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MESSAGE FROM THE CHAIR

I’m fully aware that this is the ultimate cliché… but time has flown! My term as department chair is entering its last year, so this is a good opportunity to reflect on an interesting, sometimes challenging, but certainly rewarding experience.

For a start, there is plenty of news from the personnel front. First of all, we are excited to announce that the inaugural Marshall-Heape Chair, Cynthia J. Ebinger (currently at the University of Rochester), will join us early in 2017. This position has been in the works for quite some time and it is extremely gratifying to see it come to fruition – we will forever remain indebted to Bob Marshall and Scott Heape for making this possible. Cindy is a geophysicist and a leading expert on the East African rift zone who will bring an important new dimension to the department and to Tulane. I’m sure you will hear more from her in upcoming years.

In the meantime, the EES front office is also undergoing some notable changes. Marilyn Reine stepped down a few months ago after more than 10 years of service to our department. Marilyn has had a tremendous impact on all of us, and several generations of post-Katrina students will have fond memories of her. In the meantime, Ning “Nina” Yang has joined us as a part-time accountant, splitting her time between EES and the Department of Physics and Engineering Physics. Finally, I am pleased to report that two of our faculty members (Jeff Agnew and Jeff Sigler) have recently been promoted to Senior Professor of Practice.

I have written in years past about the increasing importance of fundraising. Therefore, I am pleased to note that our departmental endowment has almost doubled in the last five years. In addition to those mentioned above, several generous donors have made this possible. It is important to remember that their generosity has a lot to do with a great educational experience, often many decades ago. In other words, much of the credit should go to the likes of Emily Vokes who have served the department during lengthy careers. On this note, Emily has written the “geological history” of the department which you can find elsewhere in this newsletter.

Beyond fundraising, we have come to realize how much we could benefit from the expertise of our alumni in a variety of ways. Therefore, we have recently established an EES Alumni Advisory Board. Nancye Dawers is serving as the liaison to the department and she reports elsewhere in this newsletter about this effort.

Our homecoming party is on Friday, October 28. As always, further details can be found in this newsletter. For those of you who can make it, this is an event you don’t want to miss!

Torbjörn Törnqvist
Vokes Geology Professor and Chair, Department of Earth and Environmental Sciences
Inasmuch as 2016 marks the 60th anniversary of Harold Vokes’s arrival at Tulane, it seemed like a brief history of the department might be of interest to both the older and younger alumni. Just to set the stage, the Geology Department (as it was so quaintly called back in those ancient days) was founded in 1926 under the leadership of the much beloved Reinhard Steinmayer (hence, the Steinmayer Award). It was located in the then brand-new “science building” known as Dinwiddie Hall, built in 1924 and the first new building on campus after the four that originally comprised Tulane University.

Although there was a Geology Department from that date, I do not believe there were any “geology majors” for some time. It was more a service department, offering “science courses” to students majoring in other things (like football). Not until the early 1940s am I aware of any “Geology alumni.” From this time on, however, the department thrived, graduating a number of men (only), many of whom wound up in the local oil industry. By this time Prof. Steinmayer was joined by a couple of junior professors, who changed regularly over the years, moving on to other jobs.

This arrangement continued until 1956, when Prof. Steinmayer reached the point of retirement (I assume age 65, as was mandatory in those days). The powers that be in the University administration decided that this would be a great opportunity to upgrade the department into something worthy of the greater aspirations that were enveloping Tulane. They would seek out a prominent senior man to come in and build the department into a “first-class” facility with a large faculty and a graduate program.

The person they chose for this makeover proved to be 48-year-old Harold Vokes, then Professor of Geology at The Johns Hopkins University. After the initial year, Steinmayer did retire and in 1957 Vokes took on the job of Chairman and facilitator of the NEW Geology Department. The first order of business was to add several faculty members. Shortly he brought in John McDowell, a former student from Hopkins and Angus McDiamond, another recent PhD. From industry he lured in Hubert Skinner, Ray Steinhoff, and Hamilton Johnson. With this core the graduate program was initiated and by 1960, there were several students working towards a Master’s degree. Subsequently the PhD was also added.

