Michael H. Darin

Curriculum Vitae

PERSONAL INFORMATION

Address: Nevada Bureau of Mines and Geology
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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

2020 **Assistant Professor**, Nevada Bureau of Mines and Geology, University of Nevada, Reno

2019–2020 **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*), Paleogene Stratigraphy and Chronology of the Western Sivas Basin, Central Anatolia (Turkey): Evolution of a Well Preserved Neotethyan Suture Basin: submitted to *Basin Research*.

Darin, M.H., (*in review*), Diachronous initiation of Arabia-Eurasia collision since the middle Eocene in eastern Anatolia: submitted 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. 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*.

8. Darin, M.H. and Umhoefer, P.J., 2019, Structure and Kinematic Evolution of the Southern Sivas Fold-Thrust Belt, Central Anatolia, Turkey: *Turkish Journal of Earth Sciences*, v. 28, p. 834–859, DOI: 10.3906/yer-1907-29

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. Schleiffarth, 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, 2018 **Geology Field Studies (GEOL 406, capstone)**, University of Oregon
- 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)