



1934



1938



1970



2001



2010



2015

SCIENCE BEYOND GUYOT: 25 YEARS OF HESS FELLOWS

A SYMPOSIUM DURING REUNIONS CELEBRATING THE HESS FELLOWSHIP

Friday May 31st



HARRY HAMMOND HESS (1906–1969)



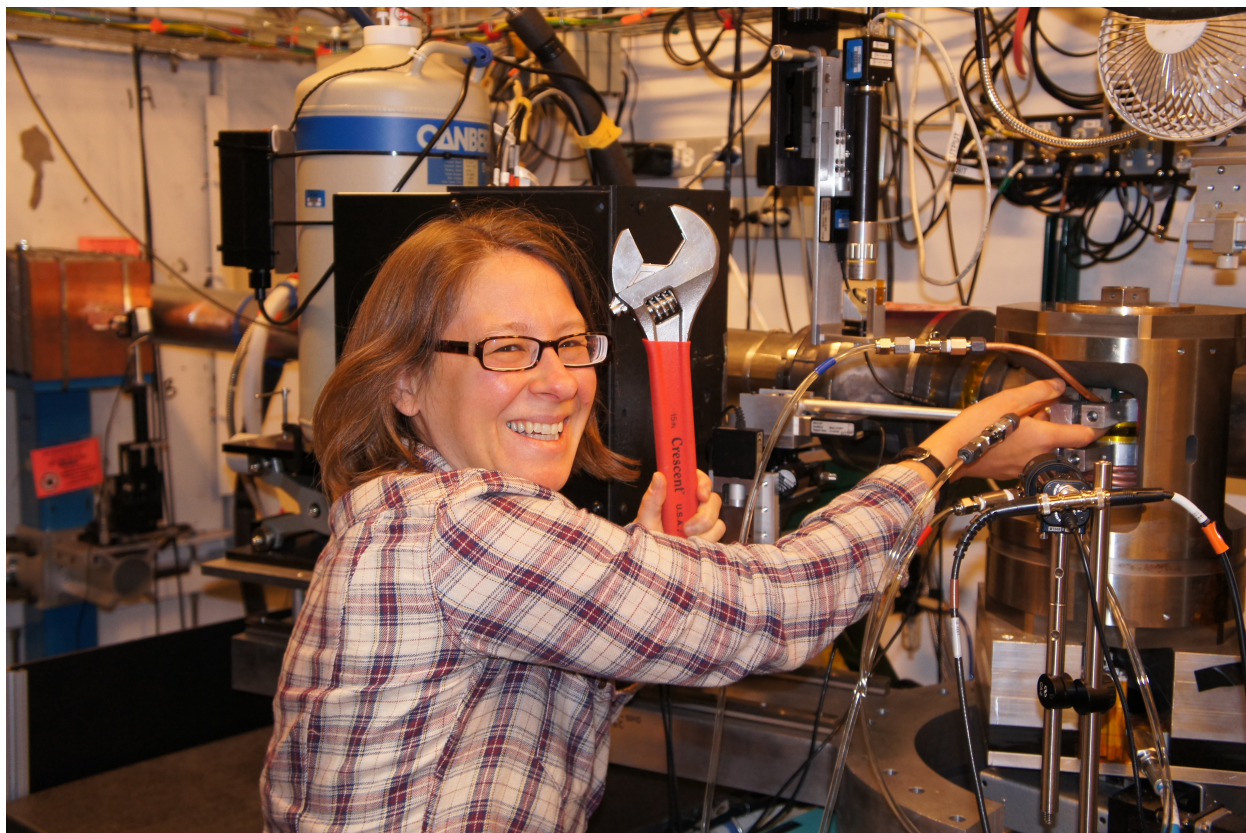
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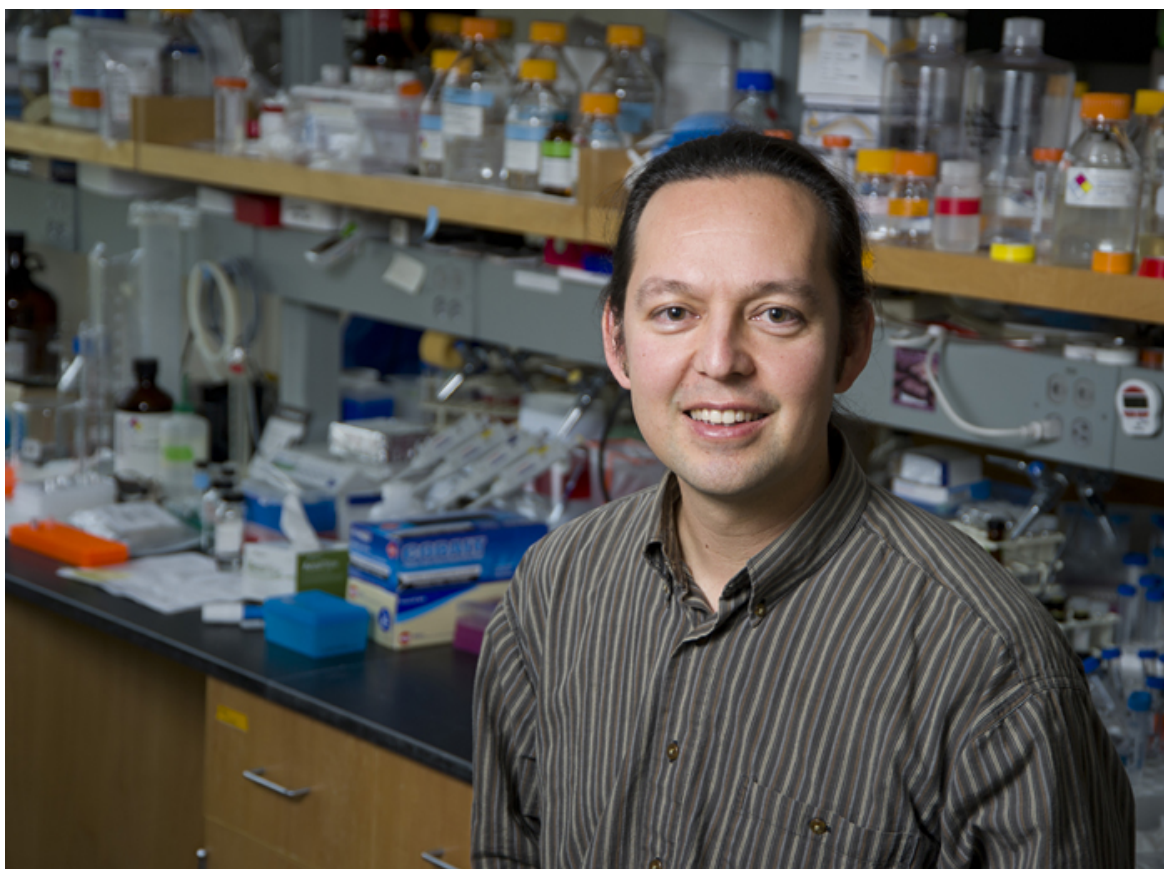
► Symposium Speakers |

