

Meet the Scientists of DUST²!



Jeff Munroe



Kelly Kerry



Sebastian Hoch



Greg Carling



Kendra Caskey



Sarah Chan



Dayvon Woodard



Otto Lang



Maura Hahnenberger



Julianne Liu

Jeff Munroe, PhD

Professor, Geology, Middlebury College

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Why did you become a scientist?

I've always been fascinated by mountain landscapes. Studying geology gave me the tools to understand why these landscapes look the way they do, how they evolve over time, and how their modern properties preserve evidence of past landscape changes. I love how being a scientist rewards creativity when developing new ideas, new hypotheses to test, new tools for analyzing samples, and new techniques for interpreting results. I also appreciate how relevant Earth science is to society, and am energized to explain and demonstrate that relevance to students and the public.



What do you study for DUST²? Why is this important?

I study how dust deposition over long time periods impacts the development of mountain soils. Soils in the mountains tend to be cold, thin, and stony; it's a tough environment! But, at the same time, many mountain soils are surprisingly fertile and loaded with nutrients. These don't come from the underlying rock; they are delivered by dust. Understanding that process is the key to understanding how soils serve as the foundation to mountain ecosystems.

What do you do day-to-day in your work?

I spend a lot of time in the field, which means living in a tent, hiking to field sites, carrying equipment, and dealing with a host of challenges. After fieldwork, I'm in the lab, analyzing the mineralogy and geochemistry of soil and dust samples. I also teach college classes on environmental geology, mountain environments, and other related topics. And I'm always busy advising students on projects at the intersection of their interests and my research.

What is your favorite part of what you do and why?

I truly enjoy being in the field. The opportunity to spend time immersed in the areas I'm studying is something I find endlessly rewarding. And I've always felt that the deeper my connection to a place, the more complex and interesting questions I can ask about it.

What advice do you have for students interested in science?

It seems cliché, but follow your passion. Find what you love, and make it the center of what you do.

Discover more DUST² Scientist Spotlights here: <https://criticalzone.org/dust2/scientistspotlights>



Kerry Kelly, PhD

Associate Professor, Chemical Engineering,
University of Utah

LinkedIn: <https://www.linkedin.com/in/kerry-kelly>



Why did you become a scientist?

I like solving problems, particularly problems that people care about (like air quality in Utah). In high-school I realized the need to have a career that would support me and my family, so I chose engineering.

What do you study for DUST²? Why is this important?

I use low-cost sensors to understand where dust comes from and where it goes. My team and I have put sensors on buildings, school athletic fields, and even drones to take measurements of pollution in Salt Lake City and around Utah. Understanding where dust and pollution are can help people take care of their health.

What do you do day-to-day in your work?

I spend part of my day meeting with students and teaching class, which is generally fun. I spend part of my time organizing research projects. Being a professor is a lot like running a small business. I have to find money, hire and manage people, and hopefully do some fun research.

What is your favorite part of what you do?

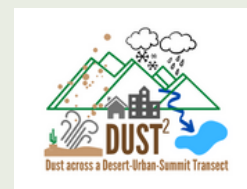
I like seeing my students succeed.

What advice do you have for students interested in science?

It is never too late. I took a non-traditional path to my PhD, and I think the somewhat random skills I developed along the way helped me.



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Sebastian Hoch, PhD

Research Associate Professor,
Atmospheric Sciences, University of Utah

Why did you become a scientist?

I always enjoyed nature. A great chemistry teacher in high school set a hook with a simple experiment.

What do you study for DUST²? Why is this important?

I'm running a research site where I measure the conditions of a drying lake bed, saltation (*when small particles bounce along the surface and break dust particles loose*), and airborne dust concentrations.

This is important to better understand under what meteorological and surface conditions the lakebed surface is prone to emit dust. The parameters measured can be used to guide parameters used in numerical dust emission models.



What do you do day-to-day in your work?

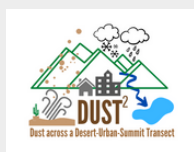
My work is a mixture of field work and work with instrumentation, data analysis and interpretation, and teaching and mentoring.

What is your favorite part of what you do and why?

I love being outside during a field campaign, extending the observations beyond the scientific measurements to all senses.

What advice do you have for students interested in science?

Observe nature and be inquisitive - try to understand what your observations tell you.



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Greg Carling, PhD

Professor, Geological Sciences,
Brigham Young University

Faculty Page:

<https://geology.byu.edu/directory/greg-carling>



Why did you become a scientist?

