Miquela Ingalls

Pennsylvania State University | Department of Geosciences
ingalls@psu.edu | ingallslab.com

RESEARCH INTERESTS

Low-T stable isotope geochemistry; Chemical sedimentology & diagenesis; Geobiology; Ancient environments

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EDUCATION

The University of Chicago 2017
Ph.D. in the Geophysical Sciences
Dissertation: *Subduction and uplift of continental crust in the India-Asia collision zone: Clumped-isotope paleothermometry and paleoaltimetry of the Lhasa block, southern Tibet*

Chicago Center for Teaching Certificate Program 2016

University of North Carolina at Chapel Hill 2011
B.S. Cum Laude with Honors in Geology
Thesis: *A study of the temporal evolution of the El Capitan granite using high-precision U/Pb zircon geochronology*

PROFESSIONAL APPOINTMENTS

Assistant Professor, Department of Geosciences, Pennsylvania State University 2020-present

Barr Foundation Postdoctoral Fellow, California Institute of Technology 2018-2020

Postdoctoral Research Associate, University of Colorado, Boulder 2017-2018

Visiting Faculty, Miami University Geological Field Station (Idaho & Wyoming). June-July 2016

Physical Scientist, U.S. Geological Survey, Northern Rocky Mountain Research Center 2011

PUBLICATIONS

Accepted or In Review Journal Articles

Ingalls, M., Snell, K.E., Tools for comprehensive assessment of solid-state and water-mediated alteration of carbonates used to reconstruct ancient elevation and environments, invited contribution to *Reaching New Heights: Recent Progress in Paleotopography* issue of *Frontiers in Earth Sciences*.

Refereed Journal Articles

Ingalls, M., Blättler, C., Higgins, J., Magyar, J.S., Eiler, J., and Fischer, W.W. (2020) P/Ca in carbonates as a proxy for alkalinity and phosphate levels, *Geophysical Research Letters*, doi: 10.1029/2020GL088804.

Smith, B.P., **Ingalls, M.**, Trower, E.J., Lingappa, U.F., Present, T.M., Magyar, J.S., and Fischer, W.W. (2020) Physical and chemical controls on flat-pebble deposits: an analog from the Great Salt Lake, Utah, *Sedimentology,* doi: 10.1029/2020JF005733.

Ingalls, M., Rowley, D.B., Currie, B.S., and Colman, A.S., (2020) Reconsidering the uplift history and peneplanation of the northern Lhasa terrane, Tibet, *American Journal of Science,* 320: 479-532, doi: 10.2475/06.2020.01.

Ingalls, M., Frantz, C.M., Snell, K.E., and Trower, E.J., (2020) Carbonate facies-specific stable isotope data record climate, hydrology, and microbial communities in Great Salt Lake, UT, *Geobiology,* 18: 566-593, doi: 10.1111/gbi.12386.

Li, S., Currie, B.S., Rowley, D.B., **Ingalls, M.**, Qiu, L., and Wu, Z. (2019) Diagenesis of shallowly buried Miocene lacustrine carbonates from the Hoh Xil Basin, northern Tibetan Plateau: Implications for stable-isotope based elevation estimates, *Sedimentary Geology*, 388: 20-36, doi:10.1016/j.sedgeo.2019.05.001.

Ingalls, M. (2019) Reconstructing carbonate alteration histories in orogenic sedimentary basins: Xigaze forearc, southern Tibet, *Geochimica et Cosmochimica Acta*, 251: 284-300, doi:10.1016/j.gca.2019.02.005.

Rowley, D.B., and **Ingalls, M.,** (2017) Reply to 'Unfeasible subduction?', *Nature Geoscience*, 10: 879-880, doi:10.1038/s41561-017-0016-1.

Ingalls, M., Rowley, D.B., Currie, B.S., Olack, G., Li, S., Tremblay, M., Schmidt, J., Shuster, D., Zeitler, P., Lin, D., and Colman, A.S., (2017) Paleocene to Pliocene low-latitude high elevation of southern Tibet: Implications for tectonic models of India-Asia collision, Cenozoic climate, and geochemical weathering, *GSA Bulletin,* doi:10.1130/B31723.1.

