

# UCLA EPSS

EARTH PLANETARY & SPACE SCIENCES  
2024 NEWSLETTER



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Image of a rising plume illuminated by thermochromic liquid crystals. We study these in the lab to understand what dynamical features give rise to hotspots like Hawaii.

# Greetings from the Chair

CAROLINA LITHGOW-BERTELLONI

This last year has been one of survival, transition, and resilience. The academic year started tragically with the loss of a beloved faculty member, our former graduate advisor Distinguished Professor An Yin. We still miss him dearly. However, in the darkest times, we were guided by his motto, "Just do it," weathering the lows and enjoying the highs. There have been both.

As I write this and look over this year's newsletter, I reflect on what we have lost and gained and how important it is to honor our past to move towards what comes next. We have tried both in this newsletter and as a department to do just that. We held a cross-continent memorial service for An, we received a beautiful art donation from Dave Jackson's daughter, and Lauri Holbrook, who we honored in last year's newsletter, has shared a wonderful piece about emeritus Professor Clarence Hall, who we also lost last year. He presided over the birth of this department as Geology and Geophysics & Space Physics merged into Earth & Space Sciences, our name before we added the P for Planetary in 2017. Not all farewells were sad; Mark Harrison and Kevin McKeegan's retirement event was a joyous celebration as was our recent retirement event honoring Researcher Krishan Khurana and long-serving staff. And we moved towards the next stage by welcoming new CAO Nick Baerg, new SAO Dr. Tasha Taylor, and Recruitment, Outreach, and DEI coordinator, Dr. Pedro Monarrez. We have also continued to attract top faculty talent, as Prof. John He and Prof. Amy Mainzer have just started at UCLA. Keep an eye on the news on our website ([epss.ucla.edu/news/](http://epss.ucla.edu/news/)) to see upcoming announcements on recent faculty recruitments, cutting-edge research and other departmental highlights.

Our efforts to explore our planet and beyond continue apace, with Prof. Tina Treude leading expeditions to the deep ocean (5,500 m!) to study methane seeps and Prof. Hao Cao winning a \$3M development grant from the DALI program at NASA to study water on the Moon. We continue to value our field education and research. Your generous donations allowed us to buy a new Silverado truck, which we inaugurated at this year's field camp. We have started a new EPSS Makerspace with 3-D printers and laser cutters for our students. Our faculty, researchers, and students continue to excel and be recognized for their achievements. Our outreach and DEI efforts continue. Thanks to emeritus Prof. Paul Davis and the indefatigable Eric Wessenauer we were able to donate 40 broadband seismometers to the Universidad Nacional Autónoma de México (UNAM).

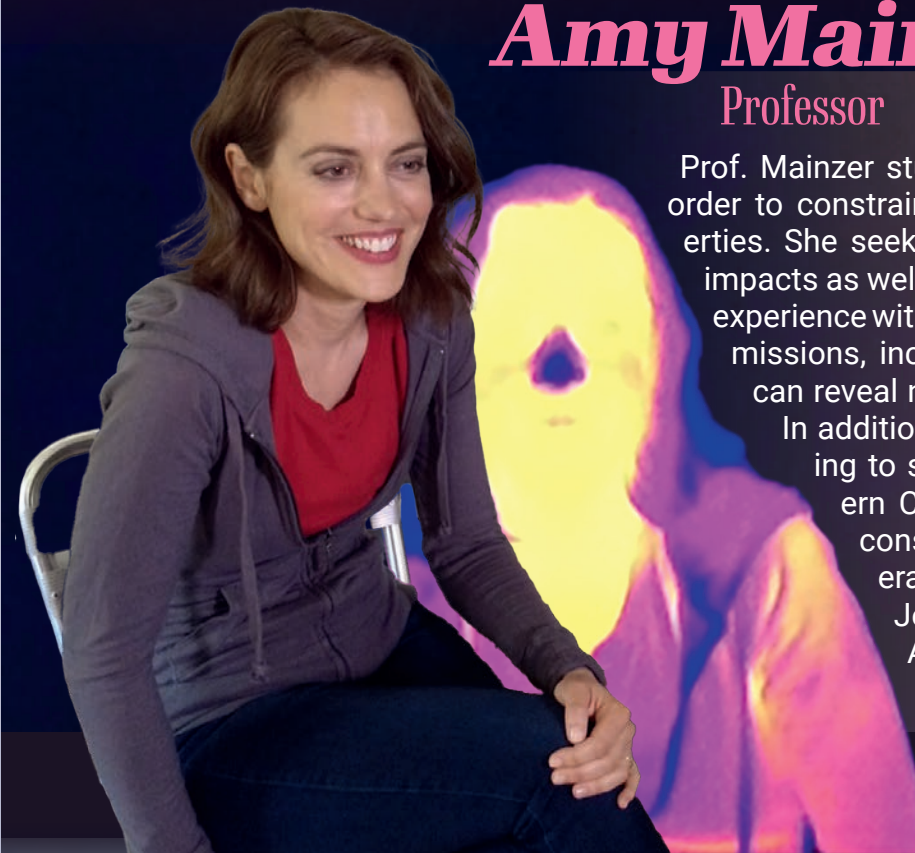
I close with two things: First, an appreciative and grateful nod to our generous donors. Without them we could not continue to offer outstanding education and research opportunities. Recent gifts by Arthur and Patricia Mirsky for graduate scholarships, Joe and Andrea Straus for undergraduate opportunities and two endowed chairs will make an enormous difference. Fritz Demopoulos and William Ballhaus are contributing to a Chair for Research and Education in Planetary Science and Ray Yin has endowed the An Yin Chair in Geology in honor of his brother. Second, a nod to the graduating class of 2024. We celebrated the accomplishments of our students at a very special commencement ceremony. Special because their academic lives were marked by disruption and difficulty since the pandemic first hit in 2020. They survived and thrived and we are very proud of what they achieved in the last four years.

We welcome visits and news from our friends and alumni (write us at [alumninews@epss.ucla.edu](mailto:alumninews@epss.ucla.edu)), and hope to be able to invite you to on-campus events again this coming academic year. If you are so inclined and are able please consider making a gift to make our goals possible.

Wishing you all the very best,

# Welcome our new Faculty and Staff!

## Amy Mainzer Professor



Prof. Mainzer studies asteroid and comet populations in order to constrain their numbers, sizes, and orbital properties. She seeks to understand their potential for Earth impacts as well as their origins and evolution. She brings experience with astronomical instrumentation and space missions, including infrared and optical sensors that can reveal new insights into small body populations. In addition, she is interested in using remote sensing to study the diverse environments of Southern California and has served as the science consultant, executive producer, and on-camera host for the PBS Kids TV series Ready Jet Go. Prof. Mainzer received her Ph.D. in Astronomy and Astrophysics from UCLA and is delighted to be back on campus.

## Nick Baerg Chief Administrative Officer (CAO)

The department welcomed Nick Baerg in March 2024 as our new EPSS Chief Administrative Officer. Nick graduated with a B.A. in Sociology from the University of California, Riverside. He started his career in private education and joined UCLA's Chemistry & Biochemistry department in 2015. Nick held various roles during his tenure in the Chem & Biochem department including graduate adviser, undergraduate manager, and Student Affairs Director.

Nick enjoys traveling with his friends and most recently had the pleasure of taking a Christmas trip to Southeast Asia where he visited the Taj Mahal along with other beautiful temples, incredible beaches, and other world treasures. He enjoys exploring food hubs and learning about the history of the places he travels to.







## Dr. Tasha Taylor

Student Affairs Officer (SAO)

Tasha brings with her a wealth of experience, spanning over a decade, in student services and academic affairs across diverse roles. Her tenure as an admissions officer has equipped her with an intricate understanding of program requirements, transferability, visa prerequisites, and financial aid. Furthermore, her role as a registrar has provided her with expertise in Student Information Systems, degree auditing, and articulation agreement evaluations. She has also served as an advisor to a broad spectrum of students, encompassing domestic and international, as well as graduate and undergraduate cohorts.

Tasha attained a doctorate in Executive Educational Leadership, complementing her MBA in Human Resources Management. Her research has been centered on crisis leadership in higher education, post-pandemic education, and the strategic imperatives for institutions of higher education to sustain their core functions amidst substantial recent transformations. Her adeptness in aligning responses to the contemporary higher education landscape, her student-focused and comprehensive advisory methodology, and her dedication to empowering underrepresented and first-generation students represent exemplary attributes.

## Dr. John He

Assistant Professor

Dr. John He, an interdisciplinary field geologist, joined EPSS as an Assistant Professor in July 2024. He received his B.A. from Amherst College in Geology and Law, Jurisprudence, and Social Thought, and completed his M.Sc. in Geosciences at the University of Arizona with the support of the John Mason Clarke 1877 Fellowship. He was a researcher at the Arizona Radiogenic Helium Lab before moving to Minneapolis as a College of Science and Engineering Fellow for a year at the University of Minnesota. He then completed his Ph.D. at the University of Arizona, where he was an ARCS Foundation Papadopoulos Scholar. Professor He was born in Pennsylvania, but he spent most of his childhood in Shanghai. Growing up in a city of asphalt, steel, and glass, he had very little exposure to rocks or the outdoors, so discovering geology was quite an accident in college. Learning about earth processes was an eye-opening experience that changed the way he saw the world around him, and the sense of discovery that came with studying geology drove him to pursue field research. Bridging structural geology, sedimentology, thermochronology, geochronology, and geodynamic modeling, his work engages with the intricate architectural challenge posed by the lithosphere's movements and transformations. From glacial erosion in Antarctica to the formation of enigmatic high-elevation basins on orogenic plateaus, like the Himalayan-Tibet mountain belt, his research explores processes that transform the planet's surface and crust over geologic time, and their potential linkages to deep-seated mantle dynamics. Outside of work, he enjoys oil painting, backpacking, fishing, climbing, and playing tennis.



## Pedro Monarrez

Recruitment, Outreach, DEI Coordinator

Growing up in Los Angeles, it was always a dream of mine to pursue my academic interests at UCLA, especially in Earth Sciences. Whereas life took me in a different direction in pursuit of my geosciences degrees, it is with great pleasure that I have been able to join the Department of Earth, Planetary, and Space Sciences at UCLA as the Recruitment, Outreach, Diversity, Equity, and Inclusion (RODEI) Coordinator this past academic year. My research background is in paleobiology and stratigraphy and while these topics remain near and dear to me, I am equally if not more passionate about serving the academic community and providing mentorship and opportunities for students.

I come from a working-class background with immigrant parents with less than middle school educations, but I always knew I was going to dedicate my life to the sciences. Growing up in southeastern Los Angeles, however, I did not have the access to the resources to satiate my interest in science until I went to college. Many years and a couple graduate degrees later, I now hold the privilege to give back to students interested in understanding how the natural world and space works. In my position as RODEI coordinator at EPSS, I can leverage my experiences to reach out to local communities, K-12 schools, community college students, and current students at UCLA, with the goal of increasing the number of students in EPSS and have them reflect the demographics of our city.



