VIRGINIA TECH

The TECHtonic

2019 Spring Newsletter
Department of Geosciences

Welcome to The TECHtonic!

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SUPPORT GEOSCIENCES.
WHAT TO SUPPORT AND HOW TO GIVE.

See back cover.

Dear Alumni, Stakeholders, & Friends of the Department,

The Spring 2019 newsletter brings news at both ends of the spectrum for VT Geosciences.

In recent months, we've lost two long-tenured members of our faculty: **Bob Tracy** and **Don Rimstidt**. Both were beloved by faculty and students alike, and both influenced generations of GeoHokie students. We have two tributes to Bob in this issue (p. 6 and 12), and I hope they bring back happy memories of Bob for all of you. Since Don's passing happened just before this newsletter went to press, we have only a short tribute to Don, but we will remember him properly in the next issue. We will miss Bob and Don terribly.

In happier news, in this newsletter, you'll read about lots of exciting developments, including a profile of Dr. **Tina Dura**, our newest faculty member; a report on the VASEM coastal zone summit led by Dr. **Robert Weiss**; an account of Dr. **Scott King**'s Mission to Mars; and more.

I'll be visiting alumni in Houston for the second year running this April. I love getting to know our amazing and dedicated alumni personally on these trips. In the future we're planning a similar trip to the DC Metro area, where there is another geographic concentration of GeoHokies. More on that soon.

Finally, I'd like to thank our friends and alumni for their remarkable generosity during this year's Giving Day on March 19-20. For the second year running, Geosciences received the most donations (more than 160). Even more impressive was the total amount raised, which exceeded $26,000! We will use this to create new opportunities for our undergraduate and graduate students. Thank you!

I hope you enjoy this semester's newsletter. And as always, we want to hear from our alumni and friends, whether by email, phone, or in person whenever you're back in Blacksburg.

W. Steven Holbrook, Head of Department

ON THE COVER | NASA's InSight lander deploys the Wind and Thermal Shield (WTS) on Feb. 2, 2019 (Sol 66 of the mission). This image was taken by the Instrument Deployment Camera (IDC) on the lander's robotic arm. The shield covers InSight's seismometer, which was placed on the Martian surface on Dec. 19, 2018. The seismometer was the first scientific instrument ever deployed on the surface of another planet using a robotic arm. The wind and thermal shield isolates the seismometer from winds gusts that have been measured at 10-20 m/s at the site and minimizes the effect of the daily temperature fluctuations that range from -100 to -10 C. The color of the sky appears reddish because dust in the Martian atmosphere is colored by iron oxides which absorb blue and scatter red wavelengths of light, giving the sky a rusty color. The rock at the bottom of the image is inferred to be basalt. Photo by NASA/JJJJJPL-Caltech

Scott King Joins the NASA Team to Explore the Red Planet

By Patricia Dove

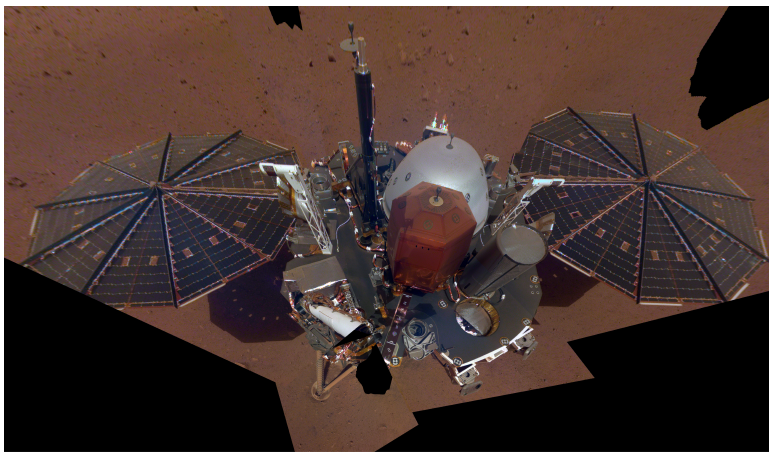
Josh Murphy and **Scott King**. Photo by Steven Mackay

The NASA InSight mission to Mars is the first space mission primarily dedicated to understanding the interior of a body in our solar system. All previous planetary missions have focused on the surface, either returning images of the surface or measuring particles or energy from the surface to infer properties of the materials near the surface. InSight's goals are to understand the internal structure of Mars and the instruments are specifically selected to answer fundamental questions about the size and composition of the core, including whether it is liquid or solid; the thickness and composition of the crust and mantle, and how warm the interior is and the present day rate of heat flowing from the interior. It's a bit surprising that we don't really know something as fundamental about Mars as the size of the core. This will bring a new understanding of how all of the Solar System's terrestrial planets (Mercury, Venus, Earth, Mars – as well as Earth's Moon) formed and evolved through time. The Department of Geosciences faculty member Professor **Scott King** has been selected to be a part of the team studying the data gathered by the InSight instruments. "Being selected to work on this mission is a really amazing experience," said Prof. King. "In the past, I've been able to work on a lot of interesting planetary problems using observations after they had been released to the general public. On this mission, I'll be seeing the data as soon as it comes back from the spacecraft."

