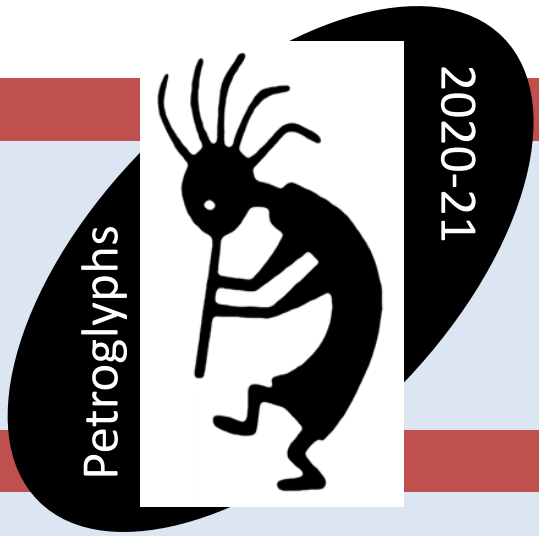


PETROGLYPHS

Environmental Earth Science

2020-21 Newsletter 10th Edition

Message from the Chair

Stephen Nathan

Hello Everyone,

We made it! That's my sound bite for the past year. The March 2020 closure and pivot to full online teaching threw all of us into the deep end of the pool. As summer 2020 progressed there were many questions about the upcoming 2020-2021 academic year. Would the new school year be like the spring? If we returned to campus, how would we keep everyone safe, let alone teach? In the end the campus did reopen fall 2020 but the teaching experience changed drastically. Fortunately, we never had a set-back that required another closure and switching back to fully online.

To prevent transmission of the virus, many classrooms had at least 1/2 of the chairs removed to enforce social distancing, wearing face masks became mandatory and foot pump operated hand sanitizer dispensers were put in every classroom. We also had to adjust to the new teaching "modalities", such as "rotating student" and "rotating class". The rotating student modality was a little odd. Students in a class taught three days a week were divided into three groups. So, on Mondays I would only see the "Monday" group in their seats, all the other students were live streaming the class on the web; with each new lecture, a new third rotated in.

Despite these challenges, the EES department had many noteworthy accomplishments during the 2020-2021 academic year. First and foremost was the inception of a new (and fourth) concentration within the EES major: Environmental Science! This new concentration offers a wide range of elective courses that address topics such as geologic hazards, ground water contamination and watershed management. We hope the concentration will attract new students to the department and offer current students better training for the job market.

Student research moved forward without missing a beat. Several of our students presented their research at Eastern's CREATE conference, the NEERS/AERS conference, the national meeting of GSA, and at Northeast GSA. Although the meetings were held virtually, they provided the students with valuable experience and opportunities to build their resumes.

Not to be outdone, our faculty managed to attend many virtual professional meetings, publish several research papers and make other significant contributions to the literature. I encourage the reader to explore the details of these student and faculty accomplishments in the Faculty Updates section of this newsletter.

On the lighter side, the EES Department held its End-Of-Year Celebration, albeit virtually. During this event, four new members of the EES Honor Society were inducted into our local chapter of Sigma Gamma Epsilon. Last, thanks to the hard work of Dr. Drzewiecki, we all enjoyed a very fun End-Of-Year (socially distanced) picnic at Mansfield Hollow State Park.

Before closing I would like to thank my two Assistant Department Chairs, Dickson Cunningham (fall 2020) and Bryan Oakley (spring 2021). Their support, encouragement, guidance and gentle prodding during my first year as Department Chair helped me make it.

EES STUDENT RECOGNITION AWARDS

May 7, 2021

Congratulations

Jack Cerra

Outstanding Environmental Earth Scientist: In recognition of his enthusiasm, academic achievement, and contributions to the Environmental Earth Science Major.

Hard Rock Geology Recognition: Jack has demonstrated the highest level of academic achievement in structural geology, mineralogy, and igneous and metamorphic petrology.

Quaternary Geology Recognition: He has excelled in both applied research topics and coursework pertaining to the Quaternary geology of New England.

Danielle Whitcomb

Geomorphology Research Recognition: For her continuing interest and efforts in applying imaging and photogrammetry to measure surface topography and change. Danielle has utilized these techniques to measure erosive change at Diana's Pool and most recently collected, analyzed, and presented drone orthoimagery and detailed 3D models of the forest floor and stream in the Eastern Arboretum.

Shane Goodson

Soft Rock Geology Recognition: Shane has demonstrated the highest level of academic achievement in historical geology, sedimentology, and stratigraphy in the classroom and the field.

Abigail Durling

Quaternary Geology Recognition: Abigail has excelled in both applied research topics and coursework pertaining to the Quaternary geology of New England.

Academic Excellence Certificate: In recognition for her academic excellence in the Junior Class

Arlene Blackwell

Academic Excellence Certificate: In recognition for her academic excellence in the Senior Class

Kilee Nutbrown

Academic Excellence Certificate: In recognition for her academic excellence in the Sophomore Class

Jonathan Lepire

Academic Excellence Certificate: In recognition for his academic excellence in the Freshman Class

FACULTY UPDATES

Denali, North America's highest summit from 70 miles away

Dickson Cunningham

I was fortunate during the last year to have sabbatic leave during the winter-spring, 2021 period. Thus, I was off campus during the worst Covid-19 period and able to focus on my research projects whilst working at home. I taught on-ground during the fall semester and was able to run my mineralogy/petrology course as normal with weekly outdoor labs (using a portable whiteboard) and local field trips. Thankfully, the students were able to drive themselves to our field sites and all went smoothly.

On the research front, I have had a productive year. In August last summer, I completed my external role as one of the 7 editors for Elsevier's Encyclopedia of Geology, 2nd Edition. This was a multi-year, time-consuming responsibility that included reviewing more than 50 chapters written by leading experts from around the world on the regional geology of all of Earth's major landmasses and island groups. Despite the large amount of time and effort, it was an enormously satisfying experience as I was able to bring myself up-to-date on the geological evolution of the entire planet! I wrote one of the chapters on the regional Mesozoic-Cenozoic evolution of Central Asia and co-authored another chapter on the Precambrian-Paleozoic evolution of Central Asia. Because I have been working on the tectonic history and crustal structure of Central Asia since 1993, writing these chapters was a useful exercise in reviewing the most important recent literature on the region.

In addition, during the winter, I published two papers with my former PhD student Haibo Yang (who spent last year with us in EES) on the active faults, evolving basins and block uplifts of the Beishan region of western China (published in *Lithosphere* and *Tectonophysics*). I also co-authored a regional synthesis of the active fault systems and crustal structure of the Alxa Block north of Tibet. This paper (published in *The Journal of Asian Earth Science*) fills an important gap in our understanding of the Indo-Eurasia deformation field north of Tibet. During winter-spring, 2021, I wrote a chapter, now accepted and in press, on landscape characteristics of intracontinental mountain ranges for an Elsevier volume titled '*Treatise on Tectonic Geomorphology'*. In addition, I also have submitted a paper on the geoheritage of Mongolia's Gobi Altai region and a separate paper on the Langshan range in China, both are currently in review at the time of writing.

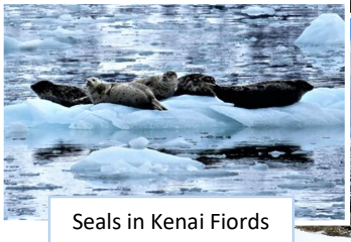
EES Major Xavier Jackson-Ward investigating traprock fracture sets on Mt. Higby, May 2021

Regarding Connecticut geological research projects, my work on the Honey Hill fault system is progressing. I now have received Ar-Ar ages from mylonitic rocks and bordering lithologies and am close to writing up all results on the kinematic and geochronological significance of this major crustal boundary in southern New England. Former EES major Thomas Zimmerman presented his undergraduate research on the Honey Hill fault system at the fall, 2020 virtual Geological Society of America National Meeting. I am in touch with Margaret Thomas, CT State Geologist to explore options for publishing other completed student projects with the Connecticut Geological Survey. Finally, during spring, 2021, Xavier Jackson-Ward worked with me on a research project highlighting the most spectacular geological features on CT 1-m LiDAR that are not revealed by other available imagery. We are currently writing up the results of our study which is basically a LiDAR greatest hits compilation. This study involved image processing, 3D shaded relief model generation and some ground truthing.

