NAGT
Geo2YC Division

FOUNDATIONS

Newsletter of the Geo2YC division of the National Association of Geoscience Teachers
Volume II, Issue 2: April, 2013

Virtual or real field experience… Why not both?

Digital field guides in the field

by Frank Granshaw
Portland Community College

One of the more exciting aspects of tablet technology is the ability to create multi-media field guides that can be used in the field. Though being able to virtually explore geologically interesting locations is not a new development, being able to use them at the actual site is. Despite the problems that come along with this type of emergent technology, tablet based digital field guides show promise in several areas.

- *Augmenting how students see what they see in the field* - A flexible, media rich guide can be a valuable tool for helping students see important patterns and features that they might otherwise miss. Through the use of interactive panoramas and images equipped with interpretative overlays, features such as bedding planes, changes in rock type, stream flow, and layering in glacial ice can be overlaid onto photographs with varying degrees of complexity. Being able to do this in the field while looking at the actual structure can provide far more information than looking at a scene without a guide or staring at a photo that has been marked up with colored pencils.

- *Understanding the geographic and geologic context of a site.* - Linking interactive panoramas and images to maps provides users with rapid access to information about specific ground locations. Furthermore, it helps them see those places in their geographic and geologic context**,** especially if the maps those images are linked to are built like geospatial viewers allowing users to quickly change the kind of information shown on them.

- *Field access to large amounts of site information* - As tablet technology improves,

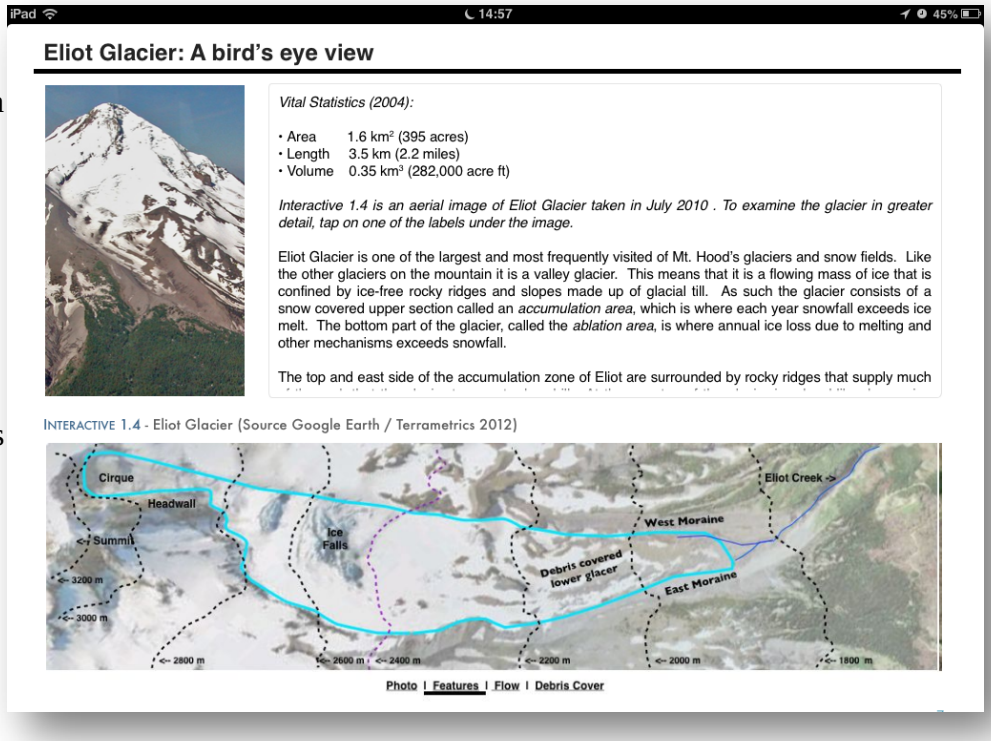


Figure 1 - A page from the background section of the guide that contains a interactive air photo of Eliot Glacier with the Features overlay displayed. Other overlays include ice flow and debris cover thickness.

