KATHLEEN T. GRANT

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EDUCATION

University of Southern California   Los Angeles, CA
Doctor of Philosophy, Earth Sciences   Expected Aug. 2025
University of Colorado at Boulder   Boulder, CO
Bachelor of Arts, Geological Sciences   May 2016

RESEARCH POSITIONS

NASA JPL Research Affiliate (2023-Present)

Earth Surface Mineral Dust Source Investigation (EMIT) Science Team Affiliate (2021-Present)

NASA JPL Visiting Student Researchers Program (2022-2023)

NASA JPL Year Round Internship Program (2021)

USC Graduate Student Researcher (2019-Present)

AWARDED GRANTS

JPL Strategic University Research Partnership (SURP) Program (2022-2025). Title: Detecting toxic metal contamination through imaging spectroscopy. Co-PI: K. Dana Chadwick, Role: JPL Scientist. Co-Investigator: A. Joshua West, Role: USC Sr. Scientist, Co-Investigator: **Kathleen Grant**, Role: USC PhD Candidate, amount: $60,000 annually

AWARDS

NASA Group Achievement Award (2023). I received this NASA Honor Award as part of a team that achieved "outstanding group science accomplishment leading to the success of Earth Surface Mineral Dust Source Investigation (EMIT) mission using innovative imaging spectroscopy." NASA Honor Awards (2023).

PUBLICATIONS

Grant, K., et al., Wavelength investigation for the remote detection of foliar metal toxicity. Remote Sensing of Environment. (in prep)

Grant, K., et al. Mapping global quartz and feldspar abundance with grain size information using combined VSWIR-TIR data. Geophysical Research Letters. (in prep)

Chadwick, K. D., et al., (inc. **Grant, K**). Unlocking Ecological Insights from Subseasonal Visible-to-Shortwave Infrared Imaging Spectroscopy: The SHIFT Campaign. *Ecosphere.* (under revision)

Thompson D. R, et al., (inc. **Grant, K**). On-orbit calibration and performance of the EMIT imaging spectrometer. Remote Sensing of Environment. 2024. https://doi.org/10.1016/j.rse.2023.113986

Green RO, Mahowald N, Thompson DR, Ung C, Brodrick P, Pollock R, Bennett M, Lundeen S, Joyce M, Olson-Duvall W, Oaida B., et al. Performance and early results from the Earth surface mineral dust source investigation (EMIT) imaging spectroscopy mission. In 2023 IEEE aerospace conference. 2023. doi: 10.1109/AERO55745.2023.10115851

Okin, G. S., Brodrick, P.G., Keebler, A., Ehlmann, B.L., Mahowald, N., Miller, R.L., (key team member **Grant, K.)**. Earth Surface Mineral dust source InvesTigation (EMIT): EMIT L3 Algorithm: Aggregated Mineral Spectral Abundance Theoretical Basis. https://lpdaac.usgs.gov/documents/1801/EMIT_L3_ATBD_V1.pdf

Chadwick, K. D., Brodrick, P. G., **Grant, K.,** Goulden, T., Henderson, A., Falco, N., Wainwright, H., Williams, K.H., Bill, M., Breckheimer, I., Brodie, E.L., et al. Integrating airborne remote sensing and field campaigns for ecology and Earth system science. Methods in Ecology and Evolution. 2020. https://doi.org/10.1111/2041-210X.13463

PUBLISHED DATASETS

Queally, N., F.W. Davis, K.D. Chadwick, et al. (2023). SHIFT: Vegetation Plot Characterization, Santa Barbara County, CA, 2022. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/2295

Queally, N., F.W. Davis, K.D. Chadwick, et al. (2024). SHIFT: Vegetation Plot Photos, Santa Barbara, CA, USA, 2022. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/2334

Chadwick, K. D., **Grant, K.,** Henderson, A., Breckheimer, I., Williams, C. F., Falco, N., ... & McCormick, M. (2020). Locations, metadata, and species cover from field sampling survey associated with NEON AOP survey, East River, CO 2018. Environmental System Science Data Infrastructure for a Virtual Ecosystem; Watershed Function SFA. doi: 10.15485/1618130

Chadwick, K. D., **Grant, K.,** Henderson, A., Scott, A., McCormick, M., Pierce, S., ... & Maher, K. (2020). Leaf mass per area and leaf water content measurements from field survey in association with NEON AOP survey, East River, *CO 2018*. Environmental System Science Data Infrastructure for a Virtual Ecosystem; A Multiscale Approach to Modeling Carbon and Nitrogen Cycling within a High Elevation Watershed. doi: 10.15485/1618132

