology and potentially to enroll them in the D-ClimNet programme. These seminars are advertised and attract a range of students, ranging from those who have never considered climatology to those who have but were unsure whether or not to pursue this line of study. At the University of Georgia, Dr Marshall Shepherd has been active in his outreach to the Peach State Louis Stokes Alliance for Minority Participation (Peach State LSAMP). This collaboration of seven colleges and universities strives to stimulate undergraduates in Georgia to complete their degrees in the Science, Technology, Engineering and Mathematics (STEM) fields.

What has been your greatest obstacle in your work on D-ClimNet?

One of the greatest challenges is definitely targeting the most critical grade level to raise their awareness of the climate sciences and geography as a potential major at the post-secondary level. Targeting Grade 12 students may not be the most time-appropriate intervention because many of them are preparing to apply to, or have already applied to, two-year and four-year post-secondary institutions; the reality of studying for the college-entrance Scholastic Aptitude Test and other such commitments seems to outweigh the requirements of a relatively new programme, such as the D-ClimNet. In addition, students self-reported not having taken either geography or earth science in high school, making them less inclined to pursue a major or career about which they know very little.

How are you working with programmes such as NSF-funded Satellites, Weather and Climate (SWAC) project in order to improve outreach?

The SWAC programme is a professional development framework aimed at bringing atmospheric science, climatology and geospatial skills in to the kindergarten to Grade 12 school curriculum. Participating SWAC teachers have opened up their Physics and Environmental Science classes to visits by my team. Through this we have been able to conduct 'mock' classes around current weather events (eg. tornadoes, excessive flooding) that highlight for students, how very necessary applied weather and climate information can be.

Do you hope to extend the network to other institutions or cities?

We recently proposed to extend the D-ClimNet programme to a historically black tertiary institute, Tennessee State University, through a NASA Minority University Research and Education Program grant. This proposed effort would expand the network and entrain the NASA Earth System Science perspective into our work. We have also been nurturing partnerships in Georgia with the Clark Atlanta University. Furthermore, at the University of Georgia, Dr Thomas Mote has worked with Tribal colleges in the past, and more recently participated in a workshop on Native American climate change issues. It is hoped that these ties could lead to expansion in those communities in the future. Diversification of a university will require a multi-pronged approach in order to be successful. It will need to be sensitive to cultural and ethnic norms and perceptions, be integrative in nature, with a strong commitment supporting and rewarding the interpersonal relationships that are necessary to assist students of colour in reaching their goals.

Creating a climate for diversity

Through a collaboration of experts, the **Diversity Climate Network** hopes to reverse current trends of under-representation of minority groups in the emerging fields of climatology, climate change and climate policy

FACED WITH A number of growing challenges in the recruitment and retention of students to the geosciences and climate sciences, a group of professors at the University of Vermont (UVM), the University of California-Los Angeles (UCLA) and the University of Georgia (UGA) recognised the need to increase students' exposure to these disciplines. This is important in ensuring these science fields are appreciated as offering truly viable career options. The problem they are dealing with is not limited to one particular geographic area; it spans both metropolitan and rural areas.

A recent article by the Project Investigator of the National Science Foundation-funded Satellites, Weather and Climate programme highlighted that recruitment in this field is a major challenge for the future. They noted that many students perceive the Earth Sciences to be a 'remedial' science, one that is not on par with physics, chemistry or biology. Other barriers to recruitment have been identified as including financial issues and inadequate high school training in particular fields. Whilst there are already a number of projects that are focused on transforming the underrepresentation of students in geosciences, many of these students are not exposed to the value and benefit of studying climate and atmospheric sciences. A new programme funded by the National Science Foundation is aiming to reverse this trend.

GRADE 10 STUDENTS FROM THE CHRISTOPHER COLUMBUS PARTNERSHIP VISIT THE UNIVERSITY OF VERMONT

A CONDUIT FOR CLIMATOLOGISTS

Dr Lesley-Ann Dupigny-Giroux, the coordinator behind the programme known as D-ClimNet, believes that many talented African-American students are often expected or steered by parents and older generations towards career fields perceived to be more lucrative and respected, such as medicine, law or business. From Dupigny-Giroux's perspective climatology is an area that needs diversifying and she hopes that D-ClimNet will be able to achieve this by encouraging diversity in the field of climate research. Her goal is to change these perceptions and to ultimately see climate sciences become accepted as a respectable career: "We aim to provide the mentoring and supportive framework that will allow students of colour to succeed and excel in climatology". She believes that the success of D-ClimNet will eventually be measured by how well they are able to increase the acceptance of climatology as an important career among underrepresented students, both of race and gender.

DR MARILYN RAPHAEL

DR MARSHALL SHEPHERD

The D-ClimNet is a partnership among climatologists at the UVM (Dupigny-Giroux), UCLA (Dr Marilyn Raphael) and UGA (Drs Marshall Shepherd and Thomas Mote). The collaborating scientists in this project are aiming to achieve four key goals. Firstly, they want make sure that there is an increase in the recruitment of first generation minority students who are choosing to pursue climate sciences. Secondly, they hope to create a 'pipeline of climate science students', who will move from high school right through to taking a doctorate. Thirdly, by fostering a community of support they hope to stimulate student involvement in research. Finally, through the use of research seminar exchanges, joint research and publications they believe a research-teaching partnership can be built.