Ingalls, M., Rowley, D.B., Currie, B.S., and Colman, A., (2016) Large-scale subduction of continental crust implied by India-Asia mass-balance calculation, *Nature Geoscience*, doi:10.1038/ngeo2806.

Currie, B.S., Polissar, P.J., **Ingalls, M.,** Rowley, D.B. and Freeman, K.H., (2016) Multiproxy paleoaltimetry of the late Oligocene-Pliocene Oiyug basin, southern Tibet, *American Journal of Science*, 316(5): 401-436.

Li, Shanying, Currie, BS, Rowley, DB, and **Ingalls, M** (2015) Cenozoic paleoaltimetry of the SE margin of the Tibetan Plateau: Constraints on the tectonic evolution of the region, *Earth and Planetary Science Letters,* 432: 415-424.

Putnam, R., AF Glazner, DS Coleman, ARC Kylander-Clark, T Pavelsky, and **M Ingalls** (2014) Plutonism in three dimensions: field and geochemical relations on the southeast face of El Capitan, Yosemite National Park, California: *Geosphere,* 11(4): 1-25.

Oral Presentations & Select Conference Activity (*invited)

***Ingalls, M.,** P/Ca in carbonate as a proxy for alkalinity and phosphate levels on early Earth, University of North Carolina at Chapel Hill, February 18, 2021.

***Ingalls, M.,** P/Ca in carbonate as a proxy for alkalinity and phosphate levels on early Earth, University of Miami, November 9, 2020.

***Ingalls, M.,** P/Ca in carbonate as a proxy for alkalinity and phosphate levels on early Earth, University of Maryland, October 30, 2020.

***Ingalls, M.,** P/Ca in carbonate as a proxy for alkalinity and phosphate levels on early Earth, Lehigh University, October 23, 2020.

Ingalls, M., Fetrow, A., Frantz, C.M., Snell, K.E., and Trower, E.J., 2020, What controls giant stromatolite formation and cessation? SEPM International Sedimentary Geosciences Congress, 26-29 April, 2020, Flagstaff, AZ (postponed).

***Ingalls, M.,** Frantz, C.M., Snell, K.E., and Trower, E.J., 2020, Leveraging the carbonate record from regional hydroclimate to microbial ecology, American Chemical Society Annual Meeting, 24-26 March, 2020, Philadelphia, PA (postponed).

Ingalls, M., Blättler, C., Higgins, J., Phelan, J., Magyar, J.S., Eiler, J., and Fischer, W.W., 2020, Carbonate-bound phosphate and Ca isotopes as measures of cation availability and relative alkalinity, American Geophysical Union Fall Meeting, 9-13 Dec., 2019, San Francisco, CA.

Ingalls, M., Snell, K., 2019, Reconstructing carbonate alteration histories and proxy fidelity in orogenic basins, International Clumped Isotope Workshop, Long Beach, CA, 26 Jan.

***Ingalls, M.,** 2019, Reconstructing carbonate alteration histories and proxy fidelity in orogenic basins, Division of Geological and Planetary Sciences, Caltech, 24 Jan.

***Ingalls, M.,** 2018, Reconstructing Earth's surface and sub-surface carbonate environments via orogenic sedimentary basins, Department of Earth and Planetary Sciences, UC Davis, 28 Nov.

***Ingalls, M.,** Rowley, D.B., Currie, B.S., and Colman, A.S., 2018, Proxy fidelity assessment critical for robust environmental and tectonic reconstructions, oral presentation at 2018 Annual Meeting, Geological Society of America, Indianapolis, IN, 4-7 Nov.

Ingalls, M., Trower, E., Frantz, C., and Snell, K., 2018, Spatial stable isotope variability in modern lacustrine carbonate: How do local processes translate to the sedimentary record?, oral presentation at the Lake Bonneville Workshop, Salt Lake City, UT, 3-5 Oct. Published Proceedings Volume: https://ugspub.nr.utah.gov/publications/misc_pubs/mp-170/mp-170-1.pdf

Ingalls, M., Trower, E., Frantz, C., and Snell, K., 2018, Spatial stable isotope variability in modern lacustrine carbonate: How do local processes translate to the sedimentary record?, oral presentation at the Goldschmidt Conference, Boston, MA, 12-17 Aug.

***Ingalls, M.,** 2018, Reconstructing Earth history through carbonate clumped isotopes: Ancient orogens to modern lakes, UC Berkeley Isotope Geochemistry Seminar Series.