In terms of Department and University Service, I was Assistant Chair in the fall as Steve Nathan began his EES Chair tenure. I also acted as Employability Liaison to support EES student employability. This involved Teams meetings with undergraduates, providing group and individual advice on resumé writing, job search strategies, and CICD resources. I was also involved in writing a lengthy self-report on the current and future status of EES student career preparation including student development of "Essential Employability Qualities" that embeds EES program Learning Outcomes.

With Sam at Dead Horse Point, Utah, spring 2021

On the home front, once we all received our vaccinations during the spring, we began to get out more. My son and I spent his spring break in Moab, Utah exploring Arches and Canyonlands National Parks and surrounding geo-sites in SE Utah. We hiked, rode horses and explored awesome canyon wilderness areas, and visited ghost towns, petroglyph sites and dinosaur fossil and footprint sites. In May, my wife, son and I travelled to Alaska for 9 days exploring by RV the central wilderness areas around Denali National Park with three days on the Kenai Peninsula including a 120-mile fiord cruise. We lucked out with the weather and traveled through stunning mountain scenery in the Alaska, Chugach and Wrangell ranges. We saw abundant wildlife, including moose, caribou, dall sheep, mountain goats, sea lions, orcas, seals, whales, sea otters, porcupines, and many stunning bird species including bald eagles, gyrfalcons and puffins. We visited a "musk oxen farm" and the 1964 earthquake park in Anchorage and got up close to several glaciers.



Seals in Kenai Fiords

Cunningham's on an alpine hike (bear spray on my belt!) in Denali NP, May 2021

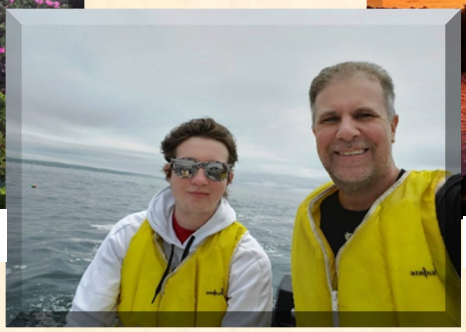
At the time of writing, EES course enrollments have rebounded back to pre-pandemic levels which is reassuring and a testament to the long-term buoyancy of our department and the critical role it plays in providing a modern and relevant curriculum in environmental earth science. With our new Environmental Science concentration within the major, we are now more diverse in our educational offerings. We are optimistic that our department will continue to thrive and evolve as environmental and earth science issues become increasingly relevant to modern society and workforce needs.

View from the house patio-my office for much of the summer

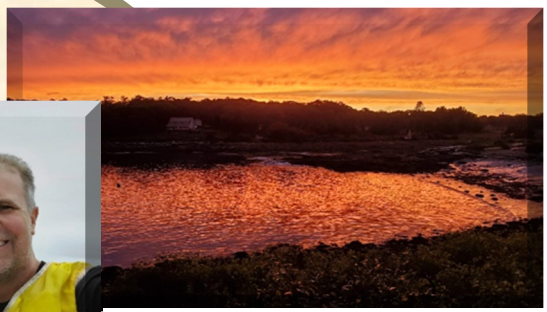
Peter Drzewiecki

Hello to all our EES alumni, students, and friends! I hope everyone is happy and healthy and that this past year has not been too bad for you. In addition, I hope that you are able to finally transition back to the way things used to be. There is no denying that this past year is one that I am happy to see in the rearview mirror! Despite the restrictions of the year, I did manage to get quite a bit done and have some good times too. My summer in 2020 was quite open because there were three things that normally take quite a bit of time that did not happen. First, our planned global field excursion to Spain was cancelled. You may recall that Spain was one of the first places to be hit hard by COVID-19. Second, summer field work with students was not permitted. And third, I did not have to go be an adult leader at Boy Scout Summer Camp for a week. Instead, right after classes ended, I went to Maine. My wife's family owns a summer home on the Pemaquid Peninsula, and this past summer it was scarcely used... except by my family. We must have been up there half the summer. My youngest son finished his high school year remotely while there, and my daughter got a summer job in the local grocery store. I quickly got into a routine that involved relaxation and coastal fun, but also some production writing papers that I should have completed long ago. Since we went up earlier in the year than normal, we were treated with a wonderful display of wildflowers, including lupines (see pictures), and a better than normal series of sunsets. We had fun taking the boat out to see seals, bald eagles and dolphins, took lots of hikes, and walked the rocky shoreline. We also made it a point to sit on the patio with cocktails and hors d'oeuvres most evenings.

Lupines in full bloom



Boat fun with my son Max (he's driving!)



Sunset over the bay

We had no big family trips because of travel restrictions, and this is my biggest regret of the COVID-19 year. As my kids get older, the chances of getting the whole family together for a trip or vacation is rapidly diminishing. We did manage the usual trips to visit my family in Buffalo, NY, but we could do very little while there. That said, my son Max (the only child still a permanent resident at my house) and I did manage a road trip to Pennsylvania. Max recently bought a National Parks Passport book that lists National Park Service localities, with a place to put a stamp for each one you visit. His goal is to get them all, and Pennsylvania was the low hanging fruit. In just 6 days we put in over 1,100 miles and managed to see the Alleghany Portage Railroad NHS, Delaware Water Gap NRA, Edgar Allen Poe NHS, Eisenhower NHS, Flight 93 National Memorial, Hopewell Furnace NHS, Independence NHP, Johnstown Flood National Memorial, Steamtown NHS (in Scranton, PA – we couldn't find "the Office" anywhere), Thaddeus Kosciuszko National Memorial (who, you ask???), and Valley Forge NHP. The highlight, though, was Gettysburg National Military Park. That is a place that had been on my bucket list for quite a while. It was quite impressive to walk over the battlefield, which is much as it was at the time of the Civil War, and see things from the perspective of the men fighting there. Some of the bigger charges must have been both frightening and impressive to behold. The Fight 93 Memorial, honoring those killed in the 9/11 plane that crashed in Pennsylvania, was also impressive and sobering. Although it has been almost 20 years since the event, the visitor center and memorial itself had a quiet, subdued atmosphere.

Pennsylvania Highlights

Sunfish Pond in the Delaware Water Gap NRA, designated one of the 7 Natural Wonders of New Jersey
(I was surprised they actually had 7!)

Sight of Pickett's Charge at Gettysburg National Military Park. Union soldiers hid behind this low stone wall as 12,500 confederate soldiers marched across the filed toward them.

Reconstructed winter cabins (each held 12 soldiers) for Revolutionary War soldiers at Valley Forge.

Flight 93 Memorial
The actual crash site is on the field below, marked by a huge boulder

In September 2020, we were in the middle of the pandemic, and all courses had to be offered online or in some sort of hybrid form that limited the number of students in the class. This made labs particularly difficult. There were no field labs at all (the University van policy only allowed the driver and one passenger in its 15-person vans, which kind of defeats the purpose of a van). I had built up some teaching release time and figured this was a good time to cash some in! I only taught EES 130 – Historical Geology and its lab. My semester was not that bad, but I feel the students were generally unable to build a rapport with each other, which is so crucial to their future success in the major. Also, during the fall, I worked with Shane Goodson finishing up an undergraduate research project that helped to catalog all Hartford Basin rock cores in Connecticut into a state and national database. This project is described more completely in the Undergraduate Research part of this Newsletter.

One casualty of the COVID pandemic was my now annual trip to Spain to co-lead a field course on carbonate facies for oil company geologists. I missed my yearly dose of interaction with professional geoscientists interested in my field (and the food, wine, and scenery, of course). Winter break was uneventful. We did go visit family briefly in Buffalo. During the fall semester, I again cashed in some teaching credits and only taught EES 344 – Sedimentology and Stratigraphy and its lab. This time, I was able to have the entire class for in-person teaching, and it was great to be as back to a more normal situation again! I remotely attended the Northeastern Geological Society of America meeting that was ironically held in Hartford this past March. Drew Hyatt and I helped co-lead a tour of Dinosaur State Park for the event. Finally, I was glad that Eastern was able to have a Commencement ceremony this year, or rather, 4 separate ceremonies. Unfortunately, it was difficult to see and cheer for all our EES majors who were spread out across all these ceremonies.

Picture of Roca Narieda, in northeastern Spain near the town of Organya. This 800m (half mile) high cliff is a carbonate platform that developed on the edge of a salt withdrawal basin. It is one of the outcrops in a paper I am writing, and a popular European rock-climbing destination.