ABBY KAVNER



My love for the geosciences developed during childhood summers spent camping, hiking, and canoeing throughout the Hudson Valley and the Adirondack Mountains of New York. I studied materials science and engineering at Northwestern University (B.S. 1989) and at UC Berkeley (M.S.E. 1993). At that point I discovered the great materials science problems posed by earth science, and switched fields, to geophysics at UC Berkeley (Ph.D. 1997). A Hess Postdoctoral Fellowship at Princeton University lured me back to the east coast, to continue my studies of materials under high pressure with Professor Tom Duffy. I have been a faculty member at UCLA since 2002. I am looking forward to seeing everyone at the Symposium!

MAK SAITO



It is hard to overstate how valuable the Harry Hess Postdoctoral Fellowship has been to my scientific and personal growth. Aside from being incredibly humbled by being associated through this named Fellowship with the scientist who proposed the theory of plate tectonics, having the opportunity to interact with the intellectual giants of biogeochemistry at Princeton was extraordinarily exciting for me as a young scientist. I was fortunate to have frequent discussions with Professors François Morel, Bess Ward, Danny Sigman, Michael Bender, and Satish Myneni and others. In addition, there was a wonderful community of postdocs and students that shared their knowledge and community, not only in the laboratory but also in extra-curricular activities such as the graduate student *a capella* group that I joined (never as good as the undergrad groups!) and the Brazilian capoeira classes. I learned so much in that period with regards to biogeochemical cycling and protein biochemistry, and consider it the time and place where I explored the early scientific connections that have become the foundation of my career's efforts in developing metaproteomic methods to interrogate ocean biochemical processes. I always think fondly of my days at Princeton, walking around campus on those beautiful mid-Atlantic spring days with a sense of excitement and inspiration, and for that, I am forever grateful to the Harry Hess Postdoctoral Fellowship.