Since my arrival to the department, I have attended numerous events and have connected with many educators and administrators within the UCLA community and around Los Angeles to meet with students, parents, produce educational and recruitment materials in multiple languages, and discuss ways to make the Earth and Space Sciences more inclusive and equitable. Among the events, schools, and organizations that I have worked with since joining EPSS (with the help of multiple students and staff at EPSS) include, Alhambra Unified School District, Barnhart School in Arcadia, Cal-Bridge Program, California State University, Fullerton Department of Geological Sciences, Ceres Elementary School in Whittier, Enabling Ethical Open Science for Past Global Change Research Coordination Network, Geological Society of America, Santa Monica College, Santiago Canyon College, Society for the Advancement of Chicano and Native American Students, Southern California Paleontological Society, UCLA Bruin Day, UCLA Division of Physical Sciences DEI Committee, UCLA Family Weekend, and UCLA Your Future Starts Here among others with plans to work with even more schools, organizations, and events during the new academic year!





Deep-sea submersible Alvin is lowered to the sea surface for its descent to the seafloor. The two swimmers on top of Alvin remove the deployment rope once the sub is in the water and are then picked up by the small, motorized boat, which is waiting in the back. Photo credit: Tina Treude



The UCLA team and collaborator Felix Janssen (AWI) in front of the deep-sea submersible Alvin. Top row left to right: Jiarui Liu, DJ Yousavich, DeMarcus Robinson, George Vetushko, Zoë Collins, Felix Janssen; bottom row left to right: Tina Treude, Kira Homola, Emily Klonicki. Photo Credit: Tania Anders

## By Professor Tina Treude

Diving with a deep-sea submersible such as Alvin is a dream come true for many marine scientists. End of June 2023, our group participated in two back-to-back marine research expeditions onboard the research vessel Atlantis (AT50\_11 and \_12), which hosts the famous deep-sea submersible Alvin. The total length of the two expeditions, supported by the National Science Foundation and organized by the Woods Hole Oceanographic Institution, was over five weeks and took us to two different types of marine environments off the coast of southern California.

The first expedition (AT50\_11) focused on microbial processes in the oxygen minimum zone of the Santa Barbara Basin. High productivity of plankton in the surface water and weak ventilation of the deep basin water triggers a strong decline of oxygen when bacteria feed on decaying planktonic biomass. The degradation of the organic material at the seafloor initiates a complex set of microbial and chemical processes, including the development of massive sulfur bacteria mats, which feed on hydrogen sulfide produced in the sediment. We are also interested to understand potential intensification and alter-

ation of the processes related to human impacts such as climate change. For our research, we descended to the seafloor (maximum depth around 590 m) with the submersible Alvin for the deployment of chambers to measure fluxes of chemicals (such as oxygen, nitrate, sulfide) into and out of the sediment. Further analytical support was provided by the cute autonomous underwater vehicle (AUV) Sentry, which completed several pre-programmed dives through the Santa Barbara Basin without a pilot to measure oxygen distribution and to monitor seafloor coverage of the sulfur bacteria mats. This NSF-funded expedition was a collaboration with the UC Santa Barbara (Dr. David Valentine), the Alfred Wegener Institute in Germany (Dr. Felix Janssen), and the Mt. San Antonio College (Dr. Tania Anders).

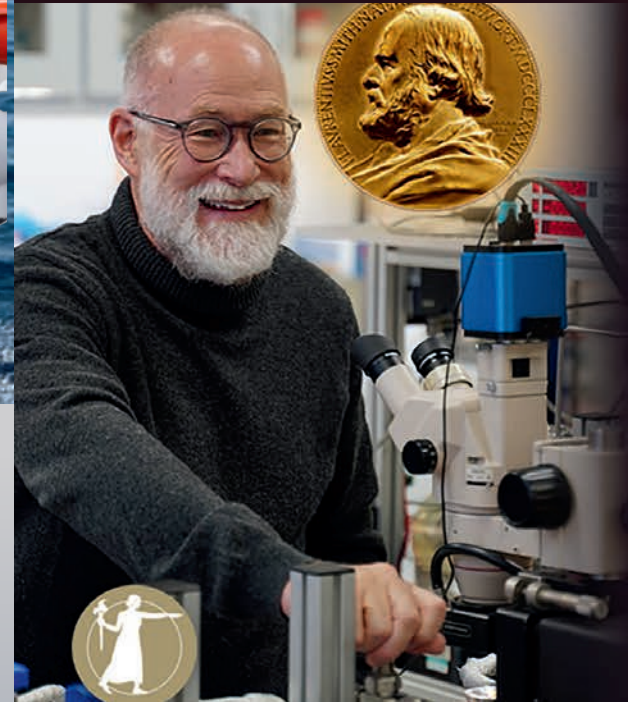
The second expedition (AT50\_12) aimed at cold seeps that release fossil methane from the seafloor. Cold seeps are found at many locations off the coast of southern California (Malibu, Santa Monica, Redondo Beach, Palos Verdes, San Pedro, Del Mar) and seepage is often facilitated through migration of methane along tectonic fault systems. The methane serves as an

energy and carbon source for many organisms and creates special cold seep communities. The seep ecosystem usually starts with microbes, who feed on the methane and provide biomass for other organisms higher up in the food chain. The overall aim of the project was to understand the connectivity between methane and organisms and the importance of cold seeps for the overall health of the deep-sea ecosystem. On our dives to the up to 1000 m deep methane seeps, we collected seep rocks (carbonates made from methane-derived carbon) and sediments to study methane-eating microbes and animals associated with this ecosystem. This NSF-funded expedition was a collaboration with the Scripps Institute of Oceanography (Dr. Lisa Levin), the Occidental College (Dr. Shana Goffredi) and Caltech (Dr. Victoria Orphan).

In May and June of 2024, our group got closer to Alvin's dive limit while exploring methane seeps off Kodiak Island (Alaska) at depths up to 5,500 m. Data gained during this future expedition will be compared to data from the shallower southern Californian seeps to study shifts in the relevance of methane for the ecosystems relative to water depth.

# Faculty Award Features

CONGRATULATIONS ON YOUR ACHIEVEMENTS!



## PROFESSOR EDWARD YOUNG

2024 J. Lawrence Smith Medal of the National Academy of Sciences

Congratulations to EPSS Professor Edward Young, who was chosen for the 2024 J. Lawrence Smith Medal, awarded by the National Academy of Sciences every 3 years for recent original and meritorious research on meteoric bodies.

Dr. Young's investigations have elucidated our understanding of oxygen isotopes in meteorites, evaporation and condensation in meteoritic materials, the origin of short-lived radionuclides in the solar nebula, and models for aqueous alteration processes in meteorite parent bodies. Dr. Young has helped us better understand the formation of the Earth-Moon system, terrestrial planets, white dwarfs, asteroids, and exoplanets. His interdisciplinary work includes aspects of atmospheric chemistry, geochemistry, meteoritics, and astronomy.

## PROFESSOR VASSILIS ANGELOPOULOS

NASA Outstanding Public Leadership Medal for 2024

Congratulations to Professor Vassilis Angelopoulos on receiving the NASA Outstanding Public Leadership Medal for 2024. The Agency Honor Awards are NASA's most prestigious form of recognition and are presented to individuals and teams who have distinguished themselves by making outstanding contributions to the Agency's mission. The Public Leadership Medal is awarded "in recognition of his outstanding leadership generating cutting edge Heliophysics research and educating, cultivating, and inspiring a new generation of heliophysicists."

Vassilis has been a professor in the UCLA Earth, Planetary and Space Sciences Department since 2007.

His primary research areas include waves and particle acceleration in Earth's magnetosphere, the response of the upper atmosphere and ionosphere to space currents (e.g. the aurora), and the solar wind's impact on the lunar environment. As Principal Investigator of NASA's THEMIS and ARTEMIS missions, he leads the operations of five satellites and over twenty ground-based observatories. He oversaw the development, successful launch, and operation of the two ELFIN CubeSats, in orbit from September 2018-2022. Since its inception, >400 undergraduates have been trained on ELFIN under his mentorship. Learn more about ELFIN here: <https://elfin.igpp.ucla.edu>





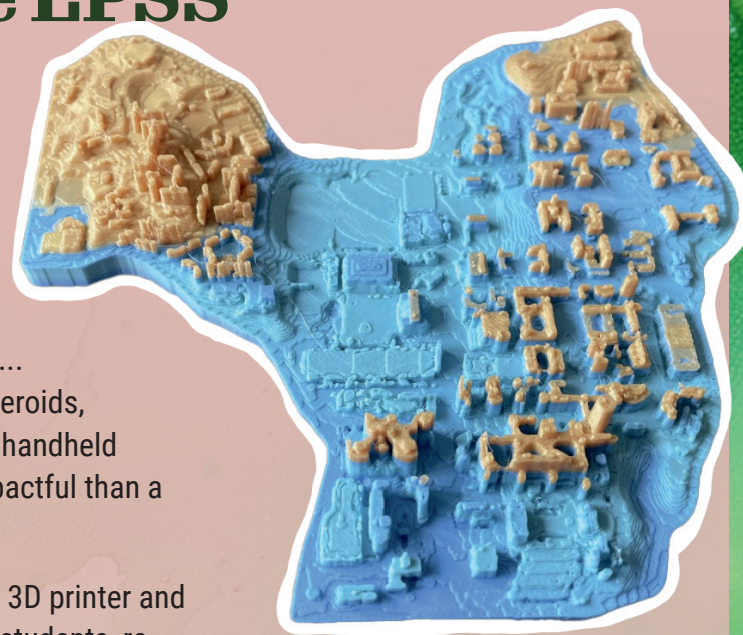
# “Make it so” with the EPSS Makerspace!

By Emmanuel Masongsong

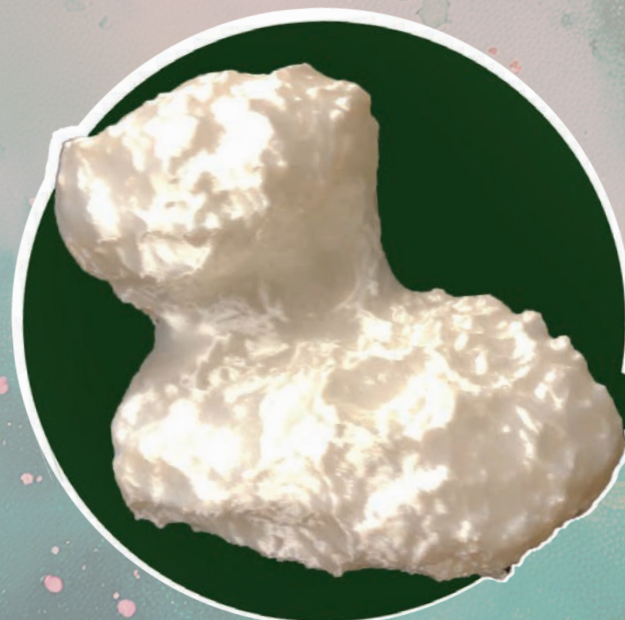
Imagine running an experiment for an impending conference deadline, when suddenly some equipment breaks and you start to panic... or you're preparing to go out into the field and you need a custom sample holder or adapter... or you're teaching a class about undersea formations, asteroids, landslides, or satellite instruments, and you realize that a handheld model would convey the concepts better and be more impactful than a photo. EPSS Makerspace to the rescue!

