

# Undergraduate Research & Creative Activities (URECA)

<http://stonybrook.edu/ureca>

## Miguel Lopez

Computer Engineering major, Class of 2010  
CSTEP, CSTEM & LSAMP programs; URECA Undergraduate Research Program

Research Mentor:  
Dr. Daniel Knopf, School of Marine and Atmospheric Sciences

## Researcher of the Month - October 2009

### About Miguel

Miguel Lopez loves working in Prof. Daniel Knopf's laboratory, in SoMAS. And it shows! Asked about the work atmosphere, he will tell you: "*The Daniel Knopf is not a lab for me, it's a house, a home. I know everybody. The kind of relationship that we have there is not a colleague relationship—but more of a friend. I can talk to them as a friend.*" When Miguel began doing research in October 07 in the Knopf lab on the advice and encouragement of CSTEP/LSAMP Asst. Director, Paul Siegel, he didn't have a background in atmospheric sciences. But his hard work and hours in the lab (on average 15-20 hours/week) have un-clouded his knowledge of the field substantially!

This year, Miguel received a URECA 09 summer fellowship award to fund his research on the effect of biomass burning aerosols on cloud formation and its impact on climate changes"; and just recently, became a co-author with his mentor on a Physical Chemistry Chemical Physics

(11:8056-8068, 2009) publication: "*Homogeneous ice freezing temperatures and ice nucleation rates of aqueous ammonium sulfate and aqueous levoglucosan particles for relevant atmospheric conditions.*" His work was also supported by the NASA New York Space Grant program. A senior majoring in Computer Engineering - offered through the Department of Electrical & Computer Engineering, Miguel Lopez now plans to pursue a Ph.D. in the field, with a focus on environmental safety and protection. Miguel is a member of the Eta Kappa Nu Electrical & Computer Engineering Honor Society; and has presented posters on his work at Earthstock, and the URECA Celebration (2008). He also presented a research poster, "Homogeneous Ice Nucleation from Aqueous Particles Containing Surrogates of Biomass Burning Aerosols" at the Conference of Collegiate Science and Technology Entry Program (C-STEP), Sagamore, New York (April 2008).



Nice work if you can get it.



Miguel Lopez will also be one of a select group of undergraduates whose research will be presented at the upcoming Student Inauguration Exhibit on **Oct. 23rd, 4-5pm, at the Pritchard Gym**, an event celebrating the inauguration of SB's 5th president, Samuel L. Stanley, Jr., M.D.

Miguel Lopez is a first generation college student at SB, and a participant in the CSTEP, CSEMS, S-STEM I and LSAMP programs offered through the Dept. of Technology & Society. Prior to coming to SB, Miguel took a language immersion course and earned an associate's degree in Computer Science at Bronx Community College-City University of New York (04-12/06). Miguel also participated in the BNL Community College Institute (Summer 2005), which provided him with valuable research experience working with Drs. John Heiser and Terrence Sullivan in the Urban Dispersion Program. Miguel would return to that same project at BNL in the following two summers to continue data analysis and update instrumentation for this project, where he studied how air flows in a city environment. He and other students in the program had the opportunity to work on the Brookhaven Atmospheric Tracer Sample (BATS) and the Personal Air Sample (PAS) project components, and to publish abstracts in the *Journal of Undergraduate Research*, published by the Office of Science, US Department of Energy (2006, 2007).

Miguel Lopez was born and raised in the Dominican Republic, and his hobbies include dancing, basketball and softball. He currently plays on BNL's men's softball league. Miguel credits his first job at ages 13-15 working in the stockroom of his stepfather's company with preparing him soundly for the future—in particular, with setting high standards, expectations and goals for himself. Below are some excerpts of his interview with Karen Kernan, URECA Director.

## The Interview

### **Karen: What is your research about?**

*Miguel:* We study the effect of biomass burning aerosols on cloud formation and its impact on climate change. For our recent paper, we looked at the homogenous ice nucleation of aqueous ammonium sulfate and levoglucosan particles. We derived the homogenous nucleation rate which can then be used to derive & estimate ice particle production rates necessary to predict cloud formation....All our experimental methods/set-up are home-made. We develop our set up, put it together, make our own experiments.

### **How did you get involved in working at SoMAS?**

Paul Siegel from the C-STEP program had sent an email to students about a research opportunity with Prof. Knopf and encouraged me to apply. I didn't have any atmospheric background when I went to the lab. Despite that, Prof. Knopf opened the door to the lab for me to work with him. He supported me a lot, and walked me through any problems that I had with understanding the science behind it.

