

TYRONE O. ROONEY

Associate Professor, Dept. of Geological Sciences
Director, MSU Geoanalytical Lab
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CURRENT POSITION

- 2013- **Associate Professor, Department of Geological Sciences & Director of Geoanalytical Lab, Michigan State University.**
Research focusing on the origin, evolution and destruction of the continental lithosphere using geochemical techniques.

EDUCATION:

- 2006 **Ph.D. Geosciences** , The Pennsylvania State University, University Park.
Dissertation: *Continental rifting in central Ethiopia: geochemical and isotopic constraints from lavas and xenoliths*, Advisor: Dr. T. Furman
- 2002 **M.S. Geosciences** , The Pennsylvania State University, University Park.
Masters Thesis: *Hydrogeological, three dimensional, numerical flow modeling of the Dublin Port Tunnel and region*, Advisor: Dr. R.R. Parizek
- 1999 **B.Sc. (Hons.) Geology** , University College Dublin, Belfield, Dublin. Ireland.

PROFESSIONAL EXPERIENCE

- 2009- **Adjunct Faculty**, MSU Center for Global Change and Earth Observations.
Collaborator with center director (J. Qi) on submitted proposal. Dr. Qi sits on committee of my Ph.D. student (Assiri).
- 2007-13 **Assistant Professor and MSU Geoanalytical Lab Director** , Department of Geological Sciences, Michigan State University.
Courses: Integrative Studies - Natural Hazards; Integrative Studies - Global Change; Igneous & Metamorphic Petrology; Advanced Igneous Petrology.
- 2006-07 **Postdoctoral Fellow** , Department of Geological Sciences, San Diego State University.
Supervisor Dr. B. Hanan.
Research focusing on radiogenic isotopic geochemistry of the Baltimore Mafic Complex & Lau Basin.
- 2000-06 **Teaching Assistant** , Department of Geosciences, The Pennsylvania State University
6 semesters as T.A. coordinator for “The Sea Around Us” – a general science oceanography course.
- 2000-06 **Research Assistant** , Department of Geosciences, The Pennsylvania State University.

Dissertation research was part of the NSF-EAGLE (Ethiopia-Afar Geoscientific Lithospheric Experiment) project examining rifting in Ethiopia using geochemical, geodynamic, and geophysical methods.

CURRENT FUNDING

Collaborative Research: Constraining the temporal evolution of mantle plume contributions to magmatism in the Turkana Depression - EAR 1551872

Tyrone Rooney, lead PI ; John Kappleman, PI; Wendy Nelson, PI; Barry Hannan, PI.

National Science Foundation: 08/01/16 - 7/31/19

Total Budget: \$449,486; \$210,136 to Rooney

Collaborative Research: Geological Evolution of the Midcontinent Rift as a Hybrid Rift and Large Igneous Province - EAR 1549764

Tyrone Rooney, lead PI ; Seth Stein, PI; Carol Stein, PI; Rob Moucha, PI.

National Science Foundation: 06/01/16 - 5/31/18, 1 year extension to 2019

Total Budget: \$484,300; \$198,996 to Rooney.

PAST FUNDING

Collaborative Research: Non-Peridotite Melting in Plume-Influenced Extensional Environments: Lithological Heterogeneity of the African Superplume and African Lithosphere

Tyrone Rooney, lead PI ; John Kappleman, PI

National Science Foundation: 07/01/12 - 12/31/15

Total Budget: \$306,692; \$255,284 to Rooney

Request for purchase of a handheld XRF

Tyrone Rooney, William Lovis, co-PIs

MSU Teaching and Learning Environment Grant Program: 2015

Total Budget \$48,578

The Initiation of Magmatically Accommodated Extension in the Rifting Environments of Terrestrial Planets

Tyrone Rooney, PI ; James Zimbelman, Co-I; Michael Ramsey, Eric Grosfils collaborators.