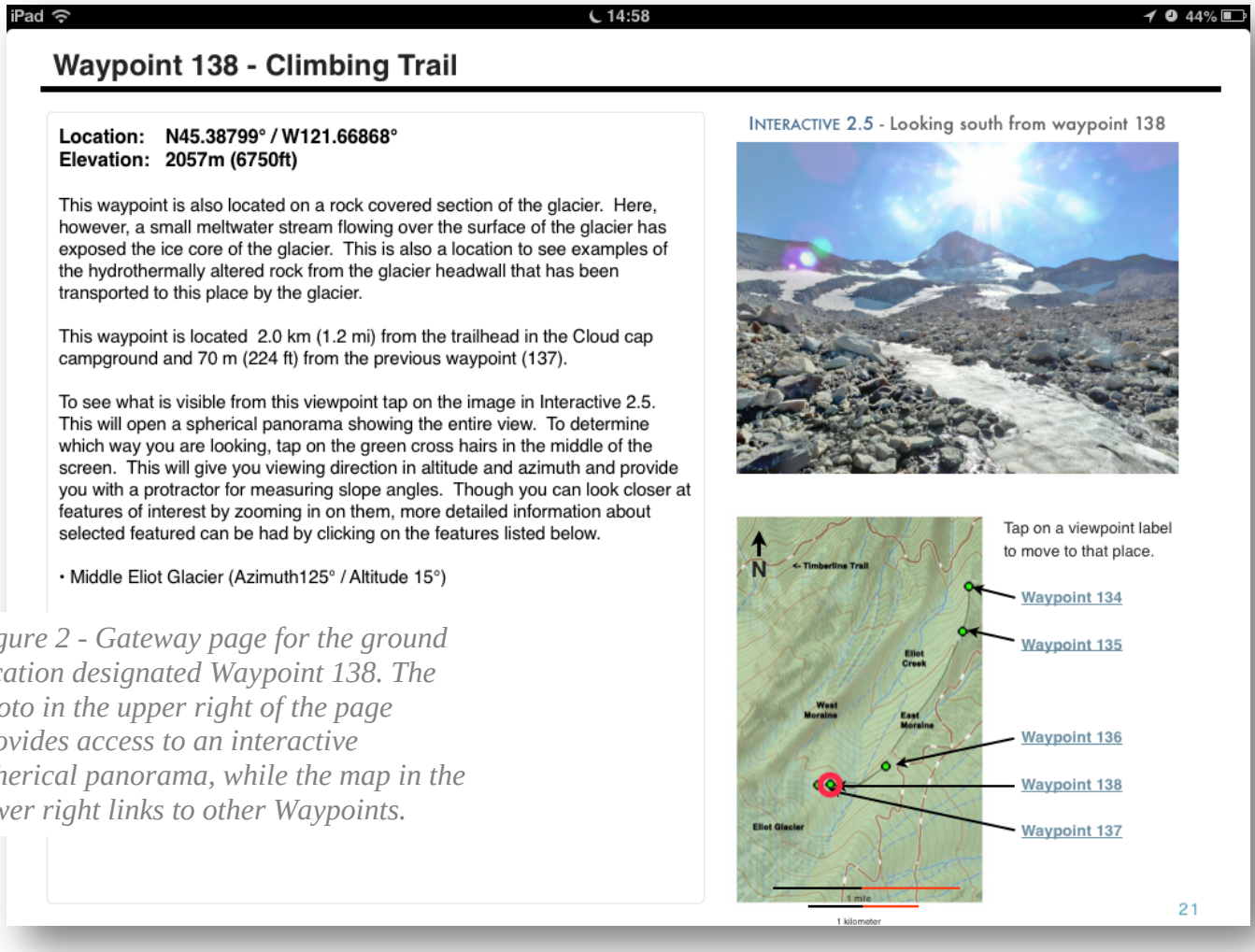


Figure 2 - Gateway page for the ground location designated Waypoint 138. The photo in the upper right of the page provides access to an interactive spherical panorama, while the map in the lower right links to other Waypoints.

increasing amounts of information about a site can be stored on a relatively small device. Having access to the equivalent of a small library on a device weighing one or two pounds is a definite advantage in a field situation.

Digital Field Guide for Eliot Glacier

One of the most accessible glaciers in the contiguous United States is Eliot Glacier on Mt. Hood Oregon. Being a classic alpine glacier with very well developed moraines and a long history of monitoring, Eliot is a favorite field trip destination for many geology classes. It is also one that I have spent considerable time on, so it was the logical choice for a first try at building a tablet based digital field guide. The preliminary results of this effort can be downloaded on an iPad from *http://www.artemis-science.com/MobileGeoscience/DFG_Eliot_Glacier.ibooks*.

The guide is essentially an iBooks document created with Apple Computer's *iBook Author*, which means that for now it only runs on an iPad. Utilizing *Author's* various multi-media capabilities**,** the guide was built as an digital narrative with a collection of interactive maps, figures, photographs, and panoramas imbedded in it. While the narrative provides the kind of background information found in a traditional paper field guide, the interactives were designed to augment the text and provide the user with a visual guide to what they are seeing in the field. For instance, in the background section of the guide the user finds a series of maps with informational overlays that allows them to investigate the thickness, source, and movement of rock debris on the glacier, query volcanic type on the mountain, or track changes in the extent of glacier. In the trail guide, they can access spherical panoramas of selected trail stops to identify features visible from those stops, and use interactive telephoto images to view those features in greater detail.

A critical feature of this field guide is that the tablet does not need to have an Internet connection to operate. This means that it can be used by students, instructors, and hikers at the actual site. This guide is a prototype designed to explore and present the idea of a tablet based field guide specifically built for geoscience instruction. As such, it has yet to be used by students at the site it was used for in the manner for which it was intended. Furthermore there are promising additions that have yet to be devised, such as linking the trail guide to the tablet's GPS so the guide would automatically turn to the page for the stop that you are closest to, or providing comments windows where users could take their own notes.

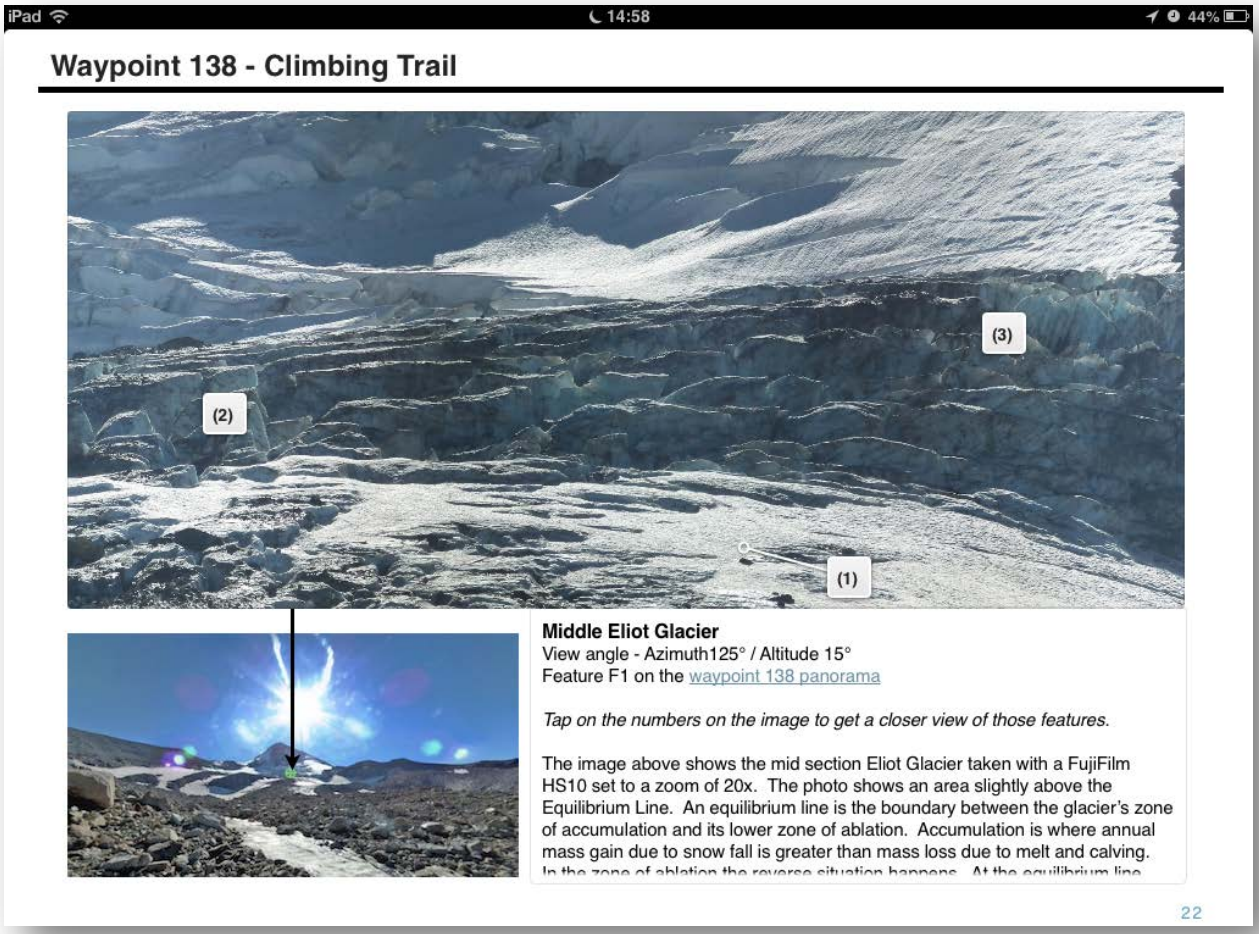


Figure 3 - Interactive photograph of one of the features seen from Waypoint 138. The user can enlarge and shrink the photo (taken with a telephoto lens from this waypoint) using finger gestures or by clicking on the numbered tabs on the photo. Information about these numbered places appears in the text block in the lower left.

