Early experiences: Pursuing a Ph.D. in geochemistry was not an obvious path for me. I grew up in a small, predominantly white, lower-middle-class community in rural New Hampshire. I chose to go to Barnard, a liberal arts college for women associated with Columbia University in New York City, because I craved a culturally diverse, intellectually stimulating environment that would support and empower me as the first woman in my family to go to college. In my first semester I waffled between majoring in urban studies and environmental policy and ultimately planned on going to law school. Then I participated in a geology trip to Death Valley, California, during my first spring break. I never thought much about geology before; rocks had always been something to hike over or pull out of the ground in my Mom's garden. Once in Death Valley, however, I was riveted with the idea that you could understand something fundamental about the tectonic and climatic processes shaping the Earth by studying rock outcrops in detail.

Realizing I was intensely curious about Earth science, I began conducting research with Profs. Nicholas Christie-Blick and Sidney Hemming at Lamont-Doherty Earth Observatory (LDEO) on extension in the Death Valley region. The Death Valley area has inspired numerous models for how the Earth's crust extends, yet the exact mechanisms responsible for the region's iconic extensional morphology remain controversial. The goal of my research over three years at LDEO was to constrain the timing of slip on major range-bounding faults and test the sequence of faulting predicted by different extensional models. With an undergraduate grant from GSA, I conducted geologic mapping with Nicholas and $^{40}Ar/^{39}Ar$ geochronology in Sidney's lab on a several-hundred meter succession of tilted volcanic and sedimentary rocks in the Resting Spring Range east of Death Valley. The combination of field and geochronology data I generated suggest that the onset and magnitude of fault-related tilting in the Resting Spring Range and at nearby Sheephead Mountain are inconsistent with the "rolling hinge," an extensional model frequently advocated for in the Death Valley area. My research on the timing of extension in eastern California resulted in my senior thesis at Barnard, which received departmental distinction. A student from Wellesley College expanded upon my research at LDEO last summer, and we plan to publish a synthesis of our research in the near future.

While conducting geochronology research at LDEO, my enthusiasm for Earth science translated into a passion for geochemistry. I found (and still find) it quite amazing how much rich geologic information can be gleaned from the chemical composition of a mineral grain only tens of microns in size. After another geology trip to eastern California during my sophomore year, where I witnessed spectacular glacial landforms carved into the Sierra Nevada, I became especially fascinated with geochemical records of past climate change. That summer I participated in the NSF *Global Change and Its Impacts* REU program at UT Austin. My research with Prof. Daniel Breecker aimed to characterize the carbon isotope composition of CO_2 respired by soil microbes, a critical yet poorly quantified variable in reconstructions of atmospheric CO_2 concentrations from ancient soil carbonates. Working with another REU participant, I designed and built seven soil incubation experiments. Daniel's lab was under construction during the REU program, and I was only able to make preliminary isotopic measurements of microbe-respired CO_2 from my experiments. Nonetheless, I learned a tremendous amount about experimental design, stable isotopes, and instrument troubleshooting while helping set up the lab.

The following summer I utilized my NOAA Ernest F. Hollings Scholarship to continue conducting paleoclimate research at Princeton, building a millennial-scale geochemical record of nutrient conditions in the North Atlantic with Prof. Daniel Sigman and Dr. Robert Toggweiler. Isotope fractionation occurs when phytoplankton assimilate nitrate, causing surface ocean $^{15}N/^{14}N$ to increase with increasing nutrient consumption. The nitrogen isotope composition of foraminifera shell organic matter ($\delta^{15}N_{org}$) reflects the composition of the surface ocean and can be used as a proxy for the degree of nutrient consumption. I sampled a North Atlantic sediment core, isolated organic matter from foraminifera shells at sampled core depths using a complex chemical procedure, and then measured foraminifera shell $\delta^{15}N_{org}$. The resulting paleonutrient record I generated suggests that nutrient consumption in the high-latitude North Atlantic was less robust during the last glacial period than today, which contradicts a key assumption in one popular hypothesis for atmospheric CO_2 drawdown during the last glacial period.

Career goals and current research: In between UT Austin and Princeton I spent a semester sailing across the equatorial Pacific on a two-mast tall ship. I found many moments to reflect on my life experiences and aspirations for the future, especially while standing lookout, alone except for the rolling black seas and star pocked sky surrounding me. During those moments I came to a resounding decision: I wanted to earn my Ph.D. in geochemistry and use my expertise to address basic outstanding questions about the geomorphic, tectonic, and climatic processes shaping the Earth's surface, both during my Ph.D. and in the future as a professor. As Ph.D. student at UC Berkeley, I am doing just that. Working with Prof. David Shuster and Dr. Greg Balco of the Berkeley Geochronology Center (BGC), I am developing a new Earth surface thermochronometer using cosmogenic noble gases that will potentially bridge the gap between relative climate proxies and absolute temperature in the past (see Graduate Research Statement).