National Aeronautics and Space Administration: 11/1/11 - 12/1/14

Total Budget: \$99,000; \$99,000 to Rooney

Slab-tear related magmatism in the Panama Canal

Tyrone Rooney, PI

MSU Intramural Research Grant Program: 2008

Total Budget \$39,486; \$39,486 to Rooney

Rifting of the Nubian Shield: Evidence from Egyptian Basaltic Lavas

Tyrone Rooney, PI

USDA Foreign Agriculture Service: 5/1/11 - 4/30/13

Total Budget \$7,062; \$7,062 to Rooney

HONORS AND AWARDS (postgraduate only)

- 2012-14 NSF GeoPrisms Distinguished Lecturer.
This program makes distinguished scientists involved with GeoPRISMS science and planning available to visit American colleges, universities, museums, schools, and other institutions.
- 2013 AGU Editors' Citation for Excellence in Refereeing
- 2006 Penn State Alumni Association Dissertation Award.
This award is considered to be among the most prestigious available to Penn State graduate students and recognizes outstanding achievement in scholarship and professional accomplishment.

SELECTED PROFESSIONAL SERVICE AND ACTIVITIES (postgraduate only)

Ongoing Roles

- 2015- Organizing committee - Vice President of Research and Graduate Students' seminar series
- 2013- Chairperson of student awards committee and member of executive committee for the Volcanology, Geochemistry, Petrology division at the American Geophysical Union.
- 2012- Member of the MSU College of Natural Science Council on Diversity and Community.
- 2011- Geochemistry Subject Editor, Journal of the Geological Society, London.
- 2015- Guest Editor for Geosphere: Anatomy of rifting; Tectonics and magmatism in continental rifts, oceanic spreading centers, and transforms
- 2018- Member of the MSU College of Natural Science Faculty Advisory Committee
- 2018- Member of EES Faculty Advisory Committee

Former Roles

- 2010-17 Adviser to the MSU Geology Club. This club, comprised of undergraduate and graduate students, is critical for building community within the department; my role is to gently guide and advise the student organizers of the club.
- 2013-17 Member of the NSF GeoPRISMS steering and oversight committee
- 2015-16 Guest Editor for Chemical Geology: Intraplate Magmatism.
- 2015 Provost's Task Force for the Recruitment and Retention of a Diverse Faculty

- 2013-16 Member two search committees (Vogel Chair, Endowed Professorship)
- 2018 Convened session at Fall 2018 Geological Society of America Meeting.
- 2015 Convenor of NSF GeoPrisms mini-workshop - From rifting to drifting: evidence from rifts and margins worldwide. San Francisco, CA. December 13th 2015.
- 2015 Convened session at Fall 2015 American Geophysical Union Meeting.
- 2014 Convened session at Fall 2014 American Geophysical Union Meeting.
- 2013 Convened session at Fall 2013 American Geophysical Union Meeting.
- 2007-13 Member of the MSU Department of Geological Sciences Student Advisory Committee. This committee manages all aspects of graduate student affairs within the unit from recruitment to progress reports.
- 2011-12 Member of student awards committee for Volcanology, Geochemistry, Petrology division at the American Geophysical Union. This role requires extensive reviews of submitted student grant application materials, coordinating student judging, undertaking a heavy judging load at the annual meeting, and interpreting the resulting data to choose student award winners.
- 2012 Co-led and co-wrote the guide for the MSU College of Natural Sciences alumni field trip to the Keweenaw Peninsula in August 2012.
- 2012 Served on three faculty search committees within the Department of Geological Sciences: Sabbatical replacement; Vogel Endowed Chair; Biogeochemistry.
- 2012 Served on NASA program review panel in Washington D.C.
- 2012 Convener for the NSF-GeoPRISMS program East Africa planning meeting in Morristown, NJ, October 2012.
- 2011 Student presentation judge for NSF-GeoPRISMS at American Geophysical Union 2011.
- 2008 Served on NSF program review panel in Washington D.C.
- 2008 MSU College of Natural Science alumni development trip to Houston

MANUSCRIPT REVIEWS

Reviewed Manuscripts for the following ISI-listed journals:

Geology;

Lithos;
Earth and Planetary Science Letters;
Bulletin of Volcanology;
Journal of Petrology;
G-cubed;
Lithosphere;
Journal of Volcanology and Geothermal Research;
Geochimica et Cosmochimica Acta;
Geosphere;
Tectonophysics;
Journal of the Geological Society;
Geological Society Special Publications
Geological Society of America Special Publications
Earth Science Reviews;
Contributions to Mineralogy and Petrology;
Journal of African Earth Science;
Tectonics;
Geophysical Research Letters;
Chemical Geology;
Journal of Geodynamics;
National Geographic Society;
Science;

PROPOSAL REVIEWS

Formal proposal reviews for National funding agencies:

National Science Foundation;
National Aeronautics and Space Administration;
European Research Council;
South African Research Council
NERC, UK
Swiss Research Foundation
National Geographic Society
Puerto Rico Trust

PUBLICATIONS

(* denotes student co-authors)

Peer-Reviewed Journal Articles

1. **Rooney, T. O.**, Krans, S. R.*, Mège, D., Arnaud, N., Korme, T., Kappelman, J., Yirgu, G. 2018. Constraining the magmatic plumbing system in a zoned continental flood basalt province. *Geochemistry, Geophysics, Geosystems*, v. 19, p. 3917-3944. doi: 10.1029/2018GC007724
2. Finlayson, V. A., Konter, J. G., Konrad, K., Koppers, A. A. P., Jackson, M. G., **Rooney, T. O.**, 2018. Sr–Pb–Nd–Hf isotopes and ⁴⁰Ar/³⁹Ar ages reveal a Hawaii–Emperor-style bend in the Rurutu hotspot. *Earth and Planetary Science Letters*, v. 500, p. 168-179.
3. Stein, S., Stein, C.A., Elling, R., Kley, J., Keller, G.R., Wyssession, M., **Rooney, T.**, Frederiksen, A., Moucha, R., 2018. Insights from North America’s failed Midcontinent Rift into the evolution of continental rifts and passive continental margins. *Tectonophysics*, v. 744, p. 403-421.
4. Chiasera, B.*, **Rooney, T.O.**, Girard, G., Yirgu, G., Grosfils, E., Ayalew, D., Mohr, P., Zimbelman, J., and Ramsey, M., 2018, Magmatically assisted off-rift extension—The case for broadly distributed strain accommodation: *Geosphere*, v. 14, doi: 10.1130/GES01615.1.
5. Krans, S. R.*, **Rooney, T. O.**, Kappelman, J., Yirgu, G., and Ayalew, D., 2018, From initiation to termination: a petrostratigraphic tour of the Ethiopian Low-Ti Flood Basalt Province: *Contributions to Mineralogy and Petrology*, v. 173, no. 5, doi: 10.1007/s00410-018-1460-7
6. **Rooney, T.O.**, 2017, The Cenozoic Magmatism of East Africa: Part I – Flood Basalt and Pulsed Magmatism: *Lithos*, v. 286, p. 264-301, doi: 10.1016/j.lithos.2017.05.014
7. **Rooney, T.O.**, Nelson, W.R., Ayalew, D., Hanan, B., Yirgu, G., and Kappelman, J., 2017, Melting the lithosphere: metasomes as a source for mantle-derived magmas: *Earth and Planetary Science Letters*. v. 461, p. 105-118
8. Abu El-Rus, M.M.A, **and Rooney, T.O.**, 2017, Lithosphere to asthenosphere melting transition in northeast Africa: Evidence from the Tertiary volcanicity in middle Egypt: *Chemical Geology*, v. 455, p. 282-303, doi: 10.1016/j.chemgeo.2016.10.005
9. *Trestrail, K.R., **Rooney, T.O.**, Girard, G., *Svoboda, C., Yirgu, G., Ayalew, D., and Kappelman, J., 2017, Sub-Continental Lithospheric Mantle Deformation in the Yerer-Tullu Wellel Volcanotectonic Lineament: A Study of Peridotite Xenoliths: *Chemical Geology*, v. 455, p. 249-263, doi: 10.1016/j.chemgeo.2016.10.013
10. **Rooney, T.O.**, *Lavigne, A., *Svoboda, C., Girard, G., Yirgu, G., Ayalew, D., and Kappelman, J., 2017, The Making of an Underplate: Pyroxenites from the Ethiopian Lithosphere: *Chemical Geology*, v. 455, p. 264-281. doi: 10.1016/j.chemgeo.2016.09.011
11. Giuliani, A., Tappe, S., **Rooney, T.O.**, McCoy-West, A.J., Yaxley, G.M., Mezger, K., 2017. Editorial: The role of intraplate magmas and their inclusions in Earth’s mantle evolution. *Chemical Geology*, 455: 1-5. doi: 10.1016/j.chemgeo.2017.03.019
12. Stein, S., Stein, C., Kley, J., Keller, R., Merino, M., Wolin, E., Wiens, D., Wyssession, M.E., Al-Equabi, G., Shen, W., Frederiksen, A., Darbyshire, F., Jurdy, D., Waite, G., Rose, W., Vye, E., **Rooney, T.O.**, Moucha, R., and Brown, E., 2016, New insights into North America’s Midcontinent Rift, *Eos*, v. 97, doi:10.1029/2016EO056659.