Prof. King and graduate student **Josh Murphy** will be working with the data from the Heat Flow and Physical Properties Package (HP3), to calculate thermal conductivity of the regolith and to measure the heat flow. Murphy and King are also developing 3D convection models that will help to constrain the thermal structure. King is also calculating density and seismic velocity profiles from potential crust, mantle, and core compositions in collaboration with the seismology team.

As of this writing, the Seismic Experiment for Interior Structure (SEIS) is placed on the surface of Mars and is covered with a shield to minimize thermal contrasts and to protect it from the wind. SEIS is comprised of a three-axis, very-broad-band seismometer and a three-axis, short-period seismometer. In addition to marsquakes, SEIS will also detect atmospheric waves, tidal forces from Mars' moon Phobos, and meteorite impacts. HP3 has also been placed on the surface and the 'mole' has been released. The mole will soon hammer its way into the regolith to a depth of 5 meters, beneath the region of the surface affected by the seasonal changes in solar heating.

Prof. King says his interest in studying the deep Earth began in college when he learned that the classical physics problems that he enjoyed working on could be applied to understand the inner workings of our planet. After a grueling mineralogy class, it was a bonus knowing that he only needed to worry about the properties of seven minerals. His thesis work focused on using the geoid to constrain subduction zone models and his early work also included studying mantle hotspots but, his interests expanded across the Solar System and he has now published papers on all of the terrestrial planets.



This is NASA InSight's first full selfie on Mars. It displays the lander solar panels and deck. On top of the deck are its science instruments, weather sensor booms, and UHF antenna. The selfie was taken on Dec. 6, 2018 (sol 10) and is made up of 11 images taken by its Instrument Deployment Camera, located on the elbow of its robotic arm. Those images are stitched together into a mosaic. Photo by NASA/JPL-Caltech.

Student News

Fall 2018 AGU Outstanding Student Presentation Award: **Rick Jayne**

AGU GeoPRISMS Student Award Honorable Mention: **Emmanuel Njinju**

2019 College of Science Outstanding Doctoral Student Award: **Rick Jayne**

Applied Machine Learning Summer Research Fellowship: **Wu Hao**

American Association of Petroleum Geologists Grant-in-Aid ($3,000): **Selva Marroquín**

What is your Favorite Geologic Feature in Southwest Virginia?

Over the past several years, the "Senior Seminar" students (GEOS 4024, taught by Dr. **James Spotila**) have created educational videos (~5 minute) that focus on interesting geological locations in and around Blacksburg. These are posted on YouTube and cover (so far!) nine locations! (see inset)

Senior Seminar focuses on honing real-world "soft skills," including written and oral communication, teamwork, and the ability to research complex topics. As a part of this, students investigate interesting geological locations and produce educational videos to raise the general public's Earth Science awareness. Creating quality videos in the context of a class assignment is a difficult task, which makes this an excellent exercise for developing effective teamwork and communicative skills.

The underlying idea is that the various locations form the sites of natural beauty that many locals and visitors enjoy year round, yet most have little idea of the geological story behind the feature's formation. What better opportunity to teach the public about how geology shapes the world around them? A goal for the near future is to create a stand-alone website that will be widely shared with relevant organizations to stimulate additional interest.

Stay up to date by subscribing to the "VT Geosciences" YouTube channel: https://bit.ly/2um3DWx.

LOCATIONS TO DATE:

- Mountain Lake
- Mount Rogers
- Falls Ridge Buffalo Mountain
- Peaks of Otter
- Devil's Marbleyard
- Blue Ridge Escarpment
- New River Water Gap at McCoy Falls
- Cave & Karst System of the New River Valley

Student Research Spotlight: Joshua R. Jones

By D. Sarah Stamps

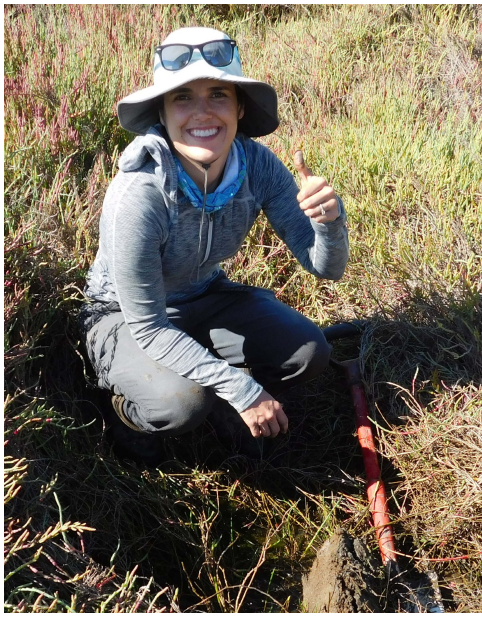
Continental rifting is an intriguing process that breaks up continents and leads to the development of new oceans. The physical processes that make it possible to rupture the Earth's lithosphere remain elusive. **Joshua R. Jones**, a Ph.D. student, has found evidence that magma associated with active volcanism can trigger fault slip on a border fault in a continental rift (Geochemistry, Geophysics, Geosystems, 2019). Not only does the magma weaken a fault towards slip, it causes unexpected fault movement that is rift-parallel, rather than rift-normal. His results have significant implication for our understanding of how continents rift in the early phases of the process. In rifts that have volcanic activity, border faults can accommodate extensional forces obliquely, which challenges our current conceptual model of continents rifting by normal faulting on border faults.

Joshua R. Jones, Geosciences Ph.D. Candidate.