In Spring 2024, the Makerspace went live with a Bambu 3D printer and Glowforge laser cutting machine, accessible to any EPSS students, researchers, and staff willing to learn (with the required lab safety courses). Prof. Mackenzie Day even created an elective undergrad course to teach how to use the machines, which filled up immediately with eager students. “UCLA has been one of the most important things in my life for the past 4 years and I wanted a keepsake to commemorate my time here,” said undergrad Ian Fu. “With this campus model, I will always have something to look back on to remind me of all the good times I had at UCLA and in EPSS.”

There is also a powerful new PC workstation equipped with Solidworks CAD software for learning how to design parts, or customize existing models sourced from vast repositories online. Besides its practical use for experiments and education/outreach, the Makerspace will empower its users with “design thinking” to start noticing how many objects can be repaired or improved upon, while also preparing our students for future jobs where they can apply these valuable skills.



Digital Elevation Model of the UCLA campus and Hill from USGS Lidar Data (Credit: Ian Fu, model by Stanley Wei)



Comet 67P/Churyumov-Gerasimenko 3D printed with love and care at the Makerspace (Credit: BreeAnn Getman)



# Eclipse

By Professor Amy Mainzer

Prof. Amy Mainzer hosted the April 8, 2024 total solar eclipse at the Dallas Cotton Bowl Stadium for an audience of about 12,000 local schoolchildren, teachers, and families. Mainzer partnered with NOAA, NSF, NASA, PBS, University of Arizona, and production company Wind Dancer Films to raise the funds to host the event at the Cotton Bowl, which was in the path of totality. Mainzer worked with Wind Dancer Films on the PBS Kids TV show Ready Jet Go!, an animated series that teaches space and Earth science to kids ages 3-8. Mainzer serves as science advisor, executive producer, and on-camera host for the show's live action segments. The series features an extensive musical component with kid-friendly science-themed songs designed to teach kids about everything from Earth's seasons to black holes. Mainzer and Wind Dancer Films brought the Ready Jet Go! band to the Cotton Bowl for a live show to entertain and

educate local school kids about space science and the eclipse.

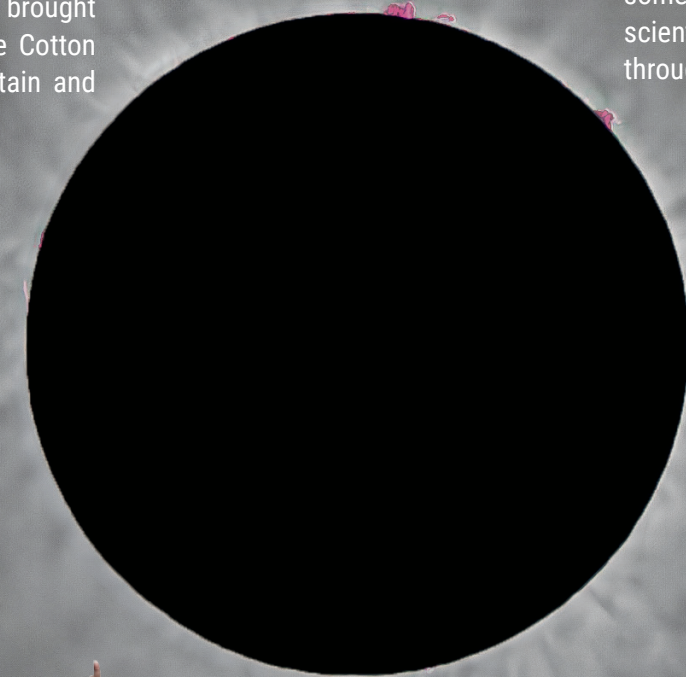
In addition, Mainzer invited special guest Dr. Neil DeGrasse Tyson to join the event and filmed an episode of his Star Talk Radio show in front of the live audience with Dr. Elsayed Talaat, the head of NOAA's space weather division. Mainzer and her graduate student Kiana McFadden answered students' questions about space and the eclipse, explaining what they could expect to see during this incredibly special experience.

In spite of uncertain and stormy weather, students and families were treated to an amazing sight when the clouds cleared about an hour before totality. Mainzer guided the crowd's viewing during the nearly four-minute-long totality.

As the sky plunged into darkness, students saw the Sun's corona, including magnificent hot-pink solar prominences and a spectacular view of the planets. Nearly every kid afterward had a huge smile on their face, and many came up to express how much they wanted to study space. Mainzer's favorite memory of the experience? “When totality began, this huge roar like an ocean wave started in the stadium – the kids were cheering and screaming and laughing, jumping up and down while they were glued to the sky. It's an amazing experience to see something so beautiful in the natural world with so many people. It was a great reason to come together.”

The next total solar eclipse to cross the United States won't occur until 2045. Hopefully the 2024 Cotton Bowl event will create a lifetime of science fans, some of whom might become planetary scientists guiding students of their own through the 2045 eclipse.

Eclipse Photo Credit: Christine Gabrielse Lin, EPSS PhD '14





# Methane, Microbes, and Mud Volcanoes

By Jiarui Liu

Jiarui Liu, 5th year EPSS PhD student in the labs of Dr. Tina Treude and Dr. Edward Young, recently revealed that microbes produce more methane in petroleum reservoirs. Jiarui's paper "Clumped isotope evidence for microbial alteration of thermogenic methane in terrestrial mud volcanoes" was published and featured on GEOLOGY's January 2024 issue cover.

Methane is the main constituent of natural gas and an important greenhouse gas. It is dominantly generated by microorganisms at low temperatures and through the breakdown of organic molecules at high temperatures. Methane accumulations in petroleum reservoirs primarily originate from thermogenic sources in sedimentary basins. Approximately half of the world's existing oil has undergone biodegradation, a process in which microorgan-

isms break down heavy hydrocarbon to produce additional methane. However, the scale of biodegradation in global petroleum accumulations and the significance of its terminal product, secondary microbial methane, in the global gas endowment and carbon cycle remain largely unknown.

Mud volcanoes stand out as unique geological features through which natural gas from underground reservoirs reaches the atmosphere. They offer a convenient means to obtain geological information from the depths of petroleum reservoirs. The most active terrestrial area with the highest number of mud volcanoes is eastern Azerbaijan, an oil and gas-condensate country located on the west coast of the Caspian Sea. Known as "the Land of Fire" for its ancient burning oil and gas seeps, it is generally considered the first oil-producing country in the world. In 1847, Azerbaijan became the site of the world's first industrially drilled oil well, and by 1899, it produced half of the volume of the world's oil.

Jiarui Liu visited Azerbaijan in the summer of 2019, right before the start of his PhD program. He joined a local team of geologists in the field and sam-

pled gas and liquid from 13 mud volcanoes across eastern Azerbaijan. Under the guidance of Dr. Tina Treude and Dr. Edward Young, he analyzed the chemical and isotopic compositions of the samples. In particular, the team unitized UCLA's Panorama high-mass-resolution gas-source mass spectrometer to quantify the abundance of "clumped" isotopologues of methane gas.

This novel tool aided the team in deciphering the origin of methane and the evolution of natural gases emitted from mud volcanoes. They discovered that the methane emitted into the atmosphere was predominantly a result of the microbial degradation of petroleum rather than the abiotic breakdown of organic molecules at high temperatures. During petroleum biodegradation, hydrocarbons are converted to methane, potentially significantly increasing methane emissions into the atmosphere. Therefore, it is crucial to consider the role of secondary microbial methane in biological contributions to global methane budgets. Overall, this approach offers a unique perspective for tracking the fate of methane in oil and gas reservoirs. Read more about Jiarui's research at the link provided below.

Local geologists Orhan Abbasov and Elnur Baloglanov measuring temperature of liquid mud. Credit: Jiarui Liu  
Aerial view of Toragay mud volcano, Azerbaijan. Toragay mud volcano is one of the largest terrestrial mud volcanoes in the world with a height of 400 meters. Instead of erupting lava as seen in typical volcanoes, mud volcanoes release a mixture of sediments, water and gases, acting as an important source of greenhouse gas methane to the atmosphere. Credit: Orhan Abbasov

# ELFIN Student Team Wins NASA TechLeap Prize

By Emmanuel Masongsong

Finding the right cable to connect your devices can be frustrating. You could use a USB-C cable or an HDMI cable... and sometimes even if it plugs in, it won't charge properly or transfer data correctly! Space agencies and aerospace companies often experience this same challenge when they need to interface their flight vehicles with scientific payloads, which often come from different research institutions. Linking unique payloads with unique satellites is often a point for failure and requires a lot of time and resources to implement correctly, so many organizations are interested in developing a universal method that works for every situation.

To solve this problem, NASA recently announced that a group of UCLA undergraduate students are one of three finalists in their TechLeap competition to design a universal interface to support payload integration onto various commercial suborbital vehicles, orbital platforms, and planetary landers. In addition to the initial \$200k prize, there is potential for future funding and support from NASA to help accelerate the maturation of teams' technologies.

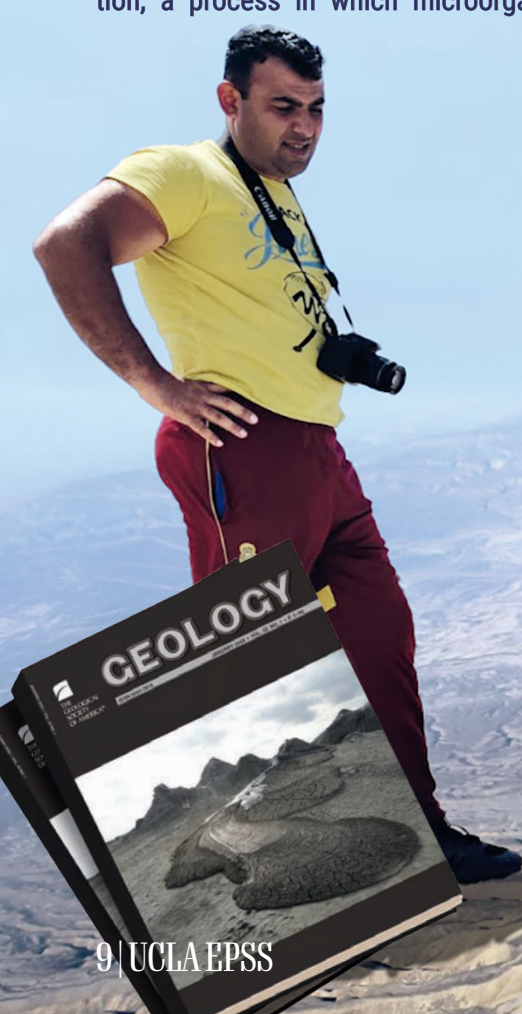
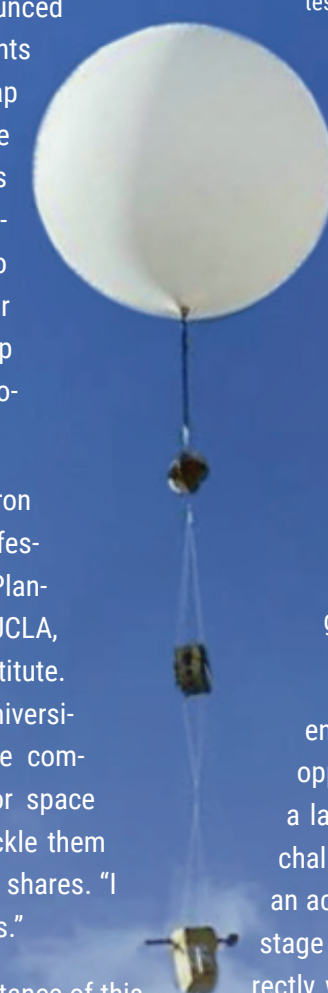
These students are part of the ELFIN (Electron Losses and Fields Investigation) team in Professor Vassilis Angelopoulos's lab in the Earth, Planetary, and Space Sciences Department at UCLA, which is also affiliated with the UCLA SPACE Institute. ELFIN faced off against dozens of other universities, research centers, and even aerospace companies. "They seek challenges fit for major space hardware providers in industry, and they tackle them with ingenuity and rigor," Prof. Angelopoulos shares. "I couldn't be prouder of their accomplishments."