MASHA PROKOPENKO



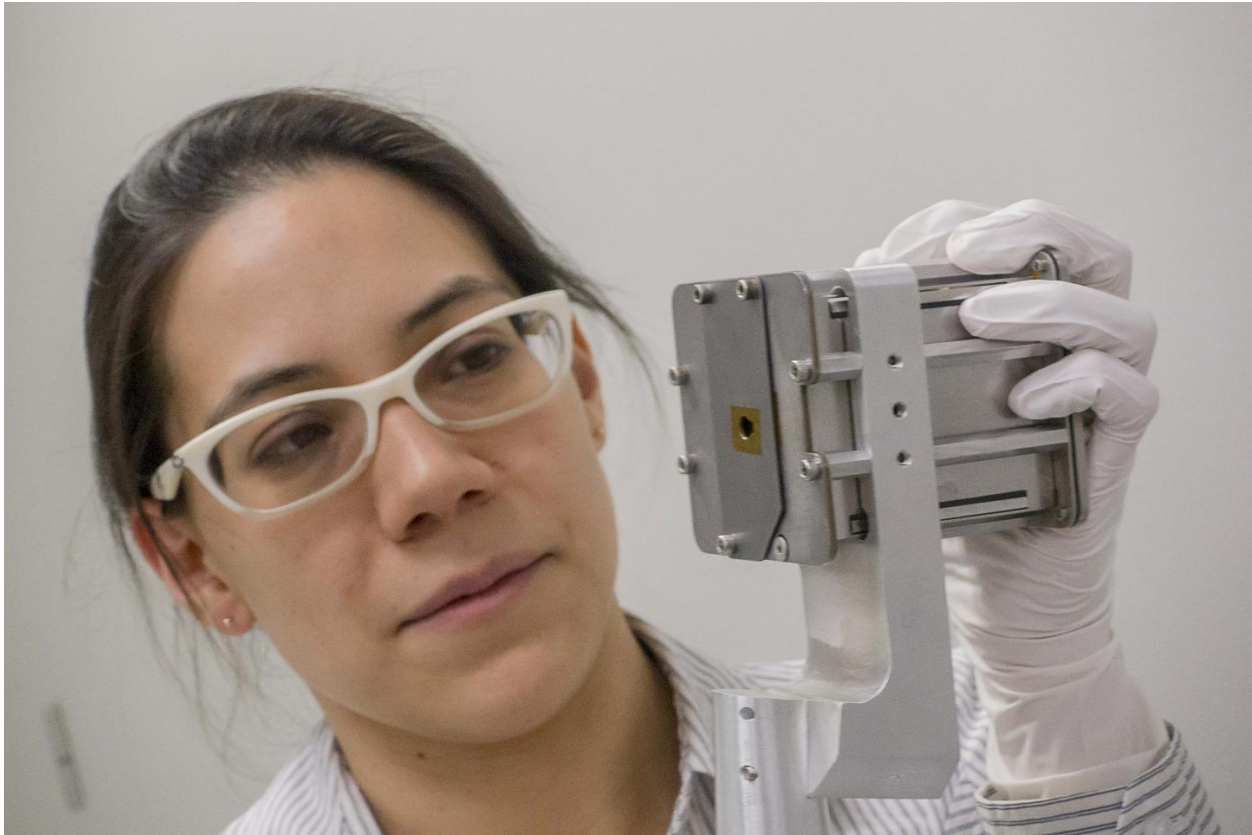
One of the ways we build scientific understanding of the world is through recognition of patterns, and if geochemistry can be described with one word, for me it would be “patterns”. I adore those rare moments when its majesty, The Recognition, strikes, often surprising you by its simplicity and eventual obviousness with which it explains a puzzle of your data that haunted you for weeks and months. However, such recognition, if it is to arrive, is not possible without following many threads and leads, unavoidably demanding you to understand yet another uncomfortably unfamiliar aspect of the earth sciences—be it the geochemistry of the rare-earth elements, atmospheric patterns over the North Atlantic, or the tempo of evolution of Ediacaran acritarchs. I learned the courage for exploring the unfamiliar during my Hess Postdoctoral Fellowship at Princeton. It was the weekly meetings of the Danny Sigman and Michael Bender research groups, where I, a fresh Ph.D., realized how ignorant I truly was, and then got the motivation to keep learning, which still drives my research today. During two postdoctoral years, I learned from my adviser, Professor Danny Sigman, to recognize the beauty of the interconnected geologic, chemical and biological cycles, these mighty wheels, driving the transformations of the Earth on daily to million-year time scales. Being surrounded by world-class scientists, having conversations at Tea Time, or simply in a hallway, I have learned not to limit my thought to the familiar, but rather to pursue answers to the problems at hand, doing the necessary learning along the way. Also, during these years at the Princeton Geosciences Department, I developed close friendships—those warm my heart when I go to meetings, invite my friends to give talks, or simply Skype with them to discuss yet another puzzle of the nitrogen cycle.

