Dr. Rebecca M. Flowers

Curriculum Vitae

Professor of Geological Sciences, University of Colorado Boulder
Director, CU TRaIL (Thermochronology Research and Instrumentation Lab)

Department of Geological Sciences
Campus Box 399, 2200 Colorado Ave.
Boulder, CO 80309

Email: rebecca.flowers@colorado.edu
Website: http://www.rebecca-flowers.com
Lab website: http://cutrail.org/

Professor Rebecca Flowers leads the Thermochronology Research and Instrumentation Lab (CU TRaIL) at the University of Colorado Boulder. Her research focuses on developing, refining, and applying geochronologic techniques, especially (U-Th)/He and U-Pb chronology. Applications include "deep-time" (U-Th)/He thermochronology to constrain the timing, causes, and consequences of ancient unconformity development (e.g., the "Great Unconformities"), determining long-term burial and erosion histories in continental interiors and their causes, dating and deciphering the origin of Snowball Earth units in Colorado, reconstructing Cenozoic histories of topographic evolution (e.g., carving of the Grand Canyon, rise of the southern African Plateau), and constraining lunar and Martian impact histories using (U-Th)/He thermochronology. The lab's instrumentation includes an ASI Alphachron quadrupole He system, an Agilent 7900 quadrupole ICP-MS, an ESI NWR193UC excimer laser, a KLA ZETA-20 optical profiler, and a custom, in-house-built He extraction and measurement system. The lab conducts conventional whole crystal (U-Th)/He dating, as well as laser-ablation (U-Th)/He and U-Pb analysis. The CU TRaIL has produced data for 200+ scientists and students and generates thousands of (U-Th)/He analyses annually.

EDUCATION

2005	**PhD,** Geology and Geochemistry, Massachusetts Institute of Technology
2000	**MSc,** Geology, University of Utah
1998	**BSc,** Geology, College of William & Mary

PROFESSIONAL EXPERIENCE

2020-present	**Professor**, Dept of Geological Sciences, University of Colorado Boulder
2014-2020	**Associate Professor**, Dept of Geological Sciences, University of Colorado Boulder
2016-2017	**Visiting Professor**, Dept of Geosciences, University of Tübingen, Germany
2007-2014	**Assistant Professor**, Dept of Geological Sciences, University of Colorado Boulder
2005-2007	**Postdoctoral Scholar**, Division of Geological and Planetary Sciences, Caltech

AWARDS AND HONORS

2024	Fellow of the Geological Society of America
2022	Geosphere Exceptional Reviewer
2019	CU ASSETT Faculty Fellow
2018	CU Research & Innovation (RIO) Faculty Fellow
2017-2018	EarthScope Distinguished Speaker
2016-2017	Alexander von Humboldt Research Fellowship
2015-2016	Mineralogical Society of America Distinguished Lecturer
2010-2015	NSF CAREER award
1999-2003	NSF Graduate Research Fellowship

RESEARCH

PUBLICATIONS

denotes *graduate advisee, **undergraduate advisee, §postdoc mentee, §§research associate in lab group

In Review

85. Mahan, K.H., Condit, C.B., **Flowers, R.M.,** §Courtney-Davies, L., Bridges, J., and Godana, K., in review, Late-stage dextral transpression in the Paleoproterozoic Big Sky Orogen of southwestern Montana: Implications for shear zone heterogeneity and evolution of the northern Wyoming craton: *Journal of the Geological Society*.

84. Fuentes, A.J., §Courtney-Davies, L., **Flowers, R.M.,** Zhang, Y., and Swanson-Hysell, N.L., in review, Hematite crystallization within iron formation during Neoproterozoic to Paleozoic tectonic quiescence: *Earth and Planetary Science Letters.*

83. Penserini, B.D., Morell, K.D., **Flowers, R.M.,** Yanites, B.J., and Kumar, A., in review, Quaternary slip along the Himalayan crest as a novel driver of drainage capture: *JGR Earth Surface.*

Published

82. **Flowers, R.M.** and *Peak, B.P., 2025, Context matters: Modeling themochronologic data in geologic frameworks using the Great Unconformity as a case study: *Earth and Planetary Science Letters-Frontiers Article,* https://doi.org/10.1016/j.epsl.2024.119061.

81. §Courtney-Davies, L., **Flowers, R.M.,** Siddoway, C.S., Tasistro-Hart, A., and Macdonald, F.A., 2024, Hematite U-Pb dating of Snowball Earth meltwater events: *Proceedings of the National Academy of Sciences*, v. 127 (47), https://doi.org/10.1073/pnas.2410759121.

80. *Zeigler, S.D., *Baker, M., §§Metcalf, J.R., and **Flowers, R.M.,** 2024, The Geometric Correction Method for zircon (U-Th)/He chronology: Correcting for systematic error and assigning uncertainties to alpha-ejection corrections and eU concentrations: *Geochronology*, v. 6, p. 6, 199–226, https://doi.org/10.5194/gchron-6-199-2024.

79. **Kainz, S.J., Abbott, L.D., **Flowers, R.M.,** Olsson, A., Fernandez, S., and Metcalf, J.R., 2024, Cenozoic exhumation across the High Plains of southeastern Colorado from (U-Th)/He thermochronology: *Lithosphere*, https://doi.org/10.2113/2023/lithosphere_2023_310.

78. *Sturrock, C.P., **Flowers, R.M.,** Kohn, B.P., and §§Metcalf, J.R., 2024, Phanerozoic burial and erosion history of the southern Canadian Shield from (U-Th)/He thermochronology: *Minerals*, v. 14, 57, https://doi.org/10.3390/min14010057.

77. Apen, F.E., Rudnick, R.L., **Flowers, R.M.,** Gaynor, S.P., and Cottle, J.M., 2024, Metasomatism of the Wyoming craton lower crust during the Laramide orogeny: Extending the record of lithosphere hydration across western North America: *Earth and Planetary Science Letters,* v. 641*,* https://doi.org/10.1016/j.epsl.2024.118832.

76. **Flowers, R.M.,** Zeitler, P.K., Danišík, M., Reiners, P.W., Gautheron, C., Ketcham, R.A., Metcalf, J.R., Stockli, D.F., Enkelmann, E., and Brown, R.W., 2023, (U-Th)/He chronology: Part 1. Data, uncertainty, and reporting: *Geological Society of America Bulletin* special volume on the *Reporting and Interpretation of Geochronologic data,* v. 135 (1-2), p. 104–136, https://doi.org/10.1130/B36266.1.

75. **Flowers, R.M.,** Ketcham, R.A., Enkelmann, E., Gautheron, C., Reiners, P.W., Metcalf, J.R., Danišík, M., Stockli, D.F., and Brown, R.W., 2023, (U-Th)/He chronology: Part 2. Considerations for evaluating, integrating, and interpreting conventional individual aliquot data: *Geological Society of America Bulletin* special volume on the *Reporting and Interpretation of Geochronologic data*, v. 135 (1-2), p. 137–161, https://doi.org/10.1130/B36268.1.

74. *Peak, B.P., **Flowers, R.M.,** Macdonald, F.A., 2023, Ediacaran-Ordovician tectonic and geodynamic drivers of Great Unconformity exhumation on the southern Canadian shield: *Earth and Planetary Science Letters*, v. 619, https://doi.org/10.1016/j.epsl.2023.118334.

73. *Zeigler, S.D., §§Metcalf, J.R., and **Flowers, R.M.,** 2023, A practical method for assigning uncertainty and improving the accuracy of alpha-ejection corrections and eU concentrations in apatite (U-Th)/He chronology: *Geochronology*, v. 5, p. 197-228, https://doi.org/10.5194/gchron-5-197-2023.

72. §Martin, P.E., §§Metcalf, J.R., and **Flowers, R.M.,** 2023, Calculation of uncertainty in the (U-Th)/He system: *Geochronology*: v. 5, p. 91-107, https://doi.org/10.5194/gchron-5-91-2023.

71. §Martin, P.E., Macdonald, F.A., McQuarrie, N., **Flowers, R.M.**, and Maffre, P.J.Y., 2023, The rise of New Guinea and the fall of Neogene global temperatures: *Proceedings of the National Academy of Sciences,* https://doi.org/10.1073/pnas.2306492120.

70. Stanley, J.R. and **Flowers, R.M.,** 2023, Localized Cenozoic erosion on the southern African Plateau: A signal of topographic uplift?: *Geology*, v. 51, p. 549-553, https://doi.org/10.1130/G50790.1.

69. Macdonald, F.A., Yonkee, W.A., **Flowers, R.M.,** and Swanson-Hysell, N.L., 2023, Neoproterozoic of Laurentia, *in* Whitmeyer, S.J., Williams, M.L., Kellett, D.A., and Tikoff, B., eds., Laurentia: Turning Points in the Evolution of a Continent: Geological Society of America Memoir 220, p. 331–380, https://doi.org/10.1130/2022.1220(19).