I have been keeping busy with committee work as well. In addition to serving as chair of the university's Sabbatical Leave Committee, I also served as co-chair of a committee that is helping to redesign Eastern's Liberal Arts Curriculum. The university has been told by our accrediting agency that we don't really deliver the Liberal Arts education that we promise to our students. My committee is charged with proposing a new program that faculty will vote on to approve. Remember all those LAC courses you had to take (or GER courses if you are more "senior")? Well, those are going away, and will be replaced by a lot of new courses more in line with our Liberal Arts mission.

COVID-19 did allow me to make progress on papers that I have been writing for some time. Two are on the tracks at Dinosaur State Park and will appear in a book that Drew Hyatt is co-editing. Both have been reviewed and were accepted pending revisions. The first reinterprets the environments in which the dinosaurs were walking. Currently, the interpretation is that they were walking on the edge of a large lake, eating the fish in that lake, and sometimes swimming. I have looked at the rocks of the same age that surround the park, and there does not appear to be any evidence for a lake at that time! This would call into question all these interpretations. The second paper deals with how to determine which layer the dinosaurs actually walked on. When they walk, their tracks occur not only on the sediment surface exposed at the time (the tracked surface), but they can penetrate onto surfaces below (undertracks) or be expressed on surfaces above (overtracks) as well. If you want to properly understand the dinosaur behavior, you need to know which tracks were formed on the same surface, and thus represent dinosaurs that may have been together. It is harder to determine than you would think! Finally, I am co-authoring a third paper with Spanish colleagues on the influence of salt tectonics on the development of a sedimentary basin in northeastern Spain. We found evidence for a lengthy period of salt tectonic deformation that preceded and was overprinted by the mountain-building event that resulted in the Pyrenees. It allowed us to explain many of the enigmatic stratigraphic and structural inconsistencies that have bothered geologists for over 50 years!

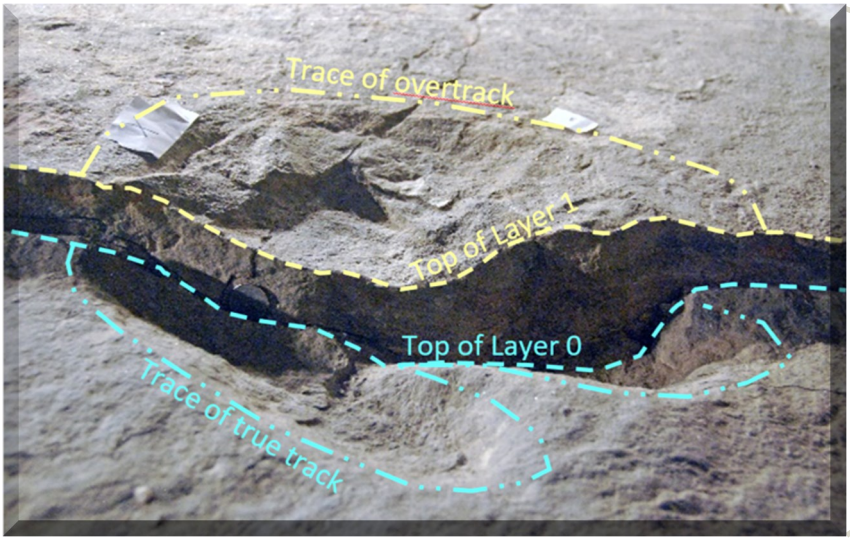


Image from my work at Dinosaur State Park (Rocky Hill, Connecticut). It shows and example of a Eubrontes dinosaur track that is expressed on two surfaces. This track is interpreted to have been made on the lower stratigraphic layer, but has an expression on the upper surface called an "overtrack".

On personal note, my family is still growing up. My oldest daughter Kaela published her first and second scientific papers and finished her first year of graduate school in genetic counseling at Brandeis University. My older son Aiden finished his fourth year of Mechanical Engineering at UConn (one semester left!) and is currently completing an internship in this summer with a company in Boston. My younger daughter Shelby finished her second year at American University in Washington DC and has chosen to major in graphic design. She lived in DC even though her school was 100% remote learning last year and got to experience first-hand all the action during the presidential election. Finally, my younger son Max completed his sophomore year of high school and got to participate in his first year of high school lacrosse. He volunteered to be goalie since the team did not have one. The bruises have finally healed! My wife continues to work as a state auditor at UConn and is really bummed as her year working from home is coming to an end.

I wish you all happiness, continued good health, and success in the upcoming year! As always feel free to visit or e-mail to let us know how things are going.

STUDENT RESEARCH

Student: Shane Goodson
Faculty Mentor: Peter Drzewiecki

Project Title: 3-D Correlation of the Lower Jurassic Portland Formation at Adriaen's Landing, Hartford, CT

Fieldwork at the DEEP Randolph P. Steinen Core Repository in Portland, CT—Shane Goodson identifying the location of the cores at the CT Core Repository

Shane Goodson completed a project with Peter Drzewiecki that began the previous academic year with two other students: Erick Bora and Joe Franklin. That project was never wrapped up because of the COVID outbreak, and Erick and Joe graduated in 2020. That left Shane to carry the torch! His project focused on documenting the descriptions and interpretations of 54 rock cores collected from the lower Jurassic Portland Formation in the area of Adriaen's Landing area (downtown Hartford waterfront). The main goals of the project included conducting "fieldwork" in the DEEP Core Repository, drafting of measured sections, creating an ArcGIS database, and incorporating metadata from these and all other Hartford Basin cores into state and national databases. The first three tasks were completed by Spring 2020.

Shane set out in the Fall of 2020 to document that work done in a report, compile all the data into one location, and incorporate the core information into the databases. We learned quickly that the ArcGIS project that the students created in Spring of 2020 was corrupted, so re-doing that became the first priority. The second task, updating the databases, resulted in two large MS Excel files. These were completed under the guidance of Margaret Thomas (State Geologist) of the Connecticut Geological Survey, who is the official steward of the state data. Shane collected data on the location, depth, formation drilled, lithologies, diameter, etc. of about 150 cores from drilling reports and other sources, and entered this information into the spreadsheets .

Peter Drzewiecki reviews a core with Shane Goodson

The final task was a written report that included the ArcGIS maps and locations, the MS Excel spreadsheets, descriptions of all 54 cores, photographs of all 54 cores, and several correlations among the cores. The cores total 810 feet in length and occur in a dense grid that allowed for 3-dimensional reconstruction of the distribution of paleoenvironmental conditions in this area of the Hartford rift basin during the Jurassic Period. We were able to make several detailed cross-sections, but the short nature of the cores (10-20 feet for most) combined with the regional 15° structural dip limited the 3-D correlation. We were, however, able to successfully tie this core set into an older set of cores that record a much longer record of paleoenvironmental change. From a strike section of 18 cores drilled along Columbus Boulevard in Hartford, we were able to test the lateral continuity of several sedimentary features and their utility for correlation along greater distances. The final report was 172 pages long!

NEW STUDENT RESEARCH

Peter Drzewiecki (left, Kilee Nutbrown (center), and Abigail Durling (right)
examining a fallen block of the East Berlin Formation that is covered with mudcracks

Students: Abigail Durling and Kilee Nutbrown

Faculty Mentor: Peter Drzewiecki

Project Title: Developing a Geological Model for Recognition of Ancient Playa Deposits based on the Lower Jurassic East Berlin and Portland Formations, central CT

Abigail Durling and Kilee Nutbrown began an undergraduate research project in the summer of 2021 aimed at revising a geological model used to recognize ancient playa (dry lake) environments in the rock record by combining existing data with new data collected at a recently cleared rock outcrop in central Connecticut. Current models for playa environments were developed decades ago and do not include more recent scientific advances in our understanding of playa systems. The new model will be useful for geoscientists studying ancient playas worldwide, such as in central Connecticut and at Dinosaur State Park. Anticipated products include conference presentations, publication in an international journal, and improved interpretations for displays at Dinosaur State Park.

Abby and Kilee will spend about 2 weeks this summer collecting data at one of the key exposures of the East Berlin Formation, and tie these data into recent studies conducted at Dinosaur State Park. The exposure is located along the on-ramp from the Berlin Turnpike on to Highway 9 South. It was exposed in the 1980's during construction of the highway but has been completely overgrown by vegetation since my arrival in Connecticut in 2002. The vegetation was recently cleared, allowing us to investigate the outcrop for the first time. Follow-up work during the 2021/22 academic year will include preparing rock samples for thin section work, investigating those thin sections, revising the depositional facies model for playa recognition, and presentation at a local GSA meeting.

Drew Hyatt

What a year it has been for everyone! I'll focus here on the positives as it undoubtedly has been a year that is memorable for good and not-so good reasons. For me it has been a busy, challenging, and at times frustrating year but also a time that reminds myself (and others I suspect) of what is important.