KEVIN LEWIS



The Hess Postdoctoral Fellowship was instrumental in shaping my early career as a geoscientist. The academic freedom provided by the Fellowship allowed me to develop collaborative relationships with multiple faculty members in the Department, while also nurturing my own research program. This allowed me to broaden my base of expertise, and branch out into new areas of research, including planetary geophysics with Professor Frederik Simons, and earth history with Professor Adam Maloof. At the same time, I was supported in maintaining an independent research footprint in planetary geology, which I had focused on as a graduate student. This independence allowed me to successfully propose to join the Curiosity Mars Rover team while at Princeton, and eventually move on to a faculty position at Johns Hopkins University. I am grateful to the Department of Geosciences for the opportunity provided by the Hess Fellowship, which has been an essential springboard for my subsequent career!

JUNE WICKS



My research interests are the synthesis and study of minerals and mineral properties to understand planetary interiors. By directly comparing densities and sound velocities of the Earth to those measured of candidate minerals in the lab, we can complement the petrologic approaches that determine phase relations of mantle minerals to solve the age-old question “What is our planet made of?” Within this theme, I came to Princeton to study the martian mantle by measuring the equation of state and sound velocities of iron-rich majorite garnet, in anticipation of the Insight seismic experiment on Mars. In collaboration with Professors Tom Duffy and Jessica Irving, I explored the relationship between seismic velocities measured in the lab with those measured on Earth or Mars, and assembled the building blocks of a velocity profile of the martian interior. I am now in the Department of Earth & Planetary Sciences and the Extreme Materials Institute at Johns Hopkins, and also hold a joint appointment in the Department of Mechanical Engineering. We continue to focus on the physical properties and dynamic history of the Earth and other planets, both within and outside our solar system. To better understand how planet-scale observables are fundamentally controlled by the behavior of atoms at extreme conditions, we use X-ray scattering techniques to experimentally probe interactions of nuclei and electrons at high pressures and temperatures.

► Some Former Hess Postdoctoral Fellows |

YAJING LIU



I was very fortunate to be awarded a Harry Hess Postdoctoral Fellowship for 2007–2009. It offered me a unique opportunity to continue to grow scientifically and prepare for my next career stage. I greatly benefited from the mentoring by Professor Allan Rubin, interaction with other faculty, postdocs and students in the Seismology Group, as well as the Geosciences community. Ten years after completing my postdoc at Princeton, I remain grateful for how the Hess Postdoctoral Fellowship has supported me to mature into an independent researcher.

MAX WERNER



The Hess Postdoctoral Fellowship was a wonderful experience that had profound influence on my development as a geoscientist and on my career. I was able to broaden my knowledge and skill set laterally in a way that would have been very difficult to do as a postdoc funded by a specific research grant. Specifically, my understanding of the mechanics of earthquakes and faulting evolved substantially during that time, leading to more sophisticated and fruitful research questions (and answers!). These continue to guide me today as I grow my research group and program as an assistant professor at the University of Bristol. The Guyot faculty (especially Professor Allan Rubin), postdocs and other Hess Postdoctoral Fellows, students, seminar speakers and the many visitors were a great inspiration. And each week ended with friendly afternoon soccer!

