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Department News

**Two weeks in the Arctic**

Students in the Arctic Geophysics class spent 1 or 2 weeks in Barrow, Alaska, in early March, performing geophysical studies of the sea ice. This trip proved to be the most challenging and rewarding of all of the previous trips. The main challenge related to the widely-reported odd weather patterns in North America this year, including

the piece of the “polar vortex” that broke from its normal near-polar location. While the central and northeastern US experience record cold and snow, the western US received record warmth and dryness. This included Barrow, which experienced an extremely-late setting-in of the shorefast sea ice on which our research was performed.

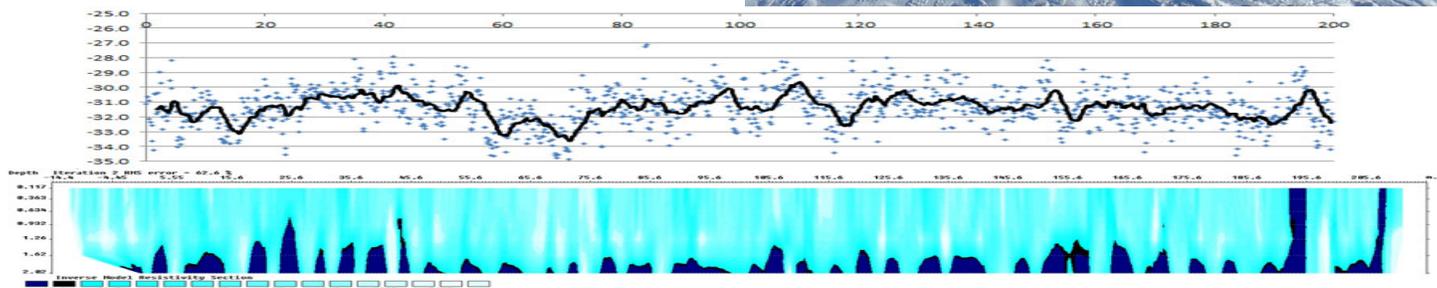
In previous years the ice had been well over 2 meters thick. But this year it was between 1.2-1.6 meters thick. This made for a great deal of difficulty for the OhmMapper capacitively coupled resistivity array that we always deploy. Even with our new, shorter (2.5 meter) dipole cables, Ohmy repeatedly lost signal, requiring serious troubleshooting from the group. After much frustration and work the data were obtained. The group coupled this with ground truth data from our ice drill, and “Whistler” the thermal sensor that recorded the temperature of the ice surface. The goal of this trip was to investigate a possible correlation between the surface temperature and the thickness of the ice.

*Top image: Cameron Baumgardner pulls the OhmMapper while Luna Brett pushes the GPR cart with Whistler.*

*Middle: Corey Roadcap (red hat) and Cameron Baumgardner drill through the ice.*

*Bottom right: Sarah House stoops to keep the front OhmMapper dipole cable on the ice. It lost data every time that cable came off the extra-thin ice.*

*Below: Do these images show the correlation between the temperature and the ice thickness?*



### SPS Sponsors Two Springtime Speakers

On April 11 the Society of Physics Students sponsored Dr. Dan Provenzano, Senior Optical Scientist at Baker Hughes Oilfield Service Company. He is at their Blacksburg, VA, research division. Dr. Provenzano talked about using fiber optic sensors to monitor dynamic situations in oil and gas wells. These sensors are able to detect pressure, temperature, strain, and acoustic energy, and the data collected enables operators to optimize production and mitigate problems. This data yields an amazing picture of the structure of the subsurface while requiring less physical disruption than other methods.



On April 25, Lieutenant Tim Dutton, US Navy, and Radford University Physics BS Class of 2004 addressed more than 2 dozen physics majors and others at RU. Lt. Dutton talked about his background and the career path that he took after graduating from Radford University. He talked about some of the reasons for the decisions that he made along the way. He currently is the Supervisor of Shipbuilding, Conversion and Repair in Newport News, and has been assigned to various projects there. Tim was recently accepted into MIT's graduate program in Naval Engineering.

*Note: While on the track team at RU Tim met his wife Maurika, a 2005 RU Foods & Nutrition major who was also on the team. They are the proud parents of two children.*

If alumni are in the area—or are close enough to travel—and would like to volunteer to come talk with our current majors, we would love to know about this. Please contact any of the faculty members about this and we will make arrangements. It's always good for students to hear what you have chosen to do with your degrees, much better than us (faculty members) just passing along the information.



