Research Interests

I am interested in the feedbacks between tectonics, surface processes, and basins. My research aims to integrate structural geology, numerical modelling, field observations, basin and geomorphic analyses, thermo- and geochronologic techniques, and subsurface data to understand tectonic systems.

Current Position

## 2021-present Assistant Professor, North Carolina State University, Department of Marine, Earth, and Atmospheric Sciences, Raleigh, NC

Education

## 2011-2015 Ph.D., Geological Sciences, University of North Carolina, Chapel Hill, NC

 Graduation Date: May, 2015

*Dissertation: Evolution of active fault systems and their topographies*

Advisor: Jason Barnes and Kevin Stewart

## 2009 M.S., Geological Sciences, University of Texas, Austin, TX

*Thesis: Fracture development and diagenesis of the Torridonian Applecross Formation, Northwest Scotland*

Advisor: Steve Laubach

## 2007 B.A., Geology, Ohio Wesleyan University, Delaware, OH

*Senior Thesis: Fracture Scaling in the Columbus and Delaware Limestones, Central Ohio*

 Advisor: Karen Fryer

Positions Held

## 2020-2021 Assistant Professor, University of Houston, Department of Earth and Atmospheric Sciences, Houston, TX

2017-2019 Postdoctoral Fellow, Institut des Sciences de la Terre, Université Grenoble Alpes, Grenoble, France

 *Research focus: Coupling lithospheric deformation and surface processes in compressional settings. Geodynamics of the Pyrenees and flanking foreland basins.*

 Supervisors: Peter van der Beek, Ritske Huismans

2015-2017 Postdoctoral Fellow, Applied Geodynamics Laboratory, Jackson School of Geosciences, University of Texas, Austin, TX

 *Research focus: Tectonic models for passive-margin salt basins; structural and stratigraphic evolution of the Gulf of Mexico from large-scale structural restorations.*

 Supervisor: Mike Hudec

## 2013 Research Assistant, Department of Geological Sciences, University of North Carolina, Chapel Hill, NC

 *Supervised by J. Barnes.*

2008 - 09 Research Assistant, Bureau of Economic Geology, University of Texas, Austin, TX

 *With Fracture Research and Application Consortium (FRAC)*

Private-Sector Work Experience

## 2009 - 11 Senior Petroleum Geologist, ExxonMobil Corporation, Houston, TX

(09/2009 – 12/2010) Exploration Company

(01/2011 – 05/2011) Production Company

Teaching Experience

2021 Instructor, Univ. Houston, GEOL1330: Physical Geology (face-to-face and online)

2020 Instructor, Univ. Houston, GEOL6390: 3D Seismic Interpretation (online)

2014 Instructor, UNC-CH, GEOL 190: Crest to Coast: Geology, landscapes, and human nature in North Carolina

2013 Graduate Research Consultant\*, GEOL 72H: Geology of California

 \* *Sponsored by the Office of Undergraduate Research, UNC*

2012-13 Teaching Assistant, UNC-CH: Introduction to Geology

2007-08 Teaching Assistant, UT-Austin: Introduction to Geology; Gemstones and Minerals

*Professional development:*

2014 Fellow, Future Faculty Fellowship Program, sponsored by the Center for Faculty Excellence

2018 Substitute Lecturer, UGA: Tectonic Geomorphology

*Graduate coursework:*

2013 GEOL 412: Principles and Methods of Teaching Earth Science - UNC

2012 EDUC 441: Education in American Society - UNC

Student Advising

*NC State University:*

Isabelle Bristol, PhD student

*University of Houston:*

A. Mattson, PhD student, 3D structural restorations and paleogeography of the Louann Salt, Gulf of Mexico.

T. Sessums, MS, Spatio-temporal evolution of Appalachian orogenies from subsidence analysis of the southern Appalachian foreland basin.

