

## M. GRACE ANDREWS

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### EDUCATION

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- Ph.D.**, Earth and Planetary Sciences, Northwestern University 2017  
Advisor: Andrew D. Jacobson
- M.S.**, Earth and Planetary Sciences, Northwestern University 2014  
Advisor: Andrew D. Jacobson
- B.A. with distinction and honors**, Earth Sciences, Boston University 2010  
Advisor: Ethan F. Baxter

### PROFESSIONAL APPOINTMENTS

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- Visiting Academic** 2020 –  
Ocean and Earth Science, University of Southampton at the National Oceanography Centre,  
Southampton, UK
- Research Staff** 2017 –  
Leverhulme Centre for Climate Change Mitigation (LC3M)  
Sheffield, UK
- Post-doctoral Research Fellow** 2017 – 2020  
Ocean and Earth Science, University of Southampton at the National Oceanography Centre,  
Southampton, UK  
P.I.'s: Rachael James & Christopher Pearce

### RESEARCH

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- Post-doctoral Research**, University of Southampton 2017 – 2020  
Implementing and evaluating the first large-scale field tests of Enhanced Weathering as a climate  
change mitigation strategy in northern hemisphere and equatorial agricultural sites
- Graduate Research**, Northwestern University 2012 – 2017  
“Carbon cycling of glaciated landscapes on modern and geologic timescales: Investigation with  
strontium and carbon isotope geochemistry”
- Post-undergraduate Research**, Northwestern University 2010 – 2012  
“Quantification of fossil fuel derived CO<sub>2</sub> in Chicagoland water using stable carbon isotopes”
- Undergraduate Senior Thesis**, Boston University 2009 – 2010  
“Oxygen and strontium isotope zonation in a shear zone garnet: evidence for open system  
exchange”
- Undergraduate Directed Studies**, Boston University 2007 – 2009  
“Development of a TIMS Total Evaporation method for measurement of stable strontium isotope  
fractionation”

### TEACHING

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- Module Instructor**, University of Southampton 2017  
*Contemporary Topics (SOES6001)*; An upper level undergraduate and masters level course. Staff  
members ask questions about topics in the geosciences presently under debate, provide key  
readings, and grade presentations and reports. My module: “Controls on long-term climate”
- Teaching Certificate Program**, Northwestern University 2015 – 2016  
A program that prepares participants for university-level teaching through seminars and  
workshops. Participants also receive mentoring and discipline-specific direction as they build and  
implement a university-level course.

**Teaching Assistant**, Northwestern University 2013 – 2016  
*Earth Systems Revealed (Earth 201)*; An undergraduate level, introductory geology course that combines combination lecture, lab, and fieldwork. Duties included weekly lab instruction and field instruction.

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#### SERVICE

**G3 (Geology, Geochemistry and Geophysics) Seminar organizer**, 2018 – 2019  
 National Oceanography Centre Southampton

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#### GRANTS AND FELLOWSHIPS

**Geologists' Association Research Award**, Geologists' Association 2017  
**Goldschmidt Travel Grant**, NSF 2016  
**Takken Student Research Presentation Travel Award**, Association for Women Geoscientists 2016  
**Goldschmidt Travel Grant**, NSF 2010  
**UROP Conference Participation Award**, Boston University 2010

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#### AWARDS

**Horace A. Scott Graduate Award for Outstanding Research**, 2016  
 Earth and Planetary Sciences, Northwestern University  
**Marion Sloss Award for Outstanding Graduate Teaching Assistant**, 2016  
 Earth and Planetary Sciences, Northwestern University  
**Departmental Prize for Excellence in Earth Science**, Earth Science, Boston University 2010

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#### COLLABORATIONS

**Oman Drilling Project**, Phase 2 Science Party 2018  
**Kangerlussuaq International Research Network (KAIRN)** 2016  
 Organizers: Jasmine Saros (University of Maine) and John Anderson (Loughborough University)

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#### INVITED TALKS

**University of Sheffield**, LC3M Annual Meeting 2017 - 2020  
**Geological Society of London**, Lyell Meeting, *Keynote* 2019  
**University of Minnesota Twin Cities**, Dept. of Earth Sciences 2019  
**University of Illinois at Urbana – Champaign**, Dept. of Plant Biology 2016

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#### ABSTRACTS/CONFERENCES

**Andrews, M.G.**, Epihov, D., Pearce, C.R., James, R.H., Beerling, D.J (2020) CO<sub>2</sub> sequestration by Enhanced Weathering of agricultural soils in Norfolk, UK. Fall American Geophysical Union. *Scheduled*.

