

Dr. PAUL M. BETKA
Associate Research Scientist
Lamont-Doherty Earth Observatory of Columbia University
61 Route 9W • Palisades, NY 10964
email: pbetka@ldeo.columbia.edu • phone: 616-446-3227

EDUCATION AND ACADEMIC APPOINTMENTS

Associate Research Scientist, Feb. 2018–present Lamont-Doherty Earth Observatory, Columbia Univ.
Postdoctoral Research Scientist, 2015–2018 Lamont-Doherty Earth Observatory, Columbia Univ.
Ph.D. Geological Sciences, 2013 Jackson School of Geosciences, The University of Texas at Austin
Advisor: Dr. Sharon Mosher. Co-advisor: Dr. Keith Klepeis
M.S. Geology, 2008 University of Vermont. Advisor: Dr. Keith Klepeis
B.S. Geology, 2006 Virginia Polytechnic Institute and State University. Advisor: Dr. Rick Law

PROFESSIONAL EXPERIENCE

Geologist III, Alaska Division of Geological and Geophysical Surveys, 2013–2015
Field-based structural geology research and mapping in the Cook Inlet forearc basin.
Supervisor: Dr. David LePain
Structural Geology Intern, Chevron, Summer 2012
Modeling of basement structures in a rifted margin setting from 2D seismic data
Received full-time offer. Mentor: Matt Laroche; Supervisor: Doug Goff

GRADUATE STUDENTS SUPERVISED

Jacob Rosenthal (MS, 2016). Geology Dept. Univ. Alaska Fairbanks; Graduate student intern, Alaska Division of Geological and Geophysical Surveys. Co-supervisor: Dr. Elisabeth Nadin

FUNDED PROPOSALS

NSF Integrated Earth Systems (2017). Collaborative Research: Subduction below extreme sedimentation – A multidisciplinary transect from the Ganges-Brahmaputra Delta to the IndoBurman Backarc, PIs Steckler, M., Buck, R., Cai, Y., Gaherty, J. Seeber, L. (w/ Thomson, S., U. AZ; Persaud, P., LSU; Sandvol, E., U. MO; Prose, D., LaMacchia, D., Earth Images Foundation). \$3,506,912.
My role: Lead field geology campaign, structural analyses, and integration of surface geology with geophysical results and detrital low-T thermochronology.

PENDING PROPOSALS AND PROPOSALS TO BE RESUBMITTED

Southern California Earthquake Center (to be submitted Nov. 9). Zooming on off-fault inelastic strain through field observations and numerical modeling: implications for interseismic stress build-up. PIs P. Betka (LDEO) and J.-A. Olive (CNRS, FR).
NSF Sedimentary Geology & Paleobiology (resubmission winter 2019). Collaborative Research: Characterizing the stratigraphic evolution of a suture delta by examining megasequence-scale stratigraphy of the paleo-Brahmaputra delta, IndoBurman range, India. PIs: Sincavage, R. (Radford U.), **Betka, P.**, Seeber, L., Steckler, M. (LDEO), Thomson, S. (U. AZ), Kodama, K. (Lehigh U.).
NSF Marine Geology & Geophysics (resubmission spring 2019). Collaborative Research: From subduction to collision: encounter of the Ganges-Brahmaputra Delta with the IndoBurman subduction zone. PIs: Steckler, M., McHugh, C., Seeber, L., **Betka, P.** (LDEO); Singh, S. (IPGP).
NSF Tectonics (resubmission spring 2019). Collaborative Research: An active subduction–collision transition in the IndoBurman and Naga fold-thrust belts, understanding the flank of a collisional orogen. PIs: **Betka, P.**, Seeber, L., Thomson, S., Steckler, M. (LDEO), Sincavage, R. (Radford U.).

INVITED TALKS

- Univ. of Mizoram Department of Geology, Aizawl, Mizoram, India, Nov., 2018
- Univ. Calif. Santa Cruz Institute of Geophysics and Planetary Physics Seminar series, May, 2018.
- Keynote speaker, Myanmar Applied Earth Sciences Association Inaugural Conference, Yangon, Myanmar. November, 2017.
- Lamont-Doherty Earth Observatory Structural Geology and Tectonics seminar. September, 2017.
- Queens College School of Earth and Environmental Sciences Colloquium, April, 2016

ANALYTICAL AND FIELD SKILLS

- Geologic mapping and cross section construction
- Petrographic, kinematic, and strain analysis of deformed rocks
- Scanning Electron Microprobe and Electron Backscatter Diffraction analysis.
- Digital mapping: handheld and RTK GPS, total stations, ArcGIS, *FieldMove*
- Structural modeling software, MOVE and LithoTect
- Integrating remote sensing, gravity, and 2D seismic data with field data
- Numerical modeling, FLAC finite difference code.