13. Lund, D., Asimow, P., Farley, K., **Rooney, T.O.**, Seeley, E., Jackson, E., and Durham, Z., 2016, Enhanced East Pacific Rise hydrothermal activity during the last two glacial terminations: *Science*, v. 351, p. 478-482.
14. Rubin, A., Cooper, K.M., Leever, M., Wimpenny, J., Deering, C., **Rooney, T.O.**, Gravley, D., and Yin, Q.-z., 2016, Changes in magma storage conditions following caldera collapse at Okataina Volcanic Center, New Zealand: *Contributions to Mineralogy and Petrology*, v. 171, p. 1-18.
15. **Rooney, T. O.**, Morell, K. D., Hidalgo P., and Fraceschi, P. , 2015, Magmatic consequences of the transition from orthogonal to oblique subduction in Panama: *Geochemistry Geophysics Geosystems*, v. 16, doi:10.1002/2015GC006150.
16. Pagli, C., Mazzarini, F., Keir, D., Rivalta, E., and **Rooney, T.O.** , 2015, Introduction: Anatomy of rifting: Tectonics and magmatism in continental rifts, oceanic spreading centers, and transforms: *Geosphere*, v. 11, p. 1256-1261.
17. Keir, D., Bastow, I.D., Corti, G., Mazzarini, F., and **Rooney, T.O.** , 2015, The origin of along-rift variations in faulting and magmatism in the Ethiopian rift. *Tectonics*, doi: 10.1002/2014tc003698.
18. **Rooney, T.O.**, Bastow, I.D., Keir, D., Mazzarini, F., *Movsesian, E., Grosfils, E.B., Zimelman, J.R., Ramsey, M.S., Ayalew, D., and Yirgu, G., 2014, The protracted development of focused magmatic intrusion during continental rifting. *Tectonics*, v.33, p.875-897, doi:10.1029/2013TC003514.
19. **Rooney, T.O.**, Nelson, W.R., Dosso, L., Furman, T., and Hanan, B., 2014, The role of continental lithosphere metasomes in the production of HIMU-like magmatism on the northeast African and Arabian plates. *Geology*, v. 42, p. 419-422.
20. **Rooney, T.O.**, and Deering, C.D., 2014, Conditions of melt generation beneath the Taupo Volcanic Zone: The influence of heterogeneous mantle inputs on large-volume silicic systems. *Geology*, v. 42, p. 3-6.
21. *Hidalgo, P., and **Rooney, T.O.** , 2014, Petrogenesis of a Voluminous Quaternary Adakitic Volcano: The Case of Baru Volcano, *Contributions to Mineralogy and Petrology*, v.168, doi: 10.1007/s00410-014-1011-9
22. Mazzarini, F., **Rooney T.O.**, and Isola, I., 2013, The intimate relationship between strain and magmatism: A numerical treatment of clustered monogenetic fields in the Main Ethiopian Rift. *Tectonics* , v. 32, p. 1-16, doi:10.1029/2012TC003146
23. **Rooney, T.O.**, Mohr, P., Dosso, L., and Hall, C.M., 2013, Geochemical evidence of mantle reservoir evolution during progressive rifting. *Geochimica et Cosmochimica Acta*, v. 102 p. 65-88, doi: 10.1016/j.gca.2012.08.019
24. **Rooney, T.O.**, Hart, W.K., Hall, C.M., Ayalew, D., Ghiorso, M.S., Hidalgo, P., and Yirgu, G., 2012, Peralkaline magma evolution and the tephra record in the Ethiopian Rift. *Contributions to Mineralogy and Petrology*, v. 163, p. 407-426
25. **Rooney, T.O.**, Hanan, B., Graham, D., Furman, T., Schilling, J.G., and Blichert-Toft, J., 2012, Upper mantle pollution during Afar plume-continental rift interaction. *Journal of Petrology*, v. 53, p. 365-389, doi:10.1093/petrology/egro65