MATTHEW PRITCHARD



I am forever grateful for the year (2004) that I spent as a Hess Postdoctoral Fellow, which provided a jump start to my career in so many ways. The intellectual environment and freedom granted to postdocs was second to none. I learned how to approach a new (for me) scientific field and think critically about the “conventional wisdom” from my nominal supervisor Professor Allan Rubin, although I suspect that he would humbly defer the debt I owe him. I also appreciate that Allan gave me the opportunity to test out my chops as an instructor by leading two discussions in a seminar for new graduate students before being dumped in the deep end as a new assistant professor at Cornell. In that regard, a multi-week “Professor 101” course that was offered to all grad students and postdocs across the disciplines at Princeton was about the only “formal” training I received for surviving those first years on the tenure track, and I’m glad to see that more institutions are offering similar courses now. The collegial culture of the Department was all too rare, and I still reflect back on conversations that I had over regular lunches with the graduate students, postdocs, and faculty about science and building a successful career. I learned from Professor Tony Dahlen that a few words of encouragement to a junior scientist can make a big impact. Another highlight were the scientific seminars of the so-called “task force” led by Professors Dahlen, Nolet, and Rubin, featuring my office-mates Frederik Simons and Pablo Ampuero and graduate students like Karin Sigloch, Tarje Nissen-Meyer, Adam Baig, Raffa Montelli. At the time, we were all struggling together to understand the physical processes driving the (then) new idea of slow earthquakes in subduction zones, and it was great fun.

EMMANUEL CHALJUB



I had the privilege of receiving a Harry Hess Postdoctoral Fellowship between 2000 and 2002, with the support of Professor Peter Bunge, who was a young Assistant Professor in the Department of Geosciences after moving from IPG in Paris where we had met. At that time, there were no postdoctoral opportunities in France, for philosophical and societal reasons which resulted in scientific research requiring a permanent position. The global landscape was of course different (the situation has also changed in France since), and the first thing to say about the Hess Fellowship is that it granted a real *researcher* status, not just the status of a collaborator on a single project. During my stay in Princeton, I was able to finalize publications from my Ph.D. thesis work and pursue fundamental developments on the consideration of elasto-gravity in numerical global seismology. This work gave me scientific legitimacy when I returned to France, and allowed me, a few years later, to become a permanent researcher at the Grenoble Institute of Earth Sciences where I still work. The most amazing thing is that I never really worked with Peter during those years (I hope he doesn't blame me about this!), which is an incredible luxury. My only regret was not to work more closely with Professor Tony Dahlen, though I will keep an eternal memory of the discussions we have had. It would be a pity if the Hess Endowment stopped funding young postdoctoral researchers, because this is certainly the period when one can take the most scientific risks and the environment of the Geosciences Department at Princeton was just perfect for this.

JURAJ MAJZLAN



My Hess Postdoctoral Fellowship started in November 2002, after a weeklong drive from sunny California to rainy New Jersey. Under the supervision of Professor Satish Myneni, we decided to investigate the environmental geochemistry of acid mine drainage waters as a continuation of my thermodynamic work at UC Davis (in the group of Professor Alex Navrotsky). What followed was a hectic time, full of long days and nights at the NSLS synchrotron in Long Island, ALS in Berkeley, and SSRL at Stanford. During those times, together with the Ph.D. students Mike Hay and Alessandra Leri, much time was invested into learning the intricacies of spectroscopic techniques, either at synchrotrons or in the basement lab at Princeton. These opportunities allowed me to expand my portfolio of experimental techniques and my understanding of aqueous and solid geochemistry of near-surface environments. Additional interactions with the group of Professor Tom Duffy, especially with Sergio Speziale and Boris Kiefer, led to further learning of spectroscopic and theoretical tools and set up scientific collaborations and friendships that last until today. I appreciate very much the opportunity to be one of the Hess Postdoctoral Fellows, to participate in the program, and to be given a chance to do excellent science—and science only. My next steps led to Freiburg in Germany and finally to a full professorship in Jena, Germany, where I am still using all experience from my Princeton times. Thank you!