Ingalls, M., Rowley, D.B., Colman, A.S., Currie, B.S., and Snell, K., 2017, Cryptic carbonate alteration in sedimentary basins: Saving the signal, oral presentation at the American Geophysical Union Fall Meeting, New Orleans, LA, 11-15 Dec.

***Ingalls, M.,** 2017, Reconstructing Earth history through carbonate clumped isotopes: Ancient orogens to modern lakes, California Institute of Technology, 8 November.

***Ingalls, M.,** 2017, Examining carbonate proxy fidelity: From Tibet to California, University of Colorado at Boulder, 12 October.

***Ingalls, M.,** 2017, Reconstructing Earth history through carbonate clumped isotopes: Ancient orogens to modern lakes, Penn State University, Department of Geosciences, 5 October.

***Ingalls, M.,** 2017, Low-latitude high elevation throughout the Lhasa Block, University of Kentucky Department of Earth and Environmental Sciences, 21 April.

***Ingalls, M.,** 2017, Subduction, uplift, and cryptic carbonate alteration of the Lhasa Block, southern Tibet, Western Washington University Department of Geology, 1 March.

***Ingalls, M.,** 2016, A tale of two plates: the elevation history of the Tibetan Plateau & mass balance of the Indo-Asian collision, N.C. State University Department of Marine, Earth, and Atmospheric Sciences, 30 March.

Ingalls, M., Rowley, D.B., Colman, A.S., Olack, G., Currie, B., and Li, S., 2016, Low-latitude high elevation of the leading edge of southern Eurasian throughout the Cenozoic, oral presentation at 2016 American Geophysical Union Fall Meeting, San Francisco, CA, 12-16 Dec.

Ingalls, M., Colman, A.S., and Rowley, D.B., 2016, Can we use clumped isotopes in tectonically complex regions?, oral presentation at 2016 Annual Meeting, GSA, Denver, CO, 24-28 Sept.

Ingalls, M., Rowley, D.B., and Colman, A.S., 2015, Paleocene-early Eocene high elevation of the Linzizong Arc implies large-scale subduction of continental crust during India-Asia collision, oral presentation at 2015 Annual Meeting, GSA, Baltimore, MD, 1-4 Nov.

Ingalls, M., Rowley, DB, Olack, G, and Colman, AS, 2015, Paleocene-Eocene Lhasaplano paleoaltimetry: Implications for mass balance in the India-Asia collision, presented at 2015 Goldschmidt Conference, Prague, CZ, 16-21 Aug.

Ingalls, M., 2011, A study of the temporal evolution of the El Capitan granite using high-precision U/Pb zircon geochronology, Anadarko Research Symposium: Chapel Hill, NC (thesis defense).

FELLOWSHIPS & GRANTS

US Environmental Protection Agency — Region 4 May 2021-April 2024

Grant number TBD, “Quantifying the impact of shallow wastewater injection on groundwater nutrient fluxes to surface waters in the Florida Keys National Marine Sanctuary” [$322,946]
Awarded to Miquela Ingalls

National Science Foundation – Geobiology and Low-Temperature Geochemistry July 2020-July 2022

EAR 1826805 “A predictive framework for micro-scale carbonate diagenesis: Towards more accurate reconstructions of global climate and environmental change” [$184,321]

Awarded to Miquela Ingalls and Kathryn Snell (CU-Boulder)

National Science Foundation –Sedimentary Geology & Paleobiology Sept. 2018-Aug. 2021

EAR 1826850 “Collaborative Research: Assessing the Sensitivity of High-altitude Environments to Global Increased Temperature as Recorded by Lacustrine Microbialite Carbonates” [$317,570]
Awarded to Kathryn Snell and Elizabeth Trower; M. Ingalls wrote proposal as postdoc ghost co-I

Barr Foundation Postdoctoral Fellowship, Caltech 2018-2020

Agouron International Geobiology Course geobiology research support [$1500]
2017

Association for Women Geoscientists Sand Award [$500]
2017

Agouron International Geobiology Course postdoctoral support [$4000]
2017

Sigma Xi Grants-in-Aid of Research [$1000] 2017

Geological Society of America Graduate Student Research Grants [$3800] 2015, 2017