Invitation for comment

Beyond being a prototype of a geoscience centered digital field guide, the Eliot Glacier guide is meant as a catalyst for discussion about mobile apps that NAGT could sell much like the lab manuals and field guides that we now derive revenue from. As an NAGT member who has been asked to investigate the possibility of such apps I invite your comments on the Eliot Glacier guide, as well as your ideas for other types of apps NAGT might market. Note - When commenting on the Eliot Glacier guide please think in terms of this type of app rather than this specific guide. Comments and question can be addressed to fgransha@pcc.edu.

As you consider other types of apps that NAGT might market, you might want to refer to the web site Mobile Geoscience to get a sense of what already exists: *http://www.artemis-science.com/MobileGeoscience*

Nominate an outstanding adjunct faculty member in your department for recognition with the Geo2YC Division's new **Outstanding Adjunct Faculty award.**

Submit your nomination at this link: http://nagt.org/nagt/divisions/2yc/oafa.html

SAGE 2YC
Supporting and Advancing Geoscience Education in Two-year Colleges

Geoscience Careers for Today's 2YC Students

Would you like to know more about what career options your 2YC students have in the geosciences? Do students ask you "What kind of job can I get in geology?" Do you know the answers?

Friday, May 17, 2013
9 AM - 2 PM
Hosted by Mt. San Antonio College

This half-day workshop is for fulltime and adjunct 2YC geoscience faculty in the Los Angeles area. Representatives from a variety of geoscience-related fields will discuss career options in the geosciences that are available for students who complete an Associate Degree with emphasis on the geosciences. Workshop participants will leave with an action plan to take back to their departments.

Workshop Panelists will include the following members:

- Richard Alvidrez, Jet Propulsion Laboratory and Director of SIRI
- Robert DeGroot, Southern California Earthquake Center
- Anna Garcis, Mojave Water Agency
- Jeff Knott, California State University
- Dave Perry, American Engineering Geologists
- Other panelists TBA

More information, and online registration:

http://serc.carleton.edu/dev/sage2yc/workforce/local2013la/index.html

Registration deadline: **Friday, April 12, 2013**

Continental breakfast, lunch and parking included.

CONVENERS:
Becca Walker, Mt. San Antonio College (walkerbecca@gmail.com)
Elizabeth Nagy-Shadman, Pasadena City College (eanagy-shadman@pasadena.edu)

Oceanography I

Community Building in the Ocean2YC Community

by Allison Beauregard
Northwest Florida State College

Over the past few years, there has been some momentum building to develop a community of geoscientists at two year colleges. Eric Baer, Heather Macdonald, and Frank Granshaw have been instrumental in these efforts, including obtaining several National Science Foundation awards to support 2YC geoscientist's attendance at national meetings and workshops. An outcome of these efforts is the recent development of the Geo2YC Division of the National Association of Geoscience Teachers; a 2YC focused session at the 2011 American Geophysical Union meeting; and a workshop on "Unique Research Experiences for Two-year College Faculty and Students" hosted by AGU in July, 2012. These exciting developments in the geoscience 2YC community demonstrate the potential positive impact that this type of community-building and support can have. These efforts, however, have tended to focus on geologists over the other disciplines of the geosciences, such as oceanography.

Ocean2YC faculty enjoy a meal together at the ASLO meeting in New Orleans. Photo by Angel Rodriguez, Broward College.

Allison Beauregard of Northwest Florida State College, and Jan Hodder of COSEE-Pacific

Partnership and the Oregon School of Marine Science, received funding from NSF to spearhead an initial effort to begin to develop a community of oceanographers at two year colleges.

In February, twenty-four oceanography two-year college faculty attended the American Society of Limnology and Oceanography meeting in New Orleans, LA. Participants attended a workshop on *Best Practices for Preparing Workforce and Transfer Students in Two-Year Colleges for Ocean Science Careers*, which included discussion on strategies to address challenges in preparing 2YC students for ocean science careers, dissemination of programs and resources to support 2YC faculty, and presentation of successful efforts by 2YC faculty in the ocean sciences. During a special session on *Opportunities and Challenges of Teaching Introductory Oceanography to Undergraduates*, 2YC faculty, alongside 4YC faculty, shared effective ways to teach and assess student learning in these classes.

This initial meeting of the Ocean2YC community was an important first step in identifying members of the two year college oceanography community and in beginning to develop a network of colleagues. Participants of the ASLO meeting benefited from learning about current oceanography research during the special sessions, engaging in professional development activities, and networking opportunities.

President's Column

by Lynsey LeMay
Thomas Nelson Community College

Just when I realize that the end of the semester is near, I quickly realize that workshop season is fast approaching! I always enjoy attending workshops and feel lucky to have participated in at least one workshop each summer for the last five or six years. Workshops are important for our own professional development, but also allow for new connections to be made, leading to future collaborations, and professional relationships to be continued and fostered. We can take the learned material and apply it in our classrooms or departments, and share it with colleagues. Many great ideas started as a result of conversations started in workshops – this organization for one!

There are a number of workshops coming up this spring and summer that you may be interested in attending. A list of many workshops is available at http://serc.carleton.edu/serc/site_guides/workshops.html. Coming up soon are local workshops in Los Angeles, Georgia, and Virginia focusing on community college education associated with the SAGE2YC project (Supporting and Advancing Geoscience Education in Two-Year Colleges). If there is one near you, or one that interests you, I would strongly encourage you to participate.

Geo2YC President Lynsey LeMay

This is also the time of year to start thinking about GSA in the fall. By the time you are reading this article, the abstract submittal system will be open, and will close August 6th. We're in the planning phases of the Geo2YC activities now, so stay tuned for information on that. In the meantime, please think about submitting an abstract to any one of the four sessions sponsored by Geo2YC this year. Yes, four!! You can choose among T117: Developing and Sustaining Thriving Geoscience Programs and Departments: Strategies and Examples from Two-Year and Four-Year Colleges and Universities, T119: Digital Geology Express (Digital Posters), T132: Strategies to Support Part-Time Faculty in Two-Year and Four-Year College Geoscience Programs, and T137: Undergraduate Research Experiences at the Introductory Level in Two- and Four-Year Colleges.

