Michael Stearns

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APPOINTMENTS

2017–present Assistant Professor – Earth Science, Utah Valley University
2016–2017 Research Assistant Professor – Geology and Geophysics, University of Utah

EDUCATION

2015 Postdoctoral Researcher, University of Utah
- Development of laser ablation split stream analysis of Hf isotopes in zircon
- Emplacement history of the Wasatch Igneous Belt
- Detrital zircon analysis of the Straight Cliffs Fm.

2014 Ph.D. - Earth Science, University of California Santa Barbara
Dissertation: Genesis and evolution of the Pamir Plateau: a petrochronology view.

2009 M.S. - Geology and Geophysics, University of Utah
Thesis: Anatomy and assembly of the McDoogle pluton near Sawmill Lake, Central Sierra Nevada, California.

2006 B.S. summa cum laude - Geology and Geography, Eastern Michigan University
Thesis: Complexity trends in the evolutionary history of dasycladalean algae.

PUBLICATIONS

In Prep

Callis, S. and **Stearns, M.A.**, in prep, Timing of contact metamorphism and migmatization surrounding the Little Cottonwood Stock using LASS-ICP-MS U-Pb petrochronology, Utah.

Stearns, M.A., Bowman, J.R., Bartley, J.M., and Fernandez, D.P., in prep, Emplacement histories of the Wasatch Igneous Belt related to the formation of the Alta contact aureole.

Couper, S., Nash, B.P., **Stearns, M.A.**, and Fernandez, D.P., in prep, Dual multicollector LASS-ICP-MS for Lu-Hf and U-Pb isotopes of zircon in rhyolite from the Yellowstone hotspot.

Channer, M.A., Ault, A.K., Reiners, P.W., and Stearns, M.A., in prep, Thermochronologic constraints on secondary Fe-oxide mineralization in southwestern New Mexico.

Accepted or Published

Garber, J., Kylander-Clark, A.R., **Stearns, M.A.**, Seward, G., and Hacker, B.R., in review, Trace element controls on metamorphic titanite: Implications for petrochronology and crustal deformation: Journal of Petrology.

Primm, J., Johnson, C., and **Stearns, M.A.,** in review, Basin-axial progradation of a sediment supply-driven distributive fluvial system in the Late Cretaceous southern Utah foreland: Basin Research.

Hacker, B.R., D., Ratschbacher, Rutte, D., **Stearns, M.A.**, Malz, N., Stübner, K., Kylander-Clark, A.R., Pfaender, J., and Everson, A., in review, Building the Pamir-Tibet Plateau—Crustal stacking, extensional collapse, and lateral extrusion in the Central Pamir: 3. Thermobarometry and Petrochronology of the Deep Asian Crust: Tectonics.

Stearns, M.A., Bowman, J.R., Bartley, J.M., and Fernandez, D.P., accepted, Rethinking the driving mechanisms for the formation of the Alta contact aureole. Wasatch Front to Back: Utah Geological Society Field Trip Guide 2017.

Rutte, D., Ratschbacher, L., Schneider, S., Stübner, K., **Stearns, M.A.**, Gulzer, M.A., Hacker, B.R., and Project TIPAGE members, in review, Building the Pamir-Tibet Plateau—Crustal stacking, extensional collapse, and lateral extrusion in the Central Pamir: 1. Geometry and kinematics: Tectonics.

Rutte, D., Ratschbacher, L., Khan, J., Stübner, K., Jonckheere, R., Pfänder, J.A., Hacker, B.R., **Stearns, M.A.**, Enkelmann, E., Sperner, B., and Tichomirowa, M., in review, Building the Pamir-Tibet Plateau—Crustal stacking, extensional collapse, and lateral extrusion in the Central Pamir: 2. Timing and rates: Tectonics.

Cottle, J.M. and **Stearns, M.A.**, in press, Application of Single Shot Laser Ablation Split Stream to Accessory Phase Petrochronology: AGU Books.

Stearns, M.A., Cottle, J.M., Kylander-Clark, A.R., and Hacker, B.R., 2016, Extracting thermal histories from the near-rim zoning in titanite using coupled U-Pb and trace-element depth profiles by single-shot laser-ablation split stream (SS-LASS) ICP-MS: Chemical Geology, vol. 422, p. 13–24, doi:10.1016/j.chemgeo.2015.12.011

Stearns, M.A., Hacker, B.R., Ratschbacher, L., Rutte, D., and Kylander-Clark, A.R., 2015, Titanite petrochronology of the Pamir gneiss domes: Implications for mid–deep crust exhumation and titanite closure to Pb diffusion: Tectonics, vol. 34, doi:10.1002/2014TC003774.