68. Lamont, E.A., Sousa, F.J., Meigs, A.J., Jayangondaperumal, R., **Flowers, R.M.,** Anilkumar, A., Woodring, D., and Sobel, E.R., 2023, Accretion of the NW Himalayan foreland pre-dates Late Cenozoic climate change: Terra Nova, v. 35, p. 41-48, http://doi.org/10.1111/ter.12627.

67. **Flowers, R.M.** and Arrowsmith, J.R., 2022, AGeS^3: Micro-funding an inclusive community grassroots effort to better understand the Earth system: *GSA* Today, Groundwork article, v. 32 (12), p. 52-53, https://doi.org/10.1130/GSATG549GW.1.

66. **Flowers, R.M.,** Ketcham, R.A., Macdonald, F.A., Siddoway, C.S., Havranek, R.E., 2022, Existing thermochronologic data do not constrain Snowball glacial erosion below the Great Unconformities: *Proceedings of the National Academy of Sciences*, Letter to the Editor, v. 119, No. 38, https://doi.org/10.1073/pnas.2208451119.

65. *Havranek, R.E. and **Flowers, R.M.**, 2022, Zircon (U-Th)/He data for the Colorado Front Range "fourteeners" and testing Cryogenian exhumation of sub-Great Unconformity basement: *Chemical Geology*, v. 591, https://doi.org/10.1016/j.chemgeo.2021.120702.

64. *Peak, B.A., **Flowers, R.M.**, Macdonald, F.A., and Cottle, J.M., 2022, Forum, Reply to Comment on: Zircon (U-Th)/He thermochronology reveals pre-Great Unconformity paleotopography in the Grand Canyon region: Geology, 50 (3): e544, https://doi.org/10.1130/G49965Y.1.

63. Abbott, L.D., **Flowers, R.M.,** §§Metcalf, J., Falkowski, S., and Niazy, F., 2022, Post-Laramide, Eocene epeirogeny in Colorado – The result of a mantle drip?: *Geosphere*, https://doi.org/10.1130/GES02434.1.

62. Pu, J.P., Macdonald, F.A., Schmitz, M.D., Rainbird, R.H., Bleeker, W., Peak, B.A., **Flowers, R.M.,** Hoffman, P.F., Rioux, M., and Hamilton, M.A., 2022, Emplacement of the Franklin large igneous province and initiation of the Sturtian Snowball Earth: *Science Advances,* v.8, doi:10.1126/sciadv.adc9430.

61. *Peak, B.A., **Flowers, R.M.**, Macdonald, F.A., and Cottle, J.M., 2021, Zircon (U-Th)/He thermochronology reveals pre-Great Unconformity paleotopography in the Grand Canyon region: *Geology*, v. 49, https://doi.org/10.1130/G49116.1.

60. *Sturrock, C.P., **Flowers, R.M.,** and Macdonald, F.A., 2021, The late Great Unconformity of the central Canadian Shield: *Geochem. Geophys. Geosyst.,* https://doi.org/10.1029/2020GC009567.

59. §§Metcalf, J.R. and **Flowers, R.M.,** 2021, (U-Th)/He Chronology, *Encyclopedia of Geology*, 2nd Edition, p. 66-75, https://doi.org/10.1016/B978-0-12-409548-9.12385-1.

58. Stanley, J.R., Braun, J., Baby, G., Guillocheau, F., Robin, C., **Flowers, R.M.**, Brown, R., Wildman, M., Beucher, R., 2021, Constraining plateau uplift in southern Africa by combining thermochronology, sediment flux, topography, and landscape evolution modeling: *Journal of Geophysical Research: Solid Earth, 126,* e2020JB021243, https://doi.org/10.1029/2020JB021243.

57. **Flowers, R.M.,** Macdonald, F.A., Siddoway, C.S., and *Havranek, R., 2020, Diachronous development of Great Unconformities before Neoproterozoic Snowball Earth: *Proceedings of the National Academy of Sciences,* v. 117 (19), www.pnas.org/cgi/doi/10.1073/pnas.1913131117.

56. *Baughman, J.S. and **Flowers, R.M.**, 2020, Mesoproterozoic burial of the Kaapvaal craton, southern Africa during Rodinia supercontinent assembly from (U-Th)/He thermochronology: *Earth and Planetary Science Letters*, v. 531, https://doi.org/10.1016/j.epsl.2019.115930.

55. *Stanley, J.R. and **Flowers, R.M.,** 2020, Mesozoic denudational history of the lower Orange River and eastward migration of erosion across the southern African Plateau: *Lithosphere*, https://doi.org/10.1130/L1121.1.

54. McDannell, K.T. and **Flowers, R.M.**, 2020, Vestiges of the ancient: Deep-time noble gas thermochronology: *Elements* issue "Noble gas thermochronology", v. 16 (5), p. 325-330, https://doi.org/10.2138/gselements.16.5.325.

53. Duvall, A.R., Harbert, S.A., Upton, P., Tucker, G., Flowers, R.M., and Collett, C., 2020, River patterns reveal two stages of landscape evolution at an oblique convergent margin, Marlborough Fault System, New Zealand: *Earth Surface Dynamics*, v. 8, p. 177-194, https://doi.org/10.5194/esurf-8-177-2020.

52. **Flowers, R.M.,** Arrowsmith, R., McConnell, V., §§Metcalf, J.R., Rittenour, T., and Schoene, B.S. 2019, The AGeS2 (Awards for Geochronology Student research) Program: Supporting community geochronology needs and interdisciplinary science: *GSA Today, Groundwork article*, v. 29, p. 36-37, https://doi.org/10.1130/GSATG392GW.1.

51. *Robinson, K.H., **Flowers, R.M.,** and §§Metcalf, J.R., 2019, Rutile (U-Th)/He thermochronology: Temperature sensitivity and radiation damage effects: *Geochem. Geophys. Geosyst.* 20, https://doi.org/10.1029/2019GC008484.

50. Collett, C., Duvall, A.R., **Flowers, R.M.,** Tucker, G.E., and Upton, P., 2019, The timing and style of oblique deformation within New Zealand's Kaikoura Ranges and Marlborough Fault system from low-temperature thermochronology: *Tectonics,* v. 38, p. 1250-1272, https://doi.org/10.1029/2018TC005268.

49. **Flowers, R.M.** and Ehlers, T.E., 2018, Influence of rock erodibility on the interpretation of thermochronologic data: *Earth and Planetary Science Letters*, v. 482, p. 312-323, https://doi.org: 10.1016/j.epsl.2017.11.018.

48. *Baughman, J.S. and **Flowers, R.M.,** 2018, Deciphering a 2 Gyr-long thermal history from a multichronometer (U-Th)/He study of the Phalaborwa carbonatite, South Africa: *Geochem. Geophys. Geosyst.*, v. 19, https://doi.org/10.1029/2017GC007198.

47. §§Kelly, N.M., **Flowers, R.M.,** §§Metcalf, J.R., and Mojzsis, S.J., 2018, Late accretion to the Moon recorded in zircon (U-Th)/He thermochronometry: *Earth and Planetary Science Letters,* v. 482, p. 222-235, https://doi.org/10.1016/j.epsl.2017.11.009.

46. **Weisberg, W.R., §§Metcalf, J.R., **Flowers, R.M.,** 2018, Response to comment on "Distinguishing slow cooling versus multiphase cooling and heating in zircon and apatite (U-Th)/He datasets: the case of the

McClure Mountain syenite standard": *Chemical Geology*, v. 498, p. 153-156, https://doi.org/10.1016/j.chemgeo.2018.07.033.

45. **Weisberg, W.R., §§Metcalf, J.R., **Flowers, R.M.,** 2018, Distinguishing slow cooling versus multiphase cooling and heating in zircon and apatite (U-Th)/He datasets: the case of the McClure Mountain syenite standard: *Chemical Geology*, v. 485, p. 90-99, https://doi.org/10.1016/j.chemgeo.2018.03.038.

44. Powell, J., Schneider, D., Desrochers, A., **Flowers, R.M.,** §§Metcalf, J.R., Gaidies, F., and Stockli, D.F., 2018, Low-temperature thermochronology of Anticosti Island: A case study on the application of conodont (U-Th)/He thermochronology to carbonate basin analysis: *Marine and Petroleum Geology*, v. 96, p. 441-456, https://doi.org/10.1016/j.marpetgeo.2018.05.018.

43. *Baughman, J.S., **Flowers, R.M.,** §§Metcalf, J.R., and Dhansay, T., 2017, Influence of radiation damage on titanite He diffusion kinetics: Geochimica et Cosmochimica Acta, v. 205, p. 50-64, https://doi.org/10.1016/j.gca.2017.01.049.

42. *Johnson, J.E., **Flowers, R.M.,** Baird, G.B., and Mahan, K.H., 2017, "Inverted" zircon and apatite (U-Th)/He dates from the Front Range, Colorado: High-damage zircon as a low temperature (<50°C) thermochronometer: *Earth and Planetary Science Letters*, v. 466, p. 80-90, https://doi.org/10.1016/j.epsl.2017.03.002.