In time McDowell defected to the Dean’s office, and Steinhoff and McDiamond moved on, but new men were added in their place. First came Ron Parsley, a new PhD from Cincinnati, and later Steve Nelson and George Flowers, both recent graduates from California. Over the years there were numerous other faculty members that passed through the department but these three remained for the long haul and, although Ron retired a few years ago, are now the senior members of our faculty. Among those who passed through we include Garrett Briggs, John Kocurko, Joe Meyer, Bob Horodyski, and Ivan Gill. There were doubtless others I no longer recall.

Harold Vokes was department Chairman from 1957 to 1966, plus an extra term in 1970-71. After him...
various faculty members took on the chore, including yours truly from 1974 to 1982. Harold was forced to retire at the then mandatory age of 70, in 1978, but continued to teach one course, his very popular History of Life, for another five years. He wished to continue teaching without pay, and when, as Chairman, I asked the Dean if this was possible, he said “Well, as long as it is requested by the students, I guess it is OK, but we wouldn’t want to set a precedent.” So, we left it in the catalog and the students continued to sign up for it, many declaring it was the best course they ever had! Harold continued to maintain his research, with his last publication coming in 1992 at age 84!

If the Steinmayer era was the Paleozoic of the department, then the Vokes years were the Mesozoic. And like the Mesozoic Era, the end came with a big bang. The department members were not killed by an asteroid but by the University’s decision to get rid of all the old dinosaurs on the faculty. With the mandatory retirement age vanishing, there were lots of old professors who had “retired into teaching” and the powers that be decided a nice buy-out would get rid of them. It worked! The Geology Department lost Hubert Skinner, John McDowell, who had returned from the Dean’s office to become Chairman (God bless him!), and the writer. But it wreaked havoc on the University as a whole, because they had to offer the buy-out to everyone on campus and a lot of the older people in Purchasing, Personnel, Dean’s offices, Graduate School, etc. — all the “little people” who ran the University — also bailed and there was a tremendous loss of institutional memory.

But like the end of the Mesozoic, the remaining life forms suddenly blossomed and we move into the Cenozoic Era of what becomes known as Earth and Environmental Sciences. Steve Nelson was pressed into service as the new Chairman and it almost killed him. New faculty came and went, then we had Katrina, and everything went. On top of the hurricane devastation, loss of faculty members, etc., the University decided to give dear old Dinwiddie Hall to the Anthropology Department, as they had lost their entire building off Freret Street.

They would move EES to an even older building, one dating to 1894, one of the four original buildings that initially formed Tulane University — what was then called the “Mechanical and Electrical Lab.” (The other three were Gibson, Hebert, and Richardson Halls — check the architecture of these four buildings and you will see the family resemblance.) Relocating to this historic building, which had been occupied by Engineering for over 100 years, fell upon Steve’s back like a ton of bricks. But he did the job and I think all will agree it is a lovely, if somewhat poorly laid out, facility.

Since the end of the departmental Mesozoic things have changed immensely but being located only on the fringes I am unable to truly document them. Steve finally got out of the Chairman job, scads of bright new faculty have been added, the departmental direction has shifted from Paleontology to more current fields, and things seem to be booming. Those of us who are still alive remember fondly that once there was a place called Camelot, but wish the new inhabitants all the best for the future.

This year’s commencement ceremony was a special one for our department: Tulane awarded an honorary doctorate to Dr. Christopher Paola from the University of Minnesota. Chris is one of the world’s leading deltaic geologists, with an extensive track record of research on the Mississippi Delta and also a longtime friend of our department. When Chris took the microphone in the Superdome, he endeared himself to the crowd by speaking the memorable words “live long and prosper”.

Here he is seen right after the ceremony, flanked by EES faculty members Torbjörn Törnqvist (left) and Kyle Straub (right).
Before I started my graduate studies at Tulane, I was a student in the Environmental Science program at Moravian College in Bethlehem, Pennsylvania. My undergraduate experience was highly interdisciplinary: I had field trips to monitor the migration of predatory birds along the Appalachian Mountains; explored the terminal moraine of the Wisconsinan glaciation; and surveyed the recovery of the Palmetton Zinc Pile Superfund site. I graduated with my B.S. in 2010 and took some time off before returning to academia. After a few interviews, Dr. Nicole Gasparini told me of a new project in her group: building a new, open-source computational tool called Landlab coded in the Python programming language, which would be accessible to new and experienced users alike. The goal of the project was to address highly interdisciplinary problems in Earth science: the intersections of hydrology, geomorphology, and ecology across both short and long timescales. It certainly has been no small undertaking; the project currently includes seven researchers from Tulane, the University of Colorado, the University of Washington and the NSF-funded Community Surface Dynamics Modeling System group.