Smit, M., Ratschbacher, L., Kooijman, E., and **Stearns, M.**, 2014, Early evolution of the Pamir deep crust from Lu-Hf and U-Pb geochronology, and garnet thermometry: Geology, vol. 42, p. 1047–1050.

Stearns, M.A. and Bartley, J.M., 2014, Multistage emplacement of the McDoogle pluton by magmatic crack-seal, an early phase of the John Muir intrusive suite, Sierra Nevada, California, by magmatic crack-seal growth: Geological Society of America Bulletin, vol. 126, p. 1569–1579.

***Stearns, M.A.**, Hacker, B.R., Ratschbacher, L., Lee, J., Cottle, J.M., and Kylander-Clark, A.R., Widespread, 2013, Synchronous Oligocene-Miocene metamorphism of the deep Pamir and North Himalaya driven by plate-scale dynamics: Geology, vol. 41, p. 1071-1074. **accompanying photo appeared on cover of Geology*

*Stübner, K., Ratschbacher, L., Weise, C., Chow, J., Hofmann, J., Khan, J., Rutte, D., Sperner, B., Pfänder, J.A., Hacker, B.R., Dunkl, I., Tichomirowa, M., and **Stearns, M.A**., 2013, The giant Shakhdara migmatitic gneiss dome, Pamir, India-Asia collision zone: 2. Timing of dome formation: Tectonics, vol. 32, doi:10.1002/tect.20059. **won 2015 Outstanding Paper Award from the Structural Geology & Tectonics Division of Geological Society of America*

Spencer, K., Hacker, B.R., Kylander-Clark, A.R.C., Andersen, T.B., Cottle, J.M., **Stearns, M.A**., Poletti, J.E., and Seward, G.G.E., 2012, Campaign-Style Titanite U-Pb Dating by Laser-Ablation ICP: Implications for Crustal Flow, Phase Transformations and Titanite Closure: Chemical Geology, vol. 341, p. 84-101.

Davis, J.W., Coleman, D.S., Gracely, J.T., Gaschnig, R., and **Stearns, M**., 2011, Magma accumulation rates and thermal histories of plutons of the Sierra Nevada batholith, CA: Contributions to Mineralogy and Petrology, p. 1-17, DOI: 10.1007/s00410-011-0683-7

Schmidt, J., Hacker, B.R., Ratschbacher, L., Stübner, K., **Stearns, M**., Kylander-Clark, A., Cottle, J.M., Webb, A.A.G., Gehrels, G., and Minaev, V., 2011, Cenozoic Deep Crust in the Pamir: Earth and Planetary Science Letters, vol. 312, p. 411-421.

Meeting Abstracts

Garber, J., Hacker, B.R., Stearns, M.A., Cottle, J.M., and Kylander-Clark, A.R., 2016, Why Does Some Subducted Continental Crust Escape Deformation and Transformation? AGU Fall Meeting.

Cottle, J.M. and Stearns, M.A., 2016, Application of single shot laser ablation split stream to accessory phase petrochronology. Geological Society of America Annual Meeting.

Couper, S., Nash, B.P., Stearns, M.A., and Fernandez, D.P., 2016, Dual multicollector LASS-ICP-MS for Lu-Hf and U-Pb isotopes; application to zircon in rhyolite from the Yellowstone hotspot. Geological Society of America Annual Meeting.

Channer, M.A., Ault, A.K., Reiners, P.W., and Stearns, M.A., 2016, Thermochronologic constraints on secondary Fe-oxide mineralization in southwestern New Mexico, Geological Society of America Annual Meeting.

Rutte, D., Ratchbacher, L., Stübner, K., and Stearns, M.A., 2016, Building the Pamir-Tibet Plateau: Crustal stacking and orogen parallel evasion of upper and middle crustal material in the Pamir. Structural Geology and Tectonics Forum.

Smit M.A., Ratschbacher L., Kooijman E., Stearns M.A., 2016, Garnet geochronology: improvements and application in studying India–Asia collision. EGU General Assembly Abstracts, Abstract EGU2016-1866.

Stearns, M.A., Bowman, J.R., Bartley, J.M., and Fernandez, D.P., 2015, Ten million years of fluid flow through the Alta Stock driven by incremental emplacement of the Little Cottonwood Stock, Wasatch, Utah. Geological Society of America Annual Meeting.