Team Lead Sophie Ye describes the importance of this project, "It's very exciting to work on a project that will be able to simplify spaceflight for others --- satellites are already such a complex domain, and it's hard enough engineering a payload to survive the journey, never mind worrying about how

it'll interface with flight vehicles." By designing a universal interface system, Ye and her colleagues are streamlining the process for everyone from high school students working on a CubeSat to researchers designing scientific instruments. "A good design would cut out a lot of redundant engineering work since it is customizable and can be used universally," said Electrical Lead Naomi Weiss. This project not only simplifies the process of spacecraft integration for everyone, but makes the entire process more accessible for groups who are still building their expertise.

The next step in the challenge is working with NASA engineers to build and test the students' design. This opportunity will allow them to refine their design at a larger scale and, pending successful completion of challenge milestones, potentially fly their technology on an actual flight test. "I'm excited to move onto the next stage of the TechLeap challenge, where we can work directly with NASA to build and improve our design," says Software Lead Aiden Szeto. Furthermore, the connections and experience these undergraduate students develop are invaluable as they enter the next phase of this project and their careers.

A board prototype named "Gertie" that interfaced with multiple sensors, test-flown with the NASA Eclipse Balloon Program in October 2023. The 2023-2024 ELFIN student team, representing a diverse array of backgrounds and skillsets. Photo credit: Ethan Tsai, EPSS





# Dave Jackson's Art Donation

By Tessa Holzmann

Seven pieces of artwork by Teresa Derdiarian now hang on the first floor of the Geology building in honor of Emeritus Professor David Jackson, donated by his daughter Kelly Rojas. These paintings symbolize his love for California's nature and geology. This love powered Professor Jackson's career, and led him to participate in founding the Institute for the Environment and Sustainability at UCLA (IOES) and serve on the curriculum panel which created the interdisciplinary Environmental Sciences major.

During his 54 years at UCLA, Professor Jackson rose to a position of international distinction for his research in natural hazard risk utilizing careful statistical approaches. Professor Jackson was passionate about education, and his contributions to the Department leave us a legacy of intellectual rigor, dedicated energy, and human warmth which will be a model for the next generation. Read Dave's In Memoriam by Emeritus Professor Paul Davis here. See right for Dave Jackson's artwork.



## Out with the Old In with the New

By Ivory Morales



Change is necessary to access new landscapes, as we folks in the EPSS department know well. The same rhetoric stands as we wave a solemn goodbye to our

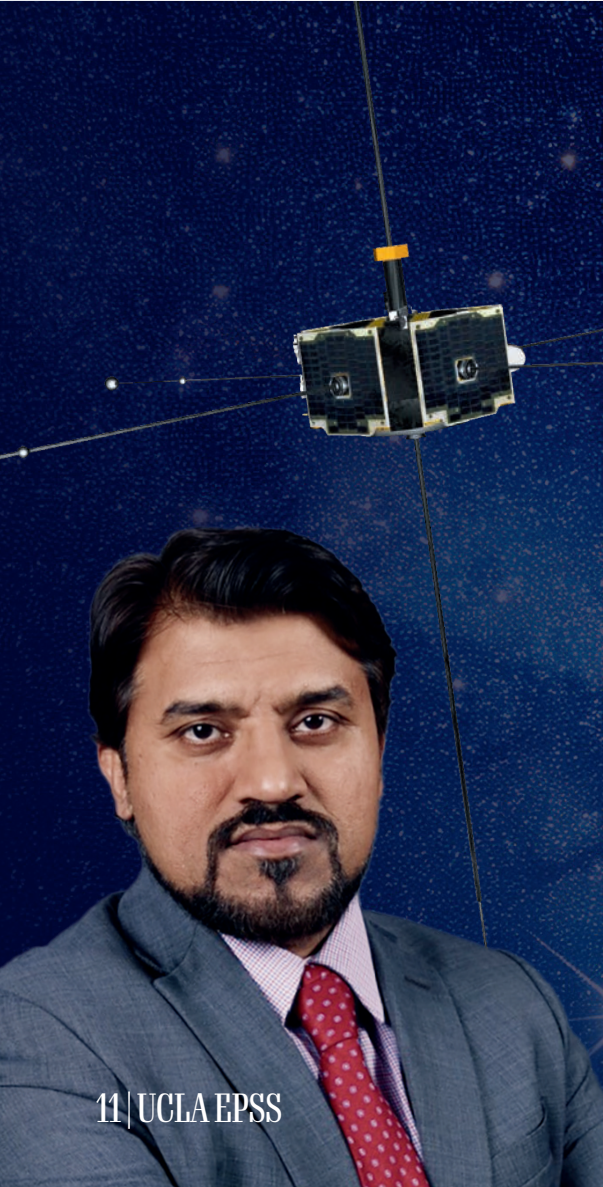
trusty 2011 Chevrolet Silverado 2500 HD 4X4, Ext Cab, which has dutifully served us. Our field vehicles play a pivotal role in facilitating year-round field programs, field trips, and conducting essential data-gathering activities for geologically focused research. It is imperative that these vehicles can safely transport our students, staff, and researchers in environments from the depths of basins to the summits of mountains.

Therefore, we are thrilled to introduce our new 2024 Chevrolet Silverado 2500 HD 4X4, Crew Cab outfitted with a camper shell. Our new addition has already traversed the Nopah Range twice (near Pahrump, NV), Bishop, and the Lava Beds National Park near the Oregon Border. It even lent a hand at the EPSSSO picnic in June. Fully fueled, cleaned, and having undergone its initial oil change, the vehicle is all set for the EPS SCI 121F Summer Field class. As a true crew cab, it is slightly larger than its predecessor, offering the promise of enhanced comfort and safety. We extend our heartfelt appreciation to building manager Eric Wessenauer for diligently maintaining all EPSS vehicles, swift help from Tom Poveromo, the Fleet Acquisition specialist, as well as all those who helped fund this necessary trade. Happy exploring to our future Silverado adventurers!

## Dr. Bashir Wins Basu Innovation Award

Dr. Muhammad Fraz Bashir, an Assistant Researcher in Prof. Vassilis Angelopoulos' group within the Department of Earth, Planetary, and Space Sciences, has been honored with the Basu Innovation Scholar Award for the year 2022-23 by the American Geophysical Union (AGU). This prestigious award is given annually to an early-career scientist who has made significant contributions to the fields of space physics and aeronomy through innovative methods of observation and interpretation.

Dr. Bashir's groundbreaking work in experimental space physics, particularly his innovative approaches using data-theory-simulation hybrid models of near-Earth dynamics, combined with ground-based and spacecraft data (especially UCLA's missions THEMIS and ELFEN), has provided profound insights into the complex wave-particle interactions within Earth's atmosphere, enhancing our understanding of space weather and its impacts. "I am deeply honored to receive the Basu Innovation Scholar Award. This recognition inspires me to continue exploring new frontiers in space physics and contribute to our understanding of the universe. I am grateful to my colleagues and mentors, especially Prof. Vassilis Angelopoulos and Dr. Anton Artemyev, for their continuous support and encouragement."





# T. Mark Harrison & Kevin McKeegan Retirement Event

By Kevin McKeegan

About 100 former students, postdocs, colleagues, friends, and family gathered at the faculty center to celebrate the careers of Mark Harrison and Kevin McKeegan and to offer well wishes for their retirement years. Chair Lithgow-Bertelloni welcomed guests from four continents to a symposium featuring overview talks by leading scientists in fields ranging from Solar System Origins to Early Earth & Life, followed by state-of-the-art reviews of Secondary Ion Mass Spectrometry (SIMS) and Thermochronology. EPSS alumni Profs. Marty Grove (Stanford) and Paul Kapp (Arizona) concluded the formal program with a review of the Harrison group's contributions to the study of Tectonics, especially with regard to east Asia and the Himalaya, which fittingly included a poignant tribute to the late Professor An Yin. His beaming smile was sorely missed but his presence was certainly felt by all at the gathering.

The scientific discussions concluded with reminiscences by the "old-guys." Harrison had recruited McKeegan to come to UCLA 33 years prior as technical "specialist" to help set up the new SIMS (ion microprobe) laboratory. With primary funding from the Keck Foundation and UCLA, Harrison, together with co-I's Prof. Mary

Reid and McKeegan, established NSF's National Ion Microprobe facility to provide access for in situ isotopic microanalysis to the broad geoscience community. In the now 3 decades of facility operation, well over 400 scientists and students have utilized the instrument resulting in significant impact in earth and planetary sciences with around 600 peer-reviewed articles and ~100 theses having been published to date. The final remarks allowed Harrison and McKeegan opportunity to thank their talented students and postdocs for their hard work enabling the group's successes. A convivial dinner followed and naturally led into the expected roasts with much ensuing laughter. Some highlights included character photos from legendary Halloween parties and the return (after 20 years) of a large piece of the original ion probe by former postdoc and now JPL Director, Laurie Leshin.

Although formally retired, Harrison and McKeegan are still scientifically active, and the SIMS lab continues as an NSF Facility. McKeegan now spends most of his time in the PNW and Harrison is often aloft, piloting his airplane between coasts.



At a family wedding, Harrison and McKeegan share thoughts about matters deeper than even zircon geochronology.

## How to Study Water on the Moon



By Rita Aksenfeld

Humanity is going back to the Moon. Water is crucial for life, so several key questions for future lunar expeditions revolve around lunar water: where is it located, how much is there, and how did it get there? Answers to these questions would inform us about the formation of the Earth-Moon system, which is a critical event that set the initial stage for the planet we all live on.

UCLA Earth, Planetary, and Space Sciences Professor Hao Cao and his team work on creating new technologies that measure magnetic fields to answer these questions. Different materials inside a planet or moon would respond to magnetic field disturbances differently. Even deep beneath the surface, water bound in rocks would alter the slowly time-varying magnetic field enough that a sensitive magnetic field measuring device – a magnetometer on the Moon's surface – could detect its presence. Magnetometers are a tried-and-true technology, and UCLA's Magnetometer (MAG) lab has continuously developed and delivered these space-grade instruments to NASA since 1965.