► Current Hess Postdoctoral Fellows |

BEHROOZ FERDOWSI



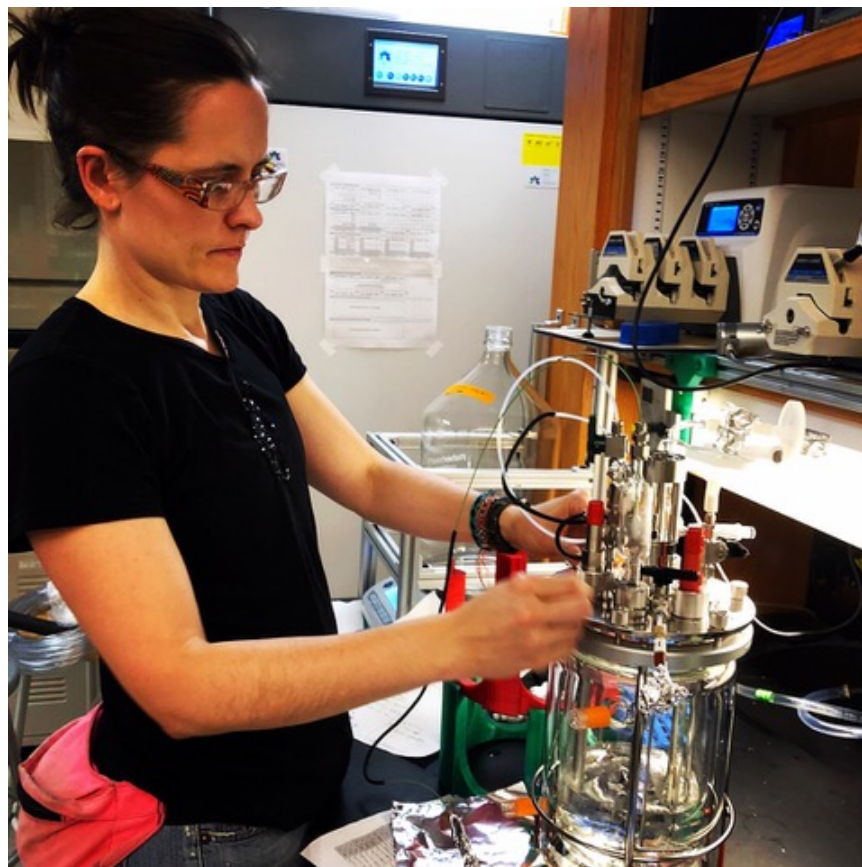
My background is in the mechanics of geomaterials—geomechanics, but I have been gradually transitioning toward the physics and statistical mechanics of granular and disordered media for geosciences, an area that is under the umbrella of soft condensed-matter physics. I am interested in describing the behaviors of solids and “fluids” like rocks, sediments, soil, dust, and ice in their different phases by developing first-principles models that are either informed or can be tested with simple small-scale experiments, as well as in connecting behaviors from constituents to field observations on a larger geological scale. I work with Professor Allan Rubin to discover the origins of the rate-and-state-dependent frictional behavior of rocks and to prepare the foundation for using more thermodynamically consistent and scalable constitutive relations for the response of Earth and planetary materials to perturbations. I also collaborate with Professor Troy Shinbrot from Rutgers University on pattern formation in vibrated sands, a phenomenon that can be the ultimate test for a computational model of aeolian dune migration and evolution. I have further collaborated with Enrique del Castillo '2019 on the grain-scale physics of critical-taper theory and mountain-building processes. With Professor Jane Willenbring and Emma Harrison of the Scripps Institution of Oceanography, I work on the interaction of grain-scale and geochemical processes during soil production and erosion. In the past two years, I also delivered several seminars at public and private colleges, universities, and research institutes for audiences of undergraduate and graduate students across a variety of disciplines (physics and hydrodynamics, engineering, geology and geophysics), and co-organized the Solid Earth Brownbag seminars at Princeton Geosciences. I am grateful for the support of the Hess Postdoctoral Fellowship, without which likely none of these developments could have happened. The interactions with undergraduate and graduate students, postdocs, professors, and staff in the Department of Geosciences and beyond have significantly enriched my scientific and social experiences and influenced my trajectory in ways that I could not have foreseen. I am looking forward to an opportunity to give back in the future.