Chicago Center for Teaching Fellowship [$3600] 2016-2017

Physical Sciences Division Undergraduate Teaching Award, nominated by students 2016

National Science Foundation Graduate Research Fellowship, Honorable Mention 2012

USGS-National Association of Geoscience Teachers Cooperative Field Training Fellowship 2011

Carolina Undergraduate Research Fellowship [$3600] 2010-2011

James Johnston Scholar of the College; UNC-Chapel Hill [full academic scholarship] 2007-2011

TEACHING

Pennsylvania State University, *Instructor*

Carbonate Seminar: Carbonate chemistry and paleoenvironments Fall 2020

Principles of Stratigraphy Spring 2021

University of Colorado, Boulder, *Co-instructor* Spring 2018

Stable Isotope Tools

- Created course material and lectured on principles of carbon, oxygen, and carbonate clumped isotope theory and applications

Chicago Center for Teaching, *Fellow* 2016-2017

- Teaching assistant for graduate course on College Teaching and Course Design; mentored 7 graduate students in designing college courses and provided feedback on practice teaching sessions and statements of Teaching Philosophy
- Created curricula on inclusive teaching in the physical and biological sciences, active teaching strategies, Constructivism, and backward course design

Miami University Geological Field Station, *Instructor* 2016

- Co-instructed a 4-week field course in geological mapping, cross section composition, and field techniques for 27 undergraduate students from across the country
- Developed students’ four-dimensional reasoning skills in the field and in the classroom

The University of Chicago

2012-2017

Teaching Assistant or Head Teaching Assistant for nine courses, including:

Evolution of the Solar System and the Earth, *Head Teaching Assistant, 1 term*

Physical Geology, *Head Teaching Assistant*, *2 terms*

- Guest lectured on plate tectonics, structural geology and crustal deformation

Global Tectonics & Structural Geology, *Teaching Assistant, 4 terms*

- Designed and implemented a structural geology lab course consisting of 9 labs and a final mapping project [received a University teaching award for this course]
- Individual Teaching Consultation through the Chicago Center for Teaching; received high praise for my execution of the observed lab period (complete evaluation available upon request)
- 90-minute lessons for ~12 upper level undergraduate and graduate students
- Discussion and problem set sessions with 1-5 students

TA First-year training, *Instructor, 1 term*

Field Geology: Death Valley & Owens Valley, CA, *Teaching Assistant and Trip Organizer, 1 term*

- Co-designed a geology field course with two UChicago faculty

Ice Age Earth, *Teaching Assistant, 1 term*

Duke Talent Identification Program, *Teaching Assistant*

2009

Science on the Appalachian Trail: Geology and Environmental Science

TECHNICAL EXPERIENCE

Isotope ratio mass spectrometry Gas Chromatography with continuous flow isotope ratio mass spectrometers (IRMS; Delta V, Thermo Scientific) Elemental Analyzer (EA) and GasBenchII; magnetic sector dual inlet IRMS (MAT253 and MAT253+, Finnigan)

Thermal ionization mass spectrometry VG Sector 54 TIMS with eight adjustable faraday cups; Radiogenic isotope geochemistry; U/Pb zircon geochronology of igneous plutons; Sr/Rb analysis of human teeth, fossils, and other biogenic materials; class 1000 and class 100 clean lab facilities; mineral separation

Analytical techniques Carbonate digestion on glass vacuum line for analyses of multiply substituted isotopologues of CO_2; Organic carbon and oxygen in biogenic and sediment samples; inorganic carbon and oxygen in carbonates from fossils, metamorphic rocks, and sediments; field emission scanning electron microscopy (Zeiss Supra35 and TESCAN LYRA3 with electron backscatter diffraction, secondary and backscattered electron detector); optical petrography and cold-cathode luminescence petrography (Technosyn cold-cathode luminiscope, Cambridge Imaging) for characterization of carbonate alteration; Secondary ionization mass spectrometry, Cameca IMS-7fGEO

Facilities

Caltech, Division of Geological and Planetary Sciences, Postdoctoral Fellow; Directors: Drs. John Eiler, Alex Sessions, Woody Fischer, and John Grotzinger (June-August 2017; August 2018-2020)

