

## PERSONAL INFORMATION

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## RESEARCH FOCUS

I use a field-based and integrative approach involving geologic mapping, structural geology, stratigraphy, geo/thermochronology, and geographic information systems (GIS) to understand the evolution of mountain belts and sedimentary basins, linkages between tectonic and sedimentary processes, and the kinematics and geodynamics of plate interactions.

## EDUCATION

- 2014–2019 **Ph.D., Geology**, Northern Arizona University, Flagstaff, AZ  
Dissertation: *Cenozoic Tectonic Evolution of the Sivas Basin from Subduction to Collision to Escape in Central Anatolia, Turkey*. Advisor: Dr. Paul J. Umhoefer.
- 2011 **M.S., Geology**, University of Oregon, Eugene, OR  
Thesis: *Late Miocene Extensional Deformation in the Sierra Bacha, Sonora, Mexico: Implications for the Kinematic Evolution of the Proto-Gulf of California*. Advisor: Dr. Rebecca Dorsey
- 2007 **B.A., Political Science with Minor in Geology**, University of Colorado, Boulder, CO  
(38 Geology credit hours, 4.0 GPA)

## EMPLOYMENT HISTORY

- 2019 **Postdoctoral Research Associate**, Department of Earth Sciences, University of Oregon, Eugene, OR. *Multi-disciplinary bio-geo-genomic investigations into Pliocene to Recent speciation and genetic divergence on the Baja peninsula using geologic mapping, structural geology, stratigraphy, and geochronology.*
- 2014–2019 **Graduate Teaching & Research Assistant**, School of Earth & Sustainability, Northern Arizona University. *Geologic mapping, structural, stratigraphic and geo/thermochronologic field investigations (>6 months total) of crustal deformation and tectonic evolution of central Turkey*
- 2014–2017 **Adjunct Instructor**, School of Earth & Sustainability, Northern Arizona University, Flagstaff, AZ  
*Advanced Geologic Field Methods (capstone), Introduction to Field Geology of Northern Arizona, Historical Geology Laboratory*
- 2013–2018 **Adjunct Instructor**, Department of Earth Sciences, University of Oregon, Eugene, OR  
*Geology Field Studies (capstone), Sedimentology & Stratigraphy*

- 2012–2014 **Exploration Geologist**, Deepwater Gulf of Mexico Team, ConocoPhillips Co., Houston, TX  
*2-D and 3-D seismic interpretation and structural and basin analysis to identify and evaluate oil and gas Prospects; management and synthesis of regional-scale seismic, structural, and stratigraphic data sets*
- 2009–2012 **Graduate Teaching Fellow & Research Assistant**, Department of Earth Sciences, University of Oregon, Eugene, OR. *Geologic mapping, structural, geochronologic, and paleomagnetic field investigations (>4 months total) of the timing, magnitude and style of rifting in the Gulf of California. Developed a GIS-based tectonic reconstructions of the San Andreas fault and Gulf of California.*
- 2007–2008 **Research & Field Assistant**, Geological Sciences Department, University of Colorado, Boulder, CO. *Geophysical surveying and borehole monitoring along the Elkhorn fault, and seismic site reconnaissance and characterization for the EarthScope Project Transportable Array in northern Colorado*

## PUBLICATIONS

### *Manuscripts in Advanced Stage*

- Darin, M.H.**, and Umhoefer, P.J., (*in review*), Tectonostratigraphy and Chronology of the Western Sivas Basin, Central Anatolia (Turkey): Evolution of a Well Preserved Neotethyan Suture Basin: *Basin Research*.
- Darin, M.H.**, Umhoefer, P.J., Thomson, S.N., Whitney, D.W., and Teyssier, C., (*in prep.*), Diachronous initiation of Arabia-Eurasia collision since the middle Eocene in eastern Anatolia: for submission to *Geological Society of America Bulletin*.
- Bennett, S.E.K., **Darin, M.H.**, Skinner, L., Oskin, M.E., Umhoefer, P.J., Dorsey, R.J., and Kluesner, J., (*in prep.*), An animated tectonic reconstruction of the Gulf of California-Salton Trough (GCAST) oblique rift since 12 Ma: for submission to *Geosphere*.