I hope that your spring semesters finish smoothly. I also hope to see many of you at a workshop this summer. Also, please consider submitting an abstract to a GSA session. As always, if you have any questions or concerns, please don't hesitate to contact me (lemayl@tncc.ed).

-Lynsey

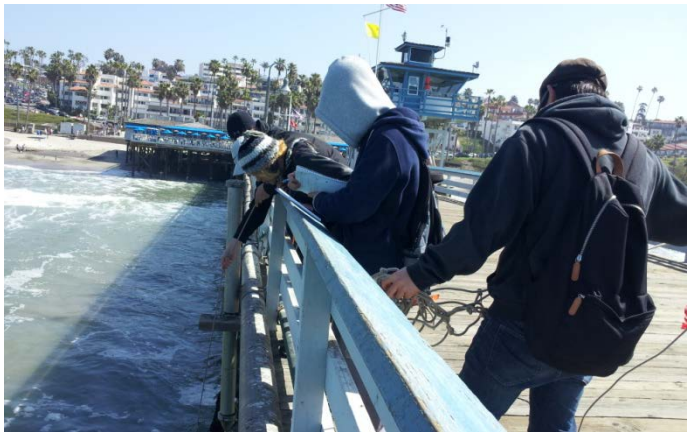
Oceanography II

Physical Oceanography Field Experience at Pasadena City College

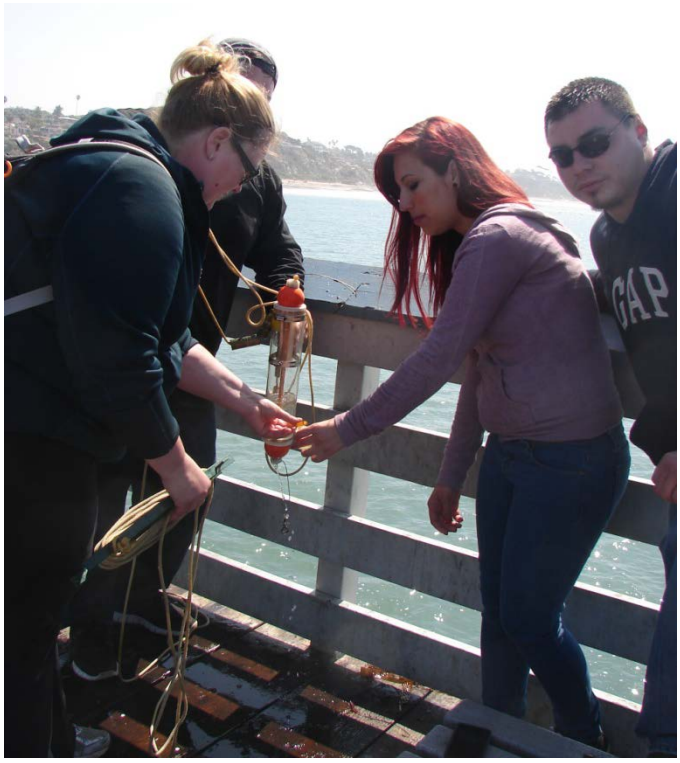
by Elizabeth Nagy-Shadman
Pasadena City College

Pasadena City College offers six to eight sections of Physical Oceanography every semester. This 3-unit lecture course can be supplemented with a 1-unit Field Experiences class if students want to transfer the class as a lab science, or just want to get outside and experience the ocean while they learn about it. One section of the field course is generally offered every semester and can accommodate up to 30 students.

This spring (2013) students in the course began their semester with a one-day trip at Cabrillo Beach and Aquarium where they were introduced to the coastal environment. Topics included the history of the Port of Los Angeles, the wonders of diatomaceous earth (local Monterey Formation), and the unfortunate and practically complete destruction of coastal estuaries in L.A. County. The high point was an exploration of local tide pools, where students were amazed to find sea stars, sea anemones, mussels, and sea urchins. The aquarium has a wealth of information about marine environments and includes a functioning aquaculture laboratory, a touch pool (our warm-up for the real thing later in the afternoon), and many fascinating marine animals. My favorites are the moon jellies.

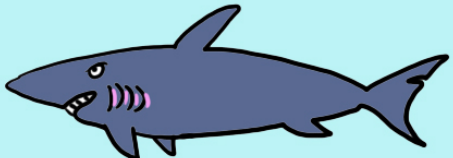


Pasadena City College students measuring depth at



PCC students taking a water sample at San Clemente Pier.

After this warm-up trip, we took a 3-day trip along the coasts of Orange and San Diego counties. The class saw examples of coastal/cliff erosion (and various efforts to prevent erosion), longshore transport, and wave refraction. We visited salt marshes and debated the pros and cons of oil-fueled power plants (Encino Power Station) and nuclear power plants (San Onofre Nuclear Generating Station) located along this stretch of coast. In addition to visiting many beaches and keeping a notebook, students also learned how to use various types of equipment and collect data. This included obtaining beach profiles and sand size distributions, as well as water depth, clarity, and chemistry at Oceanside and San Clemente piers.



Elizabeth Nagy-Shadman teaches her students how to take a beach profile.

One aspect that I particularly enjoy about teaching this class is that many of these students have never camped before, never cooked on a propane stove, never sat around a campfire, and never ate s'mores. I really enjoy seeing students "discover" the stars and planets when they have nothing else to do after dark. Our campsite is rather "cushy" in my opinion (flush toilets and showers for quarters) yet many students realized that they took things for granted back home (like dishwashers, interior lights, and salt and pepper shakers!).

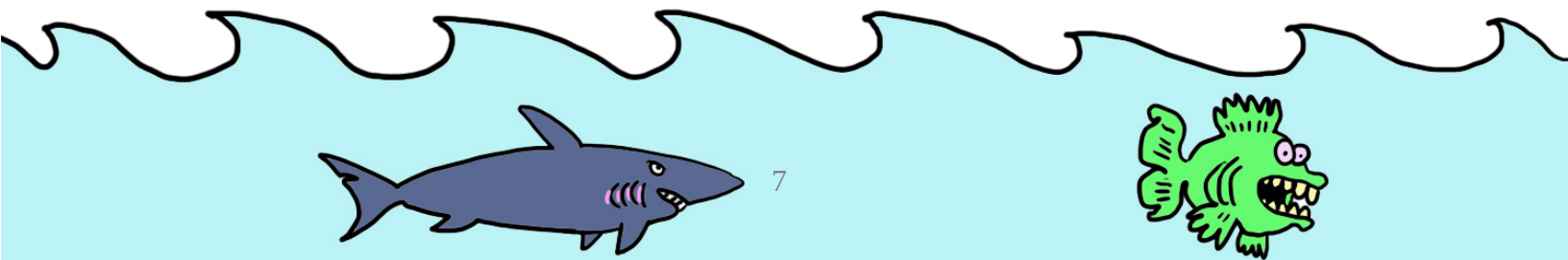
My only disappointment was that this year we were perfectly positioned to view comet PanSTARRS but the marine layer hit by the lights of San Clemente made viewing impossible. I cannot complain, though, because the weather was perfect and duct tape has once again proved its worthiness in a jam. You'll have to ask me to get the details.