*Student research mentoring (pre-tenure track position)*

GEOL 190 class (13 students, 2014)

GEOL 72H (honors) class (20 students, 2013)

Jim Mize (B.A., 2012, UNC); Antoine Prost (M.S., 2017, UGA)

Intro. to Geology (NASC 108), Pepperdine University Lausanne program, field trip assistant (2017)

Professional Service

# *University service:*

* UH EAS Diversity, Equity, and Inclusion Committee: Founding member, 2020.
* UH EAS Seminar Committee: Facilitate nominations and invitations for speakers, set specific DEI goals
* UH EAS Recruiting Committee: Manage resume database for >200 EAS students and liaise between industry recruiters and student body.

# *Peer-reviewed Journal Referee:*

GSA Bulletin, Nature Comm., Geological Society London, AAPG Bulletin, Basin Research, Journal of Structural Geology, Interpretation, Earth Surface Processes and Landforms

# *Conference Session Chair:*

2020 AGU Annual Meeting, ONLINE: EP028. Assessing Paleotopography, Relief, and Elevation Across Spatiotemporal Scales

# *Conference Session Convener:*

2018 AGU Annual Meeting, Washington, DC: T019. Fold-Thrust Belts Through the Eyes of Their Foreland Basins: The Sedimentary Record of Hinterland Tectonics, Surface Processes, and Basin Evolution

2012 GSA Annual Meeting, Charlotte, NC: T171. The Role of Structure and Diagenesis in Governing Fluid Storage and Flow in Deep Sedimentary Basins with Applications to Unconventional Oil and Gas Reservoirs

# *Volunteer Judge*

2017, ’18 Outstanding Student Poster Award Contest, EGU General Assembly, Vienna, Austria

2018, ’19, ‘20 Outstanding Student Presentation Award Contest, AGU Annual Meeting

2016 Jackson School Student Research Symposium Poster Contest, Univ. of Texas, Austin, TX

*Official Liaison, Outstanding Student Presentation Award Contest*

2018 AGU Annual Meeting, Washington, DC

Field Experience

2018 Field excursion to Andes Mountains, Argentina

2017 Field excursion to Pyrenees Mountains, France

2015 Field excursion to Paradox Basin, Utah

2012, ‘14 Field work in Nevada Basin and Range for Ph.D.

2014 Field excursion to Sierra Nevada Mountains, California

2014 Field work in Alabama Hills, California

2012 Field work in Coyote Mountain, California

2007, ‘08 Field work in NW Scotland for M.S.

2007 Field work in central Ohio for undergraduate senior thesis

Technical Expertise

* Pecube: thermokinematic modeling software with inversion on HPCCs
* FastScape: surface processes modeling software with inversion on HPCCs
* Matlab, R, Python, Fortran
* ArcGIS (XTools Pro, Spatial Analyst toolbox, Hydrotools)
* Midland Valley Move™: 2D/3D structural restoration and geologic modeling software
* DecisionSpace and Petrel: 2D and 3D seismic interpretation