26. **Rooney, T.O.**, Herzberg, C., and Bastow, I.D., 2012, Elevated mantle temperature beneath East Africa. *Geology*, v. 40, p. 27-30. doi: 10.1130/G32382.1
27. **Rooney, T.O.**, Bastow, I.D., and Keir, D., 2011, Insights into Extensional Processes During Magma Assisted Rifting: Evidence from aligned scoria cones and maars. *Journal of Volcanology and Geothermal Research*, v. 201, p. 83-96 doi:10.1016/j.jvolgeores.2010.07.019
28. *Hidalgo, P., Vogel, T., **Rooney, T.O.**, Currier, R., and Layer, P. 2011, Origin of silicic volcanism in the Panamanian arc: Evidence for a two stage fractionation process at El Valle volcano. *Contributions to Mineralogy and Petrology*, v. 162, p. 1115-1138. doi: 10.1007/s00410-011-0643-2
29. **Rooney, T.O.**, Franchesci, P., and Hall, C.M., 2011, Water Saturated Magmas in the Panama Canal Region – A Precursor to adakite-like magma generation? *Contributions to Mineralogy and Petrology*. v. 161, p. 373-388. doi:10.1007/s00410-010-0537-8
30. *Hidalgo, P., and **Rooney, T.O.**, 2010, Crystal Fractionation processes at Baru Volcano from the deep to shallow crust. *Geochemistry Geophysics Geosystems*, doi:10.1029/2010GC003262
31. **Rooney, T.O.**, Sinha, A.K., Deering, C.D., and Briggs, C., 2010, A Model for the origin of rhyolites from South Mountain, PA: Implications for rhyolites associated with large igneous provinces. *Lithosphere*. v. 2, p. 211-220. doi:10.1130/L89.1
32. **Rooney, T.O.**, 2010, Geochemical evidence of lithospheric thinning in the southern main Ethiopian rift. *Lithos*, v.117, p. 33-48. doi:10.1016/j.lithos.2010.02.002
33. Bastow, I.D., Nyblade, A.A., Stuart, G.W., **Rooney, T.O.**, and Benoit, M.H., 2008, Rifting at the edge of the African low velocity anomaly. *Geochemistry Geophysics Geosystems*, doi:10.1029/2008GC002107
34. **Rooney, T.O.**, Furman, T., Bastow, I.D., Ayalew, D., and Gezahegn, Y., 2007, Lithospheric modification during crustal extension in the main Ethiopian rift. *Journal of Geophysical Research*, B, Solid Earth and Planets. v. 112, B10201, doi:10.1029/2006JB004916
35. Furman, T., Bryce, J.G., **Rooney, T.O.**, Hanan, B.B., Yirgu, G., and Ayalew, D., 2006, Heads and tails: 30 million years of the Afar plume, In Yirgu, G., Ebinger, C., and Maguire, P., (eds), *The Afar volcanic province within the East African rift system*, v. 259, Special Publication of the Geological Society, London, p. 95-120. doi:10.1144/GSL.SP.2006.259.01.09
36. **Rooney, T.O.**, Furman, T., Yirgu, G., and Ayalew, D., 2005, Structure of the Ethiopian lithosphere: Xenolith Evidence in the main Ethiopian rift. *Geochimica et Cosmochimica Acta*, v. 69, p. 3889-3910. doi:10.1016/j.gca.2005.03.043