41. **Flowers, R.M.,** Farley, K.A., and Ketcham, R.A., 2016, Response to comment on: "A reporting protocol for thermochronologic modeling illustrated with data from the Grand Canyon": *Earth and Planetary Science Letters,* v. 441, p. 213, https://doi.org/10.1016/j.epsl.2016.02.024.

40. *Landman, R.L., **Flowers, R.M.,** Rosenau, N.A., and Powell, J., 2016, Conodont (U-Th)/He thermochronology: A case study from the Illinois Basin: *Earth and Planetary Science Letters*, v. 56, p. 55-65, https://doi.org/10.1016/j.epsl.2016.10.003.

39. *Stanley, J.R. and **Flowers, R.M.,** 2016, Dating kimberlite emplacement with zircon and perovskite (U-Th)/He geochronology: *Geochem. Geophys. Geosyst.* doi: 10.1002/2016GC006519, v. 17, p. 4517-4533, https://doi.org/10.1002/2016GC006519.

38. **Flowers, R.M.,** Farley, K.A., and Ketcham, R.A., 2015, A reporting protocol for thermochronologic modeling illustrated with data from the Grand Canyon: *Earth and Planetary Science Letters,* v. 432, p. 425-435, https://doi.org/10.1016/j.epsl.2015.09.053.

37. *Ault, A.K., **Flowers, R.M.,** and Bowring, S.A., 2015, Synchroneity of cratonic burial phases and gaps in the kimberlite record: Episodic magmatism or preservational bias?: *Earth and Planetary Science Letters,* v. 410, p. 97-104, https://doi.org/10.1016/j.epsl.2014.11.017.

36. *Stanley, J.R., **Flowers, R.M.,** and Bell, D.R., 2015, Erosion patterns and mantle sources of topographic change across the southern African Plateau derived from the shallow and deep records of kimberlites, *Geochem. Geophys. Geosyst.* v. 16, p. 3235-3256, doi:10.1002/2015GC005969, https://doi.org/10.1002/2015GC005969.

35. Condit, C.B., Mahan, K.H., Ault, A.K., and **Flowers, R.M.,** 2015, Foreland-directed propagation of high-grade tectonism in the deep roots of a Paleoproterozoic collisional orogen, SW Montana, USA: *Lithosphere*, https://doi.org/10.1130/L460.1.

34. **Flowers, R.M.**, 2014, News & Views, Geomorphology: Tales of Topography: Nature Geoscience, v. 7, p. 483-485, https://doi.org/10.1038/ngeo2177.

33. **Flowers, R.M.** and Farley, K.A., 2013, Response to Comments on "Apatite $^{4}He/^{3}He$ and (U-Th)/He evidence for an ancient Grand Canyon: *Science*, v. 340, p. 143-c, https://doi.org/10.1126/science.1234203.

32. *Ault, A.K., **Flowers, R.M.,** and Bowring, S.A., 2013, Phanerozoic surface history of the Slave craton: *Tectonics*, v. 32, p. 1-18, https://doi.org/10.1002/tect.20069.

31. *Landman, R.L. and **Flowers, R.M.,** 2013, (U-Th)/He thermochronologic constraints on the evolution of the northern Rio Grande rift, Gore Range, Colorado and implications for rift propagation models: *Geosphere*, v. 9, p. 170-187, https://doi.org/10.1130/GES00826.1.

30. *Stanley, J.R., **Flowers, R.M.,** and Bell, D.R., 2013, Kimberlite (U-Th)/He dating links surface erosion with lithospheric heating, thinning, and metasomatism in the southern African Plateau: *Geology*, v. 14, p. 1243-1246, doi:10.1130/G34797.1, https://doi.org/10.1130/G34797.1.

29. **Flowers, R.M.** and Farley, K.A., 2012, Apatite $^{4}He/^{3}He$ and (U-Th)/He evidence for an ancient Grand Canyon, *Science*, v. 338, p. 1616-1619, https://doi.org/10.1126/science.1229390.

28. **Flowers, R.M.,** *Ault, A.K., Kelley, S.A., Zhang, N., and Zhong, S., 2012, Epeirogeny or eustasy? Paleozoic-Mesozoic vertical motion of the North American continental interior from thermochronometry and implications for mantle dynamics: *Earth and Planetary Science Letters*, v. 317-318, p. 436-445, https://doi.org/10.1016/j.epsl.2011.11.015.

27. *Ault, A.K. and **Flowers, R.M.,** 2012, Is apatite U-Th zonation information necessary for accurate interpretation of apatite (U-Th)/He thermochronometry data?: *Geochimica et Cosmochimica Acta*, v. 79, p. 60-78, https://doi.org/10.1016/j.gca.2011.11.037.

26. *Ault, A.K., **Flowers, R.M.,** and Mahan, K.H., 2012, Quartz shielding of sub-10 um zircons from radiation damage-enhanced Pb loss: an example from a metamorphosed mafic dike, northwestern Wyoming craton: *Earth and Planetary Science Letters*, v. 339-340, p. 57-66, https://doi.org/10.1016/j.epsl.2012.04.025.

25. Farley, K.A. and **Flowers, R.M.,** 2012, (U-Th)/Ne and multidomain (U-Th)/He systematics of a hydrothermal hematite from eastern Grand Canyon: *Earth and Planetary Science Letters,* v. 359-360, p. 131-140, https://doi.org/10.1016/j.epsl.2012.10.010.

24. Moser, D.E., Cupelli, C.L., Barker, I., **Flowers, R.M.,** Bowman, J.R, Wooden, J., and Hart, R.J., 2012, Reply to the discussion by Rajesh and Knoper on "New shock phenomena for dating and reconstruction of large impact basins revealed by zircon microstructural (EBSD, CL), U-Pb and (U-Th)/He analysis of the Vredefort dome": *Canadian Journal of Earth Sciences*,v. 49, p. 863-864, https://doi.org/10.1139/e2012-014.

23. Zhang, N., Zhong, S., and **Flowers, R.M.,** 2012, Predicting and testing continental vertical motion histories since the Paleozoic: *Earth and Planetary Science Letters*, v. 317-318, p. 426-435, https://doi.org/10.1016/j.epsl.2011.10.041.

22. **Flowers, R.M.** and Kelley, S.A., 2011, Interpreting data dispersion and "inverted" dates in apatite (U-Th)/He and fission-track datasets: An example from the U.S. midcontinent: *Geochimica et Cosmochimica Acta,* v. 75, p. 5169-5186, https://doi.org/10.1016/j.gca.2011.06.016.

21. Moser, D.E., Cupelli, C.L., Barker, I., **Flowers, R.M.,** Bowman, J.R, Wooden, J., and Hart, R.J., 2011, New shock phenomena for dating and reconstruction of large impact basins revealed by zircon microstructural (EBSD, CL), U-Pb and (U-Th)/He analysis of the Vredefort dome: *Canadian Journal of Earth Sciences*, Special Issue on the theme of *Geochronology* in honor of Tom Krogh, v. 48, p. 117-139, https://doi.org/10.1139/E11-011.

20. **Flowers, R.M.** and Schoene, B., 2010, (U-Th)/He thermochronometry constraints on unroofing of the eastern Kaapvaal craton and significance for uplift of the southern African Plateau: *Geology*, v. 38, p. 827-830, https://doi.org/10.1130/G30980.1.

19. **Flowers, R.M.,** 2010, The enigmatic rise of the Colorado Plateau, Research Focus: *Geology*, v. 38, p. 671-672, https://doi.org/10.1130/focus072010.1.

18. **Flowers, R.M.,** Schmitt, A., and Grove, M., 2010, Decoupling of U-Pb dates from chemical and crystallographic domains in granulite-facies zircon: *Chemical Geology*, v. 270, p. 20-30, https://doi.org/10.1016/j.chemgeo.2009.11.002.

17. **Flowers, R.M.,** 2009, Exploiting radiation damage control on apatite (U-Th)/He dates in cratonic regions: *Earth and Planetary Science Letters,* v. 277, p. 148-155, https://doi.org/10.1016/j.epsl.2008.10.005.

16. **Flowers, R.M.,** Ketcham, R.A., Shuster, D.L., and Farley, K.A., 2009, Apatite (U-Th)/He thermochronometry using a radiation damage accumulation and annealing model: *Geochimica et Cosmochimica Acta*, v. 73, p. 2347-2365, https://doi.org/10.1016/j.gca.2009.01.015.

15. *Ault, A.K., **Flowers, R.M.,** and Bowring, S.A., 2009, Phanerozoic burial and unroofing history of the western Slave craton and Wopmay orogen from apatite (U-Th)/He thermochronometry, *Earth and Planetary Science Letters*, v. 284, p. 1-11, https://doi.org/10.1016/j.epsl.2009.02.035.

14. **Flowers, R.M.,** Bowring, S.A., Mahan, K.H., Williams, M.L., and Williams, I.S., 2008, Stabilization and reactivation of cratonic lithosphere from the lower crustal record in the western Canadian shield: C*ontributions to Mineralogy and Petrology*, v. 156, p. 529-549, https://doi.org/10.1007/s00410-008-0301-5.