**LANDFORM EVOLUTION AND HYDROLOGY**

During the early stages of Landlab, my role included the development of hydrology modules, including stochastic rainfall and overland flow components. Often in geomorphic models, there are simplifying assumptions made when simulating rainfall and runoff. These assumptions are made to reduce the trade-off between the complexities of solving the shallow water equations and computational efficiency. However, these simplified hydrology models may not capture the impacts of discharge variability in watersheds when coupled with erosion models. To broaden the scope of Landlab’s hydrologic capabilities, I have integrated an urban flood model into Landlab and stabilized it to work in steep, forested watersheds. This new model will allow me (and other researchers) to explore the dynamics of flooding and landscape evolution using Landlab.

**FIRE AND FLOODING**

My next research goal is to apply this new model in landscapes that have been impacted by wildfire. Many field studies have demonstrated that scorched soils and vegetation removal are linked to massive erosion events during post-wildfire storms. Capturing the erosive impacts of post-fire storm events has implications for both short- and long-term evolution of a landscape. Post-fire flooding and erosion can damage property and threaten lives. As climate change is linked to increases in extreme precipitation events and changes in wildfire frequencies, understanding the driving factors of these events becomes even more important.

Thanks to a Newcomb Faculty Grant, I was able to visit the burned Spring Creek watershed in central Colorado with EES undergraduate student Carey Schafer in June 2015. During this field campaign, we observed the nature of the channels and hillslopes to better understand the processes controlling erosion throughout the watershed. Her capstone project was then focused on identifying precipitation and discharge events that drive overland flow-driven erosion in the first few years after the large Buffalo Creek Fire. Post-fire storms exceeded the 100-year rainfall rate, and subsequent flooding destroyed homes and washed out a county highway. Thousands of tons of sediment were moved and deposited in a reservoir serving the greater Denver area after this event.

These post-fire flood and erosion events can be simulated in the Landlab overland flow model to drive flooding and erosion across a gridded digital elevation model of the Spring Creek watershed. The model will be used to explore how this new flow routing component compares to field measurements, estimate total sediment yield for individual rainfall events, and then run over several years to evolve the watershed morphology. These results can be used to make interpretations about the processes that shape...
These varied field experiences have been invaluable to me as a graduate student and have improved my skills as a researcher.

**ACKNOWLEDGMENTS**

I am tremendously grateful to the Department of Earth and Environmental Sciences and the National Science Foundation for supporting my research. I’d also like to thank my advisor Dr. Nicole Gasparini as well as the rest of my dissertation committee: Dr. Kyle Straub, Dr. Brent Goehring and Dr. Greg Tucker. Also, thanks to Dr. George Flowers for supervising my early Lake Pontchartrain project.

In addition to the Colorado trip, I’ve had opportunities to do out-of-state fieldwork. This includes work in eastern Arizona, where we collected high-resolution terrestrial LiDAR to be used by the US Forest Service to quantify sediment transport in a small, experimental watershed affected by the 2011 Wallow Fire. I also had an opportunity to visit the Big Island of Hawaii, to assist on a collaborative project between Tulane and the University of Texas. This project explored how chemical weathering controls the erodibility of basalt bedrock rivers along the Kohala peninsula, which is characterized by a strong orographic precipitation gradient.

RESEARCHER FOLLOWS EVOLUTION OF LANDFORMS

**STORY BY BARRI BRONSTON**

It’s called a Schmidt hammer, and for the past eight years, it has been a critical tool in the research of Nicole Gasparini, an associate professor in the Tulane Department of Earth and Environmental Sciences. Also known as a Swiss hammer, it measures the elastic properties or strength of concrete or rock. Gasparini is a geomorphologist, a scientist who studies the evolution and configuration of landforms. She has been using the device to gain a better understanding of bedrock river erosion.