Josh R. Jones, **D. Sarah Stamps**, Christelle Wauthier, Juliet Biggs, Elifuraha Saria, 2019, Evidence for slip on a border fault triggered by magmatic processes in an immature continental rift, *Geochemistry, Geophysics, and Geosystems*, in press. https://doi.org/10.1029/2018GC008165.

Welcome, Dr. Tina Dura!

By Lisa Whalen (Ph.D. Candidate)



Dr. **Tina Dura**.

The Department of Geosciences is excited to welcome Dr. **Tina Dura**, who arrived in Blacksburg in Fall 2018 as an Assistant Professor in Natural Hazards. She joins us with her husband, **Ivan Rabak**; son, Luka; and Border Collie, Bodhi.

Dr. Dura with her family. From left to right: Bodhi, **Ivan**, Tina, and Luka.

Dr. Dura grew up in northern California, where she developed an interest in the natural world while exploring the foothills of the Sierra Nevada. Dr. Dura followed her passion for the great outdoors into college, where she completed a B.S. in Geology at Occidental College in Eagle Rock, CA. While pursuing her undergraduate degree, Dr. Dura spent a significant amount of time mapping the faults and other geomorphic features in southeastern California, the Cascade Range, and British Columbia, gaining valuable field and research experience early in her career.

Before going to graduate school, Dr. Dura explored other geoscience careers, resulting in time as a mud logger in North Dakota, a high school Earth Science teacher in southern California, and a research scientist at an oil and gas company in Houston. These experiences served to solidify Dr. Dura's interest in geology and desire to continue in academia. Dr. Dura went on to complete a master's degree at Central Washington University in Ellensburg, WA where her research became more focused in the coastal zone and better understanding coastal hazards. She conducted fieldwork in Sumatra, where she used the coastal stratigraphic record to reconstruct a millennial scale record of past earthquakes along the Sunda Megathrust. This work led to a Ph.D. at the University of Pennsylvania where Dr. Dura added biostratigraphy to her research toolkit, using diatoms to quantify coseismic land-level change and identify tsunamis over the Holocene along the Chilean and Alaskan-Aleutian subduction zones.

At Virginia Tech, Dr. Dura is building a Coastal Hazards research group that will use field, laboratory, and modeling methods to address questions about long-term subduction zone behavior and improve hazards assessments. Dr. Dura and graduate students in the group are already busy conducting fieldwork in Chile and Alaska, mapping tsunami deposits and evidence of land-level change in coastal stratigraphic sequences. Diatom-based techniques applied in the laboratory will allow the group to quantify land-level change related to past earthquakes, helping constrain a key parameter of offshore slip models that can shed light on how earthquakes were arrayed along subduction zones in the past, helping predict future hazards. The tsunami inundation maps the group will produce from the mapping of paleotsunami deposits can help define future flood heights that help coastal planners prepare for future events.

As Dr. Dura's research concerning the coastal impacts of earthquakes and tsunamis continues, she aims to integrate tsunami and sea-level research to explore the increasing flood hazards along tsunami-prone coastlines under future accelerated sea-level rise. Over the next five years, Dr. Dura plans to continue to increase the profile of the Coastal Hazards group at Virginia Tech and make a lasting contribution to the study of coastal hazards.

Dr. **Tina Dura** and graduate student, **Jessica DePaolis** in Chile.

Geoscience Faculty Co-Organize

Securing Prosperity in the Coastal

By Patricia Dove

"Virginia's coastal zone is subject to a number of powerful and often interrelated stressors that are affecting the environment. The changing climate is fueling sea-level rise, which is exacerbated by land subsidence in the Chesapeake Bay area. It is also increasing the variability and intensity of weather. Taken together, this means the coastal zone is subject to more routine flooding as well as more violent and damaging storms."
- **Robert Weiss**

In 2013, Senator Mark Warner convened a small group of the Virginia-based members of the three national academies—National Academy of Sciences, National Academy of Engineering, and the National Academy of Medicine—along with the presidents of Virginia's premier research universities to develop an independent body of science and technology experts to advise state policymakers on related issues of the day. Just as the National Academies were created to advise the US Congress, the Virginia Academy of Science, Engineering, and Medicine (VASEM) assists the state government on matters of technical and scientific importance Each year, VASEM hosts an annual summit to identify emerging issues critical to all Virginians and to address those in a report that becomes the basis for developing a detailed study.

The 2018 Annual Summit on Securing Prosperity in the Coastal Zone, co-organized by Geosciences Associate Professor **Robert Weiss** and Professor Jen Irish (VT CEE) brought together a cross-section of Virginia universities working on issues related to the challenges facing the coastal region.

The event was held in Richmond, Virginia, on Nov 7-8, 2018, and featured high profile keynote speakers as well as a lively poster session that addressed a broad range of interconnected issues that impact the prosperity of all Virginians. The Virginia coastal region contains critical economic and military infrastructure including the world's largest Navy base, the Port of Virginia, NASA facilities, and a fast-growing private sector economy. Read the Summit report of the rapporteur here: https://bit.ly/2TQ7IfT.

Keynote speaker Lt. General (Ret.) Thomas Bostick kicked off the event by praising Virginians for their pioneering efforts to plan for sea-level rise and more frequent and intense storms. "People in coastal areas across the country are focusing on this region," he said. "It is leading the nation in exploring how we will live with water in the future." One reason, he suggested, is the special urgency of the challenge facing Virginia. Virginia is being impacted by subsiding land and a slowing Gulf Stream as well as rising seas. The result is the highest relative sea-level rise on the entire East Coast.