So … off we go for a quick recap of teaching during the 2020-21 COVID year. For more years that I care to admit I have enjoyed teaching field methods (EES 350) every fall. However, with about 3 weeks of summer left last year, I made the difficult decision to punt Field Methods from fall 2020 to spring of 2021. At the time, it seemed almost certain that all classes would be forced into a fully online modality early in the fall semester which would not work for Field Methods.

EES 460 (Fall 2020) students learn to fly drone at the ECSU soccer field

As such, in place of Field Methods I taught a brand-new course entitled "Imaging and Image analysis in Environmental Earth Science" (EES 460). I also had a class and lab section of Dynamic Earth (EES 104). Although EES 460 was offered as a 100% in-person class, if necessary, I could convert it to a hybrid or online modality. Intro (EES 104) was offered in-person for the lab and for reasons explained below, asynchronously online for class. How did this go ??? As a good friend of mine used to say, "crazier than a bag of hammers"!

Dynamic Earth seemed to go reasonably well, although it was eerily quiet in lab as wearing masks and maintaining 6 feet of separation tends to eliminate almost all banter among students (which is unfortunate). As alluded to above, to accommodate all students, maintain COVID distancing, and have an in-person lab it was necessary to split the lab into two sections – one meeting during the regular lab time, and the other spread over two of the class meeting times. This meant that class lectures had to be delivered asynchronously as video recordings. It was a tad bit confusing at first, but after a week or so we all settled into the groove. For the most part, students seemed engaged and did attend class and lab consistently. This hybrid approach drove lots of learning on my part (I would say preparation for class was easily 3-times the work of delivering class in person). That said it was probably equally challenging for the students. In the end, the class finished up reasonably well with students performing very similarly to other years – good on them!

EES 460

"Imaging and Image Analysis in Environmental Earth Science"

The fall 2020 imaging class (EES 460) involved a great group of EES majors but totally kicked my butt as everything was 100% new. Nonetheless, I did enjoy the class which introduced a variety of imaging, processing, and 3D modelling techniques. This built on my resent research exploits at Dinosaur State Park, and work with Dr. Oakley on some aspects of coastal change. Students imaged/processed/modelled rock samples, outcrops at Diana's Pool and were introduced to drone flight and related image analysis. This embedded a variety of computing techniques that made use of software programs such as *Lightroom*, *Metashape Professional*, *Cloud Compare*, *MeshLab*, and a brief introduction to *Blender*. I included a few photos of these activities. We did have a few COVID-positive hiccups that caused some students to attend class remotely for a week or two using Blackboard-Collaborate. That said, everyone in the class was very good to work with, all performed to or near their potential, and we were able to do several hands-on activities inside, on the soccer field (for flying lessons), and at Dianna's Pool. Ironically, however, the semester did not get booted to a fully online modality which was good for the imaging class, but meant a cold Field Methods class in spring, which in hindsight could have run in fall after all. Oh well!

In the spring of 2021 I taught a lecture section and two lab sections for Landform Analysis (EES 224) as well as Field Methods (EES 350). Landforms was hybrid for class (alternating half the students in person and the other half online at the same time), and 100% in-person for lab. Due to travel limitations and the class size it was not possible to incorporate off-campus field excursions for EES 224. However, I did run an on-campus field trip through the arboretum that included a drone demonstration (see the photos).

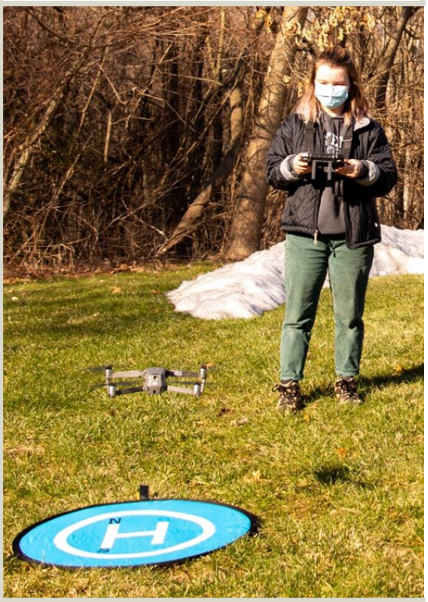
EES 224 Field Trip through the Arboretum

I did lose a bit of sleep with Field Methods this past spring primarily fretting about weather and transportation to field sites. The weather was manageable because we ran the class as two 4-hour classes per week (the same as how it has always been run in the fall). This packed classes into fewer weeks than a normal semester; thereby providing some flexibility in the event of really bad weather. Indeed, it was necessary to bump four classes, but we still managed to meet for all contact hours required for the course. Transportation was a more challenging problem. Due to COVID-distance limitations I could only take one student in a van with me. With a class of twelve and 85% of class meetings occurring at sites off campus this was a bit of a problem. However, students in the class were very accommodating and drove their own vehicles to field sites. I adjusted field sites and the timing of activities to maintain safe and reasonable working conditions.

As this was the first time ever for a winter Field Methods class, I did learn a few things. First, on the positive side, vegetation obscuring outcrops is not a problem in the winter as it would be in the fall. On the other hand, it is hard to see the rocks/ground through a snow cover! Also, not surprisingly, winter can be cold. Oh well (for the second time!). Impressively, through it all, one student managed to wear shorts to every class (see associated photos – way to go Jack!). All things considered the semester went well. I changed the order of topics, doing surveying first (as we could manage that in the snow on campus – with a bit of digging). That bumped outcrop examination to a bit later in the semester after most of the snow had fallen. The final team-based field project was held at Shelter Falls which, except for the first day when a tree company used up the only parking area, worked well and we had good weather. The last class, as usual, was held inside, reflecting on all classes in the major as well as liberal arts experiences, with emphasis on discussing why field activities like the final project are important to Earth Science but also to people without background in geo/environmental science. All things considered, it was a challenging semester, but all people remained healthy, safe, and maintained positive attitudes throughout. Check out a few of the photos that depict students engaged in various activities.

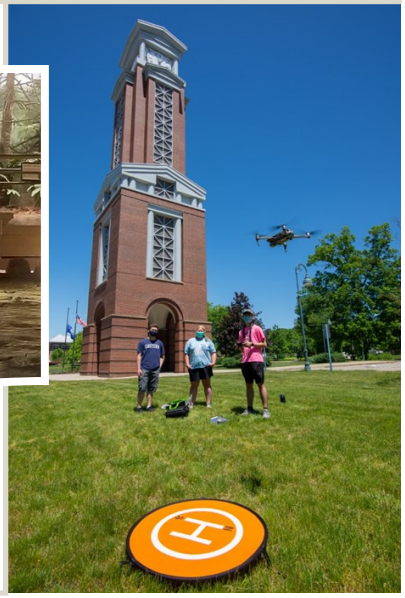
STUDENT RESEARCH

Although I did not involve any students in research last summer (2020) due to COVID restrictions, I was able to work with Danielle Whitcomb on some new drone-based mapping/modelling of the arboretum during the winter break and spring semester. As is evident from the photos, Danielle became proficient in flying the departmental drone, learned to use Drone Deploy (which is an industry standard for air borne 3D mapping) and she prepared and presented (virtually) a poster on her work at the spring CREATE conference.



Danielle was an absolute pleasure to work with, quickly learning field and lab techniques and applying her excellent writing skills to communicate findings on the work she did. Danielle graduated in the spring of 2021 receiving the graduates at one of the four in-person graduations that were held at the completion of the spring semester.

This summer (2021), I have begun working with 3 very strong students from the just-completed EES 224 class: Annette Coste, Aiden Gamache, and Cameron Soulagnet. As this will be part of next year's newsletter, I simply say that these students have begun using drones and ground-based imaging systems to map both natural and the built environment (e.g. the science building!), as well as learning to construct and measure models of selected tracks at Dinosaur State Park, and to build outcrop models from an important Triassic exposure being studied by Dr. Drzewiecki and his students. I include a few photos of these activities.



Professional Activity

I must admit that class preparations and activities almost completely consumed all my time this past academic year. I did present on some Dinosaur State Park (DSP) research at the virtual Northeast Geological Society of America meeting in spring. Also, I modelled an unusual sample at DSP that was examined and discussed at the American Geophysical Union by a Columbia colleague. In particular there is evidence of a sailing rock (rock that slid along microbial mats) and a small vertebrate trackway interpreted as an early Jurassic mammaliaform (see https://sketchfab.com/hyattj/collections/otozoum-slab-and-slider-rock to view 3D models).