Chadwick, K. D., **Grant, K.,** Bill, M., Henderson, A., Scott, A., & Maher, K. (2020). Site-level Foliar C, N, delta13C data from samples collected during field survey associated with NEON AOP survey, East River, CO 2018. Environmental System Science Data Infrastructure for a Virtual Ecosystem; A Multiscale Approach to Modeling Carbon and Nitrogen Cycling within a High Elevation Watershed. doi:10.15485/1631278

Chadwick, K. D., Brodrick, P. G., **Grant, K.,** Goulden, T., Henderson, A., Bill, M., ... Maher,K. (2020): NEON AOP foliar trait maps, maps of model uncertainty estimates, and conifer map, East River, CO 2018. A Multiscale Approach to Modeling Carbon and Nitrogen Cycling within a High Elevation Watershed. doi:10.15485/1618133

INVITED PRESENTATIONS & SEMINARS

Grant, K., et al. 2024. Detecting toxic metal contamination through imaging spectroscopy. 2024 *NASA Jet Propulsion Laboratory Annual Poster Conference, Pasadena, California.*

Grant, K., et al. 2024. Detecting toxic metal contamination through imaging spectroscopy. University of Southern California, Guest Lecture for GEOL 165: Metals and Life on Earth, *Virtual.*

Grant, K., et al. 2024. Detecting toxic metal contamination through imaging spectroscopy. Santa Clara University, *Santa Clara, California.*

Grant, K., et al. 2024. Detecting toxic metal contamination through imaging spectroscopy. University of Southern California Paleo/Environmental Seminar, *Virtual.*

Grant, K., 2024. Panelist at University of Southern California's Society for Earth Science Students Career Event, *Virtual.*

Grant, K., 2024. Panelist at University of Southern California's PhD Academy Grant Writing Fundamentals Event, *Virtual.*

Grant, K., et al. 2023. Detecting toxic metal contamination through imaging spectroscopy. 2023 *NASA Jet Propulsion Laboratory Annual Poster Conference, Pasadena, California.*

Grant, K., et al. 2022. Quartz and Feldspar: Ready for Earth System Models. 2022 *EMIT Science Team Meeting, NASA Jet Propulsion Laboratory, Chicago, Illinois.*

Grant, K., et al. 2022. Quartz and Feldspar Handoff to Earth System Modelers. 2022 *EMIT Science Team Meeting, NASA Jet Propulsion Laboratory, Cape Canaveral, Florida.*

Grant, K., et al. 2022. Remotely Retrieving Quartz and Feldspar Distributions. Eat Learn Grow Series*, NASA Jet Propulsion Laboratory, Virtual.*

Grant, K., et al. 2022. Global Quartz and Feldspar Distributions. 2022 *EMIT Science Team Meeting, NASA Jet Propulsion Laboratory, Cape Canaveral, Florida.*

Grant, K., et al. 2022. Quenching the Quartz Quandary: Grain Size Edition. Eat Learn Grow Series*, NASA Jet Propulsion Laboratory, Virtual.*

Grant, K., et al. 2022. Quenching the Quartz Quandary: Quartz and Feldspar Edition. 2022 *EMIT Science Team Meeting, NASA Jet Propulsion Laboratory, Virtual.*

Grant, K., et al. 2022. Quenching the Quartz Quandary Part (1/X). Weekly *EMIT Science Team Meeting, NASA Jet Propulsion Laboratory, Virtual.*

Grant, K., et al. 2021. NEON Hyperspectral Ground Campaign. ESS-DIVE *Community Data Workshop, Lawrence Berkeley National Lab, Virtual.*

SELECTED PRESENTATIONS

Grant, K., et al., 2024. Mapping global quartz and feldspar abundances and grain sizes using integrated VSWIR and TIR data. NASA CORE 2.0 Earth Surface and Interior Solid-Earth Team Meeting, *Washington D.C..*

Grant, K., et al., 2024. Detecting toxic metal contamination through imaging spectroscopy. Surface Biology and Geology Technical Interchange Meeting, *NASA Headquarters, Washington D.C..*