Smit M.A., Ratschbacher L., Kooijman E., Stearns M.A., 2015, Thermal Evolution of the Pamir Deep Crust Constrained using Lu-Hf and U-Pb Geochronology, and Garnet Thermometry. AGU-GAC-MAC-CGU Joint Assembly, Montreal, Abstract T11A-04.

Smit M.A., Ratschbacher L., Kooijman E., Stearns M.A., 2015, Lu-Hf and U-Pb geochronology, and thermometry link slab break-off to regional heating in the Pamir. Goldschmidt Conference, Prague, Abstract 5007.

Kylander-Clark, A.R.C., Stearns, M.A., Viete, D., Cottle, J.M., and Hacker, B.R., 2014, Single-shot laser ablation split-stream (SS-LASS) analysis depth profiling: AGU annual meeting.

Rutte, D., Stearns, M.A., Ratschbacher, L., 2014, Shortening and syn-contractional extension: the burial and exhumation history of the Cenozoic Central Pamir Gneiss domes, Tajikistan: EGU General Assembly Abstracts.

Stearns, M.A., Hacker, B.R., Ratschbacher, L., Rutte, D., and Kylander-Clark, A.R., 2013, Two modes of orogenic collapse of the Pamir plateau recorded by titanite: AGU annual meeting.

Stearns, M.A. Hacker, B.R., Kylander-Clark, A.R., Seward, G.G.E., 2013, Fluorine-aided re-equilibration of U-Pb and Zr in titanite: Geological Society of America Abstracts, paper no. 398-11.

Rutte, D., Stearns, M.A., and Ratschbacher, L., 2013, The eastern Central Pamir Gneiss Domes: temporal and spatial geometry of burial and exhumation: EGU General Assembly Conference Abstracts.

Stearns, M.A., Hacker, B.R., Ratschbacher, L., Kylander-Clark, A.R., and Mineav, V., 2012, Early Miocene extension within the Pamir plateau: constructing Temperature-time-Deformation paths with U-Pb titanite geochronology: AGU annual meeting.

Heiner, K.L., Bartley, J.M., Stearns, M.A., and Peterson, E., 2012, Bulk magnetic susceptibility as a proxy for compositional variation in plutonic rocks: Magma mixing can be a problem: Geological Society of America Abstracts, paper no. 92-40.

Stearns, M.A., Hacker, B.R., Kylander-Clark, A.R., Ratschbacher, L., and Seward, G., 2011, Thickening and propagation of the Pamir plateau: insights from monazite and titanite geochronology and trace-element geochemistry, eastern Tajikistan: EOS Trans. AGU, 1(6), Fall Meet. Suppl., abstract #T51J-06.

Hacker, B.R., Ratschbacher, L., Stearns, M.A., McGraw, J., Stubner, K., Kylander-Clark, A.R., Pfander, Jorg, Weise, C., Minaev, V., Gadoev, M., Oimahmadoc, I., 2011, Widespread, synchronous, large-magnitude exhumation of the deep Pamir, Geophysical Research Abstracts, vol. 13, EGU2011-8489

Stearns, M.S., Hacker, B.R., and Kylander-Clark, A.R., 2011, Titanite geochronology from the mid to lower crust of the Pamir plateau, eastern Tajikistan: Journal of Himalayan Earth Sciences, vol. 44, p. 80.

Hacker, B.R., Kylander-Clark, A.R., Lee, J., Cottle, J.M., and Stearns, M.A., 2011, Laser-ablation split-stream petrochronology of Kangmar and Mabja North Himalayan Gneiss Domes: Journal of Himalayan Earth Sciences, vol. 44, p. 25.

Stearns, M.A. and Bartley, J.M., 2009, Coalescence of slipped joints in granitic plutons to form the West Pinnacle Fault, Sierra Nevada, California: Geological Society of America Abstracts, paper no. 173-15.

Stearns, M.A. and Bartley, J.M., 2008, Petrologic controls of the bulk magnetic susceptibility in the McDoogle pluton, Sierra Nevada, California: EOS Trans. AGU, 89(53), Fall Meet. Suppl., Abstract V41D-2138.

Stearns, M.A., Bartley, J.M., and Coleman, D.S., 2008, Rapid emplacement of the McDoogle pluton into the Sawmill Lake shear zone, Sierra Nevada, California: Geological Society of America Abstracts, vol. 40, no. 6, p. 188.

Stearns, M.A. and Bartley, J.M., 2008, Assembly of the incrementally emplaced McDoogle pluton, central Sierra Nevada, CA: Geological Society of America Abstracts, vol. 40, no. 1, p. 92.