### **What's the atmosphere like in the Knopf lab?**

We have a very good atmosphere. Everybody helps each other. The Daniel Knopf lab is not a lab for me, it's a house, a home. I know everybody. The kind of relationship that we have there is not a colleague relationship--but more of a friend. I can talk to them as a friend. If I see something is wrong, we talk as friends, as family. We will sit down and talk the problem between us and try to come up with solutions. . . . If I have problems – to understand the science, there is a grad student who helps me to understand. If he has problems doing the experiment, I will do the experiment with him. We each share information, help each other. So that's what I like. It's team work.

### **Has your own responsibility increased over time?**

At the beginning, Prof. Knopf was trying to teach me to do the experiment. With time, he wanted me to run the experiment and do the science. That was a bit tougher because I don't have much atmospheric science background. He gave me papers to read. ....Now I not only work on the experiment but work on the analysis, the science behind the experiment — everything related to the experiment. Now I can do everything by myself, run a lot of experiments.

I would say with 80, 90% certainty....that I would be able to work on most of the instrumentation that we have in the lab. I was one of the first students in the lab and actually trained the 3 grad students that are there now when they came first .... And they helped me too with the science. It is a great experience working with the graduate students.

### **Instrumentation seems to be one of your strong points.**

Instrumentation and me are very good friends. It doesn't take me long to start working with new instrument. It happened when I was very little... I guess I was born with it. I used to fix TVs and radios. I always loved electronics..

### **What's the most frustrating thing you've experienced regarding research?**

That was when our instrument broke down. We had one-to-two weeks without having experiments done. No data for 2-3 weeks. In our case, the relative humidity in the lab was too high and that was affecting our experiments. I had the opposite happen too where for about a week, every time I ran an experiment it was perfect. Every day that I came to lab, everything worked. But then after that I had three weeks with no data. It's like that with the research, it's up and down.

### **Is it difficult to balance academics with research?**

In the beginning it was difficult because I didn't have the background. I was looking for information, reading.. but that was only the first semester. Then I learned more of the instrumentation, I learned more of the science and I was able to devote more time to classes. Now it's easier for me to manage my time in lab with my time to study for my classes.

### **What do you like about doing research?**

What I like most about the research is the challenge. It's not only doing something new, ...but discovering something that in the long term will help society. With studying climate change, I feel like I'm contributing to determine how climate change is affecting us.

### **Has the research influenced your long-term goals?**

Now I'm more inclined to doing a PhD instead of a master's program. I enjoy the time I spend in the lab.

**You presented at C-STEP conference, at the Earthstock research symposium, and at URECA's annual research Celebration. Is it a beneficial experience? Do you enjoy presenting your work? I**

I like it. But sometimes it's hard for me. I get really nervous. I start confusing my thoughts, jumping from one idea to another one. Most people say it's normal when you do a presentation that you get nervous. But I feel that every time that I do a presentation, then later it's easier for me to explain my project.

**What else have you learned from your mentors?**

I learned that I have to trust myself more. I learned that I will be the first person to doubt myself before anybody else. Paul Siegel has encouraged me to take on challenges, to always go forward and never go back. Prof. Daniel Knopf and Paul Siegel both have encouraged me to go for graduate school.

Prof. Daniel Knopf is very open to student opinions, and thoughts. He will take into consideration any problem that you have. Even though he knows the answer, he will first let you think about it and try to solve it before he tells you what is wrong. He always encourages us to give nothing but the best. Even though I was not from that major, he always treated me as one of the graduate students. He has taught me to be more analytical inside school and with my life decisions.

**What advice would you give to other SB students?**

Be open minded. If you want to do research... don't think that because of *this* major you cannot do *that* research. Because at some point, you can connect the research to your major. Doing research is not only about making some experiments, having some results...It's about you growing as a person, being more analytical, and careful. Learning to think in a different way.

**Do you enjoy doing summer research?**

The BNL summer programs were wonderful experiences. And the URECA program allowed me to get a lot done this summer. It was better because I had more time. I didn't have to think about classes, I didn't have to think about homework. I was just doing research. And it went faster than I expected too, despite some of the problems we encountered. The summer research experiences helped me to determine the career path that I want to follow.

**How much time do you put into lab during the year?**

15-20 hours a week.

**That's a lot!**

It requires a lot of time to do the research. There are three of us now using the same experimental set-up. But we never have any problems, none—even though it's a really crowded lab, with many people using the the same experimental set-ups. We work together to manage the time. The grad students, every time I go there, they're there in the lab. . . They're really passionate about it. There's something about that that encourages me to keep going to the lab. I see that everybody is passionate about the research. Even though it's not my main area .....when I see their passion, I get passionate about it. If you talk to Prof. Knopf.... you will see how passionate he is about research. And that gives me the same feeling about the research. It's really great.