Eckert, R., Kuehnle, H., Thompson, D.R., Brodrick, P.G., Chadwick, K.D., **Grant, K.,** Helmlinger, M., Jensen, D., Kokaly, R., Pavlick, R., Schneider, F., Green, R.O., 2024. Investigating Pseudo-Invariant Targets in SHIFT Time-Series Spectroscopy. *EARSeL Valencia, Italy.*

Grant, K., Chadwick, K.D., Brodrick, P.G., Maher, K., Lawrence, C., West, A.J., 2023. Linking remotely sensed foliar expressions of metal toxicity to various levels of chemical association with the soil matrix. *American Geophysical Union Fall Meeting, San Francisco, CA.*

Brodrick, P.G., Green, R.O., Thompson, D.R., Mahowald, N.M., Clark, R.N., Swayze, G.A., Kokaly, R.F., Meyer, J.M., Ochoa, F., Okin, G.S. and **Grant, K.,** 2023. The Earth Surface Mineral Dust Source Investigation (EMIT): Global Distributions of Minerology in Arid Lands. *American Geophysical Union Fall Meeting, San Francisco, CA.*

Grant, K., Mahowald, N.M., Miller, R.L., Perez Garcia-Pando, C., Ageitos, M.G., Li, L., Thompson, D.R., Green, R.O., Kokaly, R.F., Hubbard, B.E., West, A.J., Brodrick, P.G., 2022. Remotely Sensed Retrievals for Fractional Abundance of Quartz and Feldspar to Assess the Influence on Radiative Forcing in Earth System Models. *American Geophysical Union Fall Meeting, Chicago, IL.*

Brodrick, P.G., Ochoa, F., Okin, G.S., Thompson, D.R., **Grant, K.,** Ben Dor, E., Chadwick, D., Clark, R.N., Ehlmann, B.L., Fischella, M. and Ginoux, P.A., 2022. Global Distributions of Fractional Cover in Arid Lands: Early Analyses from NASA's Earth Surface Mineral Dust Source Investigation. *American Geophysical Union Fall Meeting, Chicago, IL.*

Clark, R.N., Swayze, G.A., Brodrick, P.G., Green, R.O., Mahowald, N.M., Thompson, D.R., Ehlmann, B.L., Ginoux, P.A., Kalashnikova, O.V., Keebler, A. and Lundeen, S., 2022. Minerals and Other Materials Identification and Mapping with EMIT. *American Geophysical Union Fall Meeting, Chicago, IL.*

Ochoa, F., Brodrick, P.G., Okin, G.S., Chadwick, D., Braghiere, R.K., Davis, F.W., Eckert, R., **Grant, K.,** Kreisberg, A., Angel, Y. and Lovegreen, P., 2022. Quantifying the uncertainty and error retrievals between field methods for deriving fractional ground cover in arid lands. *American Geophysical Union Fall Meeting, Chicago, IL.*

Green, R.O., Mahowald, N.M., Thompson, D.R., Clark, R.N., Ehlmann, B.L., Ginoux, P.A., Kalashnikova, O.V., Keebler, A., Miller, R.L., Okin, G.S. and Painter, T.H., 2022. First Imaging Spectroscopy Observations and Early Science from the NASA Earth Surface Mineral Dust Source Investigation. *American Geophysical Union Fall Meeting, Chicago, IL*

Thompson, D.R., Green, R.O., Mahowald, N.M., Clark, R.N., Ehlmann, B.L., Ginoux, P.A., Kalashnikova, O.V., Miller, R.L., Okin, G.S., Painter, T.H. and Pérez García-Pando, C., 2022. The Earth Mineral dust source InvesTigation (EMIT): Instrument Performance and Initial Results. *American Geophysical Union Fall Meeting, Chicago, IL.*

Lawrence, C.R., Williams, E.K., Chadwick, K.D., **Grant, K.,** Maher, K., 2021. Regional-Scale Soil Carbon mapping: A Case Study from the East River, Colorado, USA. *American Geophysical Union Fall Meeting, New Orleans, LA.*

Grant, K., Chadwick, K.D., Brodrick, P.G., West, A.J., Lawrence, C., Maher, K., 2021. Remote Sensing Surface Mineralogy and Foliar Metal Content to Discern Contaminant Sources Across Heterogeneous Landscapes. *American Geophysical Union Fall Meeting, New Orleans, LA.*

Grant, K., Chadwick, K.D., Brodrick, P.G., West, A.J., Falco, N., Lawrence, C., Maher, K., 2021. Mapping contaminate distributions across heterogenous landscapes through remotely sensed metal bioaccumulation. *Goldschmidt2021, Virtual.*

Powell, T., Henry, H., Bagshaw, S., Chadwick, K.D., **Denniston, K.**, Henderson, A., & Kueppers, L. M., 2019. Characterizing variability in hydraulic traits in co-occurring western subalpine conifers to improve drought response predictions. *AGUFM, 2019*, B33F-2537. **(formerly Kathleen Denniston)**

TEACHING & MENTORSHIP ACTIVITIES

University of Southern California Earth Sciences Undergraduate Apprenticeship Program (ESRAP) Mentor. University of Southern California, Summer 2023 and Spring 2023.