It is imperative to me as I move forward with my career that my research have breadth, because to understand the dynamic Earth requires a dynamic, multi-directional approach. To that end, I am also conducting research on landscape evolution of the Tibetan Plateau as part of my Ph.D. The Himalayan-Tibetan orogen is the archetypal example of a continent-continent collision, yet much about the dynamics of collision and evolution of the resulting plateau remain poorly understood. One major outstanding question is how Tibet keeps its edge; that is, why haven't rivers incised further and more deeply into the plateau, eroding away the plateau boundary? I am exploring this paradox using low-temperature thermochronometry to determine when externally drained rivers propagated into the southeastern plateau, generating regional km-scale relief. I spent five weeks in southeastern Tibet this past summer with another Ph.D. student collecting samples of granite bedrock along 1 km vertical transects. I am conducting $^4He/^3He$ and (U-Th)/He thermochronometry on apatite crystals from the granites and using these data to inversely model cooling paths for the rocks. Apatite $^4He/^3He$ and (U-Th)/He thermochronometry are sensitive to the thermal disturbance of km-scale relief development and thus should provide insights into when the fluvially-incised valleys in southeastern Tibet formed.

In preparation for my qualifying exam at Berkeley, I am also conducting a secondary research project with Prof. Nicholas Swanson-Hysell to develop a marine strontium isotope record for the early Neoproterozoic Tambien Group in northern Ethiopia. Marine Sr isotopes reflect changes in the relative fluxes of crustal (e.g. continental weathering) and mantle-derived (e.g. alteration of oceanic basalts) Sr to the ocean, and thus are commonly invoked to draw causal connections between the dramatic environmental, biologic, tectonic events characterizing the Neoproterozoic Era. However, hypotheses connecting the Neoproterozoic marine Sr record to process are limited by a lack of information about rates of isotopic change. The presence of volcanics in the Tambien Group provides an exceptional opportunity to surpass this limitation. I am working to chemically isolate and measure the Sr isotope compositions of carbonate samples I collected with Nicholas in Ethiopia last January. With rates of Sr isotopic change constrained by geochronology on volcanic samples, I will use my high-precision Sr isotope record to test predicted changes from another Ph.D. student's climate-tectonic-biogeochemical model.

Broader impacts: I firmly believe that the best science is science that is openly communicated, as often and with as many people as possible. I have attended seven professional meetings, presenting three talks and four posters on both my undergraduate and graduate research. I have also given talks at the NOAA headquarters, LDEO, UT Austin, and UC Berkeley. Currently I organize a weekly seminar series for graduate students my department to share their research with one another. My research on North Atlantic nutrient conditions was published in *Paleoceanography* earlier this year (Straub *et al.* 2013), and I am actively preparing three manuscripts about my graduate research on both cosmogenic noble gases and Tibet.

Early exposure to field geology and geochemistry catalyzed my passion for Earth science and desire to pursue a Ph.D. I hope to provoke the same excitement for Earth science in others through teaching. I began teaching as an undergraduate, leading part of a spring break geology class my junior year and as a teaching assistant for *Solid Earth*, an introductory geology course. I also served as president of the Columbia University Hiking Club for two years, which gave me tremendous experience organizing and leading groups of students in the outdoors. I utilized these teaching and leadership skills at Berkeley as a teaching assistant for *General Geochemistry* last spring. I plan to be a teaching assistant several more times at Berkeley, including for a weeklong California field geology course for undergraduates. I look forward immensely to developing my own geochemistry and undergraduate field courses as a professor in the future.

I am equally committed to sharing my research and passion for Earth science with audiences outside of academia through hands-on, interactive teaching. At LDEO, I helped create an interactive display for the annual open house to demonstrate how a geochronology sample transforms from a whole rock to a single grain that is analyzed on the mass spectrometer. I led dozens of visitors from the community through this display and on tours of Sidney's lab. I intend to organize a similar open house at the BGC, where I will be doing the majority of my Ph.D. research and where no such public outreach happens at present. Along with several other graduate students in my department, I have also designed hands-on experiments about plate tectonics and brought these experiments to middle schools in Oakland through a program called Bay Area Scientists in Schools (BASIS). Over the next year I will take on leadership of my department's BASIS activities, and I am excited to incorporate new curriculum related to my research and more frequent school visits into the program.

As the first woman in my family to earn a college degree, let alone pursue her Ph.D., I am acutely aware of the need to support and encourage underrepresented groups in Earth science. Since last spring I have been advising two female students in my department who transferred from community college, helping them navigate the transition to Berkeley and make decisions about summer research and post-graduation plans. I also mentored an undergraduate research intern last summer through Berkeley's New Experiences for Research & Diversity in Science (NERDS) program. My intern Sarah, who conducted petrographic analyses on carbonate samples from Ethiopia, had no research experience and little academic background at the start of her internship. I worked closely with Sarah all summer to teach her about mineralogy and Earth history while exposing her to the scientific process, providing guidance on everything from developing a hypothesis to drafting a research poster. I was touched when the NERDS program named me Outstanding Graduate Student Mentor at the end of Sarah's internship, and I will mentor interns through NERDS in upcoming summers. I intend to continue engaging underrepresented groups in all of the initiatives I pursue during my scientific career, helping build gender and ethnic diversity in the Earth sciences.