13. **Flowers, R.M.**, Wernicke, B.P., and Farley, K.A., 2008, Unroofing, incision and uplift history of the southwestern Colorado Plateau from apatite (U-Th)/He thermochronometry: *GSA Bulletin*, v. 120, p. 571-587, https://doi.org/10.1130/B26231.1.

12. Mahan, K.H., Goncalves, P., **Flowers, R.,** Williams, M.L., and Hoffman-Setka, D., 2008, The role of heterogeneous strain in the development and preservation of a polymetamorphic record in high-P granulites, western Canadian shield: *Journal of Metamorphic Geology,* v. 26, p. 669-694, https://doi.org/10.1111/j.1525-1314.2008.00783.x.

11. **Flowers, R.M.,** Shuster, D.L., Wernicke, B.P., and Farley, K.A., 2007, Radiation damage control on apatite (U-Th)/He dates from the Grand Canyon region, Colorado Plateau: *Geology*, v. 35, p. 447-450, https://doi.org/10.1130/G23471A.1.

10. **Flowers, R.M.,** Bowring, S.A., and Reiners, P.W., 2006, Low long-term erosion rates and extreme continental stability documented by ancient (U-Th)/He dates: *Geology*, v. 34, p. 925-928, https://doi.org/10.1130/G22670A.1.

9. **Flowers, R.M.,** Bowring, S.A., and Williams, M.L., 2006, Timescales of high-pressure, high-temperature metamorphism and mafic dike anatexis, Snowbird tectonic zone, Canada: *Contributions to Mineralogy and Petrology*, v. 151, p. 558-581, https://doi.org/10.1007/s00410-006-0066-7.

8. **Flowers, R.M.,** Mahan, K.H., Bowring, S.A., Williams, M.L., Pringle, M.S., and Hodges, K.V., 2006, Multistage exhumation and juxtaposition of lower continental crust in the western Canadian Shield: Linking high-resolution U-Pb and $^{40}Ar/^{39}Ar$ thermochronometry with P-T-D paths: *Tectonics*, 25, https://doi.org/10.1029/2005TC001912.

7. Mahan, K.H., Williams, M.L., **Flowers, R.M.,** Jercinovic, M.J., Baldwin, J.A., and Bowring, S.A., 2006, Geochronological constraints on the Legs Lake shear zone with implications for regional exhumation of lower crust, western Churchill Province, Canadian Shield, Canada: *Contributions to Mineralogy and Petrology*, v. 152, p. 223-242, https://doi.org/10.1007/s00410-006-0106-3.

6. Shuster, D.L., **Flowers, R.M.**, and Farley, K.A., 2006, The influence of natural radiation damage on helium diffusion kinetics in apatite: *Earth and Planetary Science Letters*, v. 249, p. 148-161, https://doi.org/10.1016/j.epsl.2006.07.028.

5. **Flowers, R.M.,** Bowring, S.A., Tulloch, A.J., and Klepeis, K.A., 2005, Tempo of burial and exhumation within the deep roots of a magmatic arc, Fiordland, New Zealand: *Geology*, v. 33, p. 17-20, https://doi.org/10.1130/G21010.1.

4. **Flowers, R.M.,** Royden, L.H., and Bowring, S.A., 2005, Isostatic constraints on lithospheric thermal evolution: Application to the Proterozoic orogen of the southwestern United States, *in* Karlstrom, K.E. and Keller, R.G., eds., The Rocky Mountain region – An evolving lithosphere: Tectonics, geochemistry and geophysics: *American Geophysical Union Monograph 154,* p. 125-138, https://doi.org/10.1029/154GM10.

3. **Flowers, R.M.,** Royden, L.H., and Bowring, S.A., 2004, Isostatic constraints on the assembly, stabilization, and preservation of cratonic lithosphere: *Geology*, v. 32, p. 321-324, https://doi.org/10.1130/G20177.2.

2. **Flowers, R.M.,** Moser, D.E. and Hart, R.J., 2003, Evolution of the amphibolite- granulite facies transition exposed by the Vredefort impact structure, Kaapvaal Craton, South Africa: *Journal of Geology*, v. 111, p. 455-470, https://doi.org/10.1086/375282.

1. Moser, D.E., **Flowers, R.M.** and Hart, R.J., 2001, Birth of the Kaapvaal tectosphere 3.08 billion years ago: *Science*, v. 291, p. 465-468, https://doi.org/10.1126/science.291.5503.465.

GRANT FUNDING

External Grant Funding

Active

27. **NSF Tectonics, EAR-2333105**, "Collaborative Research: Development of topography in the northern Sierra Nevada: Reconciling differences in uplift history and causes through multi-source thermochronologic data", co-PI (lead PI: E. Cassel; co-PI: R. Cecil), **$386,491 to CU**, 8/15/24-8/14/27.

26. **NSF Instrumentation and Facilities,** EAR-2311978, "Advancing and Broadening Access to Laser-Ablation (U-Th)/He Thermochronology", **lead PI** (co-PI: J. Metcalf), **$865,370** to CU, 07/15/2023- 06/30/2028.

25. **NSF Frontier Research in Earth Sciences**, EAR-2218547, "Collaborative Research: Human Infrastructure for a National Geochronology Consortium: Micro-funding an inclusive community grassroots effort to better understand the Earth system", **lead PI** (co-PIs: R. Arrowsmith, L. Arthurs, V. McConnell), **$528,702 to CU**; $2,485,259 total consisting mostly of funds to support three micro-award programs, 8/1/22-7/31/27.

24. **NASA Solar System Workings**, "Collaborative Research: Building a Global Record of Lunar Magmatism and Impact Processes: A Consortium Study of Apollo Regolith Apatite," **co-PI** (lead PI: C. Crow; co-PIs: J. Boyce, M. Brounce, R. Economos, B. Schoene), **$192,651** to Flowers, 1/1/20-12/31/23.

23. **NSF Petrology & Geochemistry, Geophysics,** EAR-1844182, "Deciphering lithospheric and deeper mantle contributions to the surface history of the North American Arctic from the unique mantle to surface record of kimberlites", **lead PI** (co-PI: S. Zhong), **$388,842 to CU**, 7/1/19-6/30/22.

Past

22. **NSF Geobiology & Low Temperature Geochemistry**, EAR-2203532, "Collaborative Research: EAGER: Developing new high spatial resolution hematite (U-Th)/(He-Pb) double dating techniques to date ancient oxidation," **co-PI** (lead-PI: P. Martin; co-PI: N. Swanson-Hysell), **$80,155** to CU, 12/1/21-11/30/22.

21. **NSF Sedimentary Geology & Paleobiology,** EAR-1822119, "Collaborative Research: Did the formation of the Great Unconformity trigger oxygenation and the Cambrian explosion?", **lead PI** (co-PI: F. Macdonald), **$229,950 to CU,** 9/1/18-8/31/20.

20. **NSF Instrumentation & Facilities,** EAR-1920648, "Acquisition of a 193 nm excimer laser-ablation system, hardware for a custom quadrupole He system, and an optical profiler for in situ (U-Th)/He and U-Pb geo- and thermochronology at the University of Colorado Boulder", **lead PI** (co-PI: J. Metcalf), **$499,562 to CU,** 9/1/19-2/28/22.

19. **NSF Frontier Research in Earth Sciences**, EAR-1925489, "Collaborative Research: Do arc-continent collisions in the tropics set the Earth's climate state?", **co-PI** (lead PI: F. Macdonald; co-PIs: J. Chiang, O. Jagoutz, L. Lisiecki, N. Swanson-Hysell), **$279,152 to CU,** 8/1/19-7/31/22.

18. **NSF Instrumentation & Facilities,** Supplement to "Acquisition of a 193 nm excimer laser-ablation system, hardware for a custom quadrupole He system, and an optical profiler for in situ (U-Th)/He and U-Pb geo- and thermochronology at the University of Colorado Boulder", **lead PI** (co-PI J. Metcalf), **$68,695** supplement, 9/1/21-8/31/22.

17. **NSF Tectonics, Petrology & Geochemistry,** EAR-1759200, "Collaborative Research: AGeS2 (Awards for Geochronology Student research) Program: Democratizing access to geochronology and promoting interdisciplinary science", **lead PI** (co-PIs: R. Arrowsmith, V. McConnell), **$94,964 to CU**; $850,400 total consisting mostly of student award funds, 9/1/18-7/31/21.

16. **NSF Tectonics Program,** EAR-1450181, "Hypsometric history of the North American continental interior and implications for mantle dynamics", **lead PI** (with co-PI S. Zhong), **$296,833**, 8/1/15-7/31/18.

15. **NSF Instrumentation and Facilities Program,** EAR-1559306, "Acquisition of a quadrupole ICPMS system for (U-Th)/He thermochronology and trace element analysis at the University of Colorado Boulder", **lead PI** (with co-PI J. Metcalf), **$183,646,** 8/1/16-7/31/18.