Her work, published in the science journal Nature, led her and her team of researchers to the Kohala Peninsula on the Big Island of Hawaii where the bedrock is made exclusively of basalt, a kind of volcanic rock. “What we showed is that the more rainfall you have, the more chemical weathering you have. The weaker the rock becomes, the easier it is to erode,” says Gasparini. “No one has really shown that in the context of bedrock rivers.”

To come to those conclusions, Gasparini and the research team used Schmidt hammers to gauge the compressive strength of bedrock in rivers across the Kohala Peninsula. They collected rock samples along both the dry and wet sides of the peninsula and brought them back to the laboratory for further study. “Geologists have long hypothesized that climate is an important control on how landscapes evolve,” she says. “Yet the link between climate and bedrock river erosion has been difficult to pin down. This work identifies a mechanism for this link.”

Gasparini conducted the research with Joel Johnson, assistant professor of geology at the University of Texas; Brendan Murphy, a doctoral student in geosciences at the University of Texas; and Leonard Sklar, associate professor of geology of San Francisco State University. It was funded through the National Science Foundation and a Tulane Research Enhancement grant.
The fall semester of 2015 provided me the first chance to enjoy a sabbatical from my Tulane responsibilities post tenure. More importantly, the sabbatical gave me a chance to start new research directions, as well as return to topics I have not tackled since my PhD. A mere two weeks after the birth of our second child, Gabby, my family packed up and moved to the suburbs north of Houston for the fall. While the cultural offerings of suburban Houston are (let’s just say) different from New Orleans, they are home to a plethora of energy companies of a range of sizes. Colleagues at ExxonMobil that I have known for over a decade invited me to join one of their research groups with the hope that the interaction would be beneficial to both sides.

ExxonMobil recently opened a new campus in The Woodlands, which is now their largest facility and houses somewhere in the vicinity of 14,000 employees ranging the full spectrum from “upstream to downstream” including investment traders, engineers, and a plethora of geologists. The campus is similar to what I would imagine Google’s campus is like, with all the facilities necessary to keep one comfortable, while working long hours.

Specifically, I was invited to work with their Process Stratigraphy research group. This group is comprised of approximately 15 members and focused on developing forward numerical models that describe sediment transport systems and their resulting stratigraphy. While the focus is on numerical models, the group is keenly aware that for these models to be useful they need to be validated against field data and physical laboratory experiments. As such, the group includes members with degrees in computer science, civil engineering, and geology (including those specializing in collection of outcrop observations, seismic interpreters, and experimentalists).

This group, which was formed about a year and a half ago, is currently focused on developing models for deep marine settings where sediment transport occurs primarily through turbidity currents: essentially underwater avalanches of sediment. Interestingly, they decided to start their modeling program in the deep marine as they feel that submarine transport systems, when operating, are dominated by their internal dynamics. Therefore, questions of transport system interactions with boundary conditions, like base-level, are (hopefully) minimized.

What piqued my interest was an offer to work with high resolution, shallow seismic surveys and to publish on my interpretations. These seismic surveys were from a diverse range of geological settings including mini-basins in the Gulf of Mexico, offshore Corsica, and offshore Zaire, and were of significantly higher resolution than conventional exploration surveys.

During the past year, Kyle Straub spent several months at ExxonMobil, taking advantage of their unique facilities and seismic data. Here are some impressions from his time in Houston.

This work allowed me the opportunity to dust off seismic interpretation skills that have largely lain dormant since my PhD years. Over the last seven years my research shifted largely away from field systems towards the laboratory where the construction, maintenance, and operation of a state-of-the-science experimental facility (in addition to my teaching and mentoring responsibilities) have dominated my time (see 2012 EES Newsletter).
My primary focus was on determining how or if internally controlled, hydrodynamic processes set the location of avulsions in submarine channel systems. Borrowing theory initially developed for rivers approaching the ocean, the idea was that non-normal flow in submarine channels, here resulting from the flow interaction with terminus channel fans, could set the scales of bifurcations and the locations of nodal channel avulsions. In addition to these surface process questions, the goal was to link the type and driving mechanism for avulsions to their stratigraphic architecture.

The work described above is still ongoing. While I completed much of my interpretations during the sabbatical, as with most research projects initial plans fall to the waist as theory is confronted with hard data. Thankfully, I have been given access to the data remotely, so between editing PhD student dissertation chapters, I am still clicking away and working on separating internal transport processes from possible complexities induced by pesky things like changing climate and tectonics.