However, when it comes to using a magnetometer to look for water on the moon, there are some challenges unique to the lunar surface. The primary challenge lunar instruments face is withstanding the extreme heat and cold of the lunar surface – from 250°F (121°C) during the lunar day to -369°F

(-223°C) during the lunar night according to the Diviner instrument onboard the Lunar Reconnaissance Orbiter. "These huge temperature variations pose a great challenge for making highly accurate measurements," explains Cao. "Just for the instrument to survive and operate on the surface of the moon during such huge temperature swings is challenging."

To address these obstacles, Professor Cao works with a range of experts within UCLA. The continuity of training and expertise of members of the MAG lab make it uniquely suited to develop complex instrumentation for use by NASA and commercial space partners. Recently, NASA awarded Cao and his team a three-year, \$3-million Development and Advancement of Lunar Instrumentation (DALI) grant to design, build, and test a sensitive magnetometer that is durable enough to withstand the harsh lunar environment.

Cao's solution for withstanding the challenging conditions on the lunar surface is to heat and cool the instrument to constant set points so the extreme temperature fluctuations don't affect the data being collected. This active temperature control poses two problems – background noise from the heater and limited energy availability. As a solution, Cao and his colleagues are designing "magnetically clean heaters" and thermal insulation solutions. Cao explains the magnetically clean heaters work by restricting their own minimized background noise to "a completely different frequency than the signal we're trying to measure so that there's no interference between the two." This innovative strategy would allow the magnetometer to run continuously during temperature changes so it could record more precise measurements than previously possible. By using a magnetically clean heater instead of a conventional one, the heater could be housed within the magnetometer itself. This will "significantly drop the power requirements and make the entire system more compact," states Cao.

Magnetically clean heaters are one of the key innovations that make the rest of the instrumentation possible. This new technology has many scientific applications beyond magnetometers. It would allow for non-interfering temperature control of many types of experiments in fields as diverse as environmental science and materials chemistry. By harnessing the technology and expertise developed over decades of space exploration, Cao and UCLA are developing more efficient new technologies for future scientific endeavors.



# Department Farewells

## Krishan Khurana

39 years, Researcher

By Professor Margy Kivelson

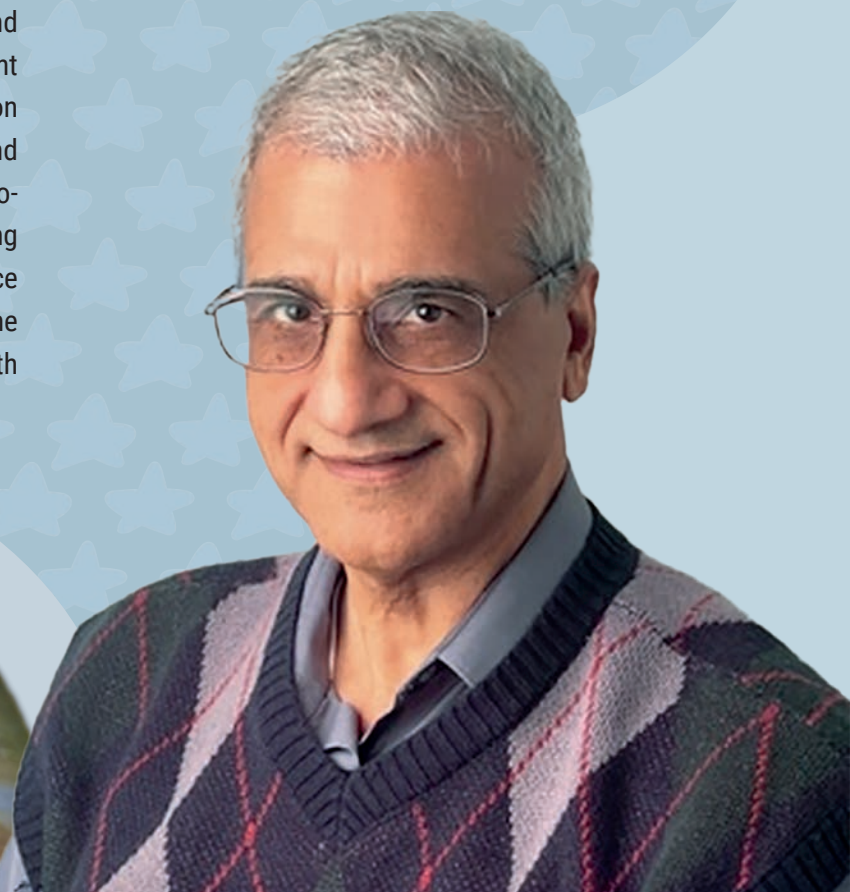
Krishan loves his work, his daily opportunity to carry out challenging and valuable research, to interact with his colleagues, to share his deep and extensive knowledge of geophysics with students, postdocs, and colleagues in the department, and to learn and teach. Oh, and to go out for coffee with his buddies.

Krishan is widely known and highly valued by colleagues all over the world. He is a Fellow of the American Geophysical Union, a now emeritus Editor of the major planetary journal, *Icarus*, and an Editor of numerous special volumes including a book on Europa. He served on the Steering Committee for the most recent National Academy Decadal Survey on Planetary Science and Astrobiology, a role in which he participated in developing a roadmap for planetary studies that will shape the field for the next decade and beyond.

Krishan's retirement gives us good reason to look both backward and forward. Let's start in 1985 when I was looking for a postdoc to work on the Galileo magnetometer and support its calibration, its integration with the spacecraft and its science-planning. One applicant stood out, an applicant bringing not one but two, Ph.D. degrees, one in exploration geophysics from Osmania University in India and a second from Durham University in the UK where he modeled magnetohydrodynamic fields and flows in a planetary interior, working closely with Raymond Hide. He had no experience with space physics, but I sure was right to take a chance on someone who was so clearly focused on learning. Krishan arrived with

his lovely wife, Amber, and soon became not only a valued colleague but he and Amber became my good friends. I should continue telling you about all of his truly essential contributions to spacecraft missions such as Galileo, Cassini, Themis, Europa Clipper, Juice and numerous proposed missions to study moons, planets, and plasma interactions, but you get the idea. He has introduced powerful new tools for in-flight calibration of magnetometers and showed how small magnetic variations at the orbital period of a moon can probe interior structures rigorously.

When not thinking deeply about geophysics, he finds the time to keep up with the latest developments on the political and international stage while being able to hold forth on the virtues of his Tesla, the latest developments in India, and the best restaurants in Italy. Krishan is one of the main reasons that I drive to UCLA many days each week. I value my "Krishan fix" as a high point of the day and I am ever so glad that he is planning to hang around.



## Elyse Chou

32 years, Financial Manager

By Jim Nakatsuka

Elyse has had a remarkable career working her way up from a records assistant in Electrical Engineering to our Business Office Manager in EPSS. She has experienced almost all aspects related to financial duties at UCLA: purchasing, travel, recharges, payroll projections, proposal preparation, and fund management.

Even though we started working around the same time on similar tasks with only a short hallway separating us, I didn't really interact with Elyse until the late 1990's. As many of you know she is pretty intense when it comes to finances...even in those early days. I was a little intimidated, but I built up my courage and started interacting with her and she wasn't really that scary. Of course, she was a fount of knowledge.

Elyse's quiet and steady leadership helped to keep a stable front office staff. She was a mentor to me and a host of other purchasing/travel specialists and fund managers in EPSS, providing training and frequent counsel. She even taught

students and academics how to submit purchase orders, travel reimbursements, and crucially, how to submit successful proposals.

In Fall 2006 Elyse took a job as Senior Fund Manager in the Institute of the Environment, and we were a little distressed to lose her expertise. For ten months we got by and then in July 2007 we were excited to hear she would return to be our Business Office Manager. We would not let her leave again!

Elyse's dedication to the department was acknowledged with multiple STAR awards for exceptional performance and consistently going above and beyond the call to duty, as well as creativity, organizational abilities, teamwork and work success. She certainly deserved these recognitions by contributing to the success of the department.

On a personal note, during the pandemic we had weekly team meetings and I was surprised to learn a few things about Elyse. She liked to dress nicely and so she liked coming into the office even during the pandemic. Going along with this Elyse also likes to window shop looking at new fashion trends. She likes K-drama and was happy to discuss episodes with other staff who watched these. And finally, she likes to cook. Many times she would mention that when her son was down for a visit she would cook up all his favorite things. Elyse deserves to enjoy her retirement, but maybe if we're lucky, in order to fulfill that desire to dress nicely, we might entice her to come back on recall.



**"Thank you for being part of my life, You are like my friends and family. I will miss working with you and walking with you around the campus during lunch time. Now that I am retired, I am planning to visit my mom in Taiwan and enjoy my hobby - building miniature houses."**

- Elyse Chou



# Xinping Liu

29 years, Programmer/Analysis

I cherished the experience of being part of exciting space physics mission projects for three decades. Beginning with writing computer software to decode and process magnetometer data for POLAR, I gained a deep understanding of data processing within NASA missions. These fundamentals were later applied to the STEREO data processing project. Among all the projects, the most exciting and challenging was supporting the DAWN mission's instrument command validation and review for uplink, along with building instrument playback. I had the rare opportunity to delve into the uplink side of a space mission, which significantly expanded my professional development. There was nothing more rewarding than witnessing those stunning images of Vesta and Ceres—results of our hard work—arriving from space. I am deeply grateful to Prof. Christopher Russell and Dr. Steve Joy for their years of guidance and the opportunities they provided. I also greatly appreciate the experiences shared with colleagues, whether through collaboration or casual conversations. All of these interactions, to a certain degree, have shaped my outlook on life and contributed to my personal growth. I wish you all continued success and will be thinking of you from time to time.



# Mark Sharlow

27 years, Programmer/Analysis

By Steve Joy

Mark Sharlow retired from EPSS on Jan 1, 2024 after working in the Space Sciences group for more than 25 years. Mark received his PhD in Chemistry back in the late 90's and occasionally worked with Ray Walker's Planetary Data System group during the summers while completing his degree. When Mark graduated he was unable to find a chemistry position locally and was unable to relocate due to caring for sick parents. The PDS Planetary Plasma Interactions (PDS/PPI) group hired him and he continued to work with the group until he retired. He was an excellent son and cared for his parents and an uncle until their passings over the next decade or so. Mark was the inner planets expert for PDS/PPI and was responsible for the fields and particles data archive for Mercury MESSENGER, Lunar Prospector, Lunar Reconnaissance Orbiter, Mars Global Surveyor, Mars Odyssey, Mars Express, and helped with the Mars MAVEN missions. Mark was an excellent archivist and he's already missed by the PDS/PPI group.

# Magnetic Connections: UNAM, Caltech, & UCLA

By Professor Paul Davis



In April 2024, a donation of 40 UCLA/Caltech broadband seismic stations left the loading dock at UCLA in a truck on their way to Mexico City where they will be used by a former UCLA student, Luis "Antonio" Dominguez, to study volcanic and seismic phenomena. The donation represents the culmination of a 20-year collaboration.