### *Published*

9. **Darin, M.** and Umhoefer, P., (*in press*), Structure and Kinematic Evolution of the Southern Sivas Fold-Thrust Belt, Central Anatolia, Turkey: *Turkish Journal of Earth Sciences*.
8. Bogan, M.T., Ballesteros-Cordova, C., Bennett, S.E.K., **Darin, M.H.**, Findley, L.T., and Varela-Romero, A., (*in press*), Oases: finding hidden biodiversity gems in the southern Sonoran Desert, in Propst, D.L., Williams, J.E., Bestgen, K.R., and Hoagstrom, C.W., eds., *Standing Between Life and Extinction: Ethics and Ecology of Conserving Aquatic Species in the American Southwest*: *University of Arizona Press*.
7. **Darin, M.H.**, Umhoefer, P.J., and Thomson, S.N., 2018, Rapid late Eocene exhumation of the Sivas Basin (Central Anatolia) driven by initial Arabia-Eurasia collision: *Tectonics*, v. 37, p. 3805–3833, DOI: 10.1029/2017TC004954
6. Schleichfarth, W.K., **Darin, M.H.**, Reid, M.R., and Umhoefer, P.J., 2018, Dynamics of episodic Late Cretaceous–Cenozoic magmatism across Central to Eastern Anatolia: New insights from an extensive geochronology compilation: *Geosphere*, v. 14, no. 5, DOI: 10.1130/GES01647.1

5. Umhoefer, P.J., **Darin, M.H.**, Bennett, S.E.K., Dorsey, R.J., Skinner, L., and Oskin, M.E., 2018, Breaching of strike-slip faults and successive flooding of pull-apart basins to form the Gulf of California seaway from ~8 to 6 Ma: *Geology*, v. 46, no. 8, p. 695–698, DOI: 10.1130/G40242.1
4. **Darin, M.H.**, Bennett, S.E.K., Dorsey, R.J., Oskin, M.E., and Iriondo, A., 2016, Late Miocene extension in coastal Sonora, Mexico: Implications for the evolution of dextral shear in the proto-Gulf of California oblique rift: *Tectonophysics*, v. 693, p. 378–408, DOI: 10.1016/j.tecto.2016.04.038
3. Bennett, S.E.K., **Darin, M.H.**, Dorsey, R.J., Skinner, L.A., Umhoefer, P.J., and Oskin, M.E., 2016, Animated tectonic reconstruction of the Lower Colorado River region: Implications for late Miocene to Present deformation, in Reynolds, R.E., ed., *Going LOCO, Investigations along the lower Colorado River*: California State University Desert Studies Center, Desert Symposium Field Guide and Proceedings, p. 73–86.
2. **Darin, M.H.** and Dorsey, R.J., compilers, 2014, Geologic map of the Sierra Bacha, coastal Sonora, Mexico: *Geological Society of America Digital Map and Chart Series*, v. 21, DOI: 10.1130/2014.DMCH021
1. **Darin, M.H.** and Dorsey, R.J., 2013, Reconciling disparate estimates of total offset on the southern San Andreas fault: *Geology*, v. 41, p. 975–978, DOI: 10.1130/G34276.1

### **Conference Presentations**

- Darin, M.H.**, Abgarmi, B., Beck, S.L., Brocard, G., Cosca, M.A., Delph, J.R., & 19 others, 2017, Geodynamic evolution of subduction to collision to escape in central Anatolia from surface to mantle – results from the CD-CAT project: European Geophysical Union General Assembly, Vienna, Austria, v. 19, abstract EGO2017-18120.
- Darin, M.H.**, Gurer, D., Umhoefer, P.J., and Van Hinsbergen, D.J.J., 2016, Evolution and structural architecture of the Cenozoic Southern Sivas Fold-Thrust Belt: implications for the transition from Arabian collision to tectonic escape in Anatolia: Abstract T53B-02 presented at the American Geophysical Union Fall Meeting, AGU, San Francisco, California, Dec. 12–16.
- Darin, M.H.**, Umhoefer, P.J., Thomson, S.N., and Lefebvre, C., 2016, Orogen-parallel variations in structural style and tectonic exhumation during the Miocene collision-escape transition in Anatolia: Geological Society of America Abstracts with Programs, v. 48, no. 7, DOI: 10.1130/abs/2016AM-283585.
- Schleiffarth, W.K., Reid, M.R., **Darin, M.H.**, and Cosca, M.A., 2016, The Central Anatolian Volcanic Province: geochronological constraints on the spatiotemporal evolution of volcanism and links to tectonic processes: Abstract T51A-2877 presented at the American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 12–16.
- Thomson, S.N., Lefebvre, C., Umhoefer, P.J., **Darin, M.H.**, Whitney, D., and Teyssier, C.P., 2016, Late Cenozoic thermochronology and exhumation history of central Anatolia: implications for the timing and nature of transition from collision to escape tectonics: Abstract T53B-04 presented at the American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 12–16.