FIELDWORK AND MAPPING EXPERIENCE

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| - Indo-Burma Ranges, NE India and Myanmar, 7 months, | 2015–ongoing |
| - Sandia Mountains, New Mexico, 2 weeks, | 2018 |
| - Main Central Thrust, Nepal, 2 weeks, | 2017 |
| - Lost River Range, Idaho, 1 week, | 2017 |
| - Iniskin Peninsula, Cook Inlet, Alaska (3 months) | 2013–2015 |
| - Cordillera Darwin, Chile (8 months) | 2007–2012 |
| - Fiordland, New Zealand (3 weeks) | 2007 |
| - University of New Mexico Advanced Field Camp (3 weeks) | 2006 |
| - Sauratown Mountains, NC, (2 weeks) | 2005–2006 |
| - Norumbega Fault Zone, Maine (2 months) | 2005 |

HONORS AND AWARDS

- Late Career PhD Poster Presentation, 2nd Place – Jackson School of Geosciences Poster Symposium
- Outstanding Teaching Assistant Award – Department of Geological Sciences, The Univ. of Texas
- ConocoPhillips Fellowship – Jackson School of Geosciences, The Univ. of Texas, 2009-2010
- Garth William Caylor Memorial Grant – American Association of Petroleum Geologists, 2009
- Teaching Assistant of the Year Award – University of Vermont, 2008
- Graduate Student Research Grant recipient – Geological Society of America, 2007
- Vermont Geological Society, 1st Place – Research Presentation, 2007
- Lowry Field Camp Scholarship – Virginia Tech, 2006
- Vice President – Sigma Gamma Epsilon, Virginia Tech, 2005
- Eagle Scout – Boy Scouts of America, 2000

MEMBERSHIPS OF PROFESSIONAL ORGANIZATIONS

American Geophysical Union, Geological Society of America

OUTREACH AND ACADEMIC SERVICE

Instructor, GeoHazards International – Geologic mapping and structural techniques course for geologists, educators, and engineers in Aizawl, India, Oct. 2016 (2 weeks).

Instructor, GeoFORCE – Field trip across the Appalachians. Univ. of Texas at Austin outreach program for high school students. July, 2016 & 2017 (2 weeks).

Seminar coordinator – Petrology, Geochemistry, Structure and Tectonics Seminar, UT Austin, 2011–2012

Graduate Student Representative – Structure/Tectonics faculty search committee, UT Austin, 2011

REVIEWING DUTIES

- Journal of Structural Geology
- Journal of South American Earth Sciences
- American Chemical Society Petroleum Research Fund
- Alaska Division of Geological and Geophysical Survey publications

TEACHING

Course Title	Position, University	Term
- Field Camp	Asst. Instructor, Univ. of Texas at Austin	Summer 2011 & 2012
- Earth Materials	TA, Univ. of Texas at Austin	Fall, 2011
- Structural Geology	TA, Univ. of Texas at Austin	Fall, 2010 & 2012
- Field Camp	TA, Univ. of Texas at Austin	Summer 2009 & 2010
- Physical Geology	TA, Univ. of Texas at Austin	Fall, 2009
- Introduction to Field and Stratigraphic Methods	TA, Univ. of Texas at Austin	Spring 2008 & 2012
- Structural Geology	TA, Univ. of Vermont	Spring, 2008
- Field Geology	TA, Univ. of Vermont	Spring, 2007
- Earth Systems Science	TA, Univ. of Vermont	Fall, 2006 & 2007
- Physical & Resources Geology	Tutor, Student Athlete Academic Support Services. Virginia Tech	Fall-spring, 2005 & 2006

REFEREED PUBLICATIONS (9 published, 6 as first author; 1 in review, 2 in prep; *student author)