14. **NSF EarthScope,** Supplement to "Collaborative Research: Earthscope geochronology: A student research and training program and EarthScope Institute", **lead PI** (co-PIs R. Arrowsmith, J. Metcalf, T. Rittenour, B. Schoene), **$69,681** supplement ($11,369 to CU), 8/1/17-7/31/18.

13. **Alexander von Humboldt Fellowship for Experienced Researchers,** "Influence of rock strength variations on the exhumation history of cratons", **sole PI, $39,550 EUR,** 7/10/16-7/9/17.

12. **NSF EarthScope Program,** EAR-1358514, "Collaborative Research: Earthscope geochronology: A student research and training program and EarthScope Institute", **lead PI** (co-PIs R. Arrowsmith, J. Metcalf, T. Rittenour, B. Schoene), **$348,407** ($56,845 to CU), 8/1/14-7/31/17.

11. **NASA Cosmochemistry Program,** NNX14AG31G, "Coupled U-Pb and (U-Th)/He geochronology of lunar zircons", **co-PI** (with lead PI S. Mojzsis and co-PI J. Metcalf), **$390,001,** 1/1/14-12/31/16.

10. **NSF CIDER program,** funds to convene workshop in spring 2015 entitled "Integrating Dynamic Topography with Surface and Geological Processes" in Boulder, CO, with Shijie Zhong and Thorsten Becker, **$18,750,** 2014-2015.

9. **ACS Petroleum Research Fund, New Directions Grant 53526-ND8,** "Quantitative constraints on thermal histories in carbonates and marine shales: Conodont (U-Th)/He thermochronometry", **sole PI, $100,000,** 6/1/13-8/31/15.

8. **NSF Tectonics Program,** EAR-1321735, "Collaborative Research: Tracing the geomorphic signature of strike-slip faulting in Marlborough Hill Country, South Island, NZ", **co-PI** (with lead PI A. Duvall and co-PI G. Tucker), **$419,519,** 9/1/13-8/31/17, with no-cost extension.

7. **NSF Instrumentation and Facilities Program,** EAR-1126991, "Early Career: Acquisition of a He system for (U-Th)/He thermochronology at the University of Colorado, Boulder", **sole PI, $320,000,** 9/15/11-8/31/15.

6. **NSF Directorate for Education and Human Resources,** Enhanced Experience Supplement to "CAREER: Evolution of the southern African Plateau using advances in (U-Th)/He thermochronometry, and enhancing student critical thinking in science", **sole PI, $35,000**, 6/15/16-7/31/17.

5. **NSF Tectonics Program,** EAR-0951518, "CAREER: Evolution of the southern African Plateau using advances in (U-Th)/He thermochronometry, and enhancing student critical thinking in science", **sole PI, $531,933**, 6/15/10-6/14/15.

4. **ACS Petroleum Research Fund, New Investigator Grant 47476-G8,** "Evolution of the Rio Grande Rift in the heart of the southern Rockies: Cooling and unroofing history of the Gore Range, Colorado", **sole PI, $50,000,** 3/1/08-2/28/10

3. **NSF Tectonics Program,** EAR-071145, "Quantifying the stability of continents using advances in apatite (U-Th)/He, $^{4}He/^{3}He$ and U/Pb thermochronometry", **sole PI, $193,144,** 9/1/07-8/31/12.

Internal Grant Funding

Past

2. **CU College of Arts & Sciences Renovation Fund Award,** CU TRaIL (U-Th)/He lab renovation**, lead faculty member** (with J. Metcalf), $99,863, 1/1/20-12/31/20.

1. **CU Renovation and Infrastructure Improvement Award** (U-Th)/He lab renovation, **lead faculty member** (with J. Metcalf)**, $62,688,** 8/1/16-7/31/17

INVITED TALKS

Invited Talks in Departmental Seminars

2023 Colby College, Geology Dept, virtual

2021 Stony Brook University, Dept of Geosciences, virtual
East Carolina University, Dept of Geology, virtual
University of Texas at Arlington, Dept of Earth and Environmental Sciences, virtual

2020 University of California Santa Barbara, Dept of Earth Science

2019 Utah State University, Geology Dept - Forster Lecturer selected by graduate students (two talks)

2018 Yale University, Dept of Geology & Geophysics
College of William & Mary, Geology Dept, 100 years of Women Geoscience Celebration University of Puerto Rico, Dept of Geology
Appalachian State University, Dept of Geological and Environmental Sciences
Lawrence University, Dept of Geology

2017 Harvard University, Earth & Planetary Sciences
University of Alberta, Dept of Earth and Atmospheric Sciences – Grace Anne Stewart speaker selected by graduate students
Montana State University, Dept of Geology
Southern Methodist University, Roy Huffington Dept of Earth Sciences
University of Potsdam, Institute of Earth and Environmental Science
GFZ German Research Center, Earth Surface Process Modeling Group
University of Bristol, School of Earth Sciences
Cardiff University, School of Earth and Ocean Sciences
University of Franche-Compte, Institute of the Environment

2016 University of Tuebingen, Dept of Geologie and Geodynamik
University of Illinois Champaign-Urbana, Dept of Geology
Grand Valley State University, Dept of Geology
Bowling Green State University, Dept of Geology
University of Arizona, Dept of Geosciences
New Mexico State University, Dept of Geological Sciences
Texas Tech, Dept of Geosciences

2015 University of Idaho, Dept of Geological Sciences
Idaho State University, Dept of Geosciences
University of Montana, Dept of Geosciences

2014 Rice University, Dept of Earth Sciences
University of Houston, Dept of Earth and Atmospheric Sciences – brownbag seminar
Utah State University, Dept of Geology
UNAVCO, Boulder, CO
University of North Carolina Chapel Hill, Dept. of Geological Sciences
University of Northern Colorado, Dept of Earth and Atmospheric Sciences

2013 University of Utah, Dept. of Geology and Geophysics
Princeton University, Dept. of Geosciences

University of Oregon, Dept. of Geological Sciences (two talks)
New Mexico Tech, Dept. of Earth and Environmental Science (two talks)
U.S. Geological Survey, Lakewood, CO
University of the Witwatersrand, School of Geosciences, South Africa
2012 University of Wyoming, Dept. of Geology and Geophysics
Southern Methodist University, Dept. of Earth Sciences
Colorado State University, Dept. of Geosciences
Colorado College, Geology Department
Colorado Scientific Society, Lakewood, Colorado
2011 University of Nevada, Las Vegas, Dept. of Geoscience
The University of the Free State, Dept. of Geology, South Africa
Nelson Mandela Metro University, Dept. of Geosciences, South Africa
2010 Stanford University, Dept. of Geological and Environmental Sciences
2009 University of Texas, Austin, Jackson School of Geological Sciences (two talks)
Boston University, Dept. of Earth Sciences
Colorado School of Mines, Dept. of Geology and Geological Engineering
Four Corners Geological Society, Colorado
2008 University of New Mexico, Dept. of Earth and Planetary Sciences
University of Florida, Dept. of Geological Sciences
University of Montana, Dept. of Geosciences
University of Wyoming, Dept. of Geology and Geophysics
Colorado State University, Dept. of Geosciences
2007 University of Colorado, Boulder, Dept. of Geological Sciences
University of California, Davis, Dept. of Geology
California Institute of Technology, Geoclub Seminar
2006 University of North Dakota, Dept. of Geology and Geological Engineering
North Dakota State University, Dept. of Geosciences
University of Colorado, Boulder, Dept. of Geological Sciences
University of Arizona, Dept. of Geosciences
University of Tennessee, Knoxville, Dept. of Earth and Planetary Sciences
University of Texas, El Paso, Dept. of Geological Sciences
2005 University of Calgary, Dept. of Geology and Geophysics
California Institute of Technology, Geoclub Seminar
University of California, Los Angeles, Dept. of Earth and Space Sciences
University of California, Santa Cruz, Dept of Earth Sciences
University of Texas, El Paso, Dept. of Geological Sciences
Vanderbilt University, Dept. of Earth and Environmental Sciences

Other Invited Talks

2017 EAR, National Science Foundation Headquarters, Arlington, VA – Future of the AGeS (Awards for Geochronology Student research) program

Invited Talks to Public Groups

2021 Science from Your Sofa, College of Arts & Sciences, University of Colorado Boulder, virtual
Commencement Speaker, Dept of Geological Sciences, University of Colorado Boulder
2020 Colorado Scientific Society
2014 Collegiate Peaks Forum Series, Buena Vista, CO; Southwest Seminars, Santa Fe, NM
2013 Café Scientifique, University of Colorado, Colorado Springs
2012 Academy for Lifelong Learning, Denver, CO

Invited and Keynote Talks at Meetings

denotes *graduate mentee and **undergraduate mentee
GSA – Geological Society of America; AGU – American Geophysical Union; GAC-MAC – Geological Association of Canada-Mineralogical Association of Canada