The DSP book project, mentioned in the newsletter last year, continues to march toward completion. I am a junior editor assisting James Farlow (emeritus from Purdue) and we have now received about 13 chapter-manuscripts all of which are in or have been reviewed. I'm involved in several chapters (5 going by memory), including one of the two remaining manuscripts that still needs to be submitted and sent out for review. I very much look forward to seeing the final book when it comes out (still a year or so from that stage I think!). Meanwhile, I am testing out some additional drone mapping and ground-based photogrammetry with three new students mentioned elsewhere, and continue to work with Bryan Oakley on mapping coastal change (recent drone work from Block Island shown below; Bryan and I are in the middle of the photo if you look carefully!).

Personal Reflections

Trudy and I have been very lucky to avoid the direct effects of COVID for which we are grateful. Our daughter Hannah was able to come home from the west coast for Christmas which was great! More recently Trudy and I got out of dodge to visit Acadia National Park (1st time for both of us; a few photos below) which was great fun, and we very much look forward to seeing family in Canada as soon as the border becomes crossable again (which finally seems to be happening!). It has been more than a year and a half since we were able to get together with several close family members, including our son Jake, so we can't wait for the visit! I include a few pics from the Acadia trip.

Stephen Nathan

They say timing is everything. So, 2020-2021 was certainly an interesting year to become Department Chair for the first time. I learned a lot while at the helm. Lesson #1: I developed a healthy respect and appreciation for what the previous chairs accomplished during their tenures. Each day as Chair brought a broad mix of challenges and details to address. From approving course overloads and students changing their majors, to crafting a new department budget (for what will hopefully be a "normal" 2021-2022 academic year), there was never a dull moment.

Although Eastern returned to some level of in-person teaching during the fall 2020 semester, I will always look back on this past year and think about how strangely quiet and (near) empty the Science Building was. It was eerie to see so many offices and classrooms empty, occupied only when necessary. This was due to many classes being taught via the rotating student modality, where on any given day, only a third or half of the students came to lecture in person, while the remainder viewed the class online. This reduced the number of students in the building considerably.

Speaking for myself, I would only come into the building to teach and then depart to spend the remainder of the day working online. This was partly driven by the University policy that no one could enter my campus office while I was there and any meetings with three or more colleagues were to be conducted virtually. Stricter rules applied to holding office hours and advising: no students were allowed in faculty offices, so all student interactions were done online. This environment forced everyone to develop, almost overnight, a survivor's knowledge of Zoom, Webex, and Microsoft Teams.

With these safety policies in force and everyone following them, another measure of the campus being so quiet (and nearly empty) was how easy it was to find a parking space right behind the Science Building at 10 in the morning! This would have been impossible pre-pandemic.

With fingers crossed for the year to come, I am looking forward to seeing my classes filled again, albeit masks may still be with us. I will be teaching Oceanography (EES 200), Sustainable Energy (EES 205) and a new class for me: Energy Resources (EES 305). I will put my own spin on the Energy Resources course. Aside from updating this course content to fit the current science, I will introduce more opportunities for the students to strengthen their writing, computational and software skills; all of which are vital in the job market.

On a personal note, it's been about 18 months since I moved to Vernon (from Massachusetts). Getting to know my new home state has been a pleasure. I have discovered what's obvious to longtime residents: there is a lot more to Connecticut than what I saw as a long-distance commuter.

Grabbing a few waves on my SUP surfboard in the spring of 2021 (photo by Harry Hanka)

Bryan Oakley

"Strange days have found us, strange days have tracked us down" (Morrison et al., 1967)

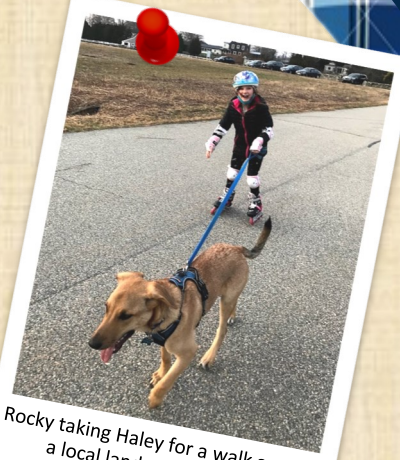
Well, if those lyrics by 'The Doors' don't characterize the last 15 months or so! Normally, I start the newsletter with a comment about how the semester seems that when we look ahead to the end of the semester it seems to arrive at a glacial pace, yet the beginning of the semester seems like yesterday. This year really flew by, maybe even more than normal, but in a much different format! I was fortunate that I was able to teach partly on-ground in the fall and fully on-ground in the spring, albeit with some modifications to how classes ran! After the crazy end of the spring 2020 semester, it was a welcome sight to see (masked) students in the computer lab and classroom! The dynamics of the department (both students and faculty) were not the same as pre-pandemic, but given all of the other impacts and adaptations, I will take what small victories we can get. Despite Covid, my colleagues and I managed to get one manuscript published (with two Eastern EES student co-authors) in the ***Journal of Marine Science and Engineering*** focused on deposition of sediment within the Point Judith Harbor of refuge. This work was the focus of student projects by Cody Murphy and Kym Lee in the recent past. As of this writing I am awaiting revisions on a second manuscript submitted ***Geosciences*** outlining historic shoreline change at Napatree Point between 1883 and 2018, so stay tuned for that one.

On the home front, my kids continue to grow; Aidan is 11½ and completing 5th grade while Haley is approaching 8 ½, and is wrapping up 2nd grade. During the pandemic things have remained relatively normal at home. There is a core group of kids in the neighborhood, so the kids played outside all winter (masked of course) so at least they have those activities to keep them grounded. Julie who works in cardiac rehab never transitioned to 'work from home'. Fortunately the Oakley kids largely had school on-ground this year, and we are glad they managed to get back to some sense of normal, although for selected weeks we still had a lot of time with dad acting as principal' of the Oakley Covid Homeschool. We also managed to adopt a rescue dog, named 'Rocky' who is now over a year old. A DNA analysis tells us he is 50% German Shepard, 15% Bloodhound and 10% Sheltie, with some other breeds thrown in. This adds up to him being a nearly 80 lb. ball of muscle and energy but has been a great addition to the Oakley clan.

The Oakley clan out on a hike at Glacier Park on a balmy day in December 2020

This is us

Aidan with a nice blackfish (tautog) taken on his grandfathers boat in 11/2020



Rocky taking Haley for a walk around a local land trust property

Haley's outdoor, socially distanced birthday party on the back deck in late December

Julie (Aidan and Haley in the background) out for a row on the local pond in the summer of 2020

RESEARCH

Pandemic fieldwork, measuring barrier profiles at Napatree Point

My on-going research projects have continued, focusing on the link between the shoreface (area just offshore of the beach and shoreline change, examining sorted bedforms on the shoreface, working with a colleague on sediment thickness and dynamics offshore of Herring Cove on Cape Cod, as well as monitoring the shoreline on Block Island collaborating with volunteers) and Napatree Point. On the Napatree front, I continue to serve as a science advisor for the Napatree Point Conservation Area, and the Watch Hill Conservancy has funded my on-going monitoring at Napatree through 2021. The partnership between Eastern EES, the University of Rhode Island Coastal Institute and the Watch Hill Conservancy remains a great asset to the department and will continue to provide student research opportunities in the future! The research on Napatree has garnered significant local and national attention. Those of you who have conducted fieldwork with me in the past would note another new change in 2021, sadly my trusty old white Tacoma was finally retired off to the great truck yard in the sky (or some other country) after 15 years and countless field days around the northeast. We had many adventures cramming students, gear and even Dr. Hyatt in the back on one very rainy trip to Block Island!

Over the past couple of years, I have had the privilege of working with some outstanding students. Working one-on-one or in small teams these student researchers transcend into collaborators, Not working with these students during the summer 2020 field season was probably the hardest part of the transition to online learning. The enthusiasm and hard work all the student researchers I have worked with is one of the things I enjoy the most about my job! Recent EES graduates have been engaged in projects that expanded the EES scope of work well beyond shoreline change.

As many of my research projects are continual and on-going, I am always looking for motivated students to help with field and lab work, especially if you have already taken GIS! Contact me for more information if you are interested in working on a project.