In addition to my seismic interpretation work, the face-to-face interactions with Exxon’s Process Stratigraphy group led to a number of additional discussions. Specifically, we started discussing how to use statistics that my research group has developed over the last 6 years for description of terrestrial alluvial basin stratigraphy, to describe the stratigraphic architecture of deepwater deposits. Again, their aim here will be to use these statistics to validate numerical models, while I see additional basic research applications to development of these statistics. This work continues and is now being led by a PhD student in my group, Tushar Bishnoi. Thanks to video-conferencing technology, Tushar and I get to interact with Exxon’s group every other Monday, bright and early at 8:00 am.

With this sabbatical in my rear-view mirror, I can say that I miss the daily interactions with such a strong research group with members all focused on linked goals and I miss the ability to focus on only one task each day. That being said, it’s great being back in New Orleans, riding my bike to the university each day, working in my office (a bit cozier than my cubicle at Exxon), interacting with my research group, running experiments, and back in the classroom.
CONGRATULATIONS TO OUR 2016 AWARD RECIPIENTS

Undergraduate Awardees

The R. A. Steinmayer Award
Recipient: Claire E. Beauchamp
Claire earned degrees in Environmental Science and Studio Art. She is in the honors program and a member of the leadership fraternity Omicron Delta Kappa. She is committed and enthusiastic about Environmental Science. This is illustrated by her stellar service record, including work with the Hope Gardens and Tulane Green Club and the educational opportunities she seized at Tulane, such as field research experience and leadership in service learning courses.

The Harold E. Vokes Award
Recipient: Ethan B. Ader
Ethan earned degrees in Environmental Science and Music. He is in the honors program and he excels in the classroom, as illustrated by his continual presence on the Dean’s list since his first semester at Tulane. Ethan has also taken advantage of numerous opportunities to apply and expand his knowledge of Earth Science beyond the classroom, including an on-campus research project and service learning project, along with an outside summer internship and K through 12 environmental education.

Graduate Awardees

The Vokes Fellowship
Recipient: Jordan Adams
Jordan Adams is the recipient of the Vokes Fellowship awarded by the Earth and Environmental Sciences faculty for her outstanding academic performance and excellence in research.

Outstanding Research Assistant
Recipient: Qi Li
Qi Li was selected the outstanding research assistant by the Earth and Environmental Sciences faculty for his outstanding contributions to research.

Outstanding Teaching Assistant
Recipient: Michael Hopkins
Michael Hopkins was selected the outstanding senior teaching assistant by the Earth and Environmental Sciences faculty for his outstanding contributions to teaching.

Outstanding Teaching Assistant
Recipient: Molly Keogh
Molly Keogh was selected the outstanding senior teaching assistant by the Earth and Environmental Sciences faculty for her outstanding contributions to teaching.

EES ALUMNI PARTY

Friday, October 28, 2016
6:00 to 9:00 PM • Cudd Hall
RSVP to Karen Muse at kmuse@tulane.edu or 504-865-5198 by Friday, October 21.

LET US KNOW WHAT YOU'RE UP TO
Email Karen Muse at kmuse@tulane.edu or fill out our Alumni Update Submission Form.

A very well attended party was held on May 23 at the home of Nancye Dawers to celebrate Marilyn’s Reine’s numerous contributions to the department.
NEW ALUMNI ADVISORY BOARD

We are pleased to announce a newly formed EES Alumni Advisory Board. Such boards are increasingly common here at Tulane and in geoscience departments across the country. Although this is not the first time this has been done here in the department, we are hopeful that it is something we can sustain into the future and that it will help us better engage alumni and foster interaction between alumni and our students.

Ten alumni, spanning a wide range of graduation dates and career paths, have very generously agreed to help get the ball rolling:

Denise Butler (MS 1984), who is retired from Shell.
Tom Giosa (MS 1985) of Bean Resources, Inc.
Bryan Grace (PhD 2012) of CH2M.
Allen Greenwood (BS 1980 & MS 1984), currently with Total.
Jade Haug (PhD 2014) of the Bureau of Ocean and Energy Management.
Sidney Hemming (MS 1986) of Columbia University.