TEACHING EXPERIENCE

Instructor

2017 Fall	Earth Materials, Utah Valley Univ.
	Intro to Earth Science, Utah Valley Univ.
	Honors Intro to Earth Science, Utah Valley Univ.

2017 Spring Earth Materials II (Petrology), Univ. of Utah
2016 Fall Earth Materials II (Petrology), Univ. of Utah
2015 Fall Earth Materials II (Petrology), Univ. of Utah
2013 Plate Tectonics, UCSB

Teaching Assistant
2011 Summer Field Geology
2011 Spring Field Geology
2011 Petrotectonics
2010 Metamorphic Petrology
2007 Structural Geology - designed and taught lesson plan for lab
2007 Earth Materials I (Mineralogy)
2006 Earth Materials I (Mineralogy)

ADVISING
Samuel Callis – B.S. student – advising undergraduate research
Jon Primm – M.S. student – committee member
Grant Rea-Downing – Ph.D. student – committee member

AWARDS AND HONORS
2017 Invited Speaker – Utah Valley University
2016 Invited Speaker – Brigham Young University
2016 Invited Speaker – Idaho State University
2015 Invited Speaker – West Virginia University
2015 Invited Speaker – University of Utah
2015 Invited Speaker – Utah State University
2014 Alumni Graduate Award for Research Excellence – UC Santa Barbara
2008 Geological Society of America outstanding student poster
2006 Undergraduate student of the year, Geology and Geography, Eastern Michigan University
2006 Symposium Undergraduate Research Fellow, Eastern Michigan University
2004–2006 Dean's List, Eastern Michigan University

GRANTS AND FELLOWSHIPS
2013 The Lloyd and Mary Edwards Field Studies Fellowship – UCSB
2012 Earth Research Institute travel grant – UCSB
2012 Tunnell Metamorphic Petrology Fellowship – UCSB
2008 White Mountain Research Station Student Research Grant – University of Utah
2007 White Mountain Research Station Student Research Grant – University of Utah
2007 Geological Society of America Student Research Grant – University of Utah
2006 Departmental Fellowship, Geology & Geophysics, University of Utah

SERVICE AND COMMUNITY INVOLVEMENT
2017
reviewer for Earth and Planetary Science Letters
U of U petrochron lab became an NSF EarthScope AGeS lab
2016 reviewer for Geological Society of America Bulletin (GSAB)
2015–2017 frequent ad hoc reviewer for NSF-EAR
2015–2016 U of U Geology & Geophysics interior design
2012 EGU session co-convener: “Tectonics and lithospheric structure of the Indo-Eurasia collision zone”
2012–2013 UCSB faculty search committee
2012–2013 UCSB Earth Science Department website design committee

2012–2013 UCSB graduate student-faculty liaison

AFFILIATIONS
Geological Society of America
American Geophysical Union

RESEARCH EXPERIENCE
Analytical and Laboratory
- Laser-Ablation Split Stream Inductively-Coupled-Plasma Mass-Spectrometry (LASS) for U-Th/Pb dating and trace element analysis of zircon, titanite, monazite, etc.
- LASS of zircon Hf isotopes & U-Pb dating
- Electron Probe Microanalysis
  Zr- & F-in-titanite, major and trace elements in many phases
  Thermobarometry, Perplex & Thermocalc thermodynamic modeling programs
  X-ray (WDS and EDS) element mapping
- Scanning Electron Microscopy (trained user in the Univ. of Utah NanoFab Surface Analysis Lab, Univ. of Utah Physics SEM lab, and the BYU SEM lab)
  SE, BSE, CL imaging
  Electron-backscatter diffraction and fabric analysis (EBSD)
- Isotope Dilution Thermal Ionization Mass Spectrometry (CA-ID-TIMS) U-Pb zircon geochronology
- X-ray Diffractometry (powder)
- Optical Microscopy (transmitted & reflected)
- Mineral Separation and Sample Preparation

Field
- Structural mapping and strain analysis
- Lithologic mapping
- Igneous and metamorphic petrology
- Bulk magnetic susceptibility mapping

Scientific Software
- Matlab – modeling, data processing, and data visualization
- Iolite for Igor Pro & IsoPlot – ICP isotopic and trace element data processing
- Stereonet – structural data plotting and analysis
- Shape preferred orientation (SPO) software – statistical analysis of shapes
- ArcView GIS – data analysis and visualization
- Adobe Illustrator – data visualization and figure drafting