Bostick is the retired Chief of Engineers of the

VASEM Summit:

Zone

United States Army and Commanding General of the U.S. Corps of Engineers (USACE). In that position, he helped to lead the response and recovery efforts in the aftermath of Hurricane Sandy, which included over $5 billion in USACE projects.

Rear Admiral (Ret.) Ann Phillips observed that "In the 12 years I have lived in Coastal Virginia, our problems (of recurrent flooding) have grown worse." As the newly appointed Special Assistant to the Governor for Coastal Adaptation and Protection, she will lead Executive Order 24: Increasing Virginia's Resilience to Sea-Level Rise and Natural Hazards. EO24 was signed just days before the VASEM summit convened. Phillips noted that she is now in the position of having an opportunity to do more than talk about the challenges that lie ahead for coastal Virginia and to actually be a part of planning and preparing for our future.

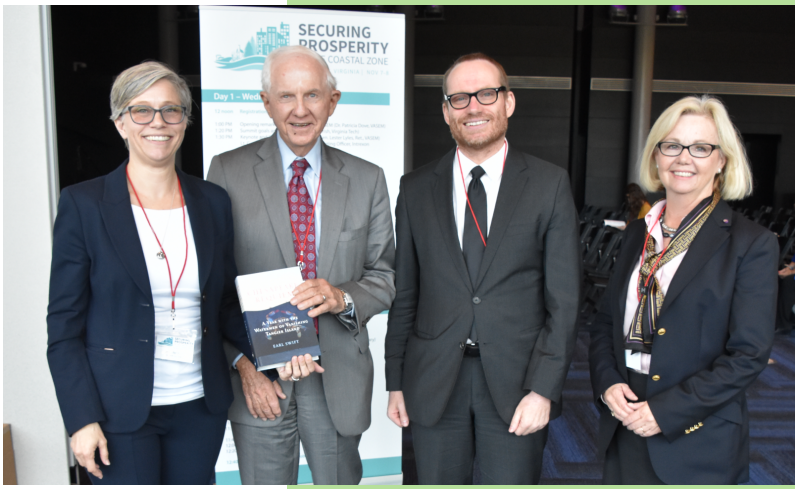
"We need a national response to this challenge. Waiting for the next big flooding event to stimulate funding is not an acceptable planning or adaptation methodology. We need all hands on deck."
- Rear Admiral (Ret.) Phillips

Phillips pointed to research that demonstrated the region reached a tipping point in the 1990s. Since then, flooding now occurs with greater and greater frequency, duration, depth, and results from a greater variety of causes. Within a decade or two, nuisance floods—defined as 0.53 meters above mean high water—will occur at nearly every high tide cycle. Addressing this problem, Phillips said, will require collaboration across jurisdictions, city or county, state or federal.

At a January briefing to the General Assembly Subcommittee on Recurrent Flooding, VASEM President and C.P. Miles Professor of Science and University Distinguished Professor **Patricia Dove** outlined the interconnected issues that must be addressed for Virginia to create a Coastal Resilience Master Plan. Everyone agreed that policy needs are urgent because the big storms, such as the near-miss of Hurricane Florence in 2018, will not wait for Virginia to act.

In a step toward the Master Plan and Executive Order 24, Robert Weiss and Jen Irish will coordinate a formal study that will be led by VASEM. The data-driven analysis will carefully quantify the economic value of using green infrastructure solutions to solve recurrent flooding challenges. The approach will also use natural and nature-based features. Given that green infrastructure solutions, in any form, currently score very poorly, the study presents an exciting opportunity to create a model that can be deployed in the future by coastal groups worldwide.

"The key to a successful solution is to leave behind old ways of thinking about risk. Inevitably, something is going to come along that will defeat the measures we put in place. A better approach is to create infrastructure systems that are resilient to disasters. You want to plan, absorb, recover, and adapt."
- Lt. General (Ret.) Bostick
Retired Chief of Engineers of the U.S. Army and Commanding General of the U.S. Army Corps of Engineers