University of Colorado, Boulder, Dept. of Geological Sciences, Postdoctoral Research Associate; Directors: Drs. Katie Snell and Brett Davidheiser-Kroll (2017-present)

University of California, Santa Barbara, Dept. of Earth Sciences, Visiting Researcher; Director: Dr. Brad Hacker (November 2017)

Miami University, Center for Advanced Microscopy and Imaging, Visiting Researcher; Director: Dr. Richard Edelmann (2012, 2013, 2016)

Miami University, Dept. of Geology & Environmental Earth Science, Visiting Researcher; Directors: Drs. John Rakovan & Brian Currie (2016)

The University of Chicago, Dept. of the Geophysical Sciences, Graduate Student Researcher; Directors: Drs. Albert Colman, Gerard Olack, and Nicolas Dauphas (2012-2017)

University of North Carolina, Chapel Hill, Dept. of Geological Sciences, Undergraduate Student Researcher; Director: Dr. Drew Coleman (2007-2011)

PROFESSIONAL ACTIVITY

International Geobiology Course—Caltech, Agouron 2017

Secondary Ion Mass Spectrometry Workshop—Arizona State University, Tempe, AZ 2017

Geological Society of America Short Courses
Organic and stable isotope geochemistry in the 21st century 2016
Strabospot for Sedimentary Field Geology 2018
Building Future Faculty Program—NCSU, Raleigh, NC 2016
Highly selective national program for early career academics
Chicago Center for Teaching
Independent Teaching Consultation (Structural Geology) 2016
College Teaching, Advanced Pedagogy Course 2015
Teaching@Chicago Conference 2015, 2016
Seminar & Workshop on the Teaching Portfolio 2014
Seminar & Workshop on Course Design 2014
Presenting Data and Information, Edward Tufte—Chicago, IL 2015
International Clumped Isotope Workshop – Harvard University, Cambridge, MA 2012
The Queen Mary, Caltech, Long Beach, CA 2019

Geology Field Trips/Field Seasons

Great Salt Lake carbonate sedimentology, aqueous geochemistry and geobiology 2017-present
Modern and Ancient Carbonate Environments: San Salvador, Bahamas 2016
Trip leader: Susan Kidwell and Michael LaBarbera, The University of Chicago
Paleoaltimetry of the Lhasa Block, Tibet 2014, 2015
Geomorphology, Active Tectonics, and Landscape Evolution in the Mid-Atlantic Region 2015
Trip leader: Frank Pazzaglia, Lehigh University
Topics in Stratigraphy and Biosedimentology: Salton Trough, California 2015
Trip leader: Susan Kidwell, The University of Chicago
Geology of Death Valley & Owens Valley, California 2014
Trip leaders: David Rowley, Mark Webster, and *Miquela Ingalls*, The University of Chicago
Lehigh University Geology Field Camp, Utah & Colorado 2010
Instructor: Dr. Frank Pazzaglia
Magma ascent rates, igneous petrology: Sierra Nevadas, CA 2010
Rockfalls in Yosemite Valley, CA 2009
PI: Greg Stock

Professional Affiliations

Society for Sedimentary Geology (2019-present), Geological Society of America (2009-present), American Geophysical Union (2013-present), Sigma Xi (2015-present), European Association of Geochemistry (2015-present), American Association of University Women (2015-present), Association of Women Geoscientists (2016-present)

SERVICE & OUTREACH

Reviewer, Nature Geoscience; Nature Communications; Geological Society of America Bulletin; Geophysical Research Letters; Earth and Planetary Science Letters; Chemical Geology; Geochimica et Cosmochimica Acta; Paleogeography, Paleoclimatology, Paleoecology; Basin Research; Climates of the Past; Geology; National Science Foundation ad hoc reviewer
University of Chicago, Dept. of the Geophysical Sciences
Chair of the 2016-2017 graduate student-selected speakers seminar series
Organized the 2015 Exposition of Graduate and Undergraduate Research
Geological Society of America
Board Member, Graduate Student Research Grants, Tectonics Division 2019-2022
Mentor to “Onto the Future” URM Presenters Oct. 2015

Miquela Ingalls

Museum of Science & Industry

Robotics Special Exhibit Facilitator	2015-2016
ScienceWorks Career Fair, “Expert”	2014, 2015
School Group Facilitator	2011-2012