In 2005 UCLA and Caltech collaborated with seismologists at UNAM (Universidad Nacional Autónoma de México) to install 100 seismic stations along a line running from Acapulco through Mexico City to Tampico on the Gulf coast of Mexico (The MASE array: Middle America Seismic Experiment). Allen Husker was the UCLA graduate student in charge of installing the 50 UCLA stations, setting up radio links between them that transmitted the data via Wi-Fi to internet hubs and back to UCLA. He was assisted by Antonio who volunteered while a student in Electrical Engineering at UNAM. After completing his PhD, Allen was appointed at UNAM as a professor, later becoming chair of the seismology group before accepting a research professorship at Caltech. Antonio, having enjoyed seismic fieldwork, decided to apply for graduate studies at UCLA. After completing his PhD in EPSS, he was appointed professor at the Morales Campus of UNAM, and then as research professor at UNAM in Mexico City, the position he now holds.

The radio-linked array was part of a collaboration between UCLA Computer Science, Engineering, and the EPSS departments in a Science and Technology Center, Center for Embedded Network Systems (CENS), led by Deborah Estrin, that developed the Wi-Fi links and associated software to multi-hop the data between stations and via the web. The radio links were assembled by another former UCLA PhD student Igor Stubailo, now at Caltech, who also extensively participated in the field deployment in Mexico. The Mexico experiment was followed by a line of radio-linked stations in Peru from the coast near Arequipa across the Andes to near Lake Titicaca and by a second array in Mexico in the southeast states of Veracruz and Oaxaca.

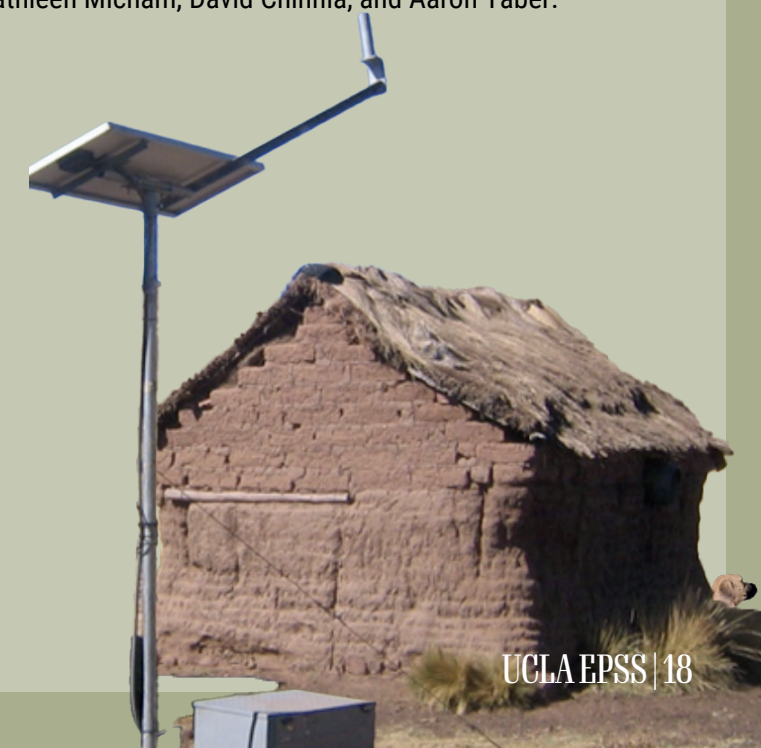
One of the results of the Mexico experiment was the discovery that the subducting slab beneath Mexico City runs flat along the base of the crust before descending into the mantle. This feature explains the spatial distribution of the earthquakes and the locations of active volcanoes such as Popo-

catepetl. But either side of the subduction zones have normal dip. Antonio plans to examine the transition to the West in Michoacan by installing stations along the third trench-parallel profile to fully characterize the shape of the subducting slab. But this requires more instrumentation than he has. Now a subset of the seismic stations is making their way back to Mexico.

Forty of the broadband seismic stations from the UCLA-Caltech portable network have been donated to UNAM. The selection of these forty instruments was overseen by Emeritus Professors Clayton (Caltech) and Davis (UCLA), who identified the best stations from the 100-station array. The donation required multiple approvals including UCLA's permission to donate, UNAM's Agreement to fund shipping and customs, and certification that the stations would not be used for military purposes. The equipment has now safely arrived and Antonio has begun his installation program. In a recent email Antonio writes:

*"In the past years we were struggling due to the lack of instruments, so we are very excited to have the MASE instruments again."*

On behalf of Antonio we thank the many at UCLA who helped to make this transfer possible: Carolina Lithgow-Berteltoni, Miguel García-Garibay, Eric Wessenauer, Carlene Brown, Kathleen Micham, David Chinnia, and Aaron Taber.





# In Memoriam: Distinguished Professor An Yin

By Professor Mark Harrison

Professor An Yin, Distinguished Professor of Earth, Planetary, and Space Sciences, passed away suddenly on July 12, 2023 while instructing undergraduate field camp in the White Mountains of eastern California. He is survived by wife Sandy and children Daniel and Hanah. An had a luminous and jocular persona beneath which lay an extraordinarily incisive and original mind.

Born in Harbin, Manchuria, in 1959 during the Great Chinese Famine, he was originally named Jisheng, or "helped by others," in recognition of a neighbor's prenatal supplements to his mother's meager rations. The state subsequently demanded that his name be changed. An grew up during the Cultural Revolution, which provided him with both a social model to react against and the motivation to pursue a career in science.

Indeed, his openness to new ideas and resistance to groupthink coupled with his remarkable intellect made him one of the great geologists of his gener-

ation. After excelling in the nationwide university entrance exam, An studied Geomechanics at Beijing University. He graduated in 1982 and joined the M.S. program in structural geology at the University of Southern California. His promise was quickly recognized by Prof. Gregory Davis and he was advanced to the Ph.D. program under Greg's supervision. Before graduating he was offered a tenure-track faculty position in what is now the Department of Earth, Planetary and Space Sciences at the University of California, Los Angeles where he remained for the rest of his career.

Initially appointed in 1987 as Acting Assistant Professor pending his Ph.D. defense, by 1996 he had ascended to Full Professor and was made Distinguished Professor last year. He shared a joint appointment with the Institute of Geophysics and Planetary Physics from 1995 to 2011.

Professor Yin made profound contributions to understanding how planetary lithospheres form and deform by

integrating an unusually broad range of geological and geophysical observations into rigorous interpretations of heretofore unexplained features. He began his career applying elasticity theory to the formation of low-angle faults before migrating to the Indo-Asian collision zone where he developed the tectonic reconstruction for the continent that has been the starting point of research there for over a quarter century.

He took advantage of the opening of Tibet to undertake a vast range of studies that discovered a multitude of geologic and tectonic phenomena, establishing him as the single greatest authority on the Indo-Asian collision. While the principal scientific focus on that continental collision zone has been the dramatic Tibetan and Himalayan topography, its distal effects have resulted in far more earthquake-related deaths.

Returning to his former home of Tianjin, An documented a 160-km-long seismic gap that has not ruptured in

over 8,000 years and is capable of generating a similar magnitude quake to that in nearby Tangshan that killed more than a quarter million people. Upon the recognition of slow earthquakes, he developed a diffusion-induced pressure-wave model that, for the first time, relates slow earthquakes to tectonic tremor propagation.

Over the past decade, he investigated extraterrestrial tectonic processes leading to the provocative proposal that Mars had once experienced localized plate tectonics and explaining the origin of the tiger-stripe fractures on Saturn's moon Enceladus. His scientific influence is documented by both the citation metrics (>38,000 citations; H = 83) of his 200+ published papers and award of the highest honors in the field, including the Penrose and Donath medals of the Geological Society of America.

Equal to his remarkable record of research contributions is Professor Yin's role as supervisor of nearly 40 graduate theses, undertaken by a remarkably diverse range of students. Eleven of them have gone on to professorships (mostly at R1 universities) and one of his PhD graduates is a NASA astronaut selected to the Artemis lunar lander team. An was a mesmerizing and inspirational undergraduate teacher and the backbone of the UCLA field research curriculum for over 30 years.

He was unstintingly generous in support of his scientific community through numerous editorships and organization of international activities. His meteoric ascent to tectonics stardom made him a global magnet for young scientists from emerging nations. Over 40 visiting scholars from China, India, Taiwan, Mongolia, Turkey, and Iran came to

UCLA to learn from the master and left as apostles of An's credo (borrowed from a TV commercial): "Just do it!" That is, no excuses; just hard work, astringent logic, and a skepticism of intellectual authority.

Beneath An's jovial and rational exterior was a deeply emotional and ardent human being who wore the love of his children and geology on his sleeve. He was reflexively impatient with diktat and many a university administrator have glimpsed the side of him forged in the chaos of the Cultural Revolution. The sudden loss of this intellectual giant will be felt acutely across the geologic world mitigated only by the model he left us of how the combination of intellectual rigor, originality, and passion can lead to new insights into how planets work.





## Memorial Event Honoring the Life and Science of Professor An Yin

By Professor Mark Harrison

A memorial event honoring the life and scientific legacy of Professor An Yin, who passed away suddenly on July 12, 2023 while instructing undergraduate field camp in the White Mountains, was held at the UCLA Faculty Center on September 23rd, 2023. Six speakers reviewed the breadth of An's research across the globe and into the deep reaches of the solar system. Mike Murphy (University of Houston) spoke of An's work in Tibet emphasizing its remarkable geographic coverage, Alex Webb (University of Hong Kong) described how An revolutionized Himalayan tectonics by proposing that the world's highest normal fault is actually a passive roof thrust, Marty Grove (Stanford) reviewed An's contributions to Cordilleran Tectonics, Jean-Phillipe Avouac (Caltech) laid out the evolution of An's increasingly sophisticated tectonic modeling efforts, Andrew Zuza (University of Nevada)

described how An's work in Southern Africa led him to think about Earth's early tectonic evolution, and Bethany Ehlmann (Caltech) reviewed An's work beyond "our pale blue dot", including reinterpretations of martian tectonics and the 'tiger stripes' of Enceladus.

A recurrent theme in these talks was how An's systematic approach to science always began with an acute observation which then led to an internally consistent model explaining the phenomenon, and climaxed in an experimentally or theoretically derived model that demonstrated the physical plausibility of his interpretation.

Ding Lin (Chinese Academy of Sciences) then spoke via Zoom of An's extraordinary impact on the Chinese geoscience community, including his extensive mentoring of young Chinese scientists and the impact that his talks had on the thousands of students who flocked to hear him. Jessica Watkins

(NASA) spoke of how An's attraction to big ideas – both geologically and in life – allowed him to confidently predict that she would realize her dream of becoming an astronaut, even when she doubted the prospect herself.

As the audience mingled during the brief break, an oft made remark was: "I had no idea he did so many different things." Following the break over a dozen family, friends and colleagues spoke of personal reminiscences culminating in a powerful and heartwarming talk by Ray Yin describing childhood memories of his beloved older brother. An's widow, Sandy, then spoke of his roles as husband and dedicated father. Carolina Lithgow-Bertelloni concluded the proceedings by relating a comment from one of the students attending field camp that epitomized An's influence: "From now on, I have changed the way I do my science."