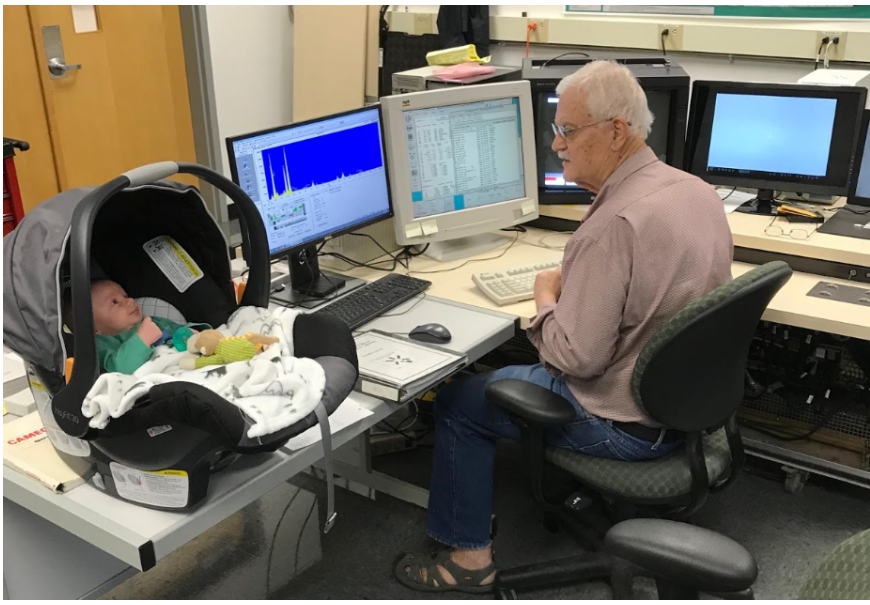


From left to right: Jennifer Irish (summit co-chair), Tom Young (VASEM member of organizing committee and National Academy of Engineering), **Robert Weiss** (summit co-chair), and **Patricia Dove** (VASEM president and National Academy of Sciences).

Dr. Robert J. Tracy: A Life in Petrology

By Mark Caddick and Besim Dragovic

The Department of Geosciences mourns the loss of **Robert J. Tracy**, who died in January. Bob was a metamorphic petrologist whose thinking always stemmed from the deepest understanding of mineral structure and chemistry, and a delight in the beauty of phase equilibria. He made significant contributions to our understanding of metamorphic rocks and of the tectonic evolution of New England. More importantly, Bob was a generous colleague, an enthusiastic teacher, a fiercely loyal friend to the petrologic community, and an important contributor to our department for more than thirty years.



Generations: **Bob Tracy** training the youngest known user of an electron microprobe, Sam, the son of VT Geoscientist **Besim Dragovic**.

Bob was born in Washington, D.C., in 1944. He obtained his A.B. degree from Amherst College in 1967 before receiving an M.S. from Brown University in 1970 for work that first introduced him to the Cortlandt Complex of New York State – rocks that he would continue to work on throughout his career. Bob's Ph.D. (1975) was from the University of Massachusetts at Amherst under the supervision of Peter Robinson, focusing on metamorphic reactions and partial melting in pelitic schists of the Quabbin Reservoir Area, MA. He then moved to Harvard as a research fellow, during which time he published influential work with Alan Thompson on anatexis in pelitic rocks and inferring metamorphic histories from chemical zoning in garnet. Bob moved to Yale in 1978 as an assistant and then associate professor and moved to Virginia Tech in 1986 as full professor. Bob was a great departmental citizen, serving as Department Chair from 2005 and 2008 and as Associate Chair from 2012 to 2018, and devoting much time to managing and maintaining our electron beam instrumentation. He was also extremely active in professional societies, in particular the Geological Society of America, in which he assumed numerous leadership roles.

Bob's early career focused on the geology of New England, through which he developed an interest in quantifying the metamorphic histories of rocks. In the mid-1970s, he published pioneering work on the measurement and interpretation of chemical zoning in garnet, an essential index mineral in metamorphic rocks. This influential work is still a frequently cited part of the metamorphic canon and has helped lead to important discoveries regarding the depths, temperatures, timescales, and evolution of orogenic belts. In later years, his interests expanded to developing techniques for chemical dating of the mineral monazite, a REE-rich phosphate. Bob accumulated a rich dataset of ages for much of western New England, Appalachian Virginia, the Wyoming Province, and beyond. He showed that measurement of Pb with an electron microprobe is an appropriate method for inferring monazite age, but only if strict statistical criteria are met. Bob's other great petrologic passion was for extremely high-temperature metamorphic rocks, notably his M.S. field area in New York state, and in similar tectonic settings

Former student, Dr. **Kristie Caddick**, and Dr. **Bob Tracy**.

in southern Virginia and Finland. Bob had the keenest eye for, and deepest experience of, petrography in these types of rocks. His enthusiasm and talent for petrographic study were both world-class and infectious.

Despite Bob's substantial and diverse research and service contributions, he will be known to many students because of his co-authorship with Harvey Blatt on the second edition of the textbook "Petrology: Igneous, Sedimentary, and Metamorphic" (published 1985). This landmark textbook was updated with Brent Owens and published in its third edition as Blatt, Tracy and Owens in 2006. It is still in common use today.