There are large geographic distances between the three collaborating universities involved in D-ClimNet. Operating as an inter-state collaborative project is not an easy task and the D-ClimNet proragmme relies heavily on leveraging resources across the three partners. This allows the collaborators to strategically meet at national scholarly conferences where they are presenting their research. "Other leveraging took the form of a a Franklin Visiting Scholar for Inclusion and Diversity Leadership grant from the UGA which was initiated by Marshall Shepherd. This allowed me to visit colleagues there, while presenting my research on climate literacy. This visit also allowed me to expand our attitudinal surveys to a pool of graduate students," highlights Dupigny-Giroux. They have also looked at opportunities to use video conferencing capabilities, such as Skype, to help foster cross-institutional lectures and seminars. This will make a significant contribution towards breaking down the D-ClimNet barriers that result from the geographic isolation.

THE VALUE OF MENTORING

D-ClimNet is the result of an organic creation that has evolved from personal relationships, shared experiences and research interests among the four principal investigators, and the programme capitalises on these existing relationships to exploit their strengths. Whilst the three institutions are regionally, ethnically and research diverse, they all offer Geography degrees with an emphasis on climatology – albeit with a slightly different focus. One of the collaborators working with Dupigny-Giroux is Dr Marilyn Raphael, who sits on the faculty advisory board of UCLA's Academic Advancement

Program. Raphael meets with a group of the students taking part in the AAP to talk about climate science and to hopefully enroll them in the D-ClimNet programme.

GRADE 10-12 STUDENTS AT THE BURLINGTON HIGH SCHOOL IN THEIR ENVIRONMENTAL SCIENCES GREENHOUSE

Mentoring is a critical element of D-ClimNet. The programme was fortunate enough to be able to leverage the mentoring skills of Dr Warren M Washington, a climate modeller at the National Center for Atmospheric Research (NCAR). Shepherd says that the D-ClimNet Principal Investigators are uniquely positioned to foster mentor relationships: "They serve on key advisory boards to NOAA and NASA, hold key positions in professional societies of organisations like the American Meteorological Society and the Association of American Geographers, and are the Chairpersons of major Geography Departments". Dupigny-Giroux believes it is essential that when they are speaking with high school students about the opportunities in the climate sciences, the mentors are able to build on students' own role models that have been an inspiration in terms of their race or gender.

NEW OPPORTUNITIES FROM BROADENING DIVERSITY

One of the most important gauges of success of such programmes occurs when students have been particularly inspired to move onto a flourishing career in science. While the D-ClimNet programme has only been running for a short time period, they already have a number of success stories. Dupigny-Giroux cites three stories about D-ClimNet which she believes exemplifies and supports how the programme benefits both African-American students and the climate sciences in general. The first African-American doctoral student supported by D-ClimNet, Marcus Williams, was recently offered a full civil servant position with the U.S. Forest Service as a research meteorologist, where his initial task will be to complete his doctoral work on irrigation-hydroclimate relationships. A D-ClimNet geography undergraduate at UCLA has continued into the Master of Arts programme and a third African-American undergraduate student at UCLA is currently pursuing a BA in Geography at UCLA.

Diversifying the science, technology and engineering related fields is a much broader problem than just the climate sciences. However, in Dupigny-Giroux's opinion, there are additional challenges in climatology due to cultural perceptions, exposure, broader political controversy and fluctuating budgets for climate research and employment: "These facts will continue to pressure efforts to broaden diversity, but hopefully new opportunities will emerge in the new, green economy as well". Interestingly, Shepherd points out, the U.S. Congressional Black Caucaus recently reported that minorities are likely to be more vulnerable to climate changes and the new economy. It would seem that D-ClimNet is now providing timely and unique opportunity to respond to such challenges.

UGA PROFESSOR, DR MARSHALL SHEPHERD WITH ACADEMY STUDENTS

INTELLIGENCE

D-CLIMNET

CREATING A DIVERSITY CLIMATE NETWORK TO ENHANCE THE CLIMATE SCIENCES PIPELINE OF MINORITY STUDENTS FROM HIGH SCHOOL TO GRADUATE LEVELS

OBJECTIVES

To create a pipeline of underrepresented students from the high school to graduate degree levels. The network is unique in its focus on the climate sciences, as well as its commitment to training the next generation of racially and gender diverse climate scientists with an explicit focus on climatology, climate change, and climate policy.

KEY COLLABORATORS

Dr Marilyn Raphael

Dr Marshall Shepherd

Dr Thomas Mote

Marcus Williams

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CONTACT

Dr Lesley-Ann Dupigny-Giroux
Associate Professor & VT State Climatologist

University of Vermont
Department of Geography
200 Old Mill Building
94 University Place
Burlington
Vermont 05405-0114
USA

T +1 802 656 2146
E ldupigny@uvm.edu

DR LESLEY-ANN DUPIGNY-GIROUX received her PhD in Climatology and Geographic Information Systems from McGill University in 1996. She is currently Associate Professor and Acting Chair in the Department of Geography at the University of Vermont. Her research interests intersect a number of interdisciplinary fields including hydroclimatic natural hazards and climate literacy as well as the use of remote sensing and Geographic Information Systems (GIS) in the fields of spatial climate and land-surface processes.