19. **Flowers, R.M.,** Macdonald, F.A., Peak, B.A., Siddoway, C.S., Sturrock, C.P., Havranek, R., and Ketcham, R.A., Development of the Great Unconformities: How old are they? 2022, National GSA meeting, Denver, CO, October 2023.
Pardee session: "The Proterozoic-Phanerozoic Transition: Laying the Foundation for the Modern Earth System"

18. **Flowers, R.M.,** Arrowsmith, R., McConnell, V., Metcalf, J.R., Rittenour, T., Schoene, B.S., Eriksson, S., 2019, The AGeS2 (Awards for Geochronology Student research 2) program: An update and seeking community input on its future**:** National GSA meeting, Phoenix, AZ, September 2019.
Session: "Diversifying Geochronology: Innovations in techniques, applications, and perspectives"

17. **Flowers, R.M.,** Bowring, S.A., Zhong, S., Macdonald, F.A., 2019, Deep-time (U-Th)/He thermochronology, the missing sedimentary record, and the Great Unconformity: Gordon Research Conference on "Geochronology: Timing, tempo, and drivers of biotic evolution", Waterville, NH, August 2019.
Session: "Supercontinents and biogeography"

16. **Flowers, R.M.,** *Baughman, J.S., *Robinson, K.H., and Metcalf, J.R., 2018, Titanite and rutile (U-Th)/He thermochronology: Diffusion kinetics, radiation damage effects, and utility: 2018 International Conference on Thermochronology, Quedlinburg, Germany. September 2018.
Session: "Noble gas diffusion applied to thermochronology"

15. **Flowers, R.M.,** *Baughman, J.S., *Johnson, J.E., and Metcalf, J.R., 2017, The expanding temperature sensitivity range of (U-Th)/He thermochronology from improved understanding of the "big three" (apatite, zircon and titanite): approaches and examples: National GSA meeting, Seattle, WA, October 2017.
Session: "Improvements and Challenges in Geochronology: Organizing the Past while Planning for the Future"

14. **Flowers, R.M.,** Arrowsmith, R., Metcalf, J.R., Rittenour, T., Schoene, B.S., Hole, J., Pavlis, T., Wagner, L., Whitmeyer, S., and Williams, M.L., 2015, Geology, Geochronology, and EarthScope: The EarthScope AGeS program and a new idea for a 4D-Earth initiative: Fall AGU meeting, San Francisco, CA, December 2015.
Session: "Crustal structure and evolution across the continental US from 10 years of Earthscope investigations: What have we learned and what are the open questions?"

13. **Flowers, R.M.,** *Baughman, J.S., *Johnson, J.E., *Landman, R.L., *Stanley, J.R., **Weisberg, W.R., and Metcalf, J.R., 2015, Expanding the temperature sensitivity range and applicability of the (U-Th)/He system: some examples National GSA meeting, Baltimore, MD, November 2015.
Session: "Novel Methods, Applications, and Data Interpretations in Thermochronology"

12. **Flowers, R.M.,** *Ault, A.K., Zhong, S., and Bowring, S.A., 2015, Exploring relationships between kimberlite distributions, mantle dynamics, and the hypsometric history of the North American cratonic interior: Spring AGU/GAC-MAC Joint Assembly meeting, Montreal, Canada, May, 2015.
Session: "Origin of cratonic mantle lithosphere, diamonds, and deeply sourced volatile-rich melts: Processes and timescales"

11. **Flowers, R.M.** and Farley, K.A., 2014, Grand Canyon, models, and the interpretation of thermochronology data: Thermo2014, 14th International Conference on Thermochronology, Chamonix, France, September 2014.
Session: "Landscape evolution on different timescales"

10. **Flowers, R.M.,** 2013, Kimberlites, thermochronology, and the Phanerozoic elevation change histories of cratons: Keynote speaker, post-AGU Cooperative Institute for Dynamic Earth Research symposium, Berkeley, CA, December 2013.

9. **Flowers, R.M.,** Blackburn, T.J., Kelley, S.A., and *Ault, A.K., 2013, Evidence for post-100 Ma deposition, erosion and vertical motion of North American interior regions lacking preserved Cretaceous cover: Invited Speaker, Fall AGU meeting, San Francisco, CA, December 2013.
Session: "Origin, evolution, and impacts of high topography in continental interiors"

8. **Flowers, R.M.** and Farley, K.A., 2013, Constraints on an ancient Grand Canyon and the topographic evolution of the southwestern Colorado Plateau from thermochronometry: Invited Speaker, National GSA meeting, Denver CO, October 2013.
   Session: "Paleotopography"

7. **Flowers, R.M.,** *Ault, A.K., Kelley, S.K., Zhang, N., and Zhong, S., 2011, Deciphering the history and causes of the cryptic rise and fall of continental interiors using low temperature thermochronology: Invited Speaker, Fall AGU meeting, San Francisco, CA, December 2011.
   Session: "The long road to flat – Towards understanding the drivers and quantifying change in 'dead' orogens"

6. **Flowers, R.M.,** *Ault, A.K., Kelley, S.A., Zhang, N., and Zhong, S., 2011, Testing mantle dynamic models from thermochronology constraints on the rise and fall of continental interiors: Invited Speaker, Special meeting on Dynamic Topography organized by the Royal Astronomical Society, Geological Society and the British Geophysical Association, September 2011.

5. **Flowers, R.M.,** 2010, Interpretation of apatite (U-Th)/He thermochronometry data from cratonic rocks: Invited speaker, Thermo2010, 12th International Conference on Thermochronology, Glasgow, Scotland, August 2010.
   Session: "Interpretation of thermochronology data: Limitations and potential"

4. **Flowers, R.M.,** 2010, Deciphering unroofing, paleotopography and elevation gain of cratonic plateaus using (U-Th)/He thermochronometry: case studies from the Colorado Plateau and southern Africa: Keynote speaker, Structural Geology and Tectonics Forum, Madison, WI, May 2010.
   Session: "Exhumation and large scale tectonics"

3. **Flowers, R.M.,** Wernicke, B.P., and Farley, K.A., 2009, Constraints on Early Tertiary incision and uplift of the Grand Canyon region of the Colorado Plateau from apatite (U-Th)/He thermochronometry: Invited speaker, AGU Joint Assembly, Toronto, Canada, May 2009.
   Session: "Surface geological and tectonic constraints on time-dependent mantle convection"

2. **Flowers, R.M.,** 2008, High to low temperature geo- and thermochronology and the reactivation and stability of continental lithosphere, western Canadian shield: Keynote speaker, Goldschmidt international geochemistry meeting, Vancouver, Canada, July 2008.
   Session: "4D structure of the continental crust: greenstones to granulites"

1. **Flowers, R.M.** and Kelley, S., 2008, Thermal histories in sedimentary basins from integrated low-temperature thermochronometry: An example from the High Plains of New Mexico and western Texas: Invited speaker, Goldschmidt international geochemistry meeting, Vancouver, Canada, July 2008.
   Session: "Sedimentary basin development and evolution"

I am an author on 12-18 abstracts per year submitted to national and international meetings..

ADVISING AND TEACHING

ADVISEES AND LAB MEMBERS

Current Graduate Student Advisees (2)

Connor Diaz, PhD, Fall 2022-present, ***NSF Graduate Research Fellow***
Spencer Zeigler, PhD, Fall 2020-present, ***NSF Graduate Research Fellow***

Past PhD Student Advisees (6)

Barra Peak, PhD, Fall 2019-2024, ***CU Chancellors Fellow***, Continental breakup, mountain building, and the Great Unconformity: The exhumation history of North America's most iconic erosional surface using zircon (U-Th)/He thermochronology. Now Postdoctoral Fellow at UT-Austin.

Colin Sturrock, PhD, 2015-2021, Deciphering burial and erosion histories across the interior of the Canadian shield and implications for mantle dynamics. Now at USGS.

Jaclyn Baughman, PhD, 2013-2018, Bridging high and low temperature thermal histories across the Kaapvaal craton, southern Africa from advances in titanite and zircon (U-Th)/He thermochronology. Now Assistant Professor at Humboldt State University.

Jessica Stanley, PhD, 2010-2015, Discerning erosion patterns and mantle sources of topography across the southern African Plateau from the shallow and deep records of kimberlites. ***NSF Graduate Research Fellow.*** Now Assistant Professor at University of Idaho.

Rachel Landman, PhD 2011-2015*,* Thermochronologic investigations of Cenozoic unroofing and surface uplift in the southern Rocky Mountains and High Plains.

Alexis Ault, PhD, 2007-2012, Constraints on craton stability from thermochronologic and geochronologic studies of the Slave and Wyoming cratons. ***NSF Graduate Research Fellow.*** Now Associate Professor at Utah State University. Awarded a CAREER grant and the International Early Career Thermochronology Prize.

Past MSc Student Advisees (5)

Morgan Baker, MSc, 2019-2022, Correcting for systematic error and estimating uncertainties of alpha-ejection corrections and eU values for the zircon (U-Th)/He method. Now in permanent lecturer position at Appalachian State University.

Katherine Robinson, MSc, 2017-2019, Development of rutile (U-Th)/He thermochronology.