Publications

## Papers (*Published, peer-reviewed journals*)

* **Curry, M.A.E.,** van der Beek, P., Huismans, R.S., Wolf, S.G., Fillon, C., Muñoz, J. A., 2021, (*Accepted manuscript as of 01/16/21*), Spatio-temporal patterns of exhumation of the Pyrenees revealed by inverse thermo-kinematic modeling of a large thermochronologic dataset. *Geology,* doi: 10.1130/G48687.1.
* Wolf, S.G., Huismans, R.S., Muñoz, J. A., **Curry, M.E.**, van der Beek, P., 2020, Growth of collisional orogens from small and cold to large and hot – inferences from geodynamic models. *Journal of Geophysical Research: Solid Earth*, v. 125, doi: 10.1029/2020JB021168.
* **Curry, M.A.E**., van der Beek, P., Huismans, R.S., Wolf, S.G., Muñoz, J. A., 2019, Evolving lithospheric flexure and paleotopography of the Pyrenean Orogen from 3D flexural modeling and basin analysis, *Earth and Planetary Science Letters*, v. 515, p. 26-37, doi: 10.1016/j.epsl.2019.03.009.
* **Curry, M.A.E.,** Peel, F., Hudec, M., Norton, I., 2018, Extensional models for the development of passive-margin salt basins, with application to the Gulf of Mexico, *Basin Research*, doi: 10.1111/bre.12299.
* **Curry, M.A.E.,** Barnes, J.B., Colgan, J.P., 2016, Testing fault growth models with low-temperature thermochronology in the northwest Basin and Range, USA. *Tectonics*, v. 35, p. 2467-2492. doi:10.1002/2016TC004211.
* **Ellis, M.A.** and Barnes, J.B. 2015. A global perspective on the topographic response to fault growth. *Geosphere*, v. 11, p. 1008-1023. doi: 10.1130/GES01156.1
* **Ellis, M.A.**, Barnes, J.B., Colgan, J.P. 2014. Geomorphic evidence for renewed Plio-Quaternary faulting in the northwest Basin and Range. *Lithosphere*, v. 7, p. 59-72, doi: 10.1130/L401.1.
* Laubach, S.; P. Eichhubl; P. Hargrove; **Ellis, M.A.**; Hooker, J. 2014. **Fault core and damage zone fracture attributes vary along strike owing to interaction of fracture growth, quartz accumulation, and differing sandstone composition.** *Journal of Structural Geology*, v. 68, Part A, 207-226. doi: 10.1016/j.jsg.2014.08.007.
* **Ellis, M.A**.; Laubach, S.E.; Eichhubl, P.; Olson, J.E.; Hargrove, P., 2012. Fracture development and diagenesis of Torridon Group Applecross Formation, near An Teallach, NW Scotland: millennia of brittle deformation resilience? *Journal of the Geological Society*, v. 169, 297-310. doi: 10.1144/0016-76492011-086.

Papers (*In review)*

* Capaldi, T., Odlum, M.L., **Curry, M.A.E.,** Stockli, D.F., Variable thermal histories across the Pyrenees orogen recorded in modern river sand detrital geo- and thermochronology and thermokinematic modeling. In review at *Basin Research.*
* Honegger, L., Adatte, T., Spangenberg, J.E., Poyatos-Moré, M., Ortiz, A., **Curry, M.A.E.**, Huyghe, D., Puigdefàbregas, C., Garcés, M., Vinyoles, A., Valero, L., Läuchli, C., Nowak, A., Fildani, A., Clark, J.D., and Castelltort, S., 2021, Tectonics, Climate and Topography: Oxygen stable isotopes and the early Eocene growth of the Pyrenees: Solid Earth Discuss., v. 2021, p. 1–35, doi:10.5194/se-2021-12.

Papers (*In prep*)

* **Curry, M.A.E.,** Hudec, M., Fernandez, N., Peel, F., Duffy, O., Norton, I., Snedden, J. Structural restorations of the conjugate U.S.A. – Mexico Gulf of Mexico margin. (intended *GSA Bulletin*)
* Odlum, M.L., **Curry M.A.E.,** Capaldi, T., Rapid, early exhumation of the Pyrenees revealed from detrital thermochronology and thermokinematic modeling. (intended *Terra Nova*)
* **Curry, M.A.E.,** van der Beek, P., Braun, J., Huismans, R., Wolf, S., Peak- to post-orogenic landscape evolution of the Pyrenees Mountains from landscape evolution modeling and thermochronology. (intended *Tectonics)*

Abstracts:

* **Curry, M.A.E.**, van der Beek, P., Odlum, M.L., 2020, 3D thermokinematic modeling of a large thermochronologic dataset from the Pyrenees Mountains: Strategies and lessons of using Pecube in inversion mode, AGU Annual Meeting, ONLINE
* Capaldi, T.N., Odlum, M.L., **Curry, M.E.**, Stockli, D.F., 2020, River sand detrital geo-thermochronology record contrasting thermal histories across the Pyrenees of Spain and France, AGU Annual Meeting, ONLINE
* Rudolph, K., **Curry, M.E.**, Saylor, J., Jacobs, M., 2020, Constraining the timing and magnitude of orogenesis by basin response: two examples from North America, AGU Annual Meeting, ONLINE
* **Curry, M.A.E.,** Rudolph, K., Erratt, D., 2020, Foreland basin response as a constraint on Laurentian Paleozoic orogenies: Insights from subsidence analysis and flexural modeling, GSA Annual Meeting, ONLINE
* **Curry, M.A.E.,** van der Beek, P., Huismans, R.S., Wolf, S.G., Muñoz, J. A., 2019, Peak- to post-orogenic landscape evolution of the Pyrenees Mountains from numerical modeling and thermochronology. AGU Annual Meeting, San Francisco, CA.
* **Curry, M.A.E.,** van der Beek, P., Huismans, R.S., Wolf, S.G., Muñoz, J. A., 2018, Spatio-temporal evolution of exhumation of the Pyrenees Mountains. AGU Annual Meeting, Washington, D.C.
* **Curry, M.A.E.,** Barnes, J.B., Colgan, J.P. 2018. Testing fault growth models with low-temperature thermochronology in the northwest Basin and Range. Thermo Conference, Quedlinburg, Germany.
* **Curry, M.A.E**., van der Beek, P., Huismans, R.S., Wolf, S.G., Muñoz, J. A. 2018. Evolving lithospheric flexure and paleotopography of the Pyrenean Orogen from 3D flexural modeling and basin analysis. EGU General Assembly. Vienna, Austria.
* **Curry, M.A.E**., van der Beek, P., Huismans, R.S., Muñoz, J. A. 2017. Evolving lithospheric flexure and paleotopography of the Pyrenean Orogen from 3D flexural modeling and basin analysis. AGU Annual Meeting, New Orleans, U.S.A.
* **Curry, M.A.E.,** Barnes, J.B., Colgan, J.P. 2017. Testing fault growth models with low-temperature thermochronology in the northwest Basin and Range. EGU General Assembly. Vienna, Austria.
* **Curry, M.A.E,** Peel, F., Hudec, M., Norton, I. 2016. Extensional models for the Gulf of Mexico. AGL Annual Meeting. Austin, TX. Talk no. 35-16.
* **Curry, M.A.E.,** Hudec, M., Peel, F., Snedden, J. 2016. Regional structural restorations in the NE Gulf of Mexico. AGL Annual Meeting. Austin, TX. Talk no. 35-17.
* **Ellis, M.A.,** Hudec, M., Snedden, J. 2015. Basement uplift of the northern Gulf of Mexico coast: timing and implications. AGL Annual Meeting. Austin, TX. Talk no. 34-21.
* **Ellis, M.A.,** Hudec, M., Norton, I., Snedden, J. 2015. Gulf of Mexico basin structural restoration project: status report. AGL Annual Meeting. Austin, TX. Talk no. 34-22.
* **Ellis, M.A.,** Barnes, J.B., and Colgan, J.P. 2014. Testing fault growth models with low-temperature thermochronology in northwest Nevada. GSA annual conference, Vancouver, BC.
* **Ellis, M.A.,** Barnes, J.B., and Colgan, J.P. 2013. Geomorphic evidence for renewed Plio-Quaternary faulting in the northwest Basin and Range, T31D-2544, AGU Fall Meeting, San Francisco, CA, 9-13 December.
* **Ellis, M.A.** and Barnes, J.B. 2012. Scales of topographic growth associated with active faulting, T21E-2621, AGU Fall Meeting, San Francisco, CA, 2-7 December.
* **Ellis, M.A.,** Laubach, S., Eichhubl, P., Olson, JE, Hargrove, P. 2012. Fracture development and diagenesis of the Torridon Group Applecross Formation, near An Teallach, NW Scotland: Millenia of brittle deformation resilience? (abs.) in GSA Abstracts with Programs, Vol. 44.
* Laubach, S.E., **M. Ellis,** P. Hargrove, P. Eichhubl. 2010. Fracturing, cementation and feedback in a small-offset oblique slip fault in sandstone (abs.) in Goldschmidt Conference Abstracts.
* **Ellis, M.A.,** Hargrove, P., Laubach, S. E. 2009. Fracture pattern development in the Applecross Formation (Torridonian) sandstones south of Ullapool, NW Scotland (abs.), in TSG 2009: Tectonic Studies Group Annual Meeting Programme Abstract Volume, Staffordshire, UK, January 5–8, p. 31.
* Hargrove, P., **Ellis, M.A.,** Laubach, S. E. 2009. Fault-related fracture pattern evolution and distribution in Cambrian Eriboll Formation sandstones: Northwest Highlands, Scotland (abs.), in TSG 2009: Tectonic Studies Group Annual Meeting Programme Abstract Volume, Staffordshire, UK, January 5–8, p. 32.
* Laubach, S.E., **Ellis, M.,** Hargrove, P., Eichhubl, P. 2009. Fracturing, cementation and feedback in a small-offset oblique slip fault in sandstone: Geochimica et Cosmochimica Acta, vol. 74, no. 11, Supplement 1, p. A656.