James, R.H., **Andrews, M.G.**, Pearce, C.R., Jardine, G., Goring-Harford, H., Epihov, D., Masters, M., Yeong, B., and Beerling, D.J (2020) Carbon Dioxide Removal via Enhanced Rock Weathering With Agriculture in Large-Scale Field Trials. Fall American Geophysical Union. *Scheduled*.

**Andrews, M.G.**, Pearce, C.R., James, R.H., Masters, M.D., Kantola, I.B., Yeong, K.L., Hanapi, M.J., Benedick, S., Reynolds, G., DeLucia, E.H., and Beerling, D.J. (2019) Field trials of Enhanced Weathering in two contrasting climate zones. Goldschmidt Conference, Barcelona, Spain. *Invited presentation*.

**Andrews, M.G.**, Pearce, C.R., James, R.H., Masters, M.D., Kantola, I.B., DeLucia, E.H., and Beerling, D.J. (2018) Enhanced rock weathering in agroecosystem field trials, Illinois, USA. Goldschmidt Conference, Boston, MA, USA.

**Andrews, M.G.**, Jacobson, A.D., Osburn, M.R., and Flynn, T.F. (2017) Microbial CO<sub>2</sub> production at the Greenland Ice Sheet margin. Goldschmidt Conference, Paris, France. *Oral presentation*.

Jacobson, A.D., and **Andrews, M.G.** (2017) The impact of subsurface silicate weathering on the long-term C cycle. Goldschmidt Conference, Paris, France. *Oral presentation*.

**Andrews, M.G.** and Jacobson, A.D. (2016) Radiogenic and stable Sr isotope ratios as tracers of silicate and carbonate weathering in Iceland. Goldschmidt Conference, Yokohama, Japan. *Oral presentation*.

**Andrews, M.G.** and Jacobson, A.D. (2015) Seasonal variation and controls on subglacial riverine CO<sub>2</sub> concentrations from a small catchment, west Greenland Ice Sheet. Fall American Geophysical Union, San Francisco, CA, USA.

**Andrews, M.G.**, Jacobson, A.D., and Lehn, G.O. (2014) Stable strontium isotopes ( $\delta^{88/86}\text{Sr}$ ) as a tracer of Sr sources and biogeochemical cycling in two catchments draining Fiordland, New Zealand. Fall American Geophysical Union, San Francisco, CA, USA.

**Andrews, M.G.**, Baxter, E.F., Pollington, A.D., Spicuzza, M. and Valley, J.W. (2010) Oxygen and strontium isotope zonation in a shear zone garnet: evidence for open system exchange. Goldschmidt Conference, Knoxville, TN, USA.

## **PUBLICATIONS**

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Beerling D.J., Kantzas E., Lomas M.R., Wade P., Eufrazio R.M., Renforth P., Quirk J., Sarkar B., **Andrews M.G.**, James R.H., Pearce C.R., Khanna M., Koh L., Quegan S., Pidgeon N.F., Janssens I.A., Hansen J. and Banwart S.A. (2020) Potential for large-scale CO<sub>2</sub> removal via enhanced rock weathering with croplands. *Nature* 583, 242 - 248.

Kelland, M.E., Wade, P.W., Lewis, A.L., Taylor, L.L., Sarkar, B., **Andrews, M.G.**, Lomas, M.R., Cotton, T.E.A., Kemp, S.J., James, R.H., Pearce, C.R., Hartley, S.E., Hodson, M.E., Leake, J.R., Banwart, S.A., and Beerling, D.J. (2020) Increased yield and CO<sub>2</sub> sequestration potential with the C<sub>4</sub> cereal *Sorghum bicolor* cultivated in basaltic rock dust-amended agricultural soil. *Global Change Biology* 26, 3658-3676.

Griffith, E.M., Schmitt, A.D, **Andrews, M.G.**, and Fantle, M.S. (2020) Elucidating modern geochemical cycles at local, regional, and global scales using calcium isotopes. *Chemical Geology* 538, 119445.

**Andrews, M.G.** and Taylor, L.L. (2019) Combating climate change through Enhanced Weathering of agricultural soils. *Elements* 15(4).