- Darin, M.H.**, Umhoefer, P.J., Thomson, S.N., and Lefebvre, C., 2015, Structural geology and exhumation of the Paleogene Southern Sivas Fold and Thrust Belt, central Anatolia, Turkey: Abstract T13B-2986 presented at the American Geophysical Union Fall Meeting, San Francisco, California, Dec. 14–18.
- Bennett, S.E.K., Skinner, L.A., **Darin, M.H.**, Umhoefer, P., Oskin, M.E., and Dorsey, R.J., 2013, New Constraints on Baja California-North America Relative Plate Motion Since 11 Ma: Abstract T14C-02 presented at the American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 9–13.
- Darin, M.H.**, Dorsey, R.J., Bennett, S.E.K., and Oskin, M.E., 2013, Cumulative dextral strain across the Miocene-Present Pacific-North America plate boundary: Eastern California shear zone to the northern Gulf of California: Geological Society of America Abstracts with Programs, v. 45, no. 6, p.22.
- Umhoefer, P.J., Bennett, S.E.K., Skinner, L.A., **Darin, M.H.**, Oskin, M.E., and Dorsey, R.J., 2013, Reconstructing the Gulf of California-Salton Trough oblique plate boundary with GIS maps since 12 Ma: Geological Society of America Abstracts with Programs, v. 45, no. 6, p. 22.
- Umhoefer, P.J., Skinner, L.A., Bennett, S.E.K., Oskin, M.E., Dorsey, R.J., and **Darin, M.H.**, 2013, Breaching of transform faults and flooding of pull-apart basins to incrementally form the early Gulf of California seaway from ~8 to 6.3 Ma: Geological Society of America Abstracts with Programs, v. 45, no. 6, p. 15.
- Darin, M.H.**, Dorsey, R.J., Bennett, S.E.K., Oskin, M.E., and Iriondo, A., 2012, Late Miocene Extension in the Sierra Bacha, coastal Sonora, Mexico: Implications for the Kinematic Evolution of the Proto-Gulf of California: Geological Society of America Abstracts with Programs, v. 44, no. 3, p. 5.
- Darin, M.H.**, and Dorsey, R.J., 2012, A New Estimate for Total Offset on the Southern San Andreas Fault: Implications for Cumulative Plate Boundary Shear in the Northern Gulf of California: Abstract T44A-05 presented at American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 3–7.
- Darin, M.H.**, Dorsey, R.J., Oskin, M.E., Iriondo, A. and Bennett, S.E.K., 2010, Late Miocene Extensional Deformation in the Sierra Bacha, Sonora, Mexico: Implications for the Kinematic Evolution of the Proto-Gulf of California: Geological Society of America Abstracts with Programs, v. 42, no. 5, p. 318.

## TEACHING EXPERIENCE

### *Instructor of Record*

- 2013, 2014, **Geology Field Studies (GEOL 406, capstone)**, University of Oregon
- 2018 • Coordinated and led ~20-35 students in an intensive field and lecture course involving various advanced geologic mapping, structural geology, and stratigraphic projects in southwestern Montana.

- 2018 **Sedimentology & Stratigraphy (GEOL 334)**, University of Oregon
- Instructed 26 geology majors in foundational principles of sedimentologic processes and products and stratigraphic concepts.
  - Led a group field trip to Oregon coast to study forearc sedimentary facies and processes.
- 2017 **Historical Geology Laboratory (GLG 104)**, Northern Arizona University
- Led major and non-major students to develop foundational skills in rock and mineral identification, understanding geologic time, and stratigraphic & structural geology principles.
  - Designed new exercises and a field trip with a focus on active, inquiry-based learning
- 2016 **Fieldwork Experience: Introduction to Field Geology of Northern Arizona (GLG 208)**, Northern Arizona University
- Designed original lectures and field trips to study various faults and fold structures north of Flagstaff to introduce geologic field methods to majors and non-majors.
- 2014–2015 **Advanced Geological Field Methods (GLG 440, capstone)**, Northern Arizona University
- Co-led four different 2-week sections and co-designed two brand new geologic mapping projects on structural geology and geophysics and physical volcanology.
- 2011 **Structural Geology Problems (GEOL 351)**, University of Oregon
- Led field trips and exercises in solving structural geology problems that emphasized calculating stress and strain from structural markers using stereographic projections.

### ***Teaching Assistant***

- 2014, 2017 **Introduction to Field Methods & Report Writing (GLG 240)**, Northern Arizona University
- Assisted and instructed three sections of students in basic geologic field methods including map and compass skills, cross-section drafting, report writing, and field-based GIS.
  - Co-designed several original exercises and field projects to achieve learning objectives.
- 2011 **Structural Geology (GEOL 350)**, University of Oregon
- Assisted students in a laboratory setting with the description, analysis, and origin of geologic structures, with an emphasis on kinematic and dynamic analysis of deformation.
- 2010–2011 **Introduction to Field Methods (GEOL 318)**, University of Oregon
- Assisted students in basic geologic field methods (map, compass, cross-sections, writing).
- 2010 **Geology Field Studies (GEOL 406, capstone)**, University of Oregon
- Assisted students in the field with structural and tectonic geomorphology projects in Montana.