Professional Research Talks

2020 *(Invited)* Dinner with a Geoscientist, Moorpark College, Department of Chemistry and Earth Science (via Zoom)

2020 (*Invited)* Seminar, Bureau of Economic Geology, University of Texas at Austin (via Zoom)

2019 (*Invited-workshop*) Source-to-sink workshop, TOTAL, Jusseiu Campus, Paris, France

2019 COLORS Annual meeting, Bergen, Norway

2019 (*Invited-workshop*) Tectonics and Magmatism in the Western US, Conférence Universitaire de Suisse Occidental (CUSO), Geneva, Switzerland

2018 American Geophysical Union Annual Meeting, Washington, D.C.

2018 *(invited)* Pyrenees Source to Sink Seminar, TOTAL E&P, Pau, France

2018 *(invited)* University of Geneva, Department of Geology, Geneva, Switzerland

2018 COLORS Annual meeting, Potsdam, Germany

2018 European Geosciences Union General Assembly, Vienna, Austria

2017 American Geophysical Union Annual Meeting, New Orleans, LA

2017 COLORS Annual meeting, Toulouse, France

2017 *(invited)* Université Grenoble Alpes, ISTerre, Grenoble, France

2015, ‘16 Applied Geodynamics Laboratory Annual Meeting, Austin, TX

2013,’14, ‘15 Anadarko research symposium, Chapel Hill, NC

2014 Geological Society of America Annual Meeting, Vancouver, BC

2012 Geological Society of America Annual Meeting, Charlotte, NC

2010 *(invited)* ExxonMobil Upstream Research Company, Fracture Prediction and Flow Modeling Group, Houston, TX

2009 Fracture Research and Application Consortium Annual Meeting, Austin, TX

2009 Tectonic Studies Group Annual Meeting, Keele University, Keele, UK

2008 Fracture Research and Application Consortium Annual Meeting, Santa Barbara, CA

Grants

2014 Kenan award ($1,300), Department of Geological Sciences, UNC Chapel Hill

2013 Supplemental Martin Research Grant (~$5,000), Department of Geological Sciences, UNC

2012 GSA Student Research Grant (~$2,500)

2012 Sigma Xi Grant (~$300)

2012 Supplemental Martin Research Grant (~$5,000), Department of Geological Sciences, UNC

2009 Exit Fellowship, Jackson School of Geosciences (~$2,000), UT Austin

2008 Grant, GDL Foundation (~$5,000), for Master’s thesis research

2008 Off-campus Research Award (~$2,000), Jackson School of Geosciences, UT Austin

2008 Analytical Research Award (~$1,500), Jackson School of Geosciences, UT Austin

Honors

2015 Roy L. Ingram Research Award ($500), UNC Chapel Hill

2014 Fellow ($450), Future Faculty Fellowship Program, UNC Chapel Hill

2014,’13,’11 Fellow ($31,400), Geological Sciences Martin Fellowship, UNC Chapel Hill

2007 Robert E. Shanklin Distinguished Scholar Award in Geology, Ohio Wesleyan University (OWU)

2006 Andres Duarte Vivas Senior Scholarship in Geology, OWU

2005 Crowell-Shanklin Scholarship in Geology, OWU

2003-07 Trustee Scholarship, OWU

Professional Affiliations

2006- Geological Society of America

2007- American Association of Petroleum Geologists

2011- American Geophysical Union

2014- National Association of Geoscience Teachers

2016- European Geosciences Union