Saros, J., Anderson, N. J., Juggins, S., McGowan, S., Yde, J., Telling, J., Bullard, J., Yallop, M., Heathcote, A., Burpee, B., Fowler, F., Barry, C., Northington, R., Osburn, C., Pla-Rabes, S., Mernild, S.H., Whiteford, E., **Andrews, M.G.**, Kerby, J., and Post, E. (2019) Arctic climate shifts drive rapid ecosystem responses across the West Greenland landscape. *Environmental Research Letters*. DOI: 10.1088/1748-9326/ab2928

**Andrews, M.G.** and Jacobson, A.D. (2018) Controls on the solute geochemistry of subglacial discharge from the Russell Glacier, Greenland Ice Sheet determined by radiogenic and stable Sr isotope ratios. *Geochimica et Cosmochimica Acta* 238, 312 - 329.

**Andrews, M.G.**, Jacobson, A.D., Osburn, M.R., and Flynn, T.M. (2018) Dissolved carbon dynamics in meltwaters from the Russell Glacier, Greenland Ice Sheet. *Journal of Geophysical Research – Biogeosciences*. DOI: 10.1029/2018JG004458

**Andrews, M.G.** and Jacobson, A.D. (2017) The radiogenic and stable Sr isotope geochemistry of basalt weathering in Iceland: Role of hydrothermal calcite and implications for long-term climate regulation. *Geochimica et Cosmochimica Acta* 215, 247 – 262.

**Andrews, M.G.**, Jacobson, A.D., Lehn, G.O., Horton, T.W., and Craw, D. (2016) Radiogenic and stable Sr isotope ratios ( $^{87}\text{Sr}/^{86}\text{Sr}$ ,  $\delta^{88/86}\text{Sr}$ ) as tracers of riverine cation sources and biogeochemical cycling in the Milford Sound region of Fiordland, New Zealand. *Geochimica et Cosmochimica Acta* 173, 284 – 303.

Jacobson, A.D., **Andrews, M.G.**, Lehn, G.O., and Holmden, C. (2015) Silicate versus carbonate weathering in Iceland: New insights from Ca isotopes. *Earth and Planetary Science Letters* 416, 132 – 142.

## OUTREACH

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- People Fixing the World**, BBC World Service 2019  
*Podcast Interview* for episode “Can capturing carbon buy us time to tackle climate change?” (Tom Colls, 11 June). A look at Carbon Dioxide Removal strategies featuring Enhanced Weathering.
- Pint of Science Festival**, Southampton, UK 2018  
*Event Host*; this three-day festival brings science to the public over a pint of beer. Housed in pubs across the city, university researchers give informal talks about their work.
- Bright Club**, Southampton, UK 2018  
*Podcast interview*; Episode 16. An in-depth conversation about the science behind the laughs of my routine for this science-based stand-up comedy club.
- Café Scientifique featuring Bright Club**, Salisbury, UK 2017  
*Comedian*; at this merger event, researchers performed stand-up comedy and hosted a Q&A with the public.
- Bright Club**, Southampton, UK 2017  
*Comedian*; this science-based stand-up comedy club combines laughs and research to educate and entertain a diverse public audience.
- Pint of Science Festival**, Southampton, UK 2017  
*Organizer*; this three-day festival brings science to the public over a pint of beer. Housed in pubs across the city, university researchers give informal talks about their work.
- STEAM Research and Design Program**, Northwestern University 2016  
*Graduate Student Mentor*; this partnership program between Evanston Township High School and NU brings high school students, interested in pursuing university STEM degrees, to shadow NU graduate students and then design their own research project.
- New York Times** 2015  
*“Climate research at the end of the world”* (Josh Haner, 26 Nov.); a look at climate research in Greenland with a spotlight on my PhD work.
- NASA Television** 2015  
*“Rising Seas: Science on the Greenland Ice Sheet”*; a profile on active scientific fieldwork in Greenland featuring an interview with me.
- Project EXCITE**, Northwestern University 2014, 2015  
*Module Presenter: “Evidence for paleoclimates through leaf margin analysis”*; EXCITE is a collaborative educational and social outreach project between NU and Evanston, IL School District. EXCITE addresses the achievement gap between minority and non-minority students by providing extracurricular opportunities in mathematics and the sciences.
- Girls Do Hack**, Adler Planetarium, Chicago, IL 2014  
*Mentor*; GDH is designed to encourage female high school students to pursue STEM careers by partnering them with female mentors in STEM fields. Together, students and mentors complete workshops designed to bolster skills needed to succeed in STEM careers.
- Research Magazine**, Boston University 2010  
*“Rock of Ages”*; a profile on my undergraduate research in the Baxter Group TIMS Laboratory at Boston University.