Oceanography at a Land-locked College Campus

by Ken Rasmussen
Northern Virginia Community College

When I first arrived at Northern Virginia Community College (NOVA) in 1992, I was asked to teach the usual 2YC fare – Physical and Historical Geology. Having tread water in "The Land of Lost Post-Docs" long enough, I was more than ready to do so. There were problems, however: it had been about 13 years since I had sat in an introductory-level geology course. Moreover, my graduate work was in Marine Science – and I was rusty. Accordingly, a lot of my first-year teaching was spent learning what I had forgotten about geologic fundamentals. Staying "just one step ahead" of my students, it was an exciting, challenging, and humbling time all at once. The unexpected by-product of my re-education in basic geology was that I also rediscovered the utter importance of oceanography to the geosciences. I heartily recommend you create a course, short-course, or two.

As Dutch experimental sedimentologist Philip Kuenen made clear: "No geology without marine geology". I rediscovered that mantra for myself – but soon enlarged it to "no geology without oceanography". In some of the most critical areas of basic geoscience, there sits oceanography, front and center. Whether it be introductions to the rock and water cycles, the observational underpinnings of the uniformitarian approach, the environmental settings of most sedimentary rocks, or the birth of the theory of plate tectonics, the contributions of oceanography are paramount. Historical geology,



Ken Rasmussen and students discuss barrier island geology at Assateauge National Seashore.

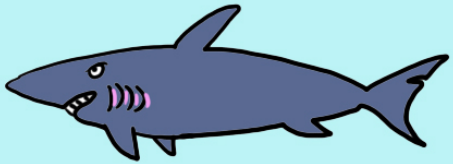
with discussions of transgression-regression, facies reconstruction, patterns of Phanerozoic sedimentation and biodiversity, would be empty without discussions of the sea, its sub-environments and biota. Fast-forwarding to "Anthropocene" environmental geology, how can current human interactions with the global environment be considered without reference to the plight of coral reefs, developed shorelines, coastal eutrophication, ocean acidification, and accelerated sea-level rise? Needless to say further, there is a special place for oceanographic concepts – either embedded in basic geology courses, or as a stand-alone.

Within two years it was apparent in my case to do both. It's been 18 years now since I introduced a year-long Introductory Oceanography (I and II) class with laboratory to our offerings. More recently I've added site-specific short courses on the Chesapeake Bay, and Assateague Island/Ocean City – given NOVA's proximity to the Atlantic. I'd like to share a few perspectives on teaching these oceanographic courses, since the watery geoscience presents certain challenges.

Although NOAA states "39 percent of the nation's population live in counties directly on the shoreline", teaching from a land-locked campus is a common, but surmountable challenge. You can make it real and relevant by having students monitor weekly newspaper headlines of marine significance from around the globe – sources typically from coastal locations like Boston, New York, Los Angeles, and Vancouver. My olds to PhDs) use our library's access to the "Proquest Newsstand" for this task, which remedies the fact that many newspapers grant only limited free-access these days. I choose newspapers, rather than journals, to drive home the point that marine science is "Front Page" news and not restricted to the halls of academe. It also means that there is much less technical jargon for introductory students to wade through.

A laboratory section is critical, presenting much-needed opportunities to "bring the water to them". I do this through lots of video and simple experiments/displays. Web-posted clips from active research expeditions, often via National Geographic, MBARI, and WHOI websites (to name a few), are amazingly numerous, high-quality, and engaging. You certainly cannot taste the salty air, yet students report videos greatly compensate for being inland. Video series such as "The Blue Planet", "Planet Earth", and others (somewhat more dated) by Coronet cover many of the basics – particularly in the biological realm. Demonstrations of various beach grains, particle settling behavior (varying grain size, density, and shape), and thermal stratification within aquaria help scale-down basic marine phenomena easily and reasonably. And the addition of a cold, sugary Coke to a stratified aquarium simulates thermohaline flow quite nicely.

We dive into museums and aquaria! One does not have to live along the coast to have access to marine aquaria of high quality. Even truly land-locked locations like Chicago, St. Louis, Chattanooga, and



Denver have amazing displays of sea life. In the DC area, the Smithsonian exhibit called “Life in the Ancient Seas” gives oceanography students a look at the historical precedents of modern ocean life. Others, like “reefHQ” in Townsville, Australia, and Jason Live, have virtual options to effectively visit a reef and hear about ongoing research expeditions.

But as we all know, there is truly no replacing “being there”, if only for a day or two. Walking a beach, and charting a boat are the experiences students will most remember; onsite trips catch their imagination, demonstrate the pitfalls of fieldwork, and build class camaraderie. My students visit the Chesapeake Bay, and the barrier coasts of the Assateague/Ocean City area. We incorporate locals who make their living on or near the water – and like Ben Franklin on his many crossings – eventually found a way to take some shipboard samples! We have engaged with a waterman of the Chesapeake, using his crabbing vessel to cross the bay inexpensively. By far the most useful device we carry is called the “Hydrolab” – a simple CTD with oxygen and pH sensors. We have made cross-bay transects for 7 years now, in summer stratified VS fall mixed conditions. We map the depth, location, and seasonal timing of thermocline, halocline, and dead zones. An inexpensive clam-type grab sampler, Secchi disk, plankton net, etc. allow students to understand the interdisciplinary nature of oceanography – for example, pairing bottom sediments with water-column conditions, as well as human development with beach and waterway function. Follow-up labs analyze the data, and compare it with that taken at the same stations in different years and over different seasons. This has proved so successful that a 2-day Chesapeake course (classroom/lab, and field) has evolved from a smaller oceanography fieldtrip. I’ve also expanded a brief class-visit to the oceanic coast of Maryland into a similar stand-alone 2-day course to Assateague/Ocean City. There we make cross-island transects of windward to leeward ecosystems, discussing the function of developed VS undeveloped shorelines, and the role of humans in each. The added significance of both bay and oceanic locations is how impacted they both are, bringing home perhaps the most essential point of teaching oceanography at the 2YC level: how we might learn to live more lightly with our oceans.