## Remembering An Yin

An's impact on the geological community is hard to put into words. His contributions to advancing science were vast, including his decades of research on the tectonics of Asia and western North America. He was a big thinker with a huge smile, and we will always remember his zeal for generating and exploring new—and sometimes controversial—ideas.

An deeply valued mapping-based and curiosity-driven research and instilled these passions in his students as well. While always there for guidance, he encouraged us to think and work independently, building our skills and confidence as future contributors to the field of geosciences. He showed us how we could do better science—and be better people—through building collaborative teams.

An was a master coach in so many ways, with a true knack for bringing and mixing people together and making magic happen. We will always remember his "Yin" isms and many sayings that not only motivated us to be the best we could, but also made us laugh and remember the value in being good people. An's unending enthusiasm, boundless creativity, and positive influence on his students and colleagues were remarkable. He is deeply missed.

*Eric Cowgill, Peter Haproff, Paul Kapp, Mike Murphy, Alex Robinson, Mike Taylor, Alex Webb, Andrew Zuza*

An was a father figure and a role model for me, diligent and enthusiastic about science, full of creative off-mainstream ideas.

*Hanzhang Chen*

What a marvelous person An was to be around. His boundless enthusiasm, keen intellect, generous nature, and love for science, his work, and his students were a wonder to behold. I remember being so glad when he took an interest in Enceladus.

*Carolyn Porco, JPL*



# Clarence Albert Hall, Jr. Geologist, Professor, Dean

By Lauri Holbrook (Mrs. Clarence Hall; UCLA B.S. Geology 1984)  
Edits by EPSS Professors Emeriti Peter Bird and Ray Ingersoll

UCLA Professor and Dean Emeritus Clarence Albert Hall, Jr. (January 5, 1930 – August 20, 2023) was a true southern California native. Born and raised in Glendale, California, amidst the oak and sycamore woodlands of East Glenoaks Canyon, with a running creek and wildlife including fox, coyote, bobcat, mountain lion and bear. Clarence's father worked in the movie industry, while his mother developed the roles of helping with drives to collect materials for use by the war-time industries, and walking the local streets to remind residents to keep all lights off when air raid sirens were heard. By the end of the war, as a teen and an Eagle Scout, he had developed a

great fascination for chemistry, which his parents fostered including the approved use of the entire bedroom closet as a wet lab. As his father was the head of the prop/set production shop for the Warnwer Brothers film studios in Burbank, Clarence worked during his high-school summers to deliver mail to "the backlot," riding his bicycle to deliver letters to famous and infamous stars including Humphrey Bogart, Bette Davis, and Gene Tierney. His visit to Jack Warner's office left an ever-lasting impression, as the desk was on a platform that was raised much higher than the surrounding area. Aspiring to be a scientist, Clarence did not continue a career in movie production, but got all his degrees at Stanford University, achieving the Ph.D in Geology. He was soon hired as an Assistant Professor of Geology at UCLA, and the rest is history.

Clarence was a central figure during the merger of the UCLA Department of Geology (Chair, 1974-76) with the UCLA Department of Geophysics and Space Physics (Acting Chair 1976); he

continued for two additional years as the first Chair of the new UCLA Department of Earth and Space Sciences. In 1980 he became Systemwide Director of the University of California White Mountain Research Station (WMRS), the University's high-altitude research center that has operated for decades and where many scientists and collaborators have made advancements in all branches of science. While continuing to serve as White Mountain Director, Clarence also assumed the post of UCLA Dean of Physical Sciences in 1983. In Clarence's own words, "I retired three times." After serving for a decade, he continued as Interim Dean of the Division in 1984, and held the WMRS Directorship until his final retirement in 1995.

Throughout his scientific career, Clarence pushed research in new directions. As a two-time Fulbright recipient, he completed two sabbaticals in northern Italy, moving his entire family to small

towns near Guilia and Modena, while pursuing paleoclimate science through geochemical and paleoenvironmental analysis of marine strata focusing on species in Bivalvia, Gastropoda, and Echinodermata. His shift

to California tectonics became a calling by the 1970's. Clarence was a superb mapper! He has covered almost as much ground as the famous Thom Dibblee.

Clarence was well-known for his Cenozoic reconstructions of California, from pre-San Andreas fault settings to the present, which were informed and constrained by the marine fossil record. Amassing over 76 publications that span across five and a half decades, his research areas included the central California

Coast Ranges, the White/Inyo Range, and the French Pyrenees.

Clarence was ever the teacher, tirelessly educating undergraduate Geology and Engineering Geology majors in core field mapping classes, and supporting graduate students as they worked to achieve their degrees and enter academia or pursue professional geoscience careers in industry. Those who taught the intro-

ductory mapping class, the one before Clarence's, always knew that students would have to meet high standards of diligence, logic, and clarity in reporting. His most recent journal publication was less than 10 years ago in the field of California tectonics, with tectonics co-author Prof. Jason Saleeby of Caltech in Pasadena; they fearlessly proposed a solution to the "Salinia problem" (of Sierran-type granites now found in the Coast Ranges) that involved long-distance thrusting on the newly-discovered fault they called the Southern California allochthon, or Nacimiento thrust fault.

Clarence stayed active in environmental issues, keeping his California State Board of Registered Geologists license current until his death. Earlier involvement included testifying in court regarding the hazards of installing nuclear power plants directly along coastal California active fault zones. Over the span of the last decade, Clarence contributed to the fight to discontinue a still-extant large landfill that operates in the hills above the famous Rose Bowl in Pasadena. His gathered data and public presentation of the hazards and health and safety issues related to a toxic dump in the vicinity of the Verdugo Fault have helped the fight to finally win a decision to discontinue the site within a few years.

Throughout his life, Clarence loved the pursuit of science, and the pursuit of knowledge. Along the way, Clarence married and raised son Eric and daughter Kris. Following two decades of focusing on his career, Clarence began life with his second wife-to-be Lauri, taking her to Italy in 1998. Clarence and Lauri truly lived a joyful, travel-filled

non-stop adventurous life together (including attending as many home UCLA Football and UCLA Basketball games as possible) until his passing in August 2023. He left a legacy of inspired students in both the geological sciences and in botany, another area of interest, where he dedicatedly taught a General Education lab and 8-field-trip course, "Natural History of Southern California." Passing along the knowledge and love of native plants that he learned from taking Professor Mildred Mathias' course decades earlier, Clarence continued to teach this course every Spring at UCLA for more than a decade following his retirement. Never leaving a job half-finished, UC Press published his 493 page textbook, "Introduction to the Geology of Southern California and its Native Plants," © 2007 by the Regents of the University of California. Clarence taught ESS 20 like he lived his life: working hard, playing hard. Plan for those field trips, lead the charge, have everything reserved and paid for in advance. Throughout his career, when the departure time arrived on the Geology/Chemistry loading dock, he taught students to be neat. Be organized. Be ready. And GO. Clarence taught so many of us how to plan, how to execute, how to truly enjoy life along the way, by always planning well ahead for the next trip, to always be ready to travel, and ready to learn. Clarence Albert Hall, Jr.: Geologist, Professor, Dean. He will be greatly missed.

*The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living.*

- Jules Henri Poincaré (1854 - 1912)



# Alumni Quotes

"The problems are in the field." Those words, and the man who said them, enriched and changed my life. I am so thankful to have studied under the direction of Dr. Clarence Hall while earning my B.S. in Geology at UCLA. Clarence Hall is one of the classic California field geologists, a group that includes Tom Dibblee, Clem Nelson, Gary Ernst, John Crowell, Clyde Wahrhaftig, and Konrad Krauskopf, among others. These men had boots on the ground, walked the outcrop, took strike & dip measurements with a Brunton compass, recorded everything by hand on paper topographic base maps, inked their maps at night, and published geologic maps. (No computer-generated maps from THIS group!)... [he] was an exceptional geologist and an amazing person. He was a positive influence in the lives of 1,000's of students, professors, colleagues at UCLA, and people in his community... Clarence also will be remembered for his silly sense of humor (dressing up and lecturing as Darth Vader), his quick jokes, and his ready smile.

**Dr. Karen B. Loomis, UCLA B.S. Geology 1985**  
Excerpted from <https://tinyurl.com/wmrc-cah>

Clarence Albert Hall, Jr. could turn a phrase, turn heads, and turn on a bright light when he entered a room full of darkness and despair. He was not a favorite of all students as he admitted he was, "dedicated to training geologists." Yet he had a heart of gold, and if you could map, well, he made you feel like you were on top of the world.

**Lauri Holbrook, UCLA B.S. Geology, 1984**

With Clarence I found freedom: to explore, discover, relate diverse concepts, make mistakes, learn from my errors—to do something, learn, stumble, pick myself up and keep on going. That was, in fact, Clarence's motto; "just keep on going..." I would never have gotten there without the freedom Clarence conferred on me. He did not confine me. He had no prior expectations of what I should become. There was no one else in my career like him and I am tremendously grateful.

**Gary Rosenberg, UCLA Ph.D., 1972**

Clarence cared deeply about and dedicated his life to his students, to his science and to the University. And, he did it all with contagious good humor.

**Jeffrey Johnson, UCLA Ph.D. Geology, 1985**

I first met Clarence as my ESS 20 professor (or glorified TA, as the emeritus Dean insisted on referring to himself), little knowing he would go on to become my friend and mentor.

His class changed the way I saw the natural world, while his faith in my abilities changed the way I saw myself and my place in the wider world. Clarence was simultaneously cantankerous and possessed of a joie de vivre to which I can only aspire. I will remain forever grateful to Clarence and Lauri for the years of friendship, support, and adventures.

**Laurel Grzesik-Mourad, UCLA EPSS 20 Class of 2004**

ESS 20 was hands-down my favorite class at UCLA because Clarence made California his classroom. I loved jumping in a van every weekend to camp under the stars and learn about the chaparral all around us, the wild blooms gracing roadsides and meadows and the geologic features of state landmarks like Yosemite.

Despite the 50-year difference, I considered Clarence a kindred spirit. We both loved being outdoors and having a good laugh. He had a mischievous sense of humor! Most people would be affronted if a young undergrad nicknames you 'Old man' and starts rifling through your wallet, but Clarence only cheekily grinned and plotted his revenge! I cherished our later friendship, and his sage advice and honest reflections of a life well-lived as I figured out my next steps. He's sorely missed, but I'm thankful for the meaningful moments I got to share with him, Lauri and the rest of the ESS 20 family.

**Lina Taing, ESS 20, UCLA 2006 alum**



ESS20: Yosemite, 1983



# Fred Schwab Memoriam

**By Paul Davis**

Fred Schwab, a theoretical seismologist, age 89, passed away on August 7, 2023. He was appointed by Leon Knopoff in the 1960s to pursue synthetic seismology, a subject to which he devoted his whole career. He developed a reputation as a meticulous developer of seismic tools. Throughout his career virtually every synthetic seismology program was limited to models having either a flat earth or a perfectly spherical one. However, Fred was interested in the seismic shaking in regions such as the Himalayas and so developed ingenious methods to sum normal nodes in regions of vastly different surface curvature, at the same time taking into account anisotropy and attenuation.