- (12) **Betka, P.M.**, Mosher, S., Klepeis, K. Progressive development of a distributed ductile shear zone beneath the Patagonian retroarc fold-thrust belt, Chile. *Lithosphere*. (*under review*).
- (11) **Betka, P.M.**, Buck, R., Seeber, L., Sincavage, R., Thomson, S., Steckler, M., Zoramthara, C. Extreme sediment accretion in the Indo-Burman Ranges: geological and theoretical constraints on the megathrust geometry. *Tectonics*. (*in prep*).
- (10) Sincavage, R. **Betka, P.M.**, Blum, M., Seeber, L., Steckler, M. Late-Miocene linkage between the paleo-Brahmaputra Delta and the Bengal and Nicobar Fans. *Nature Geoscience*. (*in prep*).
- (9) **Betka, P.M.**, Seeber, L., Steckler, M., Thomson, S., Sincavage, R., Zoramthara, C. 2018. Slip-partitioning above a shallow, weak décollement beneath the Indo-Burman accretionary prism. *Earth and Planetary Science Letters*. v.503. pp.17-28. <https://doi.org/10.1016/j.epsl.2018.09.003>
- (8) **Betka, P.M.**, Gillis, R., Benowitz, J. 2017. Cenozoic sinistral transpression and polyphase slip within the Bruin Bay fault system, Iniskin-Tuxedni region, Cook Inlet, Alaska. *Geosphere*, v.13. no.6. doi:10.1130/GES01464.1
- (7) *Rosenthal, J., **Betka, P.**, Nadin, E., Gillis, R., Benowitz, J. 2017. Vein formation during progressive Paleogene faulting and folding within the lower Cook Inlet basin, Alaska. *Geosphere*, v.14, no.1. doi:10.1130/GES01435.1
- (6) **Betka, P.M.**, Klepeis, K.A., Mosher, S. 2016. Fault kinematics of the Magallanes-Fagnano Fault System, southern Chile; an example of diffuse strain and sinistral transtension along a continental transform margin. *Journal of Structural Geology*. V. 85, pp 130-153.
- (5) **Betka, P.M.**, Klepeis, K.A., Mosher, S. 2015. Along-strike variation in crustal shortening and kinematic evolution of the Magallanes fold-thrust belt, Chile 53°-55° S. *Geol. Soc. Amer. Bulletin*. v. 127, p. 1108-1134. doi:10.1130/b31130.1
- (4) **Betka, P.M.**, Gillis, R.J. 2014. Preliminary characterization of brittle deformation on the Iniskin Peninsula: Implications for the kinematic history of the Bruin Bay fault system, lower Cook Inlet, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2014-5, 14 p. doi:10.14509/29130
- (3) **Betka, P.M.**, Klepeis, K.A. 2013. Three-stage evolution of lower crustal gneiss domes at Breaksea Entrance, Fiordland, New Zealand. *Tectonics* v. 32. pp. 1-23. doi: 10.1002/tect.20068

REFEREED PUBLICATIONS (*continued*)

- (2) McAtamney, J., Klepeis, K., Mehrtens, C., Thomson, S., **Betka, P.**, Rojas, L., Snyder, S. 2011. Along-strike variability of back-arc basin collapse and the initiation of sedimentation in the Magallanes foreland basin, southernmost Andes (53-54.4°S). *Tectonics* v. 30/5. TC002826.
- (1) Klepeis, K., **Betka, P.**, Clarke, G., Fanning, M., H., Rojas, L., Mpodozis, C., & Thomson, S. 2010. Continental underthrusting and obduction during the Cretaceous closure of the Rocas Verdes rift basin, Cordillera Darwin, Patagonian Andes. *Tectonics*, V. 29, TC3024.

