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

Tim Canty
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&
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"Fearless Ideas"

The UMD undergraduate program in Atmospheric and Oceanic Science (AOSC) was created in 2013

Decided not to focus on any one area of research expertise in our program (NWP, DA, Atmos. Chem., Oceanography, Climate, etc.)

Goal: offer broad but rigorous foundation (i.e., lots of math) that allows students to develop particular interests

ATMOSPHERIC & OCEANIC SCIENCE

"Fearless Research"

Resources: UMD located near wealth of research facilities

- NASA
- NOAA
- NWS
- ESSIC
- CICS-MD
- JGCRI

"Fearless Questions"

Question:

Should undergrads be involved in research and how best to do this?

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What do research advisors get out of this?

What's wrong with traditional classes?

"Fearless Gimics"

What's wrong with traditional classes?

New techniques ("clickers", flipped classes, etc.) allow for more highly efficient dispensing of knowledge.

The "sage on the stage" can expound on QG Theory while students, rapt in awe, bask in their new found enlightenment....

or play

Words With Friends

"Fearless Students"

What's wrong with traditional classes?

Classes are an integral part of the developmental process….

… but they don't always evaluate the skills most needed in a research/work environment

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"Fearlessly Stressing out Students"

All **UMD AOSC students must complete and defend (x2) a full year senior research project:**

Fall Prospectus Defense: 15 minute "conference style" talk*
Spring Final Defense: 2 hr poster session*

This is

- **a chance to gain valuable, marketable skills**
- **excellent preparation for graduate school**
- **stressful (by design)**
- **an opportunity to showcase abilities not tested for in classes**

*** Written prospectus and final dissertation also required**

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Should <u>all</u> undergraduates be involved in research and not just the next generation of PhDs?

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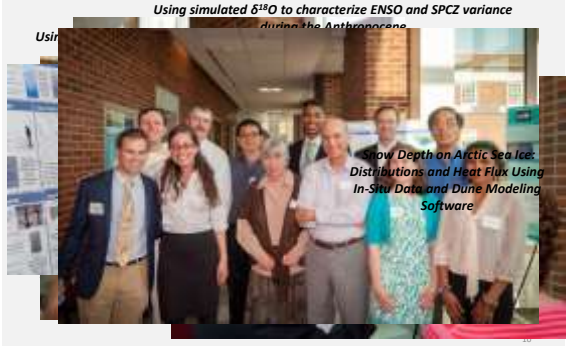
Using simulated $\delta^{18}O$ to characterize ENSO and SPCZ variance during the Anthropocene

Snow Depth on Arctic Sea Ice: Distributions and Heat Flux Using In-Situ Data and Dune Modeling Software



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"Fearlessly Taking Chances"

Should <u>all</u> undergraduates be involved in research and not just the next generation of PhDs?

YES!

Majority of projects are at grad. student level (cost less, too), 4 published students, many presenting at conferences

Some of the most advanced projects have been completed by students who, at first glance, would not be considered PhD material

Exams, quizzes, term papers don't test for these skills!!!!

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Should <u>all</u> undergraduates be involved in research and not just the next generation of PhDs?

What to do researchers advisors get out of students?

- **Willingness to work on "menial" tasks**
- **Work on ideas you haven't had time to focus on**
- **Low cost**
- **Funding agencies like this**
- **Enthusiasm(!)**

Since inception increasing numbers of local research community wanting to get involved

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"Fearlessly Thinking Bigger than Our Background"

Departments should be open to a broader definition of science research

- Pure research, of course
- Operational
- Policy
- Industry/Private sector
- Public health
- Law

Opportunity for employers to guide the training of scientific work force while students are in school

Help departments stay current!

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2017: Project Titles

- The Global Tropospheric Distribution of Carbon Monoxide
- *The Effects of Wild Fire Plume Height on Aerosol Distribution*
- NOAH LAND SURFACE MODEL – MP UPGRADE: A Performance Evaluation of the Noah-MP Land Surface Model
- *13 Day Model Simulation of CO_2 in the D.C. – Baltimore region, Summer 2016*
- Characterizing Off-Shore Thunderstorms using Lightning and Satellite Observations
- *Identifying Stratospheric Air Intrusions and Associated Hurricane-Force Wind Events over the North Pacific Ocean*
- The Future of Arctic Freshwater Flux and the AMOC
- *Case Study of the Synoptic Environment within the Banded, Heavy Snow Event of 26-27 January 2015 New England Blizzard*
- Investigating Changes in Antarctic Intermediate Water in the South Pacific under RCP8.5
- *Assessing the Validity of Citizen Scientist Data on Tropical Cyclones from 2005 using Official Observations*
- Using MISR Data to Test the HYSPLIT Dispersion Model
- *ProbGale: Severe Weather Characteristics over the Ocean*

"Fearlessly Offering Free Food"

4th ANNUAL STUDENT RESEARCH

SYMPOSIUM

DEPARTMENT OF ATMOSPHERIC & OCEAN SCIENCE

Thursday, May 11th 2017 Atlantic Bldg 2400

Opening Remarks 3:30-3:45pm
Poster Session 3:45-5:30pm

Questions? Contact: Tim Canty (tcanty@umd.edu)

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