Kathy McManus (BS 1980), with ExxonMobil, has tentatively agreed to serve on the board.
Kevin McMichael (BS 1977), of Claymore Oil & Gas, has agreed to serve while also serving on the Tulane School of Science and Engineering Board of Advisors.
Jeff Nittrouer (MS 2006) of Rice University.
Loren Setlow (BS 1970), is currently affiliated with SC&A, Inc., having retired from the EPA.

The board will hold its first meeting on October 28 – the same day as the Department’s alumni party and other Homecoming festivities. If you have any questions or would like further information, feel free to email Nancye Dawers at ndawers@tulane.edu.

A BIG THANK YOU TO OUR DONORS

The following donors made generous contributions to the department, enabling us to enhance endowed professorships and scholarships and to support field trips and student research. We are most grateful!

Martha and Brian Andersen, Rock Hill, SC  Louisiana Board of Regents, Baton Rouge, LA
Kathleen Austin, Houston, TX  Patricia and Robert Lunn, Bellaire, TX
Rodey Batiza, Fairfax, VA  Eileen and Kenneth Mallon, Houston, TX
Janet and Joseph Born, Broken Arrow, OK  Kathleen McManus, Houston, TX
Pervin and Maneck Chichgar, Corona, CA  Georges Pardo, Naples, FL
Keith Culling, Glendale, CA  Beth and Michael Schneider, United Kingdom
Barbara and Robert Danos, Denver, CO  Michaelene and Loren Setlow, Oakton, VA
Jo Ann Eichenour, Conroe, TX  Mary and Richard Steele, Houston, TX
ExxonMobil Foundation, Irving, TX  James Stoyanoff, Bush, LA
Freeport-McMoRan Foundation, Phoenix, AZ  Betsy and Gregory Suppes, Johnstown, PA
Katerina Kourentzi and Costa Fotopoulos, Bellaire, TX  Ruo and William Watson, San Diego, CA
Helis Foundation, New Orleans, LA  Mathilde and Charles Wenck, Kingwood, TX
Charlotte and Fred Hubbell, Des Moines, IA  Thomas Westbrook, Metairie, LA
Laura and Bryant Korn, Houston, TX
INVEST IN EARTH AND ENVIRONMENTAL SCIENCES

By supporting EES, you will enable creative student and faculty research addressing challenges in energy, the environment, and stewardship of the natural world. As a proud alumus, you can help advance Tulane as a leader in the geosciences. We deeply appreciate your support in creating an outstanding academic experience.

Your generous gift will help sponsor the following priorities:

Geology Student Research Fund
• Originally known as the Tulane Geology Fund, this supports a wide range of activities associated with the Geology major
• Our current emphasis is on supporting undergraduate research that Geology majors carry out with faculty

Environmental Earth Science Student Research Fund
• A relatively new initiative that supports undergraduate research carried out by Environmental Earth Science majors in conjunction with individual faculty
• Also supports laboratory needs related to the Environmental Earth Science major

Earth And Environmental Sciences Computer Facilities Fund
• We utilize this lab for hands-on teaching of 3D Stratigraphy, Subsurface Geology, Geophysics, GIS, and Remote Sensing courses
• It also provides the hardware and software tools for the AAPG Imperial Barrel Award team

Earth And Environmental Sciences Field Studies Fund
• Enables students to gain field experience and, in particular, supports essential class field trips to the Appalachians, Ouachitas, Llano uplift, and the Mississippi River delta plain
• Donations will also help establish a new Death Valley fieldtrip

Thank you in advance for your generosity and continued support of Tulane EES!

TO MAKE A DONATION

ONLINE
Visit http://www2.tulane.edu/sse/eens/giving/invest-in-eens.cfm and click on the "SUPPORT TULANE EES" button in the middle of the page. From there you will be directed to the secure donation form.

BY MAIL
Print and fill out the donation form below. Mail your completed form and check to the address listed on the form. Please make your check payable to: TULANE UNIVERSITY and indicate in the memo line which fund you wish to support.

If you have a question or would like more information about setting up endowed gifts, please contact Torbjörn Törnqvist via email at tor@tulane.edu or by phone at 504-314-2221.

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____ Environmental Earth Science Student Research Fund
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____ Earth and Environmental Sciences Field Studies Fund

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Please return this form, with your gift, to: Tulane University – SSE Development
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