New faculty at a new college

by Tiffany Rivera
College of Western Idaho

When I was in my early days of becoming a geologist, I attended a community college in order to boost my grades and save some money. Because I was living in a large metropolitan area with many prestigious universities, I knew that the faculty at my community college was superb. Now, a decade (or more) later, I have the opportunity to impact young geologic minds, as well as the young community college in the Treasure Valley of Idaho.

CWI geology students exploring Pliocene oolite beds and searching for carp fossils.

I started my faculty position at the College of Western Idaho (CWI) as I was finishing writing up my PhD dissertation in the fall of 2012. My excitement for teaching was growing by the day, yet I had this PhD weighing on my shoulders. I had never taught a course before as my own; I had a teaching assistant scholarship during my MSc program, but did not do any teaching during my PhD. It was a real eye-opener trying to figure out how to sculpt a syllabus, plan for tests three months in advance, and prepare labs. Then there were the PowerPoints. While my Program Chair had given me a few of his slide stacks, I was finding that I needed to re-familiarize myself with certain aspects of Historical Geology. (*When was the Kaskaskia sequence deposited again??*)

And this was while I was trying to finish a PhD…

Needless to say, I was over-committed, and some days I felt like I was drowning. But, to complicate matters even further, CWI is a very young school having opened for its first semester of classes in January of 2008 with an enrollment of about 2,000 students. In the 5 years since, the school has a total 'head count' of nearly 19,000 students, including non-credit enrollments such as Adult Basic Education and Workforce Development programs. Still, that's nearly a ten-fold increase in five years. This was something that the faculty, students, and community had not forecasted – which led to many organizational questions. How do we group programs under a dean? How many divisions do we have? How do we succeed in meeting the needs of the students with such rapid growth?

CWI geology students on a field trip pose in front of Plio-Pleistocene Snake River Plain basalts.

CWI and I were in the same boat. How do we best balance our time and resources in order to provide the support and structure essential to student achievement? While I can't speak for CWI, I can share some personal reflection. I remembered back to my experience at community college ten years ago, and I thought about my geology instructors that gave their hearts to ensure each student comprehended the complexities behind sequence stratigraphy, or could identify 30 different minerals. I decided that I wanted to be like those that inspired me, and I quickly cranked out the tail end of that PhD so I could focus on improving my courses for the benefit of the students.

I teach a variety of courses at CWI: Historical Geology, Physical Geography, and Physical Geology Lab. My teaching abilities and the course structure continually to improve each day on the job, but I feel my Historical Geology course has become that one course that give students the reason to be in college. It's fun, it's spunky, it's informative, and it's personal. I let my passion for geology and for teaching show in my personality, which makes a strong positive impact on the students. I'll also admit that walking into my Historical Geology class is probably my favorite part of my day. The students excite me; their inquisitiveness astounds me; their level of comprehension, analysis, and critique is exceptional. I couldn't ask for a better group.

CWI is in their 5th year as a college. I am in my 5th month as faculty at CWI. We have both come a long way in this early part of our journeys. The true winners, though, are the students. At CWI, I'm not alone in my dedication to the students. Whether they're future geologists, journalists, nurses, or small-engine repairmen, the students at CWI continue to amaze the faculty, which drives the faculty to produce more for the students creating an endless circle of motivation. And if the growth of the college continues to trend in forthcoming years, I'm certain that many more exceptional professionals will claim CWI as their alma mater.

Who's on deck?

This is a call for nominations from the Geo2YC community for our division's next Vice President. Nominees should be hard-working professional geoscience educators in the two-year-college community, and be dedicated to improving 2YC geoscience education across the country.
Send your nominations to Lynsey LeMay: lemayl@tncc.edu

Thanks for helping us find the ideal future leader of Geo2YC!

NAGT Geo2YC Division

Joseph van Gaalen: Outstanding adjunct faculty award

by Kaatje Kraft and Alison Beauregard
Mesa Community College and Northwest Florida State College

We are proud to announce the inaugural Outstanding Adjunct Faculty awardee for the Geo2yc Division of NAGT. Joseph van Gaalen, a dedicated adjunct faculty for the science department at Edison State College in Fort Myers, FL for more than 5 years.

Joe was nominated by Dr. Rozalind Jester, and she writes, “Joe embodies all the characteristics of what we expect from our full-time faculty and I have been fortunate to work closely with him over the last several years. Joe makes a point to participate in departmental projects, meetings and discussions, as well as contribute to curriculum development. He does all of this (without extra compensation I may add) because he is committed to the College and our students. In fact, Joe developed the entire lecture and lab curriculum for our Physical Geology course, an area where Edison lacks a full-time faculty member. Joe also contributed a significant amount of time and effort to help design and write a custom lab manual that is now used throughout our oceanography courses. His positive attitude & flexible nature has made him a real asset to our department! Joe is committed, not just to our department, but also to his student's success. As an adjunct, he makes himself very accessible to his students and is always willing to spend extra time to help them if needed. I often hear from students that "Prof vG" is always so excited about the material he presents in class and they relate to his enthusiasm. It's true; he is very passionate about Earth sciences & genuinely loves teaching at the introductory level! From our collaborations, I know that he is constantly trying to think of ways he can better relate challenging science concepts to our students, many of whom are under prepared for college level science courses. Joe knows how to turn what some might see as "dry" science into an engaging trip through our planet & its habitats. I have no doubt that in the end Joe has his student's best interest at heart and I truly think he deserves recognition as an Outstanding Adjunct Faculty Member!”

Joseph van Gaalen, outstanding adjunct faculty at Edison State College, Florida

Congratulations to Joe from all of us at the executive council of Geo2yc. Our programs wouldn’t be what they are without our part-time faculty and we’re glad to be able to recognize Joe in the amazing efforts he has contributed toward his department. We are pleased to award Joe with an honorary membership to the Geo2yc division of NAGT for 2013 and he will be in the pool to be our annual outstanding adjunct faculty awardee to be announced at GSA 2013. (If you know of one of your adjunct faculty who deserves recognition, please nominate them at: http://nagt.org/nagt/divisions/2yc/oafa_nomination.html)

CLEAN & ICEE:

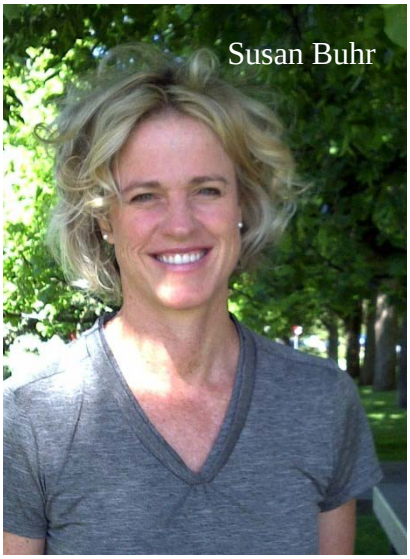
Two new resources for teaching climate science

by Susan M. Buhr (NAGT President)
and Deb Morrison
CIRES, University of Colorado, Boulder

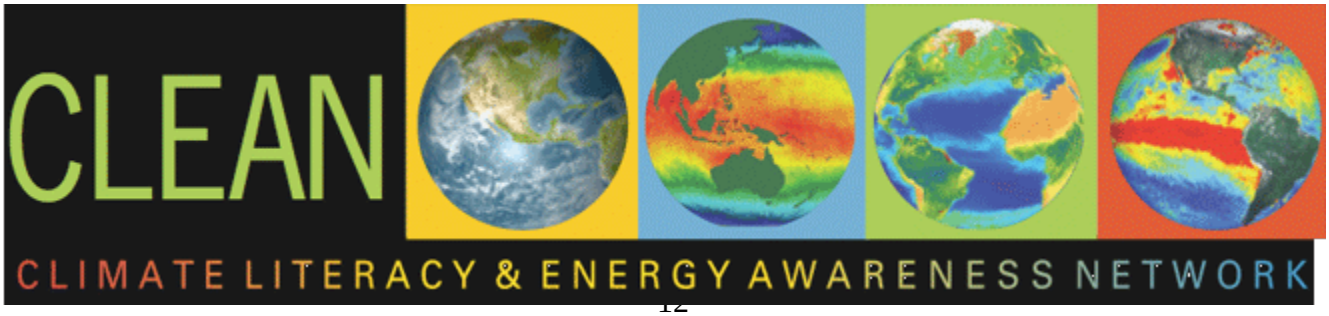
Susan first thought of science as a potential career as a first-generation college student taking General Chemistry at Ventura Community College, Ventura, California. That spark led to atmospheric chemistry work and her current work in climate education. Deb initially thought about science as a career as a result of work experiences embedded in her undergraduate Geography degree that she used to support herself through college. These field work opportunities led to work in forest ecology and biogeochemical cycling. Susan and Deb's experiences are not isolated; most professional geoscientists fell into geoscience as part of their introductory college science courses. Much of the population takes those introductory courses through 2YC institutions, especially first-generation students such as Susan and Deb. As such, climate and energy instruction in 2YC introductory courses are an important pathway to a climate-smart society.

Well before the public dialogue on climate science became ubiquitous, we in the geosciences understood the importance of climate science and energy topics and concepts in the classroom. In response to the public dialogue on climate science, the 2008 NAGT position statement on climate science instruction states "that teaching climate change science is a fundamental and integral part of earth science education" and recognizes that climate instruction is "best taught in an interdisciplinary manner, integrating the many relevant sciences into a holistic curriculum approach; that climate-change topics provide exceptional opportunities for students to learn how geoscientists study past, present, and future climate systems…; and that a current and comprehensive level of understanding of the science and teaching of climate change is essential to effective education."

With the advent of the Next Generation Science Standards, which include climate science, instructors at 2YC institutions have a role in transforming education across the country. Since most college-bound high school students do not take geoscience in high school. Future teachers are likely to receive their first and perhaps only formal climate science instruction within your introductory courses.


Susan Buhr

We know, through evaluation data and research literature, that educators approaching climate instruction for the first time share needs and challenges in common. Across the board, educators describe the need to navigate social complexity around climate science, to access credible, pedagogically appropriate resources, and to gain more knowledge about fundamental and emerging knowledge within the field. College faculty further describe a need for resources that build quantitative skills. This article outlines specific identified needs and describes two projects that are designed to help educators meet these needs: the Climate Literacy and Energy Awareness Network (CLEAN) Collection (http://cleanet.org/), and the Inspiring Climate Education Excellence (ICEE) professional development project (http://iceeonline.org/).



Need for current, up-to-date resources: The CLEAN Collection is a peer-reviewed repository of learning activities, videos, and visualizations led by TERC, the CIRES Education and Outreach Group, and the Carleton College Science Education Resource Center (SERC). CLEAN resources are aligned with Climate Literacy: The Essential Principles of Climate Science and the new Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education frameworks. Each resource within the collection has been reviewed multiple times by educators at the target level, scientists and a publishing scientist within the appropriate sub-discipline. The review annotations give teaching tips, science review notes and links to additional helpful resources. Resources are searchable by instructional level, including upper and lower division college levels, by topic, literacy principle, and resource type. The CLEAN team of educators and scientists has reviewed over 14,000 resources, resulting in a curated collection of 514 as of this writing. CLEAN is a NAGT-sponsored project.

Need for foundational and cutting edge knowledge: Through CLEAN and ICEE, educators can learn how to teach climate and energy topics. CLEAN contains "Teaching About" pages, each focused on a literacy principle of climate literacy and the new Energy Literacy principles. These pages give a summary of each principle, outline possible challenges for educators, suggest pedagogic approaches for each grade level, and link to relevant CLEAN resources. Educators can find resources developed for and through workshops for College Faculty, linking together different CLEAN resources for different learning goals. Through ICEE interested individuals can participate in a webinar series focused on each literacy principle, including cutting edge science related to that principle, and participate in a climate education list and forum.

Need to navigate social complexity - controversy, prior knowledge, solutions: Because of the social complexity of climate education, educators need to be prepared for student beliefs, prior knowledge and reactions to what is being taught in class. Students and teachers usually come into this topic having formed their opinions based on media reports and the prevailing attitudes held by friends and family. The reality of climate impacts can be overwhelming for students and educators at all levels, as they grapple with change to places and past-times that are important to them. ICEE provides a community where educators can discuss strategies to decrease these challenges, including framing climate change in ways that are sensible to your student community, integrating climate change solutions information into class to make the reality less overwhelming, and talking through any challenges from students, colleagues, parents or administrators. You can get on the ICEE list-serve by emailing Amanda.morton@colorado.edu and register for the ICEE forum at iceeonline.org/forum. Opportunities to engage in climate science professional development and resources for promoting climate science education are shared through these mechanisms.


