Undergraduate research in Atmospheric and Oceanic Science at the University of Maryland

Prof. Timothy Canty Associate Director of Undergraduate

&

Professional Masters programs



All Atmospheric and Oceanic Science (AOSC) students must complete and defend a full year senior research project

This is:

- an opportunity to participate in the research process
- a chance to gain valuable, marketable skills
- good preparation for graduate school
- stressful...
- not a book report!





Our students are presenting at conferences...





Mike Natoli presenting at 2013 AMS

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Our students are presenting at conferences...





Lynn Montgomery presenting at 2014 NASA Aura Science Team Meeting



... and publishing

Koenig, L. S., Lampkin, D. J., Montgomery, L. N., Hamilton, S. L., Turrin, J. B., Joseph, C. A., Moutsafa, S. E., Panzer, B., Casey, K. A., Paden, J. D., Leuschen, C., and Gogineni, P.: Wintertime storage of water in buried supraglacial lakes across the Greenland Ice Sheet, *The Cryosphere Discuss.*, 8, 3999-4031, doi:10.5194/tcd-8-3999-2014, 2014.



Figure 5. Snow Radar echogram of buried lakes (left) with DMS imagery of the GrIS surface (right) from: (top) a rare buried lake in Northwest Greenland (~ 45 km inland from the terminus of Streenstrup Glacier) with a surface expression showing darker blue where there is buried liquid water and a more turquoise, lighter blue where the lake is frozen through and (bottom) a typical buried lake in Western Greenland (~ 60 km inland from the terminus of Jakobsavn Isbrae) showing surface sastrugi and no detectable lake surface expression.



Figure 9. Snow Radar echogram (top) with DMS image of GrIS snow surface (bottom) taken on 2 May 2011 for a buried lake in North Greenland (~ 100 km inland from the terminus Zashariae Isstrøm Glacier) showing from location 1 to 2 the turquoise blue refrozen lake, from 2 to 3 the darker blue retained water, a pressure ridge at 3, and from 3 to 4 surface melt caused by radiative heating at the surface of the refrozen lake edge.



SENSE

Monitoring weather, air pollution and greenhouse gases with a smart sensor network

A University of Maryland student research project

Participants so far:

AOSC undergraduate students: Kristy Weber, Walter Tribett, Tom Kelly, Bari Turpie, Lynn Montgomery, Grace Duke
Engineering: Cooper Gilbert, Camden Miller
Computer Science: Ben Dugal
Chemistry: Alex Poonai
Environmental Science and Policy: Mike Pascone, Jimmy Shue
Graduate students: Cory Martin, Fang Zhao
Advisor: Prof. Ning Zeng (AOSC: Atmospheric and Oceanic Science)
Co-advisors: Prof. Russ Dickerson (AOSC), Prof. Mary Bowden (Aerospace Engineering), Dr. Xinrong Ren (NOAA/ARL)

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CO₂ tracking in DC Metro Area

Major traffic routes play a major role such as the Capital Beltway; effects of Potomac River on humidity



Group photo before we departed in 4 groups from one of the CO2 tracking trips in January 2014, including two young helpers from University Park Elementary School



Project website

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sense.umd.edu

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NEWS SENSOR LOCATIONS

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DENSE – WELCOME!

DeNSE: Monitoring weather, air pollution and greenhouse gases with low-cost highdensity smart sensors in an urban environment.

For more information, or to participate in the project such as hosting one of these sensors, please fill out the request for information form.

FACEBOOK

Find us on Facebook Dense UMD ✓ Like You like this. Dense UMD added 6 new photos. September 8 at 7:03pm

TWITTER

Tweets	y Follow
Dense UMD @denseUMD	25 Aug
	Our first prototype

sensor package is now in Beltsville. No data yet, due to a comm. issue, but hope to fix soon!

RECENT NEWS

3D Printing Enclosure

Friday evening, University of Maryland Mechanical Engineering student Cooper Gilbert gave a demonstration on how 3D printers work. Our prototype radiation/weather shield for our instrument package is made up of 3D printed layers that stack [...]

Cryosphere Research

Casey Joseph and Lynn Montgomery Advisor: Derrick Lampkin

- Goal: Use echogram radar images from NASA's Ice Bridge Mission to find buried subglacial lakes that persist through the Winter.
- Top line denotes the surface.
- Accumulation layer is the line below the surface, which is accumulated snow and ice.
- Bottom lines denote what appear to be water.



Cryosphere Research

Casey Joseph and Lynn Montgomery Advisor: Derrick Lampkin

Landsat Lake/Crevasse Mapping



CICS-MD is leading the way!!



CICS-MD Summer Initiative 2014

"Young scientists, including students and post-doctoral researchers, play an important role in conducting research at

"Thanks to Scott Rudlosky, Pat Meyers, Huan Meng, and Hugo **Berbery for serving as mentors** during the summer of 2014."

http://cicsmd.umd.edu/outreach/

CICS-MD is leading the way!!

"Undergraduates work on thesis projects with CICS advisors, and *the close partnership between the AOSC department and CICS is a major recruiting tool for the undergraduate program.* During the summer, CICS-MD hosts undergraduate students in Maryland to train them in scientific methods applied to climate studies. Given the growing interest in students as well as scientists, the intent is to expand this activity."

> Much of the success of the AOSC major research requirement is due to CICS!!

This partnership has inspired other scientists to work with AOSC students

Senior Research

- Michael Natoli Advisor Hugo Berbery
- Sarah Shellem Advisor Scott Rudlosky
- Colleen Wilson Advisor Michael Folmer
- Michael Belcher Advisor Rachel Pinker
- Grace Duke Advisor Michael Evans
- Abby Ahlert Advisor Michael Winton
- Bari Turpie Advisor Ning Zeng
- Dan Eiblum Advisor Da-Lin Zhang
- Michael Francis Advisor Wallace Hogsett



Senior Research Prospectus Defense December 11, 12

- The Impact of the Madden-Julian Oscillation (MJO) on Temperature and Precipitation in the Americas
- Sprites: Dancing Lights Above the Thundercloud
- Advancing Marine Forecasting with Lightning Density Detection
- Photosynthetically Active Radiation and Its Correlation With Water Vapor
- \bullet Characterizing the SPCZ's Spatial Variability during the Little Ice Age using observed and simulated $\delta 180$
- Diagnosing Factors Influencing AMOC Decline in Climate Models
- Offset and calibrations Methods and Corrections of K-30 CO₂ sensors for environmental monitoring
- A Regression Analysis of Tornado Frequency in the Midwest and the Southeastern U.S. and Surface Air & Dew Point Temperatures 1990-2013
- Snow Damage: Research and the beginning of an index



Our Reward...



Our Reward...









Spring 2015:

Graduating 8 students (up 60% from last year!) Data visualization/ forecasting lab almost complete

• Have installed AWIPS, WRF

5 AOSC undergrads presenting at 2015 AMS

Interested in working with AOSC students?

Please contact: Tim Canty (tcanty@atmos.umd.edu)