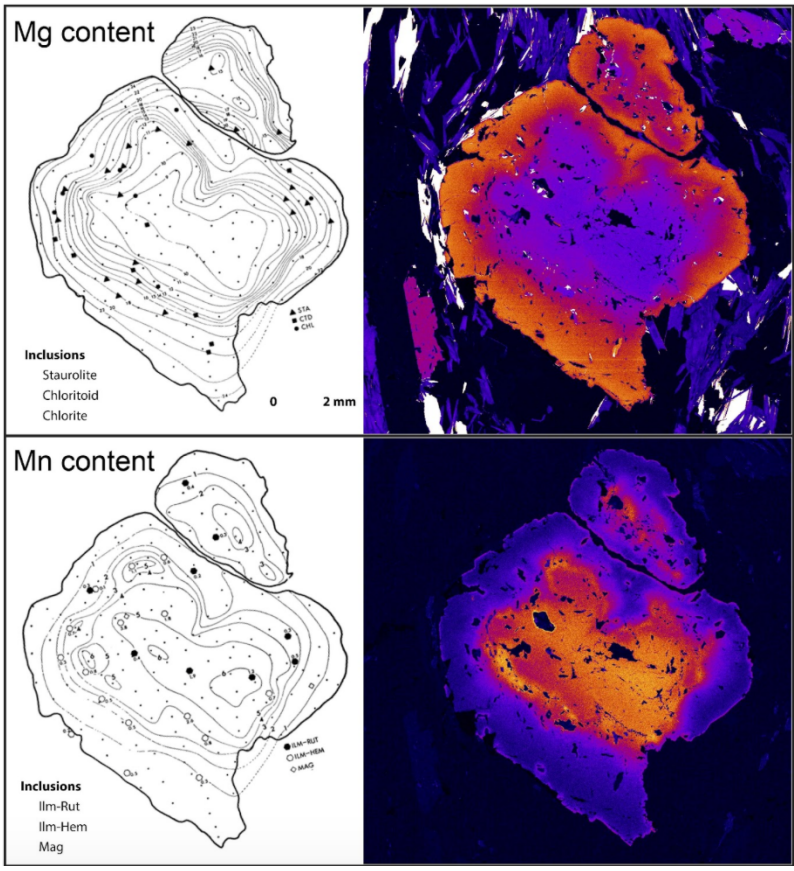
Those who knew Bob well will be aware of both the depth and the breadth of his knowledge. He was a fount of information, a walking encyclopedia of mineralogy, petrology, optical and electron microscopy, sample preparation, wine, French cuisine, European and American political history, fishing, and barbecue (amongst many other topics). Bob liked nothing more than using this information to help people, and students in particular, generally espousing his wisdom with a carefully pointed wit. His generosity in terms of sharing his time, knowledge, ideas, data and opinion are difficult to equal. He will be greatly missed.

To those who would like to make a donation in memory of Bob may do so by making contributions to the Robert J. Tracy Student Research Fund (see below).

Generations: Bob delighted in helping junior colleagues understand the richly diverse geology of SW Virginia. Here he is taking a break between outcrops with current VT Geosciences faculty **Mark Caddick** and alumnus **Victor Guevara** (soon to be an assistant professor at Bob's alma mater, Amherst College).

Robert J. Tracy Student Research Fund

Checks payable to: Virginia Tech Foundation, Inc.
Mail to: Geosciences Department, Virginia Tech
926 W. Campus Drive
4044 Derring Hall MC0420
Blacksburg, Virginia 24061



Then and Now: Hand-contoured and fully digital maps of compositional zoning in a garnet crystal. The black and white panels, which were groundbreaking in the mid 1970s, took Bob several months to construct by hand. The color panels were produced by fully-automated analysis of the same crystal almost 40 year later, taking a mere 12 hours to generate.

FACULTY NEWS

Research Awards

Mark Caddick
Associate Professor of Metamorphic Processes
College of Science Certificate of Teaching Excellence Award

Gerald (Jerry) Gibbs
Professor Emeritus of Mineralogy and University Distinguished Professor
2019 Thomas Jefferson Medal for Outstanding Contributions to Natural Science from the Virginia Museum of Natural History (VMNH)

Bill Henika
Associate and Adjunct Professor of Geology
2019 William Barton Rogers Individual Award from the VMNH

Sterling Nesbitt
Assistant Professor of Geobiology
2019 SCHEV Rising Star Award and Excellence in Teaching Award from Virginia Tech's Center for Excellence in Teaching and Learning

Richard Law
Professor of Geology
Received the 2019 Major John Sacheverell A'Deane Coke Medal by the Geological Society of London

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Publication Highlights

Holbrook, W.S., Marcon, V., Bacon, A.R., Brantley, S.L., Carr, B.J., Flinchum, B.A., Richter, D.D., and Riebe, C.S., 2019, Links between physical and chemical weathering inferred from a 65-m-deep borehole through Earth's critical zone, *Scientific Reports*, v. 9, no. 1 (March 14, 2019): 4495, https://doi.org/10.1038/s41598-019-40819-9.

Palomino-Ore, S.B., **Rimstidt, J.D.**, **Chermak J.A.**, Seal,R.R., **Schreiber M.E.**, 2019, Aluminum hydroxide coatings in limestone drains, *Applied Geochemistry*, 103: 23-30, https://doi.org/10.1016/j.apgeochem.2019.02.004.

Liu, S. and **King, S.D.**, 2019, A benchmark study of incompressible Stokes flow in a 3-D spherical shell using ASPECT, *Geophysical Journal International*, Volume 217, Issue 1, Pages 650–667, https://doi.org/10.1093/gji/ggz036.

Rui X. and **Stamps, D.S.**, 2019, A Geodetic Strain Rate and Velocity Model for China, *Geochemistry, Geophysics, and Geosystems*, https://doi.org/10.1029/2018GC007806.

Beskardes, G.D., **Wu, Q.**, **Hole, J.A.**, **Chapman, M.C.**, **Davenport, K.K.**, Brown, L.D., and Quiros, D.A., 2019, Aftershock Sequence of the 2011 Virginia Earthquake Derived from the Dense AIDA Array and Backprojection, *Bulletin of the Seismological Society of America*, 109, 19-33, https://doi.org/10.1785/0120180107.

Ye, Q., Tong, J., Tian, L., Hu, J., An, Z., **Bodnar, R.J.**, and **Xiao, S.**, 2019, Detrital graphite particles in the Cryogenian Nantuo Formation of South China: Implications for sedimentary provenance and tectonic history, *Precambrian Research*, https://doi.org/10.1016/j.precamres.2019.01.003.