This year I worked with Nina Musco and Jack Cerra. Nina completed a map of the eelgrass beds of the Little Narragansett Bay estuary, based on side-scan sonar mapping I did I the summer of 2020. This was compared to previous mapping efforts using aerial photography and showed an increase in the extent of this important submerged aquatic vegetation. Jack examined bluff erosion along the west side of Block Island, furthering our work towards understanding the sediment budget of the island. Both Jack and Nina presented at CREATE and Jack also presented at the New England Estuarine Research Society/Atlantic Estuarine Research Society joint annual meeting. In addition, both Joey Marsalisi (sedimentation within the flood-tidal delta of the Napatree Lagoon), and Greg Rodman (changes to the Napatree shoreface and Little Narragansett Bay using historic bathymetric) presented their work at the 2021 NEGSA conference. Both of these projects help foster the science-based management of this important part of the Napatree ecosystem.

CREATE Conference

April 2021

Three EES students presented at the annual conference Celebrating Research Excellence and Artistic Talent at Eastern (aka'CREATE'). Jack Cerra presented an oral presentation on his work on Block Island, while Nina Musco presented on Eelgrass Mapping in Little Narragansett Bay and Danielle Whitcomb presented her work on Photogrammetric models from Diana's Pool, the Eastern Arboretum and Block Island. The conference was held virtually, and the presentations can be viewed at: https://www.easternct.edu/create/create-2021/create-2021.html

EXTENT OF EELGRASS IN LITTLE NARRAGANSETT BAY, RHODE ISLAND USING SIDE SCAN SONAR

Nina Musco ECSU, Dr. Bryan Oakley ECSU, Dr. Peter August Watch Hill Conservancy, Watch Hill, Rhode Island

INTRODUCTION

Eelgrass, Zostera marina, is a flowering underwater plant which blooms from late spring to summer in groups referred to as meadows ((Figure 1). The larger bed in Little Narragansett Bay is one of Rhode Island's largest eelgrass beds. Eelgrass is an important and vital habitat for several animals including fish and crustaceans (Massie and Young, 1998). An EdgeTech's 4125i Side Scan Sonar System was used between Napatree Point Conservation Area and Sandy Point in Little Narragansett Bay to map the current extent of eelgrass. The 2016 extent of eelgrass was mapped using aerial imagery of aquatic vegetation (Bradley, 2017). Side-scan sonar imagery, coupled with vertical aerial photographs was used to map the extent of eelgrass beds and scattered eelgrass within the study area.

Figure 1. Eelgrass photographed by Dr. Bryan Oakley in Little Narragansett Bay

RESULTS

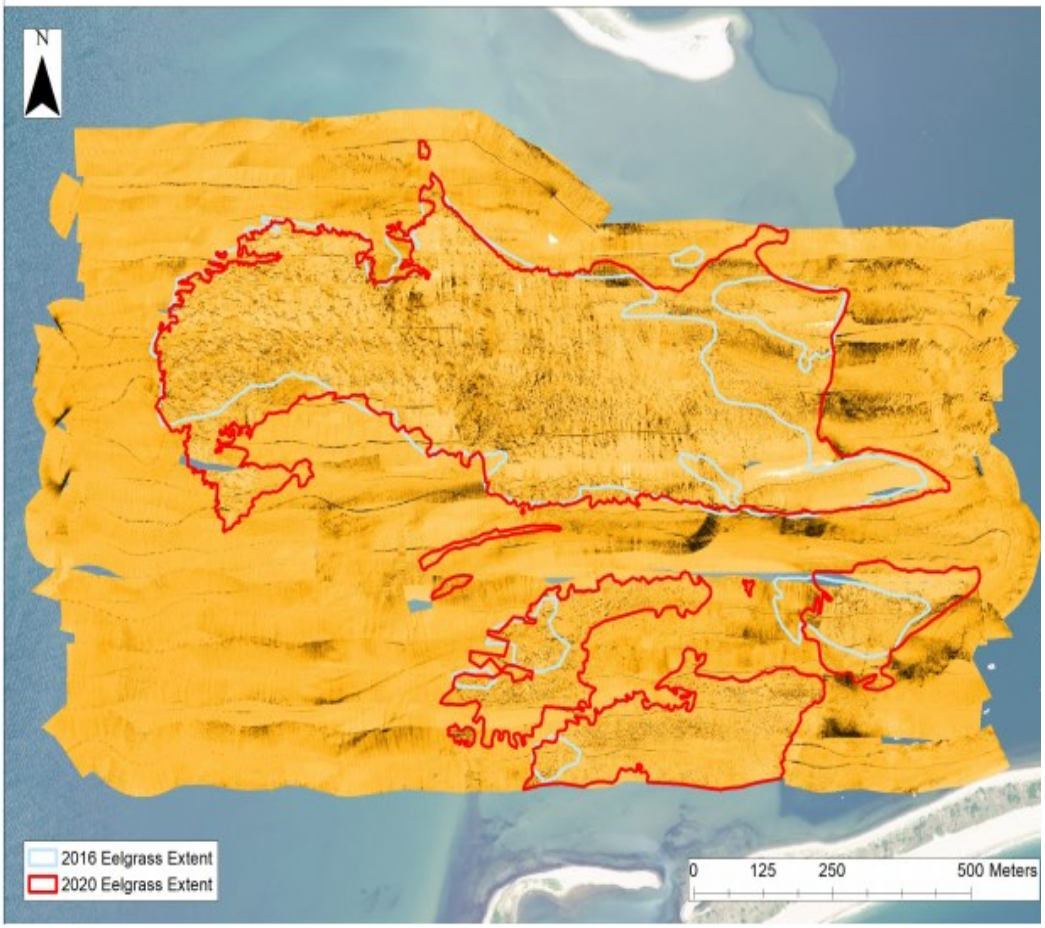


Figure 2. Extent of eelgrass in Little Narragansett Bay in 2020, shown in red, compared to the 2016 extent, shown in blue, on top of the slide scan sonar data collected by Dr. Peter August and Dr. Bryan Oakley

CONCLUSION:

Napatree Points eelgrass meadows have extended from 96 total acres in 2016 to 142 acres in 2020 (Figure 2). The areas where extent increased on the upper meadow include the northeast and southwest corners. On the lower meadow, growth is seen but it's rather sparse compared to the eelgrass found in the northern beds. This study allowed researchers to use a combination of sonar and satellite data to more accurately locate locations of eelgrass which is essential for the area's ecosystem. The sparse beds mapped using sonar may not be visible in aerial imagery or may represent further expansion of the eelgrass beds.

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- Massie, F. D., & Young, R. (1998). The Uncommon Guide to Common Life on Narragansett Bay. Providence: Save the Bay.

This project was supported by the Sea Grant program of Rhode Island, the University of Rhode Island Coastal Institute, The Watch Hill Conservancy, and the A. M. Roberts Foundation.

PHOTOGRAMMETRIC MODELLING OF THE ARBORETUM, DIANA'S POOL, AND BLOCK ISLAND

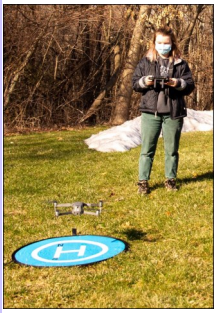
Danielle Whitcomb (Supervisor: Dr. Drew Hyatt), whitcombd@my.easternct.edu

Introduction

1

Digital photogrammetry (DP) is a technique involving the capture of overlapping images to analyze an object; it is especially useful for detailed analyses of geologic and geomorphic sites. Ground and/or air-based photogrammetry (Fig.1; Panel 4) were used to analyze Diana's Pool in Chaplin, CT, the Arboretum at Eastern, and West Beach Block Island using Adobe Lightroom, Agisoftr Metashape, Drone Deploy, and ArcGIS.

Overriding objectives are:



(1) Image geological sites on ground and in the air

(2) Create related maps and 3D printed models, and

(3) Analyze change (deposition/erosion) and topography to understand geologic conditions at these sites.

Figure 1. Landing the Mavic Pro 2 Drone at the Arboretum site. The Arboretum is an on-campus wetland used by a variety of classes in the Arts and Sciences. Drone imagery is used to map a variety of sites (see panels) in Connecticut and Rhode Island

DP Use at Geologic Sites in CT and RI

2

DP was used at several sites in CT and RI. Diana's P{ool, a bedrock-controlled reach of the Natchaug River in Chaplin, CT, is underlain by lapetos-east terrane characterized by coarse-grained pegmatite and banded gneiss. Stream erosion and differential weathering have exploited joints and foliation to create topographically distinct geomorphic features (Fig.2).

Also in CT, the Arboretum is a small stream system that drains Eastern's campus to flow Northward through a wetland complex. This complex flows over glacial till and stratified drift deposits.