Editorials and White Papers

1. Recruiting and retaining a diverse faculty at MSU: Provost's working group final report. 2015, *Rooney was one of 16 authors.*
2. NSF-GeoPRISMS East African Rift System Primary Site Draft Implementation Plan. 2013, *Rooney was one of 9 primary authors.*
3. Workshop Report for NSF-GeoPRISMS Science Workshop for the East African Rift System focus site, 2012, *Rooney was one of 9 primary authors.*
4. **Rooney, T.O.**, Nelson, W., Fischer, T., Ferguson, D., Brounce, M., Mana, S., Hilton, D., Castillo, P., Head, E., Vanderkluyzen, L., Chiasera, B., 2012, White paper: Geochemical and

- petrographic approaches for the study of rifting in the EAR. White paper for NSF-GeoPRISMS Workshop – East African Rift. Morristown, NJ, October 24-27, 2012.
5. Egger, A., **Rooney, T.O.**, Shillington, D., 2012, Report from the magmatic rifting and Active Volcanism Conference, Afar Rift Consortium (Addis Ababa, Ethiopia) for GeoPRISMS
 6. Workshop Report for NSF-EarthScope - GeoPRISMS Science Workshop for Eastern North America, 2011, *Rooney was one of 17 authors.*
 7. GeoPRISMS implementation plan submitted to the National Science Foundation, March 2011. This document was reviewed by the broader community before submission to NSF. *Rooney was one of 28 authors.*
 8. Benoit, M.H., Long, M.H., **Rooney, T.O.**, King, S., Kirby, E., Miller, S., Hole, J., 2011, White Paper: Integrating lithospheric structure, mantle dynamics, and surface processes to investigate topographic and lithospheric evolution of the southeastern US continental margin. NSF-GeoPRISMS Workshop – Eastern North American Margin, Bethlehem, PA October 26 -29, 2011.
 9. **Rooney, T.O.**, Hyndman, D.W. 2010, Iceland eruption shows impact of volcanism on us - Op/Ed article in Lansing State Journal, April 29, 2010.
www.lansingstatejournal.com/article/20100429/OPINION02/4290305/1087/OPINION02
 10. **Rooney, T.O.**, Keranen, K., Benoit, M.H., 2010, White Paper: Advances and ongoing challenges in interdisciplinary rifting research. White paper for NSF-GeoPRISMS implementation workshop - Rift initiation and evolution, San Antonio, TX, February 2010.
 11. **Rooney, T.O.**, Bastow, I.D., and Keir, D., 2010, White Paper: Insights into Extensional Processes During Magma Assisted Rifting: NSF-GeoPRISMS Implementation Workshop - Rift Initiation and Evolution, Santa Fe, NM, November 4 – 6, 2010.

Pedagogical Publications:

1. **Rooney, T.O.**, Marone, C., and Arthur, M.A., 2006, *The Sea Around Us* (5th Edition): Mason, OH, Thompson.
2. **Rooney, T.O.**, Marone, C., and Arthur, M.A., 2005, *The Sea Around Us* (4th Edition): Mason, OH, Thompson.
3. **Rooney, T.O.**, Marone, C., and Arthur, M.A., 2004, *The Sea Around Us* (3rd Edition): Dubuque, IA, Kendall/Hunt.