### **GRANTS, AWARDS, & RECOGNITION**

- 2017 NAU Graduate Student Government International Travel Grant (university-wide) [**\$1500**]
- 2016 Tom and Rose Bedwell Earth Physics Award, (college-wide) [**\$1000**]
- 2015–2016 Pioneer Natural Resources Research Grants [**\$1000**]
- 2015 Ronald C. Blakey Scholarship Award [**\$1500**]

- 2015 NAU Geology Graduate Student Scholarship Award [**\$500**]
- 2012 Geological Society of America Cordilleran Section Meeting Student Travel Grant [**\$250**]
- 2011 Best Student Poster, 2nd place overall - AAPG-RMR Annual Meeting
- 2010 Geological Society of America Graduate Student Research Grant [**\$1390**]
- 2008–2006 Dean's List, University of Colorado

## UNIVERSITY SERVICE

- 2017 **President**, Geology Graduate Student Organization, NAU
- 2016 **Vice President**, Geology Graduate Student Organization, NAU
- 2015–2018 **Manager**, Mineral Separation and Rock Crushing Laboratories, NAU
- 2015–2016 **Graduate student representative** and liaison for SES Faculty, NAU
- 2015 **Volunteer Judge**, annual Undergraduate (UGRADS) Research Symposium, NAU
- 2015 **Volunteer** for geology exhibition at Flagstaff Festival of Science, NAU
- 2014–2015 **Coordinator**, SESES weekly seminar series, NAU
- 2011–2010 **Steward** for Earth Sciences department, Graduate Teaching Fellows Federation, UO

## PROFESSIONAL ACTIVITIES, SERVICE, & OUTREACH

### *Membership*

- Geological Society of America – Structural Geology & Tectonics Division
- Geological Society of America – Geoscience Education Division
- American Geophysical Union
- National Association of Geoscience Teachers

### *Journal Reviewer*

- Tectonics, Geosphere, Tectonophysics

### *Service & Outreach*

- 2018 Technical Session Convener for GSA Cordilleran Section Meeting, Flagstaff, AZ: *Miocene to Recent Evolution of the Lower Colorado River Corridor and the Northern Gulf of California*
- 2016 Guided two-day geology field trip in northern Arizona for an 80-person Christian family group from Classical Conversations of Corona (CA)
- 2015 Technical Session Convener for N-GEN Sonoran Desert Researchers Summit, Guaymas, Sonora, MEX: *Interplay Between Sonoran Desert Geology and Non-Geologic Processes*
- 2015 Volunteer Judge for AGU Outstanding Student Paper Contest, San Francisco, CA
- 2015 Invited lecture about Earthquake Hazards in Arizona, American Red Cross, Flagstaff, AZ

- 2013 Technical Session Convener for GSA Cordilleran Section Meeting, Fresno, CA: *Reconstructing the Pacific-North America Plate Boundary Through Late Cenozoic Time*
- 2012 Event Coordinator for Oregon State Science Olympiad, Monmouth, OR
- 2012 Volunteer Judge for annual Science Fair at local elementary schools, Eugene, OR
- 2010 Public lecture on Historical Eruptions & Volcanic Hazards, Community Center, Eugene, OR

## **TECHNICAL SKILLS**

### ***Field***

Traditional & GIS-based geologic mapping; structural analysis (fault kinematics, ductile strain, deformation history); stratigraphy (section logging, facies analysis, paleocurrents); paleomagnetic core sampling; shallow seismic reflection & refraction surveying; paleoseismic trenching; traverse planning

### ***Computing***

Geographic Information Systems (ArcGIS, GIS Pro, Global Mapper); Adobe Illustrator and Photoshop; structural analysis (FaultKin, Stereonet); thermal history modelling (HeFTy), tectonic reconstruction modelling (G-Plates), geochronology data analysis (AgeCalcML, DZStats, Isoplot, densityplotter, KDX); seismic interpretation software (DecisionSpace Desktop, 3-D Canvas, PowerView, GeoProbe); Microsoft Office suite

### ***Analytical /Instrumentation***

Fission Track Thermochronology, Cryogenic Magnetometer, Mass Spectrometry (LA-ICP-MS, Quadrupole), X-Ray Diffraction (XRD), mineral separation (apatite and zircon)