SELECTED CONFERENCE ABSTRACTS AND GEOLOGIC SURVEY REPORTS

- (25) **Betka, P.M.**, B. Oryan., J.R. Thigpen, C. Grall, W.R. Buck, and M. Steckler. 2018. Combining kinematic and numerical modeling to understand the progression from detachment folding to fault-cored folding; a case study from the Indo-Burman fold-thrust belt. Geological Society of America Annual Meeting. Nov. 4-7, Indianapolis, IN. USA.
- (24) **Betka, P.M.**, L. Seeber, S. Thomson, R. Sincavage, M. Steckler, C. Zoramthara, V.K. Gahalaut. 2018. New geologic maps, cross sections, and structural models of the Indo-Burman accretionary prism. American Geophysical Union Annual Meeting. Dec. 10-14, Washington DC. USA.
- (23) **Betka, P.M.**, S. Thomson, L. Seeber, M. Steckler, C. Zoramthara, R. Sincavage. 2017. Mechanical stratification during extreme sediment accretion in the Indo-Burman Ranges: geological and theoretical constraints on the megathrust geometry. American Geophysical Union Annual Meeting. Dec. 11-15, New Orleans, LA. USA.
- (22) **Betka, P.M.**, S. Thomson, L. Seeber, M. Steckler, C. Zoramthara, R. Sincavage. 2016. The Indo-Burma Ranges: Eocene—Pliocene Coevolution of the paleo-Brahmaputra Fluvial-Deltaic System and Indo-Burma Accretionary Prism. American Geophysical Union Annual Meeting. Dec. 12-16, San Francisco, CA. USA.
- (21) Wypych, Alicja, Gillis, R.J., **Betka, P.M.**, and Decker, P.L. 2016. Major-oxide and trace-element geochemical data from rocks collected in 2015 in lower Cook Inlet, Iniskin - Tuxedni region, Alaska: Alaska Division of Geological & Geophysical Surveys Raw Data File 2016-3, 2 p. <http://doi.org/10.14509/29575>
- (20) *Rosenthal, J.L., **Betka, P.M.**, Gillis, R.J., and Nadin, E. 2016. Fracture intensity in the Paveloff Siltstone Member (Chinitna Formation) and Pomeroy Arkose Member (Naknek Formation), Iniskin Peninsula, Alaska: Implications for hydrocarbon migration in Cook Inlet basin, in Herriott, T.M., ed., Petroleum-related geologic studies in lower Cook Inlet during 2015, Iniskin-Tuxedni region, south-central Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2016-1-9, p. 67-72.
- (19) **Betka, P.M.**, Gillis, R.J. 2016. Observations on the Bruin Bay fault system between Chinitna and Tuxedni bays, Cook Inlet, Alaska, in Herriott, T.M., ed., Petroleum-related geologic studies in lower Cook Inlet during 2015, Iniskin-Tuxedni region, south-central Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2016-1-10, p. 73-78. <http://doi.org/10.14509/29544>
- (18) **Betka, P.M.**, L. Seeber, M. Steckler. 2015. A case for plane-strain during the development of the Indo-Burma fold-thrust belt in Tripura and Mizoram, northeast India (23-24°N lat; 91-93°E long.). American Geophysical Union Annual Meeting. Dec. 14-18, San Francisco, CA. USA.
- (17) *Rosenthal, J.L., **Betka, P.M.**, Gillis, R.J., and Nadin, E. 2015. Preliminary investigation of fracture populations in Mesozoic strata of the Cook Inlet forearc basin: Iniskin Peninsula and Lake Clark National Park, Alaska, in Wartes, M.A., ed., Energy-related studies during the 2014 field season, western Cook Inlet, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2015-5-3, p. 9-13. <http://doi.org/10.14509/29458>
- (16) **Betka, P.M.**, and Gillis, R.J. 2015. The superposition of strike-slip and reverse-slip faults in the Bruin Bay fault system, Ursus Head, lower Cook Inlet, in Wartes, M.A., ed., Energy-related studies during the 2014 field season, western Cook Inlet, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2015-5-2, p. 5-8. <http://doi.org/10.14509/29457>
- (15) **Betka, P.M.**, Gillis, R.J. 2014. Fault-slip history of the Bruin Bay fault system, Iniskin Peninsula, Cook Inlet, Alaska. Geological Society of America Abstracts with Programs. Joint Annual Meeting. Oct. 19-22 Vancouver, BC, Canada.

CONFERENCE ABSTRACTS AND GEOLOGIC SURVEY REPORTS (*continued*)