Rachel Havranek, MSc, 2015-2017, Coupling vertical transect zircon (U-Th)/He and Raman spectroscopy data to constrain Colorado Front Range evolution. Now postdoc at University of Utah.

Josh Johnson, MSc, 2013-2015, "Inverted" zircon and apatite (U-Th)/He dates and interpretation of high-damage zircon from the southern Rocky Mountains, Front Range, Colorado. Now at Idaho Conservation League, Ketchum, Idaho.

Rachel Landman, MSc, 2008-2010, Tertiary cooling history of the Gore Range: a northern Rio Grande Rift flank uplift, central Colorado.

Postdoc Mentees (4)

Dr. Catherine Ross, April 2024-present, NSF Postdoctoral Fellow
Dr. Liam Courtney-Davies, Feb 2023-present
Dr. Peter Martin, 2020-2022
Dr. Ellen Alexander, 2020-2022

Research Associates in Lab Group (3)

Dr. James Metcalf, 2012-present
Dr. Cullen Kortyna, May 2024-present
Dr. Jeff Benowitz, Jan 2022-April 2022

Geochronology Mentor for AGeS Students (7)

Aurora Rosenberger, WSU PhD student, 2024 AGeS project entitled: "Investigating temporal connections between normal faulting, ductile stretching, and detachment faulting in the Snake Range core complex, Nevada"

Anthony Fuentes, UC Berkeley PhD student, 2024 AGeS project entitled: "Towards Resolving the Red Bed Controversy: Developing the Capacity for Detrital Hematite U/Pb Geochronology"

Brian Penserini, UCSB PhD student, 2021 AGeS project entitled: "Testing Multiple Hypotheses for Large-Scale Capture Events using low-T Thermochronometry, Sutlej River, western Himalaya".

Nicolas Perez-Consuegra, Syracuse PhD student, 2020 AGeS project entitled: ;"Using apatite 4He/3He and (U-Th)/He thermochronology to unravel the timing and mechanism of incision of the Cauca River Canyon in the northern Andes".

Ellen Lamont, Oregon State University PhD student, 2019 AGeS project entitled: "Evaluating Late Cenozoic Mountain Range Evolution in India's Himalayan Fold-and-Thrust Belt".

Matthew Morriss, University of Oregon PhD student, 2016 AGeS project entitled: "Thermochronometric constraints on the age of Hells Canyon, testing lithospheric foundering in NE Oregon".

Mariana Bonich, Syracuse University PhD student, 2015 AGeS project entitled: "Deciphering novel methods to link source rock to sediment sink: Overcoming the 'stepladder effect'".

RESESS (Research Experiences in Solid Earth Science for Students) Underrepresented Undergraduate Interns in TRaIL (7)

Kaden Berkhahn, 2023, RESESS summer intern in collaboration with PhD student Spencer Zeigler and postdoc Dr. Liam Courtney-Davies.
Addison Curtis, 2022, RESESS summer intern in collaboration with PhD student Barra Peak.
Haley May, 2018, RESESS summer intern in collaboration with PhD student Colin Sturrock.
Fatima Niazy, 2017, RESESS summer intern in collaboration with Dr. Lon Abbott and Dr. Jim Metcalf.
Wes Weisberg, 2014-2016, RESESS summer intern in collaboration with Dr. Jim Metcalf.
Brandt Scott, 2015, RESESS summer intern in collaboration with Dr. Jim Metcalf.
Cristina Lugo-Centeno, 2012, RESESS summer intern in collaboration with Dr. Alison Duvall.

Current and Past Undergraduates working in (U-Th)/He Lab (30+. Subset listed.)

Sabrina Kainz, 2020-2022, Honors thesis in collaboration with Dr. Lon Abbott
- Recipient of ***2023 NSF Graduate Research Fellowship***

Spencer Zeigler, 2018-2020, Research project.
- Recipient of ***2020 NSF Graduate Research Fellowship***

Lane Daigle, 2018-2019, GEOL mentoring program and UROP in collaboration with Dr. Ben Johnson
Kristin Putnam, Research project in collaboration with Dr. Lon Abbott
Evan Schanock, Research project in collaboration with Dr. Lon Abbott
Noah McCorkel, 2017, Honors thesis in collaboration with Dr. Lon Abbott and Dr. Jim Metcalf
Jamie Glass, 2015-17, UROP and GEOL mentoring program
Coleman Hiett, 2015-17, Honors thesis in collaboration with Dr. Lon Abbott and Dr. Jim Metcalf
- Recipient of ***2019 NSF Graduate Research Fellowship***

Ryan Stoner, 2015-16, UROP and GEOL mentoring program, Honors thesis
- Recipient of ***2018 NSF Graduate Research Fellowship***

David Liefert, 2014-15, Honors thesis
Melissa Lowe, 2014, GEOL mentoring program
Brenda Kessenich, 2012-2014, CU UROP and GEOL mentoring program
Connor Simmons, 2013-2014, CU UROP and CU work-study programs
Matthew Tello, 2012- 2013, CU UROP and GEOL mentoring programs
Keith Bowhan, 2012-2013
Ryan Nell, 2009-2010, CU UROP and GEOL mentoring program
Emily Gregonis (now Wolin), 2008-2009, CU UROP and GEOL mentoring program
Katherine Anarde, 2009, GEOL mentoring program
Marc Serravezza, 2008, GEOL mentoring program
Brian Meyer, 2008, CU Summer undergraduate research experience (SURE) program

TEACHING

CLASSES TAUGHT

GEOL 1010, Introduction to Geology, 3 credits.	Fall 2007-2009, Spring 2011,13,15
GEOL 2005, Introduction to Earth Materials, 4 credits.	Spring 2014-16, Spring 2018-23
GEOL 3090, Developing Scientific Writing Skills, 3 credits.	Fall 2011-13, Fall 2018
GEOL 4500, Critical Thinking, 3 credits.	Spring 2009
GEOL 4960, Writing in Geosciences, 1 credit.	Fall 2009
GEOL 5215/4215, Geochronology, 2 or 3 credits.	Spring 2009,12. Fall 2015,17,20,22,24
GEOL 5216, Geochronology Reading Seminar, 1 credit	Spring 2020-23
GEOL 5700, Graduate Writing, 2 credits.	Spring 2018. Fall 2019-22, 24.
GEOL 5703, Tectonics reading seminar, 1 credit.	Fall 2014
GEOL 5700/4700, Problems in the Rockies, co-taught, 3 credits.	Spring 2008

SCIENCE EDUCATiON ACTIVITIES

Participant, Science Education Initiative (SEI) in GEOL, GEOL 4500, GEOL 1010 2x
Participant, multi-institutional NSF-funded GARNET Project, GEOL 1010 2x
Participant, NAGT Temporal Journal Learning Club, monthly virtual discussions of readings that explored the cognitive underpinnings of understanding geologic time, 2011

SERVICE

NATIONAL AND INTERNATIONAL SERVICE

Leadership and Committee Service

2022-present Lead-PI and co-director of the AGeS^3 (Advancing Geochronology Science, Spaces, & Systems) Initiative. AGeS^3 is funded by an NSF FRES award, continues its partnership with GSA, and will make a total of ~160 strategic micro-awards of $8-$18k each over 5 years through a trio of micro-funding programs (AGeS-Grad, AGeS-DiG, AGeS-TRaCE). The AGeS lab network now consists of 70+ labs and 120+ senior geochronologists.

2024-2025 GSA Joint Technical Program Committee, Structural Geology & Tectonics Division Representative.

2019-2023 GSA Geochronology Division Leadership. Second Vice Chair, First Vice Chair, Chair, Past Chair.

2018-2022 Lead-PI and co-director of AGeS2 (Awards for Geochronology Student research program). AGeS2 was funded by a multi-programmatic NSF award, included a new partnership with GSA, continued to grow the AGeS lab network, supported 52 graduate student geochronology projects averaging ~$8.2k each, and launched the pilot AGeS-DiG (Diversity in Geochronology) program, which funded 6 projects of ~$14k each to support cohorts of underrepresented minority students in geochronology.

2021 NSF Review Panel member.

2020 NSF Review Panel member.

2019 NASA Review Panel member.

2014-2018 Lead-PI, co-founder, and co-director of AGeS1 (Awards for Geochronology Student research program). AGeS1 was funded by an NSF EarthScope award, established the AGeS lab network, and supported 25 collaborative geochronology projects between graduate students and labs averaging ~$8.2k each.

2015-2018 Member, GSA Student Research Grant Committee.

2017 Member, GSA position statement panel on "Removing Barriers to Career Progression for Women in the Geosciences".

2015-2017 Secretary, GSA Structural Geology and Tectonics Division.

2017 NSF PIRE Site Visit Review Panel member.

2012-2015 NSF EarthScope Steering Committee.

2013-2014 Associate Editor, *Geosphere.*

2012-2014 Colorado Scientific Society, Counselor.

2013 Instructor at CIDER (Cooperative Institute for Dynamic Earth Research) Summer Program at UC Berkeley.

2011-2012 AGU Tectonophysics Program Committee.