Teaching Assistant, GEOL 165: Metals and Life on Earth. University of Southern California, Fall 2019 and Fall 2020

Teach Assistant, GEOL 241: Energy Systems. University of Southern California, Spring 2021

UNDERGRADUATE & POSTGRADUATE MENTEES

Lauren Hechinger, University of Southern California

Angie Vasquez, University of Southern California

Eric Wilderman, University of Colorado at Boulder

WORK EXPERIENCE

Stanford University   Stanford, CA
Life Sciences Research Professional – Department of Earth System Science   June 2018 to July 2019

I coordinated and completed a ground sampling campaign for foliar, litter, soil and microbial analysis that accompanied hyperspectral and LiDAR datasets collected from NEON overflights. These samples were collected over twelve areas within four watersheds of interest, for a total of 435 sampling sites. Among other responsibilities, I ran a variety of assays to determine foliar, litter, root and soil compositions. The assays over which I had responsibility includes:

- Total C, N, and 13C on an Elemental Analyzer and Picarro Isotope Analyzer
- Nitric acid digests for micronutrient determination on Inductively Coupled Optical Emission Spectrometry
- Nitric acid digests for micronutrient determination on Inductively Coupled Mass Spectrometry

The May Institute   Santa Cruz, CA
Instructor – The Bay School   August 2017 to May 2018

I served as a one-on-one instructor for children on the low-functioning end of the autistic spectrum. The Bay School employs the latest applied behavioral analysis treatments and research findings to produce measurable and lasting improvements in the lives of children with autism. My role included:

- Daily collection of quantitative data relating to the development of individual students
- Created curriculum for individual students

Carnegie Institution for Science   Stanford, CA
Laboratory Technician – Department of Global Ecology   October 2016 to August 2017

I was employed at the Department of Global Ecology, Carnegie Institution for Science, located on the Stanford University campus, where I served as a laboratory technician in the Asner Lab. During my time at the Carnegie Institution, I build upon my skillset from undergraduate work and ran a wide variety of assays to determining foliar chemical compositions. In addition, at the Carnegie Institution, I obtained training on overall laboratory safety and conduct, communicated and cooperated with colleagues, and provided some general administrative support. The assays over which I had responsibility includes:

- Total C, N, and 13C on an Elemental Analyzer and Picarro Isotope Analyzer
- Nitric acid digests for micronutrient determination on Inductively Coupled Optical Emission Spectrometry
- Nitric acid digests for micronutrient determination on Inductively Coupled Mass Spectrometry
- Phenol and tannin content
- Chlorophyll and carotenoid extractions
- Carbon Fractions
- Extractions of exchangeable cations
- Oxalate extractable phosphorus, iron and aluminum for determination with Inductively Coupled Optical Emission Spectrometry

ADDITIONAL INFORMATION

Applications:	ArcGIS, qGIS, Python, RStudio, Julia, e-Cognition, Idrisi, PHREEQC, MATLAB, Adobe Creative Suite
Hardware:	Elemental Analyzer and Picarro Isotope Analyzer, Inductively Coupled Plasma Mass Spectrometer, Inductively Coupled Plasma Optical Emission Spectrometer, MARS Microwave Digestion System, Metrohm Ion Chromatograph, HCl Evaporator, UV-Vis Spectrophotometer, 200/220 fiber analyzer, ASD FieldSpec 4 Hi-Res NG, Nicolet 860 Magna series FTIR, Thermo-Nicolet iS50 FTIR, Horiba XGT-7200 X-ray Fluorescence Microscope, Rigaku R-Axis II for X-ray diffraction
Certificates/Orgs:	NASA Transform to Open Science (TOPS) Digital Badge, PhD Academy Certificate in Communication, Leadership, and Management, USC Center for Excellence in Teaching (CET), USC's Earth Sciences Diversity, Equity and Inclusion Task Force