Sad News: J. Donald Rimstidt

As we go to press, we are mourning the sudden and unexpected loss of Emeritus Professor of Geochemistry, **Don Rimstidt** to acute myeloid leukemia on March 24, 2019.

Don was an internationally-renowned geochemist, author of scores of scientific papers, and the textbook: *Geochemical Rate Models*. He was also a caring and devoted advisor. Associate Department Head and Professor **Madeline Schreiber** described Don as a beloved mentor, colleague, and collaborator for many faculty. Dr. Schreiber said, "He taught and mentored generations of graduate students and was always available to talk about geochemistry concepts, research ideas, or whatever was on a student's mind. He worked across scientific disciplines to solve both fundamental and applied problems in geochemistry." Don's first Ph.D. student, **John Chermak** also recalled his selfless mentorship. "His door was always open and (he) always found time to spread knowledge and spend time with students, staff, and faculty. A true data-driven scientist and no matter the subject; he would be able to help give his thoughts and insight on a potential path forward. In my view, an extraordinary man with an understated brilliance."

Dr. **J. Donald Rimstidt**.

A future issue of *TECHtonic* will highlight the many contributions of Don Rimstidt to geochemistry and his mentoring of students and junior faculty. In the meantime, see VT News: https://bit.ly/2HYwult.

Planning is underway for a memorial service at Virginia Tech in early summer. To those who would like to make a donation in memory of Don, his family asks that, in lieu of flowers, contributions be made to the J. Donald Rimstidt Field Trip Fund (see below).

J.D. Rimstidt Field Trip Fund

Checks payable to: Virginia Tech Foundation, Inc.

Mail to: Geosciences Department, Virginia Tech
926 W. Campus Drive
4044 Derring Hall MC0420
Blacksburg, Virginia 24061

GEOS IN THE NEWS - *Biology Letters*

Reconstruction of North America's oldest frog from the Triassic Period (~215 Ma) with a 3D model of the hip bone fossil on the right side. Reconstruction by Andrey Atuchin.

The early fossil record of the vertebrates that we see today (e.g., frogs, lizards, turtles, mammals) appears in the Triassic Period, but the earliest members of those groups are exceedingly rare, small, and difficult to recognize. Of these groups, frogs have a poor fossil record with only two species representing the first 60 million years of frog evolution.

Recently, Virginia Tech Geosciences faculty **Michelle Stocker** and **Sterling Nesbitt** and graduate student **Ben Kligman** recognized tiny remains of North America's oldest frogs which come from the Triassic-aged rocks (~215 million years old) of Arizona near Petrified Forest National Park. These tiny remains indicate that frogs inhabited the low latitudes for tens of millions of years before their next record in the Jurassic Period and that North America's oldest frogs were very small (about the size of your thumbnail).

This publication received media interest from around the world and helps other paleontologists to recognize early frog fossils. This summer, the group will return to the same fossil locality to look for more evidence of small vertebrates with both undergraduate and graduate students through funding provided by the David B. Jones Foundation. Tune into their latest finds through their Twitter account (@VTechmeetsPaleo).

ALUMNI FLASHBACK

By Daniel Yancey (B.S., 2004 and M.S., 2006)

*On December 3, 2018, Professor **Martin Chapman** received an email from alumnus **Daniel Yancey**, in which he described his personal experience during a 7.0 magnitude Alaska earthquake.*

"Hi Martin,

I hope this e-mail finds you well. As you are aware, Anchorage and the surrounding area experienced a very large earthquake this past Friday. I figured I'd give you a personal account of my family's experience so you can share with the Earthquake Seismology class or the Strong Motion Seismology class to let them know the importance of what they are studying. Feel free to share with whomever at the department. Also, I'd like to make a donation to the VTSO. Can you put me in contact with someone who can provide the address to mail a check to and how I should go about doing it?

The Yancey family's kitchen after the earthquake.

On Friday, November 30, my family experienced the 7.0 earthquake just outside Anchorage Alaska. I was upstairs in the bedroom with my wife while our son was downstairs sleeping. We experience earthquakes all the time in Anchorage and the attitude everyone has developed when we start to feel an earthquake is 'it will stop in a few seconds.' That's exactly how I felt as this one started. The problem was it didn't stop. I jumped out of bed (which you're not supposed to do). I wanted to get downstairs (which I wasn't supposed to do) to our son to be near him but the house was shaking so much I couldn't even stand up. I fell to the floor and was on my hands and knees bouncing up and down like a doll. The shaking seemed to last an eternity. We could hear glass crashing in the kitchen and things falling off of shelves. When the shaking finally stopped my wife and I ran downstairs and our son was just fine but scared. We held each other and then began to assess damage. I checked the gas lines coming into the house and any water lines. Checked for broken windows and eventually walked the perimeter of the house to make sure there were no structural issues. Thankfully things are ok.

I then decided I should try and take our son into daycare (another silly idea) so we could clean up the house since we don't want a toddler running around broken glass everywhere. As I drove down Minnesota Drive, I saw several areas of collapsed on and off ramps. The earthquake was quite a bit more serious than I initially realized. Most of downtown Anchorage had lost power by this point and I had to turn back. I was in traffic for about three hours (on a commute that normally takes 15 minutes). Grocery stores were closed so we got some snacks at a gas station and I went to a friend's house near downtown and hung out there.