- (14) Gillis, R.J., Wartes, M.A., Herriott, T.M., Bull, K.F., Decker, P.L., and Betka, P.M. 2014. Overview of new 1:63,360-scale geologic mapping of the Iniskin Peninsula, lower Cook Inlet, Alaska, in Gillis, R.J., ed., Cook Inlet program 2013 field studies: Observations and preliminary interpretations from new 1:63,360-scale geologic mapping of the Iniskin Peninsula, lower Cook Inlet, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2014-2-1, p. 3-6. <http://doi.org/10.14509/27306>
- (13) Betka, P.M. and Gillis, R.J. 2014. Preliminary kinematic evidence for right-lateral slip along a system of steeply-dipping faults in the hanging wall of the Bruin Bay Fault, Iniskin Peninsula, lower Cook Inlet, Alaska, in Gillis, R.J., Cook Inlet program 2013 field studies: Observations and preliminary interpretations from new 1:63,360-scale geologic mapping of the Iniskin Peninsula, lower Cook Inlet, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2014-2-4, p. 17-22. doi:10.14509/27309
- (12) Betka, P.M., Klepeis, K.A., Mosher, S. 2012. The formation of a retroarc fold-thrust belt by the closure and inversion of a back-arc basin: Patagonian-Fuegian fold-thrust belt, Chile. American Geophysical Union Annual Meeting. Dec. 3-7, San Francisco, CA. USA.
- (11) Betka, P.M., Mosher, S., Klepeis, K.A. 2012. Decoupling along a high strain zone during the tectonic inversion of a back-arc basin and formation of the Patagonian Andes, Chile. Geological Society of America Abstracts with Programs. Joint Annual Meeting. Nov. 4-7 Charlotte, NC. USA.
- (10) Betka, P., Klepeis, K., Mosher, S. 2011. Along-strike change in structural style and tectonic shortening during the development of the Patagonian retroarc fold-thrust belt, southern Andes. Geological Society of America Abstracts with Programs. Joint Annual Meeting. Oct. 9-12 Minneapolis, MN. USA.
- (9) Klepeis, K., McAtamney, J., Mehrtens, C., Thomson, S., Betka, P., Mosher, S. 2011. Along-strike variability of back arc basin collapse and the initiation of sedimentation in the Magallanes foreland basin, southernmost Andes (53 – 54.5°S). Geological Society of America Abstracts with Programs. Joint Annual Meeting. Oct. 9-12 Minneapolis, MN. USA.
- (8) Betka, P., Klepeis, K., Mosher, S. 2010. New Structural Maps and cross-sections of the Patagonian fold-thrust belt near Seno Otway, Seno Martínez and Peninsula Brunswick, Southern Chile. Bollettino di Geofisica teorica ed applicata. Vol 51. p. 129.
- (7) Klepeis, K., Betka, P., Fanning, C. M., Clarke, G., & Baldwin, S. L. 2009. The Initiation of Orogenesis in the Patagonian Andes by the Compression Inversion of the Extensional Rocas Verdes Basin. Geological Society of America Abstracts with Programs. Joint Annual Meeting. Oct. 18-21 Portland, OR. USA.
- (6) Betka, P., Klepeis, K., De Paoli, M., & Clarke G. 2008. Three-Dimensional Finite Strain and Kinematics of Flow from a Lower Crustal Extensional Shear Zone: Fiordland, New Zealand. Geological Society of America Abstracts with Programs. Joint Annual Meeting. Oct. 5-9 Houston, TX. USA.
- (5) Klepeis, K., Betka, P., Alvarez, J., Poblete, F., Thomson, S., Gehrels, G., & Clarke, G. Tectonic Evolution of a Doubly-Vergent, Thick-Skinned Fold and Thrust Belt in the Patagonian Andes, Southernmost South America. 2008. Geological Society of America Abstracts with Programs Joint Annual Meeting. Oct. 5-9. Houston, TX. USA.
- (4) Betka, P.M., Klepeis, K., De Paoli, M., & Clarke, G. 2007. Structure and kinematic evolution of the lower crust and upper mantle during lithospheric extension from the Resolution Island Shear Zone, Fiordland, New Zealand. Geological Society of America Abstracts with Programs Vol. 39, No. 6, p. 229.
- (3) Betka, P.M. 2007. Crust – mantle interactions during extension in the lower continental crust. The Green Mountain Geologist. Vol. 34, No. 2, pp. 3-4.
- (2) Betka, P. M., Jessup, M.J. & Law, R. D. 2006. Structural evolution of the Sauratown Mountain quartzites; Evidence for polyphase deformation and shearing. Southeastern Section – Geological Society of America Abstracts with Programs. Vol. 38, No. 3, p. 34.
- (1) Betka, P., Swanson, M., & Bampton, M. 2006. Digital Mapping Techniques Used to Correlate Left Lateral Shearing with the Emplacement of the Waldoboro Pluton, Muscongus Bay, Maine. Northeastern Section - Geological Society of America Abstracts with Programs. Vol. 38, No. 2, p. 92.