Block Island in RI experiences wave erosion that has modified shorelines and exposed metal and plastic refuse from an abandoned dump site at West Beach, Block Island (Fig.3). The site was mitigated in the summer of 2018 with a $1.8 million revetment project to reduce pollution offshore (Moniesson, 2018).

Figure 2. Alternating pegmatite and banded gneiss weather differentially creating overhangs beside the river. Also, jointing often contributes to stair-like bedrock in the stream.

Figure 3. West Beach, BI in 2018 revealing wave eroded debris from a former dump site. Rusted metal, plastic, cement and other detritus were introduced to the beach and littoral zone, ultimately prompting a $1.8 million mitigation effort.

Ground and Drone Image Capture

Ground: Images were captured to characterize microtopography of a stream-eroded cavity on a jointed outcrop at Diana's Pool using an iPhone XR under diffused natural lighting. A photogrammetric target was placed on the out crop to provide ground control for scaling 3D models. A total of 36 images were captured using a pattern of 8 images passing 4 times across the outcrop (Fig. 4). At West Beach (RI), images were captured using a Nikon D610 on a tripod at ≈ 1.5m intervals along 5 shore parallel to shore–oblique lines to ensure >60% overlap. Scale bars were placed at varying elevations and surveyed using Real Time Kinematics (RTK) GPS (Fig. 6).

Figure 6. Gathering RTK GPS data on Block Island

In the Air: A total of 956 images were captured ~75m above the Arboretum using a Mavic Pro 2 Drone. Photogrammetric ground targets were placed throughout the Arboretum to provide ground control for 3D modelling **(Fig. 5)**. Surveying was performed using RTK GPS for ground control. DJI Fly was utilized to create a specific linear flight pattern that could then be transferred to the drone. Images for the site were uploaded to Drone Deploy for DP analysis.

Table 1. Camera settings for the 36 images captured of the Diana's Pool feature.

	Shutter Speed	ISD	Aperture
Images	1/120, 1/130, 1/150, 1/200, 1/240, 1/290, 1/380, 1/400	ISO 25, ISO 32, ISO 40	f/1.8

3

Figure 4. ***(a)*** Pattern of image capture for the stream-eroded outcrop at Diana's Pool. A photogrammetric targets at the top of the outcrop to be used for 3D modelling. Eight images were taken at 45º positions around the site from a high angle. ***(b)*** View of the image capturing process with an arrow indicating the erosional cavity.

Figure 5. Map view of the Arboretum including photogrammetric target locations in yellow. The Arboretum was separated into 3 sub-sections for imaging to limit the distance the done had to fly away from the operation.

4

Drone Deploy

Drone Deploy software was utilized to develop aerial models of the field sites from UAV imagery captured during two flights ≈ 75m above the forest floor. A drone and a compatible mobile device is used with the Drone Deploy app. We performed mission-planning using DJI Pilot professional edition. Images uploaded to DD are used to map elevation changes, create a 3D model (Fig. 7), and present maps of plant health (Fig. 6-8). Two take-off locations were used (Fig. 6) to minimize flight distance and conserve batteries. However, this creates a mismatch in orthoimages due to differing shadows (Fig. 6) as well as an offset in elevation (Fig. 7 inset). Future flights will recapture images from one take-off location to resolve these problems.

Figure 6. Aerial view of the Arboretum taken from the Drone Deploy website after uploading the 956 images captured with two flight lines at 90° to each other. Flights used 2 sets of parallel flight lines with 75% forward overlap and 80% forward and 75% side overlap. Insets show close views of *(a)* a stream section separated into two segments. A photogrammetric target can be viewed as well. Inset *(b)* shows a close-up view of a site from the upper flight. Note extensive shadows caused by sunny conditions during the flight. This upper-lower flight boundary causes elevation mismatches (see Fig. 7).

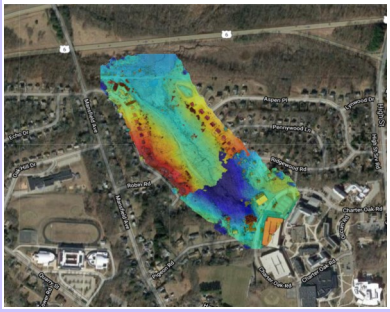


Figure 8. Aerial view of the Arboretum with elevation shown in color. The elevation estimates are mismatched at the boundary between upper and lower flight images (e.g. Blue to green boundary.

Figure 7. 3D model of the Arboretum created in Drone Deploy. While detail is realistic, the inset shows error associated with merging model data from two flights with differing take-off elevations. This can be addressed within DD softer, but is better resolved by using a single take-off location.

5

Building a Model with Agisoft Metashape (AM)

AM is suitable for modelling geologic sites. We use AM to model West Beach (Fig. 9) and to create a file suitable for 3D printing a sample recovered from the site (Fig. 10). The print file was constructed from point cloud data converted to a printable format (.stl). Similar approaches were used to develop a 3D point cloud (x-y-z points) and textured mesh of the Diana's Pool outcrop (Fig. 11)

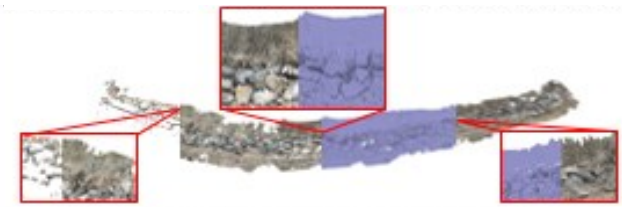


Fig. 9. *(from left to right)* Tie point cloud, dense cloud, wireframe mesh, and textured model of the West Bach model developed in AM

Fig. 10. Metal refuse *(left)* taken from the West Beach site compared with the 3D printed model

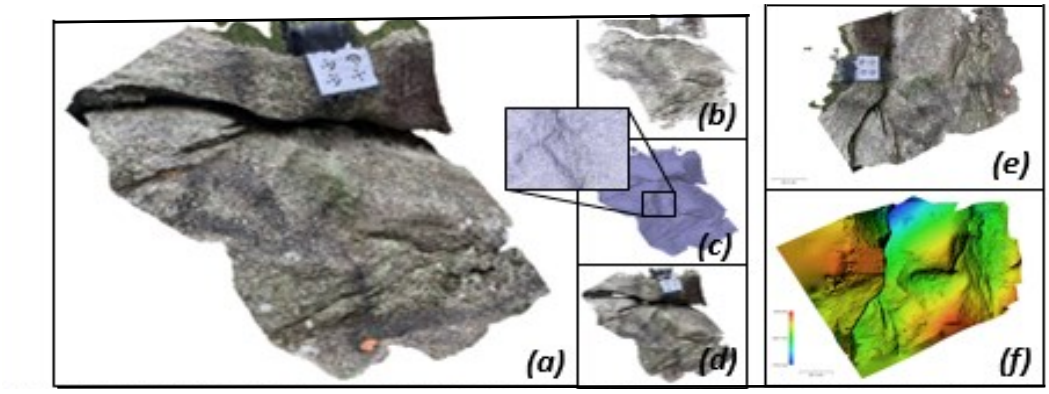


Fig. 8. ***(a)*** Fully-rendered textured model of the site at Diana's Pool. A tie point cloud ***(b)*** of 69,433 points was initially created from the 36 aligned images. This was used to create a wireframe mesh ***(c)*** of 788,346 triangulated faces that connected at common points. A dense cloud ***(d)*** of 49,963 points was finally created after careful removal of unnecessary tie pints through gradual selection. An orthomosaiac photo ***(e)*** and DEM ***(f)*** could be created and exported to quantify erosion at the outcrop.

6

Change Detection

The value of 3D data is to support analyses that are difficult or impossible to do otherwise. For example,n3D models are well-suited for characterizing topographic change through time. Cloud Compare freeware was used to compare topography in two or more dense clouds. This enables characterizing change between 2 points in time (an analysis referred to as change detection). Block Island models from 2017, 2018, and 2019 of West Beach, before and after the revetment project (Fig. 12), were analyzed Cloud Compare to determine erosion. ArcGIS can also represent erosion/deposition as it was used for the Diana's Pool site. Erosion refers to where the surface has been raised.