After a few hours the traffic died down and we returned home.

The aftershocks are very nerve-wracking. Luckily in Anchorage most people escaped serious harm or injury with minor property damage. A lot of that has been chalked up to the geoscientists and engineers implementing good codes after the 1964 earthquake. We thank them for that.

Most people are fearful about earthquakes now. H.P. Lovecraft sums up fear best with this quote: 'The oldest and strongest emotion of mankind is fear, and the oldest and strongest kind of fear is fear of the unknown.'

Tell your students that the work they do is important and that one day, it may prevent people from losing their lives."

GeoHokies

Around the World

Virginia Tech Geosciences faulty and alums on a field trip to southern Namibia. From left to right: **Mike Meyer** (Ph.D., 2013), **Pengju Liu** (Post-Doctoral Fellow, 2006-2007), **Marc Laflamme** (Post-Doctoral Fellow, 2008-2009), **Shuhai Xiao**, Simon Darroch, **Natasha Bykova** (Ph.D., 2017), **Qing Tang** (Ph.D., 2018), and **Drew Muscente** (Ph.D., 2016).

Ph.D. Candidates, Rebecca Englert from University of Calgary (left) and **Sebastian Kaempfe** (right), doing detrital zircon sampling in the Magallanes region of Chile.

Community Outreach at Eastern Elementary/Middle School in Giles County, Virginia

Geosciences Graduate Student, **Dana Korneisel** (far right), visited Kindergarten classes at Eastern Elementary/Middle School to teach students about Paleotology. Also pictured above on far left is Emma Jayde Collins, **Sharon Collins**'s granddaughter. Photo by Toni Robertson

Geosciences Graduate Student, **Khanh To** (far left), pictured with students from Eastern Elementary/Middle School in Giles County, Virginia. Photo by Toni Robertson

THE MUSEUM PIECE

By Llyn Sharp

Nancy Ross and **Bob Tracy** admire the Aquamarine crystal. Photo by Mark Fortney

Along with the rest of the Department, the Museum will suffer greatly from the loss of Dr. **Robert Tracy**. Dr. Tracy served as Director of the Museum of Geosciences from 2009 until his death in 2019. During that time, he established the Museum as an important part of the Department's Public Outreach, Academic, and Collections Stewardship activities.

Looking back over his tenure, Bob's impact is striking:

- Established the Museum Committee, including both graduate and undergraduate student members
- Established the Board of Curators, quickly including some new faculty members
- Initiated the Museum Public Lecture Series, and gave one of the all-time best-attended lectures in that series featuring the NASA Lunar Samples (moon rocks! happy 50th anniversary in 2019)
- Negotiated significant donations from **Donald V. Dalton**, Lynn V. Ehrke, Arthur A. Kirk and his family, and Paul and Ruth Prideaux. These donations include high quality secure cabinetry, the spectacular aquamarine crystal, hundreds of amazing exhibit quality specimens, and the huge amethyst geode in the conference room. Bob helped haul that into place--no small feat! Bob also donated several samples himself including a striking labradorite specimen displayed in the Main Office.

This gem-quality crystal weighs over 18,100 carats—eight pounds. It is from the famous Minas Gerais district in Brazil. Photo by MoGs

- Encouraged the modern LED lighting and exhibit upgrades initiated by a generous financial donation in 2015 from Don Dalton (in addition to Don's regular support and fundraising for the Museum).
- Participated enthusiastically in many public outreach events, including the Virginia Association of Science Teachers conference
- Served as P.I. on the Museum's three-year $150,000 Institute of Museum and Library Services (IMLS) grant to preserve continuity and improve collections accessibility
- Chaired the 2014 SEGSA section meeting at Virginia Tech, where there was a special session on collections management for geoscience collections

- Chaired **Sarah (Timm) Christensen**'s unusual M.S. project to incorporate a Museum collections management aspect. Under Bob's guidance she did original geologic research to understand analytic needs and specimen relationships, then worked with many geoscientists, the Smithsonian, and the Virginia Museum of Natural History to develop a database for the Museum of Geosciences and the broader geoscience collections community. Sarah went on to be Curator at the Tellus Museum in Georgia.
- While serving on the GSA Council in 2014-15 Bob put forward a resolution in support of Geological Collections to call attention to the value and vulnerability of collections that are so critical to the future of the science.

Bob loved rocks and minerals and was always happy to look at things for us. He identified countless mystery rocks that came into the Museum from students and community members. He analyzed dozens of wish-it-was-a-meteorites, and at least one that WAS a meteorite! His encyclopedic knowledge of geology, the history of geology, and the history of the Department meant that all questions generated answers with fascinating stories that taught so much more.

We miss him.

Amethyst geode (approximately 1.2 x 0.5 meters!) donated by Lynn V. Ehrke displayed in the conference room. Photo by MoGs

Dr. Bob Tracy, Dr. Arthur A. Kirk, and his daughter, Anne Kirk. Photo by Mark Fortney

GEOSCIENCES
Virginia Tech

2019 Spring Newsletter

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https://www.giving.vt.edu/ or all the Office of Accounting at 1-800-533-1144.

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Alumnus **Jimmy Whitmer** waves to a Virginia Tech drone from atop Eggishorn, Switzerland.