Deb Morrison

The best part about these projects is connecting to the community of educators who use the resources. The most confident climate educators have strong networks of trusted colleagues with whom they can get resources, expertise, and access opportunities. These networks include participation in national science organizations such as the American Geophysical Union and national science education organizations such as NAGT. Benefits that develop include personal relationships with like-minded educators and with climate scientists, which may allow you to have any question about climate

science answered by an expert quickly. Participation in this larger climate science education focused community also allows for ties to local and regional climate and energy organizations to get the latest, on-the-ground information where you and your students live. You can participate in a very active climate education group through the CLEAN Network which includes a weekly teleconference and an active list-serve. This article describes just a couple of the many great current climate education projects, funded through NASA, NOAA and NSF. The easiest way to get started is to get connected with one of these and start getting involved. Feel free to contact us with any questions.

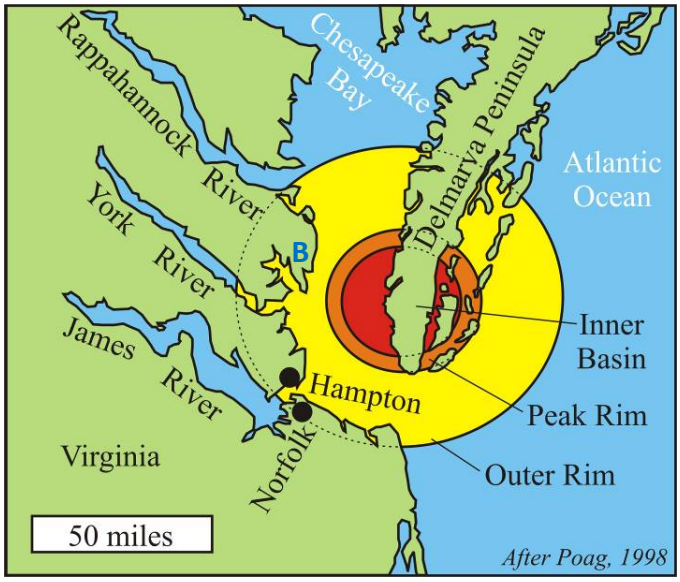
Resources:

• NAGT Position Statement on Teaching Climate Change: http://nagt.org/nagt/policy/ps-climate.html
• Next Generation Science Standards: http://www.nextgenscience.org/
• Climate Literacy: The Essential Principles of Climate Science http://www.globalchange.gov/resources/educators/climate-literacy
• Energy Literacy: The Essential Principles and Fundamental Concepts for Energy Education http://www1.eere.energy.gov/education/energy_literacy.html
• The Climate Literacy and Energy Awareness Network (CLEAN) Collection: http://cleannet.org
• To join the Inspiring Climate Education Excellence (ICEE) list-serve: email Amanda.morton@colorado.edu.
• To read and join the ICEE forum see http://iceeonline.org/forum.

"Box O' Rocks"

by Shelley Jaye
Northern Virginia Community College

About 35 million years ago, a three-kilometer-diameter asteroid or comet fragment hit just off the Atlantic coast at the end of Chesapeake Bay. Although not as big as the famous Chicxulub asteroid that sealed the fate of the dinosaurs, it was big enough to shatter the subsurface stratigraphy and allow major saltwater incursions into the groundwater system beneath the Tidewater area of southeast Virginia.



Regional map showing the placement of the impact structure centered on Virginia's eastern shore in the Hampton Roads area of southeastern Virginia. "B" marks the location of the "Bayside" core being analyzed by students from Northern Virginia Community College.

In efforts to understand the saltwater mixing problem, the Virginia Department of Environmental Quality and the US Geological Survey drilled numerous cores and analyzed marine seismic-reflection data of the Virginia Coastal Plain to provide detail to the subsurface geologic picture. The information that came to light coupled with the Deep Sea Drilling Project discovery of Eocene age impact ejecta pointing to a source area in the mid-Atlantic region detailed the existence of an impact structure at the southern end of the Chesapeake Bay. Beginning in 2000, the USGS began drilling several deep cores in the area bringing up over 728 m of sediment and rock sample in an effort to drill through the impact structure and into the basement rock of the Coastal Plain. (Horton, and others, 2005).

In February, the Geology Department at Northern Virginia Community College (NOVA) brought two boxes containing the bottom-most 4 m of the deepest, "Bayside" core to the Annandale Campus geology prep room, on loan for several months from the USGS. Petrographic analysis of the core is the subject of a directed study project currently offered by the geology department (see map). Eight NOVA students are developing their technical skill in making rock thin sections to analyze and

specifically characterize the mineralogy and petrology of the basement rock of the core.

This opportunity is a direct outgrowth of two NOVA initiatives. First, two years ago, NOVA Annandale began offering a fully transferrable course in Mineralogy that includes optical techniques and petrographic analysis (Jaye, 2012). Second, NOVA geology is working with the USGS to prepare our students for internships and employment as Physical Science Technicians at the USGS headquarters in Reston, VA. Seven NOVA students were offered paid internships at the USGS last summer; three have continued on as part-time employees at the Survey while they finish their studies at NOVA.

NOVA is in the process of developing a new Physical Science Technician Associate of Applied Science Degree in various STEM disciplines including Geology. As a part of the new degree program in Geology, NOVA will offer five new classes in geological techniques covering field study, core description, sediment size analysis, micro-paleontology, and hard rock analysis. The current directed studies course serves as a pilot for the hard rock techniques course to be taught this summer.

We don't expect to make any major new discoveries in analysis of the core, at least not this semester however, the USGS doesn't have the staff to analyze all of the Chesapeake Bay Impact Structure core that they have. The plan is to have NOVA students enrolled in Mineralogy and the Hard Rock Techniques course work their way up through the core and contribute to the further understanding of the Chesapeake Bay Impact Structure and the geology of the basement rock of the Coastal Plain. This is a wonderful opportunity for community college students to become involved in real research and to contribute to the geologic record.

J. Wright Horton, lead core petrographer from the USGS, discussing the Bayside core with the NOVA students involved in the directed study core research.

Works Cited

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Dorothy Stout Professional Development Grants

In honor of Dottie Stout's work as the first female president of NAGT and lifelong dedication to Earth Science Education, grants are made in her honor to faculty and students at 2 year colleges teachers in support of the following:

- Participation in Earth science classes or workshops
- Attendance at professional scientific or science education meetings
- Participation in Earth science field trips
- Purchase of Earth science materials for classroom use

Grants of $750 will be made annually in three categories: Community College Faculty, Community College Student, and K-12 Educator. Award winners will also be given an one-year membership to NAGT.

Eligibility

Community College Faculty and K-12 teachers who teach one or more Earth science courses and Community College students actively pursuing a career in the Earth sciences are encouraged to apply for these awards.

Apply online:
http://nagt.org/nagt/programs/stout.html

FOUNDATIONS is edited by Callan Bentley, Northern Virginia Community College. Please get in touch with your feedback: cbentley@nvcc.edu