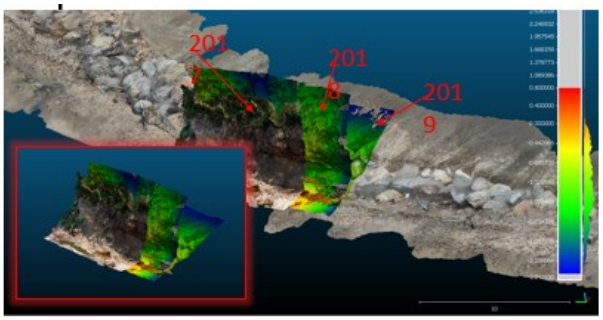


Figure 12. Cloud Compare view of the 2017, 2018, and 2019 dense clouds of the West Beach site. Inset details the changes; erosion signifies shoreline retreat with the armored revetment project.

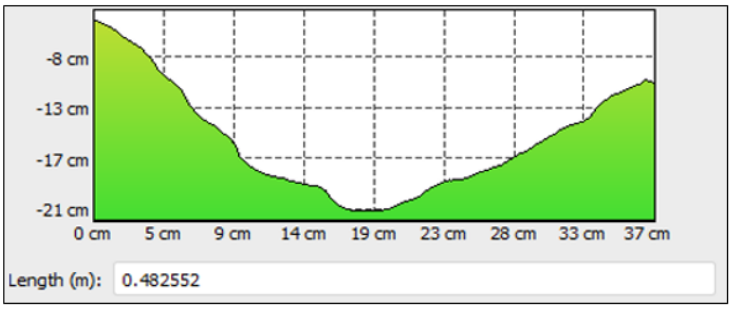


Figure 13. Cross-sectional view of the erosional depression at Diana's Pool site. This GIS cross-section in ArcGIS reveals ~ 0.48m length ~ 19cm depth.

Initial Modelling and Ongoing Actions

This project introduced techniques used to create photogrammetric models of field sites using images captured through drone and ground imaging. This can be used to measure microtopography of detailed erosion (*e.g.* at Diana's Pool), ~ 3.5m topographic change associated with the West Beach Revetment (Fig. 14), and topography at the Arboretum forest canopy. Additional mapping is anticipated at the Arboretum using Drone Deploy to create resolve flight matching errors and to map and analyze stream and valley geomorphology beneath the forest canopy.

7

Figure 14. View facing the West Beach location after the revetment project in June of 2019. Boulders and native coastal grasses were strategically placed along the beach face to anchor sediment to prevent erosion. The RTK GPS and imaging setup is viewed on the right.

Acknowledgements and Citations: I would like to thank Dr. Drew Hyatt and Dr. Bryan Oakley for their assistance on these projects. Also, thanks to Arlene Blackwell and Jack Cerra for their teamwork on the Block Island field work. Permission from Eastern's Chief of Police to fly the drone is greatly appreciated.

Monieson, A. 2013. Storms Expose Debris from Old Town Landfill: https://www.blockislandtimes.com/article/storms-expose-debris-old-town-landfill/33594 (accessed Nov. 2019)

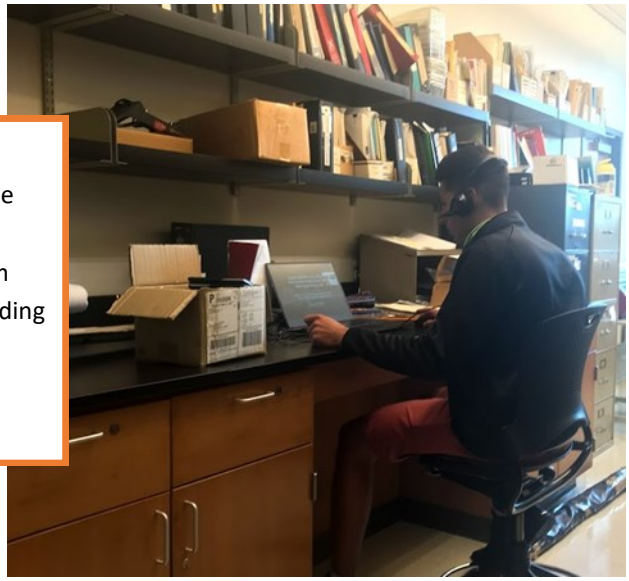
Nordstrom, S. (n.d.). What is an Orthomosaic Map and How Does Mapping Benefit My Property? Retrieved December 3, 2020 from: https://blog.dronebase.com/what-is-an-orthomosaic-map-and-how-does-mapping-benefit-my-property

Jack Cerra presented an oral presentation on his work on Block Island

New England Estuarine Research Society & Atlantic Estuarine Research Society

Joint Meeting

April 2021



Jack Cerra presenting at the NEERS/AERS conference from the Science Building Room 217. The conference was held virtually.

Jack Cerra presented his research quantifying erosion on the west side of Block Island at the annual NEERS meting held this year jointly with AERS. Jack's presentation in a session focused on 'Coastlines and Sea Level Rise' was very well received, and he was awarded the Rankin Award for best undergraduate oral presentation at the conference.

Quantifying Bluff Erosion Along the Western Shoreline of Block Island, Rhode Island Using Airporne Lidar

Bluff erosion along the western Block Island, Rhode Island shoreline between Dories Cove and Charleston Beach was quantified using Airborne Light Detection and Range (LiDAR) data from 2011, 2012, 2014, and 2018. The annualized volume of sediment eroded here is roughly 5,000 m3 yr -1 but varied within the data. Construction of a jetty at the inlet of Great Salt Pond has disrupted longshore transport, depositing sediment in the inlet where it is later dredged. Dredging from 2012–2017 removed roughly 11,500 m3 yr -1 of sediment from Great Salt Pond. The volume of sediment dredged is roughly double the total volume of sediment estimated to have eroded from the study area. Differences in volumes can be attributed to sediment input from bluffs further south, cross-shore sediment transport, and LiDAR uncertainty. Future studies seek to analyze transects towards Southwest Point likely accounting for most of the remaining sediment dredged, developing a more accurate sediment budget.

SUMMER FIELDWORK

Jonathan Lepire and Alexia Alberts are working with Dr. Oakley on mapping the flood tidal delta and inlet channel of the lagoon at Napatree Point. This dynamic system has continued to change over time, and this current project builds off of previous projects by Alyson Augenstein, Madeline Varney and Joey Marsalisi. Stay tuned for the results of this work in the next newsletter.

Alexia and Jonathan mapping the tidal delta elevations inside the Napatree Lagoon, May 2021

Students from EES 456 (Coastal Geologic Hazards) at Napatree Point, April 2021.
Pete August, chair of the Science Advisors at the Napatree Point Conservation Area is on the right
(photo by Janice Sassi

In late April 2021, students from the coastal geologic hazards class met with staff and scientists at the Watch Hill Conservancy (WHC) and Napatree Point Conservation Area (NPCA) to discuss the challenges the area faces in the face of sea level rise, shoreline erosion and storms. This was part of the final project, where the groups completed a phase-1 site assessment of the area around Watch Hill and Napatree Point assessing these risks. This provides the class with the experience of working with a stakeholder group on a real-world project. I know the WHC/NPCA staff and scientists always enjoy engaging with the EES students and the results of the project feed into the on-going planning process underway in Watch Hill!

EES 456 Coastal Geologic Hazards Fieldtrip

Graduation Day—May 15

CLASS OF 2021

Some of our newly minted 2021 EES graduates at commencement (held outside this year).

Left to right: Dr. Drew Hyatt, Kym Lee, Arlene Blackwell, Nina Musco (Student Commencement Marshal)

Left to right: Morgan Kuryluk, Jack Cerra, Danielle Whitcomb and Dr. Bryan Oakley (Faculty Commencement Marshal)

All of these graduates are members of the EES Honor Society (i.e., the local chapter of Sigma Gamma Epsilon) and we are very proud of their accomplishments during the past four years!

SUPPORTING EES STUDENTS

The faculty members of the EES Department are committed to providing our students with practical research, field, and presentation experience as often as possible Many of the activities our students participate in are supported through EES Founders Fund, which was established for these purposes. We welcome your tax-deductible donations to this fund and encourage you to contact Mr. Joseph McGann at Institutional Advancement (860-465-4514) or email him at (McGannJ@easternct.edu), if you would like to learn more about how to contribute to experiences that open minds and support career development for new generations of EES students. Thank you in advance!

Eastern EES Facebook Page: Alumni, if you are not currently a member of the Eastern EES Facebook page, please email Bryan at OakleyB@easternct.edu and he can send you the link. The Facebook page is a great way to stay connected to the department as well as a growing resource for the EES related jobs.

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We're on the Web!

See us at:

https://www.easternct.edu/environmental-earth-science/index.html

EES students and faculty in the Grand Canyon