I became interested in geology during my 8th grade earth science class. I never planned on being a "scientist" but started taking geology classes during my freshman year of college and never looked back. As I was finishing up my master's degree in geology, my advisor encouraged me to pursue a PhD. By that point, I loved doing research and thought that a PhD might lead to a fun career that would allow me to make a difference in the world. My geology career has been great so far, even better than expected!

What do you study for DUST²? Why is this important?

I study the impact of dust on air quality and water quality. This is important because it affects our health and the health of the environment.

What do you do day-to-day in your work?

I spend most of my time teaching classes, meeting with students, and doing research. The research part includes field work to collect dust and water samples, lab work to analyze the samples, and data analysis. I work with students to try to publish our results in scientific journals.

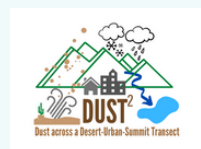
What is your favorite part of what you do and why?

I love discovering new things, especially if it somehow helps our planet. I also enjoy watching my students succeed in their research projects and start their own careers.

What advice do you have for students interested in science?

Find something that interests you and go for it. This is especially a great thing to study if you love being outdoors.

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Kendra Caskey, MS

Master's Student, Geological Sciences,
Brigham Young University

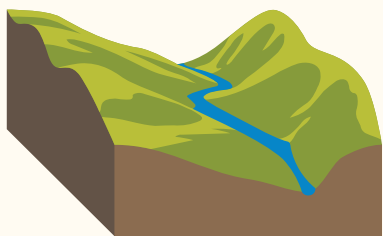
Why did you become a scientist?

I became a scientist because I was always curious about the world around me. My love for science began in high school when I took physics classes, and I was amazed to learn about the mechanisms that control our world. When someone suggested I take geology, I became more fascinated with environmental issues and how we can better help our world around us.



What do you study for DUST²? Why is this important?

I study dissolved and particulate trace metals in the Provo River, which is a snow melt dominated stream in Utah. This is important as metals in water can affect the water quality for drinking.



What do you do day-to-day in your work?

I drive to the mountains and take water samples of the river in specific locations. In the lab, I acidify these samples and filter some, and I use different machines to analyze for trace metals, isotopes, and anions. I also do data analysis to find trends in our data and come up with a story that this data is telling us.

What is your favorite part of what you do and why?

My favorite part is the field work I get to do. I love being able to go outside and have a hands on experience with the project that I am working on and enjoying the beautiful aspects of nature.

What advice do you have for students interested in science?

Communicate with professors and other scientists as much as you can; they can be your biggest help. I would also learn to love what you are doing and to practice writing as much as you can.

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Sarah Chan, PhD

PhD Student, Plant and Wildlife Sciences,
Brigham Young University

Why did you become a scientist?

I became a scientist because there is nothing more interesting to me than the natural world. I love being able to explore my questions about our planet by performing experiments and analyzing results. Science is the perfect field for someone who's curious about the way things work, and who wants to know more about why nature behaves the way that it does.



What do you study for DUST²? Why is this important?

I study the microbiome of dust. I take dust samples and examine all the bacteria in them, then use those bacteria to generate a fingerprint. That fingerprint can then be used in the future to tell us where dust is coming from when it lands somewhere.

What do you do day-to-day in your work?

Every day is different depending on what kind of research I'm doing. I might be in the lab filtering samples or extracting DNA, in the field performing an experiment or collecting more dust, or at a desk analyzing data and writing about my results.



What advice do you have for students interested in science?

If you're interested in the environment, learn as much as you can! There is always more to know about our world, and the more you learn, the more you'll be able to figure out what new things YOU can discover.

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Otto Lang, PhD



PhD Candidate, Geography,
University of Utah

Why did you become a scientist?

I grew up in southern Idaho doing a lot of outdoor activities which inspired me to study geology. I always really wanted to understand why landscapes are what they are and how they evolve over human and geologic timescales. As I observed changes in our environment later on, I wanted to study something that would help us better manage our changing climate.

What do you study for DUST²? Why is this important?

I study how dust darkens snow, which causes it to melt earlier and faster. Throughout Utah and the Intermountain West, we are very dependent on our snowpack for water, especially in the summer months when we rely on our reservoirs to have stored the season's snowmelt. When snow is gone earlier, it can stress vegetation and make it more difficult to manage reservoirs. I work to incorporate the dust-on-snow effect into models which forecast when the snowpack will melt so that we can better optimize our water resources.



What do you do day-to-day in your work?

I do a combination of field work, lab work, remote sensing data analysis, and modeling. In the field I measure snow properties by digging snow pits and collecting samples of dust layers which I analyze in the lab. These field data, along with satellite observations, inform my modeling efforts where I quantify the impact of dust on snow.