2008 NSF Review Panel Member

Meeting, Workshop, Short Course, and Session Organizer

2014-2023 Standing Committee for the International Thermochronology Conferences.

2022 Instructor and organizer, 1.5-day GSA short course "AGeS Geochronology", Boulder, CO, USA.

2022 Co-organizer, 1.5 day workhop for NSF FRES project COOL (Context of Long-term Climate and Tectonics), Boulder, CO, USA.

2019-2021 Organizing Committee, Thermo2021, 17th International Conference on Thermochronology, Santa Fe, NM.

2015 Co-organizer, 2-day NSF CIDER workshop, "Linking dynamic topography with the observational record" in the Dept of Geological Sciences at CU-Boulder.

2014 Instructor and organizer, 2-day GSA short course "EarthScope Institute: Geochronology and the Earth Sciences", Vancouver, Canada.

2013 Organizer, 1.25-day short course, "An introduction to low temperature thermochronology", at the African Earth Observatory Network, Port Elizabeth, South Africa.

2013 Instructor and organizer, 1-day GSA short course at the CU-Boulder TRaIL, "An introduction to the theory and methods of (U-Th)/He thermochronology", Boulder, CO, USA.

2013 Organizing committee, NSF EarthCube Geochronology workshop.

2007, 2009, 2014 Convener, Technical session at AGU Fall Meetings

2010, 2013 Convener, Technical session at GSA National Meetings

2010, 2011, 2013 Convener, Technical session at Goldschmidt Conferences

Panelist/Round Table Discussions

2023 Leader of "Power Hour" at the 2023 Gordon Research Conference on Geochronology. The Power Hour is a forum for conversations about barriers to inclusivity.

2018 Panelist, two separate round tables on "Diffusion" and "Reproducibility" at the 16th International Conference on Thermochronology, Quedlinburg, Germany.

2016 Panelist, "'Insights into the Writing & Publishing Process" at the Career Development Workshop for NSF Geoscience Postdoctoral Researchers, NOAA, Boulder, CO.

2014 Panelist, "Developing synergies between disciplines" at the Challenges and Opportunities in Geochronology Workshop, pre-Goldschmidt Meeting.

2014 Panelist, two separate round tables on "Diffusion" and "Databases" at the 14th International Conference on Thermochronology, Chamonix, France.

Referee for Journals, Proposals, and Books

Referee for academic journals (35 different journals, typically 8-12 manuscript reviews/year): *American Journal of Science, Analytical Chemistry, Chemical Geology, Contributions to Mineralogy and Petrology, Earth and Planetary Science Letters, Earth Surface Processes and Landforms, G-cubed, Geological Society of America Bulletin, Geochimica et Cosmochimica Acta, Geochronology, Geology, Geomorphology, Geophysical Research Letters, Geosphere, Geostandards and Geoanalytical Research, Journal of African Earth Sciences, Journal of the Geological Society, Journal of Geophysical Research-Earth Surface, Journal of Metamorphic Geology, Journal of Geology, Journal of Structural Geology, Lithos, Lithosphere,*

Mountain Geologist, Nature, Nature Communications, Nature Geoscience, Precambrian Research, Proceedings of the National Academy of Sciences, Science, Science Advances, Scientific Reports, Tectonics, Tectonophysics, Terra Nova.

Referee for National Science Foundation proposals (16 different NSF programs): Antarctic Earth Sciences, Arctic Research Opportunities, EarthCube, EarthScope, Frontiers in Earth Science Research, Geoinformatics, Geomorphology, Geophysics, Instrumentation and Facilities, Integrated Earth Systems, Major Research Instrumentation, Marine Geology and Geophysics, Petrology and Geochemistry, Postdoctoral Fellowship, Sedimentary Geology and Paleobiology, Tectonics.

Referee for other programs: American Chemical Society Petroleum Research Fund, Canadian NSERC program, Department of Energy, Dutch Council for Earth and Life Sciences, W.M. Keck Foundation proposals.

Referee for book: "Geochronology and Thermochronology" by Reiners, Carlson, et al.

PUBLIC OUTREACH AND RESEARCH DISSEMINATION TO PUBLIC

2025 Interviews and discussions with Sarah Burns and Christine Lin about Snowball Earth Tava research being featured in PBS documentary series "Transparent Earth".

2025 Interview and email discussions with artist Nina Elder (www.ninaelder.com) about serving as a collaborating scientist on an art exhibit focused on absence and unconformities.

2025 Interviewed for children's book by Emily Starr (www.starrmatica.com) entitled *"Nature's Hidden Library"*, provided a review of part of the manuscript for accuracy, and will be a featured scientist in the back matter of the book.

2024 Coauthor on an article in The Conversation with >79,000 reads about research lead by Dr. Liam Courtney-Davies on Snowball Earth and the Neoproterozoic Tavakaiv sandstone injectites in Colorado, November 2024.

2024 Research on the Snowball Earth and Neoproterozoic Tavakaiv sandstone injectites in Colorado lead by postdoc Dr. Liam Courtney-Davies featured in numerous popular science articles, including ArsTechnica, Science Daily, and CU Boulder Today, November 2024.

2024 Thermochronology research on the erosion history of Colorado's High Plains lead by former CU undergraduate student Sabrina Kainz featured in multiple articles, including the Denver Gazette's "Origins of Colorado's Spanish Peaks near Walsenburg Explained" and BNN Newsroom's "Unlocking Colorado's Geological Mysteries: CU Boulder Study Sheds Light on Spanish Peaks" March 4, 2024.

2023 Interviewed for geochronology article on livescience.com "How do we know how old Earth is?", April 15, 2023.

2023 Great Unconformities research featured in GSA Science Communication blog "Is 'The Great Unconformity' a Misnomer?", March 22, 2023.

2022 Work on the Great Unconformities featured in AGU *Eos* article "The Great Unconformity or Great Unconformities?", December 23, 2022.

2022 Feature on new Geochronology exhibit in CU-Boulder Earth Sciences Map Library, October 13, 2022.

2022 Press release about AGeS3 FRES grant to advance geochronology by CU Boulder College of Arts & Sciences Magazine, Sept 22, 2022.

2022 Co-host "Every Rock Has A Story" Youtube video, Episode #68, Grand Canyon, 10 min, October 6, 2022.

2021 Geology Bites podcast on "Deciphering the Thermal History of Rocks", 31 min.

2021 Gneiss Chats podcast interview, "Thermochronology", the Traveling Geologist. 43 min.

2021 Public interest in research on the Great Unconformity in the Grand Canyon. Coverage from various media outlets.

2020 Public interest in research on the Great Unconformity in Colorado. Coverage from CNN and other media outlets.

2018-19 Science Coach in American Chemical Society, American Association of Chemistry Teachers program. Serve as mentor for high school science teacher Susan Kelly.

2017 Presentation on Geologic Time to first and second graders at Flatirons Elementary School.

2012 Public interest in Grand Canyon research. Coverage from hundreds of media outlets, including the front page of *NY Times*, *Washington Post*, and *LA Times*, as well as reports on *NPR* and *PBS NewsHour*.

2010 Filmed for National Geographic "Naked Science" documentary on the origin and evolution of the Grand Canyon.

2008 Grand Canyon research included in an annual review for the 2009 Britannica Book of the Year in Geology & Geochemistry.

2008 Public interest in Grand Canyon region research. Coverage from Science, Nature, MSNBC, National Geographic.com, Earth Magazine, Science Spin, and other media outlets.

UNIVERSITY SERVICE

2021-22 CU Arts & Sciences Council
2021-22 CU Arts & Sciences Council Planning Committee
2022 CU Arts & Sciences Search Committee for Award Administrator
2020 Reviewer for CU Graduate School Research Grants
2018-19 CU Arts & Sciences Search Committee for Post-Award Administrator
2015-16 CU Arts & Sciences Council
2015-16 CU Arts & Sciences curriculum committee

DEPARTMENT SERVICE

2024 Chair, targeted hire search committee for Earth and Mineral Materials
2024 Primary unit evaluation committee for junior faculty member
2024 Member, SamPLER prep lab committee
2019-23 Analytical facilities and space committee
2019-23 Graduate curriculum committee
2019-23 Member, SamPLER prep lab committee
2020-23 Graduate admissions committee
2018-19 Member, new chair committee
2018-19 Chair, Salary equity and grievance committee
2017-19 Chair, SamPLER prep lab commitee
2017-18 Futures committee
2017-18 Executive committee
2017-18 Salary equity and grievance committee
2015-16 Search committee, Geobiology faculty member
2014-15 Executive committee
2013-15 Graduate curriculum committee
2012-13 Member, new chair committee
2012-13 Member, Salary equity and grievance committee
2012-13 Undergraduate curriculum committee

2010-12 Analytical facilities and space committee
2009 Colloquium organizer
2008-09 Executive committee
2007-08 Graduate curriculum committee

MEMBERSHIPS

American Geophysical Union
Geological Society of America
Mineralogical Society of America