His expertise was an important resource for students in the EPSS seismology group, but in addition, he developed a significant interna-

tional reputation. In the mid-nineties, he was involved in a major United Nations program based in Trieste to teach seismic procedures including scientists in developing countries. Giuliano Panza, Professor at U. Trieste, noted that the size of the task group, for which Fred was the leader: "included approximately 140 researchers at 40 local centers in 23 different countries." Professor Panza also goes on to say "I have been very happy to have the possibility to internationally acknowledge Fred as one of my mentors."

Fred's goal was to develop tools for the reduction of loss of human life and property damage caused by earthquakes. He leaves behind the basis for the continuation of his work by the researchers who benefited from his teaching. He is missed by those with whom he interacted.

# Remembering Paul Merifield

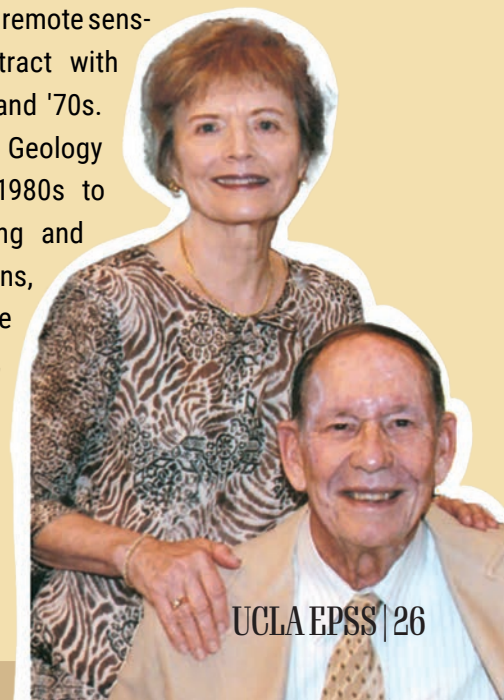
**By Tessa Holzmann**

Paul M. Merifield died on October 13, 2023 at the age of 91. He lived in the Mar Vista area of Los Angeles for many years. His wife Ruth predeceased him in 2017 at the age of 76. He got his B.A. in Geology from UCLA in 1954, then served in the Army Corps of Engineers and completed a Fulbright Scholarship and Masters in Germany, receiving his Ph.D. from the University of Colorado in 1963.

Paul returned to UCLA in 1969 as a Lecturer in the Geology department, also working in IGPP and ESS as an Associate Researcher. Beyond his successful career as a professional geologist, Merifield prepared many UCLA students for careers in the geosciences. He taught Engineering Geology for 42 years, becoming an Adjunct Professor in 1988 and retiring in 2012. He wrote a 300+ page course reader textbook in engineering and environmental geology with an emphasis on Southern California concerns and case histories, which he generously allowed to be used in geology courses at local universities. His teaching was highly regarded, and many of his students went on to become successful engineering

geologists for private firms, government agencies, and in academia.

Paul also partnered with Don Lamar in an engineering geology consulting firm, Lamar-Merifield, located in Santa Monica. As part of his consulting work, Paul worked on a number of satellite-based remote sensing projects under contract with NASA during the 1960s and '70s. When LA County set up a Geology Appeals Board in the 1980s to review contested building and grading permit applications, Paul was appointed as one of its original members, serving the community for many years.





# EPSS Commencement & Awards 2024

- JUNE 16, 2024 -

Commencement Speaker: Jennifer Scully, Geophysics & Space Physics PhD '15

## 2024 Graduates

### - Majors | Bachelor of Arts -

Ahmad Almokdad – Earth & Environmental Sci  
Sarah George Chalhoub – Earth & Environmental Sci  
Sarah Mylene Egan – Earth & Environmental Sci  
Stephanie Garcia – Earth & Environmental Sci; Sociology BA  
Ashley Guan – Earth & Environmental Sci  
Emily McFerson – Earth & Environmental Sci  
Xuan Tien Nguyen – Earth & Environmental Sci  
Alexandra Michelle Ortega – Earth & Environmental Sci  
Emma Jean Plant – Earth & Environmental Sci

### - Majors | Bachelor of Science -

Lyndsey Faye Archuleta – Geology  
Sarah Sun Mee Chung – Geology  
Masooma Saiyeda Hasnain – Geophysics  
Duyen Le – Geology  
Nathan Ji-Yan Leung – Geology  
Max Toake Liu – Engineering Geology  
Didier Massyel Monterroza – Geophysics  
Alexa Nguyen – Engineering Geology  
Natasha Ambika Rodkin – Geology  
Brianna Rose Pearson – Geology  
Shawronna Sengupta – Geology; Music Performance BM  
Audrey Kathleen Taylor – Geophysics

Natalie Elana Rampersaud – Geophysics  
Sarah Elizabeth Stuecker – Engineering Geology  
Emily Grace Welsh – Geophysics  
Sophia Alexandria White – Geology  
MengMeng Zhang – Geology

### - Minors -

Jiovanni Omar Estevez – Earth & Environmental Sci  
Ian Paul Fu – Geophysics & Planetary Physics  
Lidia Lisette Garcia Marroquin – Geochemistry  
Yiyu Hao – Geophysics  
Duyen Le – Geochemistry  
Nathan Ji-Yan Leung – Geochemistry  
Charlotte Elizabeth Six – Geophysics & Planetary Physics

### - Master of Science -

Alana Archbold – Geology  
Hayley Lauren Bricker – Geochemistry  
Hanzhang Chen – Geology  
Dominic Hernandez – Geophysics & Space Physics  
Sergei Kamaletdinov – Geophysics & Space Physics  
Emily F. Klonicki – Geochemistry  
Joshua Anthony Lee – Geology  
Catherine Psarakis – Geochemistry  
Emily Anne Whittaker – Planetary Sci  
Jacob Widmer – Geology

### - Doctor of Philosophy -

Marina Olivia Argueta – Geophysics & Space Physics  
Xiyuan Bao – Geophysics & Space Physics  
Fekireselassie Beyene – Geophysics & Space Physics  
Jordan Melisande Zoe Bretzfelder – Geology  
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Francisco Eduardo Spaulding-Astudillo – Geophysics & Space Physics  
Mai Tran – Geophysics & Space Physics  
Ethan Tsai – Geophysics & Space Physics  
Robert Nguyen Ulrich – Geochemistry  
David Yousavich – Geochemistry

## 2024 Undergrad Awards

### - Valedictorian -

Nathan Ji-Yan Leung – Eugene B. Waggoner Scholarship

### - Salutatorian -

Masooma Hasnain – John & Frances Handin Scholarship  
Emily McFerson – Harold & Mayla Sullwold Scholarship  
Brianna Pearson – John & Frances Handin Scholarship  
Shawronna Sengupta – John & Frances Handin Scholarship  
Audrey Taylor – Harold & Mayla Sullwold Scholarship

### - Academic Merit | Majors -

Lyndsey Archuleta – Deane Oberste-Lehn Scholarship  
Stephanie Garcia – Deane Oberste-Lehn Scholarship  
Natalie Rampersaud – Deane Oberste-Lehn Scholarship  
Natasha Rodkin – Deane Oberste-Lehn Scholarship  
Emily Welsh – Deane Oberste-Lehn Scholarship  
MengMeng Zhang – Deane Oberste-Lehn Scholarship

### - Academic Merit | Minors -

Ian Fu – Straus Family Fund for Undergraduate Opportunity  
Yiyu Hao – Straus Family Fund for Undergraduate Opportunity

### - Summer Field Scholarships -

Mahdi Alioua – Clarence A. Hall Jr. Scholarship  
Ahmad Almokdad – Walter S. Harris Award  
Lyndsey Faye Archuleta – Deane Oberste-Lehn Award  
Safa Beg – Clarence A. Hall Jr. Scholarship  
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Shanya Dinata – Deane Oberste-Lehn Award  
Sora Graciano – Walter S. Harris Award  
Dean Lewis – Clarence A. Hall Jr. Scholarship  
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Sarah Elizabeth Stuecker – Deane Oberste-Lehn Scholarship  
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Veronica Vega – Deane Oberste-Lehn Scholarship  
MengMeng Zhang – Deane Oberste-Lehn Scholarship





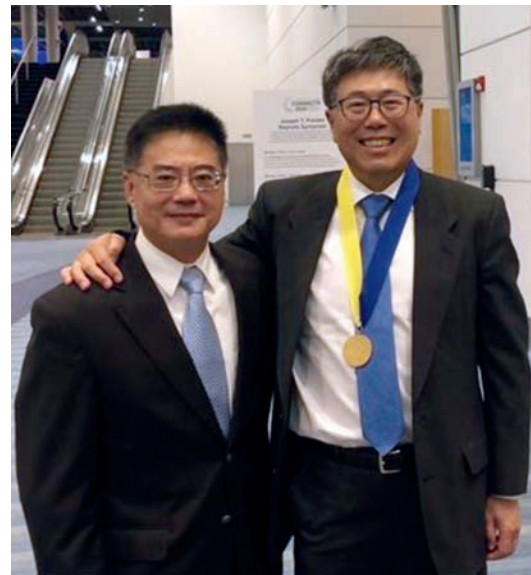
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## AN YIN ENDOWED CHAIR



The An Yin Endowed Chair is a term-appointment chair to support a faculty member in the Division of Physical Sciences in the Department of Earth, Planetary, and Space Sciences in the College of Letters and Science with an expertise in field-based Geology to honor the late-Distinguished Professor An Yin and his advancement of this field and dedication to UCLA.

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The department is grateful for your incredible generosity over the last few years. Thanks to you, we have funded undergraduate and graduate research, bought a new pickup truck we used for field camp this year, created a new Makerspace, renovated spaces, and continued to strive for excellence in research, teaching, and outreach. Budgetary situations are such that we continue to need your help. Please visit our EPSS General Fund at the QR code to the right. No amount is too small, and every cent is deeply appreciated.



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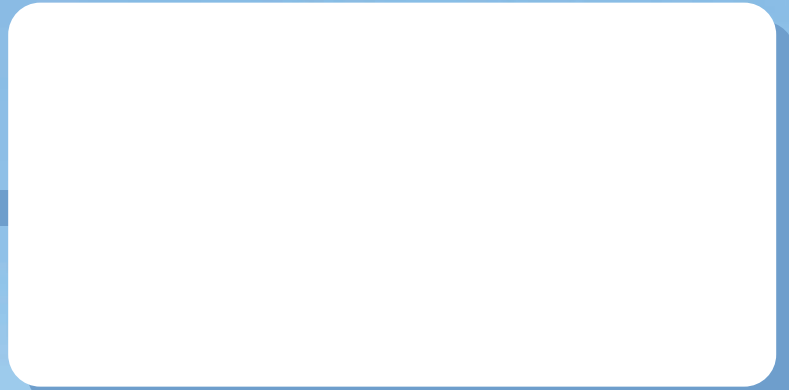
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