NADIR JEEVANJEE



I am a climate scientist with a background in theoretical physics. The overarching goal of my research is to help develop the “physics of climate”, i.e., an essential understanding of climate dynamics and climate change that can be formulated with simple mathematical models, and which complements the perspective we gain from complex computer simulations. The Hess Postdoctoral Fellowship has allowed my unfettered pursuit of this goal, as well as a broadening of the scope of my research. In collaboration with Geosciences faculty as well as researchers across Princeton and beyond, we have gained fundamental insight into the greenhouse effect from both H_2O and CO_2 , better understood what drives mixing between clouds and their environment, and explored the basic reasons why the poles are warming more than the tropics. In addition to this research, I also delivered a short series of pedagogical lectures on the physics of climate to the Geosciences Department. Such diversity of activity is usually not possible with grant-based funding. Beyond my own work, the Hess Fellowship has also broadened my perspective by bringing me into close contact with paleoclimatologists and geochemists, whose work is essential for putting modern climate change into context. I am extremely grateful for the Hess Postdoctoral Fellowship, and cannot imagine what my research career would look like without it.

ASHLEY MALONEY



I am interested in how micro-organisms respond to environmental change. In order to survive in relentlessly dynamic environments, cells have the fascinating capacity to alter the quantity, form, and isotope composition of their biomolecules. The Hess Postdoctoral Fellowship has allowed me to pursue exciting biogeochemical research and learn about systems I have not previously worked with. Currently I am developing tools to help characterize microbial metabolisms in modern and past environments. I use microbiology and stable isotope geochemistry in controlled laboratory studies to compliment field observations along physical and metabolic gradients. The support from the Hess Postdoctoral Fellowship and the Geosciences faculty has been outstanding and empowered me to design and conduct independent research, an extremely valuable opportunity at this point in my career.

► Current Hess Visiting Faculty Fellow |

SASHA TURCHYN



I graduated from Princeton in 1997, and went to work in the oil industry until 2000, when I moved to Harvard to get my Ph.D. with a former Princeton faculty member, Professor Dan Schrag, who I had met during my undergraduate studies in Guyot Hall. After a postdoc at UC Berkeley, I moved to a tenure-track faculty position at the University of Cambridge, where I have been for the last 11 years, tenured for the last 7. The year for my sabbatical was chosen less by when I was first eligible and more by when it would be an easy year for my three daughters to miss school in England. Returning to the USA for sabbatical, giving my children experience at American schools and proximity to their American grandparents and cousins, at first seemed out of the question. The chance to return to Guyot Hall as the inaugural Hess Visiting Faculty Fellow made this dream a reality. My time at Princeton has been phenomenal and I am eternally grateful for this program. I have had great conversations with faculty, postdocs, graduate students and undergraduate students. The support staff who facilitated my visit and helped with every road block (real or imagined) made everything smooth. As a university professor, your time is tied up in a million different tasks that prevent you from doing the thing that actually got you into science in the first place, the puzzle-solving nature of primary research involved in the study of our planet. As a Hess Visiting Faculty Fellow, I have had the space and time to think and build new ideas and finish projects. I have written papers on microbial geochemistry involving isotope fractionation, on how worms may be key for limiting the release of methane from mud, and how the chemistry of the ocean has changed over the last 550 million years. I have made new friends and colleagues, and I have refreshed and re-energized my soul before heading back to the frenetic pace of my real job.

HARRY H. HESS POSTDOCTORAL FELLOWS

Ashley Maloney	2018–2020
Nadir Jeevanjee	2017–2019
Behrooz Ferdowsi	2017–2019
Ayla Pamukcu	2015–2017
Edwin Kite	2014–2014
June Wicks	2013–2015
Bonnie Chang	2010–2012
Max Werner	2010–2012
Kevin Lewis	2009–2011
John Higgins	2009–2011
Yajing Liu	2007–2009
Huub Douma	2006–2008
Pascale Poussart	2006–2008
Andrew Leier	2005–2007
Masha Prokopenko	2005–2007
Matthew Pritchard	2004–2005
Carrie Tuit	2003–2005
Jan Kaiser	2003–2006
Juraj Majzlan	2002–2004
Matthew Reuer	2002–2004
Brian Schlottman	2002–2004
Frederik Simons	2002–2004
Mak Saito	2001–2003
Emmanuel Chaljub	2000–2002
Christopher Francis	2000–2001
Melissa Hendricks	2000–2002
Christopher Daniel	1998–2000
Daniel Sigman	1998–1999
Abby Kavner	1997–1999



Interested in how you can help the Department of Geosciences support its mission of continuing the Hess Postdoctoral Fellowship? Contact us at hessfellows@princeton.edu.