**Physics Majors in Summer Programs**

Rising Junior **Joe Ashley** will be at the National Institute of Standards and Technology (NIST) facility in Gaithersburg, MD for 11 weeks. Joe worked with Dr. Huston to set up our new Scanning Tunneling Microscope in the Curie 039 research lab. *Editor's note: 2004 Physics grad Tim Dutton participated in this same internship.* Joe described his project in a recent email:



*"Most photovoltaic devices in production today are silicon based...Unfortunately, photovoltaics made of silicon need to be relatively thick in order to capture enough energy to be useful, causing solar cells to be expensive and bulky.*

*Some people at NIST (including my advisor Paul Haney) recently developed a way to measure the grain boundaries in polycrystalline semiconductors, and found that even though grain boundaries can reduce efficiency in some cases, in other cases they can actually increase efficiency as well. This would allow us to use a variety of polycrystalline materials which can be more efficient than silicon at a fraction of the thickness. This would hopefully make solar cells much cheaper, as well as introduce them to a variety of applications such as being ingrained into clothing, or maybe even coated onto windows. ... I am [modeling] the drift-diffusion equations for a polycrystalline semiconductor with variable grain boundaries and doping in order to gain a better understanding of the conditions which affect efficiency and how they interact with each other."*

Rising Senior **Melissa Brett** will return (almost) to the Arctic region in her work in the Juneau Icefield Research Program. This program has monitored glaciers in this area since 1942, and her work is critical in the ongoing work on Earth's climate.



Melissa—majoring in both Physics and Geology—will be blogging from the field during her two months living and working on glaciers. You can track her progress here: <https://share.delorme.com/LunaJuneau>. She was featured on the RU homepage due to her work in the Arctic Geophysics class this spring. Her words then were prophetic: *"The opportunity to conduct undergraduate research in the harsh polar climate gives me a chance for me to test my skills and knowledge against one of the most extreme places on earth...."* Melissa plans on making arctic research her life's work. She will give a talk this fall on her extraordinary experiences in this remote area in work that will help the futures of all of us.

Rising Junior **Jordan Eagle** has participated in research by being one of the students in the Arctic Geophysics class this spring. But she was also accepted into a one-week intensive workshop in radio astronomy held at the National Radio Astronomy Observatory at Green Bank, West Virginia. This workshop is called "Educational Research in Radio Astronomy", or ERIRA (<http://skynet.unc.edu/erira/about-erira/>). This workshop is led by UNC professor Dan Reichart and other radio astronomy professionals. Only 15 students nationwide were accepted into this program which is designed to encourage physics/astronomy majors to do research early in their careers.



In a recent email about her just-completed week at



Green Bank Jordan said of her work, *"We are ... doing a project that includes using a dipole antenna to estimate the current number of sunspots and just recently I heard that they picked up an IOB storm with it."*

When she returns to RU this fall she will be setting up RU's very own dipole antenna and receiver to monitor our sun, Io (Jupiter's moon), and other radio sources. We will get the results online when she has it up and running.

### New Graduates

One graduate in December of 2013 plus 6 in May puts RU above the national average in terms of yearly Physics graduates. According to the American Institute of Physics *“The average number of physics bachelor’s produced by departments where the bachelor’s was the highest physics degree offered was 4.9...”* for the Class of 2010. More information on this topic is here: <http://www.aip.org/sites/default/files/statistics/undergrad/bachdegrees-p-10.pdf>.

Pictured at right are new Physics grads (l-r) Physics Dean’s Scholar Brian Uthe, Andy Andis, Jesse Dodson, and Mark Godman in front of Reed Hall. Not pictured: Matt Sublett, Corey Roadcap, Lewis Mitchell (December 2013 graduate).



### Sharks in the Arctic??

Some of you may know this author’s long-standing warnings about land sharks, linoleum sharks, cloud sharks, ceiling-tile sharks, etc. There is now solid photographic evidence that these creatures have worked their way to Barrow, Alaska! These rare images were captured on the most recent trip to the Arctic in early March.



*Who said research had to be boring?? ☺*



*Above: The fin of the heretofore unseen sea ice shark is captured in full attack mode. Note the powerful wake this creature has left behind as it traverses the snow cover on the sea ice! These very rare sharks are like the Loch Ness monster, and thus are deserving of further study.*

*Left: Note the stealthy shark fin caught on camera on the side of the building on the grounds of the Naval Arctic Research Labs, just across from the Quonset hut where the RU Arctic Geophysics stayed while in Barrow.*

## Department News

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### New Department Chair

After being Chair of the Department of Chemistry and Physics from 1998-2009, Coordinator of the Physics Program within the School of Environmental and Physical Sciences (2009-2011), and Chair of the Department of Physics from 2011-present, Dr. Walter Jaronski has decided to step down as Department Chair. Dr. Jaronski will be teaching full-time as usual, but with the additional work of coordinating a number of Science Education outreach grants. These grants had previously been solely administered by Dr. Franklin Jones, Emeritus Professor of Physical Science.

Dr. Brett Taylor was elected as our new Chair. He formally began his duties on May 26, 2014. We look forward to his leadership in the coming years as the Department expands into the new 3-building lab science complex of Reed Hall, Curie Hall, and the new Center for the Sciences.

### New Building Update

Yeah, this is happening.



### Contact Us

*Let us know how you're doing, what you're doing, and where you're doing it!*

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