What is your favorite part of what you do?

I love doing field work. It gets me outside and allows me to observe the processes I study first hand.

What advice do you have for students interested in science?

Study something you feel a personal connection with and are passionate about. Don't be afraid to reach out to others.



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Dayvon Woodard

Undergraduate Student, Geological Sciences,
CUAHSI, Western Kentucky University

LinkedIn: www.linkedin.com/in/dayvonwoodard

Why did you become a scientist?

From an early age, I have always wanted the world to heal and become better, and what better way to heal the Earth than to learn about it through the sciences. Through my hands on experience on my college campus and at Brigham Young University (BYU) this summer, I gained the knowledge needed to consider myself an up-coming scientist that will mold the world for the better.

What do you study for DUST²? Why is this important?

I was awarded an REU internship (Research Experience for Undergraduates through the National Science Foundation) this summer at BYU, working with Dr. Greg Carling on his Fingerprint Dust Tracing project. We received data from 200+ samples and I researched possible health effects and correlations between the surrounding populations and chemical elements found in the samples.



What do you do day-to-day in your work?

In the Fingerprint Dust Tracing project, my day-to-day life consisted of weighing samples, perform acid digestion, using a particle analyzer, and a plethora of other activities. I was also able to travel to many different land-use sites in Nevada and Utah.

What is your favorite part of what you do and why?

My favorite part of what I do is gaining new information and adding it to my day-to-day life. Also, I like sharing it with the public who will then know more about what we do as scientists.

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Maura Hahnenberger, PhD

Associate Professor, Earth and Environmental Sciences,
Salt Lake Community College

X: @DrMaura_Science



Why did you become a scientist?

I've loved science and nature since I was a kid, but wasn't sure what type of science I wanted to do. I'm also a performing artist, and, while watching TV one day, I saw a TV meteorologist. I thought, what a perfect job: I can be a performer and a scientist! That's what got me into studying weather. But, once I learned more about about being on TV, I decided that teaching and research were more in line with my interests.

What do you study for DUST²? Why is this important?

I lead the atmospheric dust transport part of DUST², which includes figuring out where dust is coming from, what weather conditions make it move, and how it impacts air quality where people live. Understanding this helps forecast dust storms and lets people know when the air might be hazardous to breathe.

What do you do day-to-day in your work?

As a professor, I teach and work with students in environmental sciences and other majors. I do research, too, which involves analyzing datasets on a computer and creating graphs and charts that help people understand how dust transport is changing. I also serve on organizations helping women to succeed in careers in science and higher education.



What is your favorite part of what you do and why?

I love helping students succeed and discovering new scientific insights. I love working with students in my classes and helping them move on to fulfill their goals at other universities and getting science jobs. I also really love doing science (particularly with students) and then sharing that science with other and conferences and events.

What advice do you have for students interested in science?

Figure out how the science you love connects to your everyday life and share it with others. We learn the most by teaching, so share your passions with your family and friends!



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Julianne Liu

DustKids Outreach Coordinator,
Salt Lake Community College



Why did you become a scientist?

In high school, I became really interested in learning about the climate crisis, both the science behind it and the social movements attached to it. I first had the opportunity to take classes about these subjects at the University of Utah, where I also found my passions for environmental justice and science communication. Being able to talk about science with people from all ages and backgrounds brings the research that scientists are doing in the field or lab to everyone's everyday experiences, which is what led me to pursue and enjoy doing outreach!



What do you do for DUST^2? Why is this important?

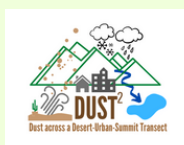
I help run the DustKids program with one of the DUST^2 researchers, Dr. Maura Hahnenberger. We work with after school programs to teach students about the different aspects of the dust cycle with hands-on science activities. Dust has always been prevalent in our lives and landscapes, and will continue to be in the years to come, but it's not often talked about. Sharing this science with students helps bridge connections between people and their surroundings.

What do you do day-to-day in your work?

Most of the time, I'm in the classroom to facilitate DustKids lessons. I occasionally go into the field to collect samples for us to use in our activities or table at outreach events to talk about the dust cycle and how it affects people and the environment. I also help design the lessons and create resources (like this!) for teachers to use in their schools.

What is your favorite part of what you do and why?

My favorite part of doing outreach is watching people get excited about dust and science more broadly. It's fun and interesting to look at oolitic sand through a microscope, and it's even more fun to teach someone else how to do it and talk together about why it matters.



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DUST² is a group of scientists who research dust from source to sink in the southwestern US.

Learn more here:

<https://criticalzone.org/dust2>