

Alan D. Rooney

Yale University
Department of Earth and Planetary Sciences
New Haven, CT, 06511
alan.rooney@yale.edu

<https://people.earth.yale.edu/profile/alan-rooney/about>

Current Position

Assistant Professor, Yale University, Department Earth and Planetary Sciences 2017 –
Faculty Affiliate, Yale University Institute for Biospheric Sciences 2019 –

Education

Harvard University, Department of Earth and Planetary Sciences: 2012 – 2016
Durham University, Department of Earth Sciences: 2011 – 2012
Durham University, Department of Earth Sciences, *PhD*: 2007 – 2011
Stockholm University, Department of Geology and Geochemistry, *MRes*: 2005 – 2006
University of Glasgow, Department of Earth Sciences, *BSc (Hons)*: 2000 – 2004

Research Interests

My research employs radiogenic isotope systems to better understand the interactions between tectonics, climatic processes and geochemical cycles on a range of time scales.

- Re-Os geochronology of sedimentary rocks and sulphides
- Using radiogenic isotopes as tracers of crustal-mantle processes
- Applying radiogenic isotopes as a tracer of ice sheet dynamics

Current Funding

Yale Center for Natural Carbon Capture: *Calibrating Enhanced Rock Weathering with Os and Sr Isotopes*, Award Period: 7/1/2022-6/30/24, Lead PI

NSF funding

Collaborative Research: *FRES: Co-evolution of Earth and Life across the Proterozoic-Phanerozoic transition: Integrated perspectives from outcrop and drill core*, Award Period: 9/1/2020-8/31/2025, Co-PI (lead at Yale)

Collaborative Research: *Caught in the Act- The Petrology of Modern Lower-Crust Formation and Foundering in the North Andean Arc*, Award period: 9/1/2019–8/31/2022 (NCE-8/31/2023)
Co-PI,

Previous NSF Funding:

Collaborative Research: *Developing a multi-proxy approach for reconstructing deep-time silicate weathering*, Award period: 9/1/2019–8/31/2021 – Lead PI,

Peer-Reviewed Publications

(† represents student or postdoc author)

In Review

38. **Rooney, A.D.**, Hnatyshin, D., Toma, J., Saintilan, N.J., †Millikin, A.E.G., Selby, D., Creaser, R.A., Application of the ^{187}Re - ^{187}Os geochronometer to crustal materials: systematics,

methodology, data reporting and interpretation GSA Bulletin Special Issue on Reporting and Interpreting Geochronology Data, *Manuscript Number: B37294*

2023

37. †Goss, G.A., **Rooney, A.D.**, Variations in Mid-Pleistocene glacial cycles: new insights from osmium isotopes. *Quaternary Science Reviews*, 321, 108351
36. Zhang, T., Keller, C.B., Hoggard, M.J., **Rooney, A.D.**, Halverson, G.P., Bergmann, K.D., Crowley, J.L., Strauss, J.V., 2023. A Bayesian Framework for Subsidence Modeling in Sedimentary Basins: A Case Study of the Tonian Akademikerbreen Group of Svalbard, Norway, *Earth and Planetary Science Letters*, 620,
35. Busch, J. F., Boag, T. H., Sperling, E. A., **Rooney, A. D.**, Feng, X., Moynihan, D. P., & Strauss, J. V. (2023). Integrated Litho-, Chemo- and Sequence Stratigraphy of the Ediacaran Gametrail Formation Across a Shelf-Slope Transect in the Wernecke Mountains, Yukon, Canada. *American Journal of Science*, 323, 4.
34. Jones, M.T., Stokke, E.W., **Rooney, A.D.**, Frieling, J., Pogge von Strandmann, P.A.W., Wilson, D.J., Svensen, H.H., Planke, S., Adatte, T., Thibault, N.R., Vickers, M.L., Mather, T.A., Tegner, C., Zuchuat, V., Schultz, B.P., 2023. Tracing North Atlantic volcanism and seaway connectivity across the Paleocene–Eocene Thermal Maximum (PETM), *Climate of the Past*. 19 (8), 1623-1652
33. Ziemann, L., Ibanez-Mejia, M., **Rooney, A.D.**, Bloch, E., Pardo, N., Schoene, B., Szymanowski, D., 2023. To sink or not to sink: the thermal and density structure of the modern northern Andean arc constrained by xenolith petrology. *Geology*, 51 pp.586–590.
32. Planavsky, N. J., Asael, D., **Rooney, A. D.**, Robbins, L. J., Gill, B. C., Dehler, C. M., Cole, D. B., Porter, S. M., Love, G. D., Konhauser, K. O., & Reinhard, C. T., 2022. A sedimentary record of the evolution of the global marine phosphorus cycle. *Geobiology*, 21 pp. 168-174,

2022

31. Cawood, T.K., Moser, A., Borsook, A. and **Rooney, A.D.**, 2022. New constraints on the timing and character of the Laramide Orogeny and associated gold mineralization in SE California, USA. *GSA Bulletin*, 134 (11-12), pp. 3221-3241.
30. Tassara, S., **Rooney, A.D.**, Ague, J.J., Guido, D., Reich, M., Barra, F., Navarrete, C., 2022. Osmium isotopes fingerprint mantle controls on the genesis of an epithermal gold province, *Geology*, 50 (11), pp. 1291-1295
29. **Rooney, A.D.**, †Millikin, A.E.G., Ahlberg, P., Re-Os geochronology for the Cambrian SPICE event: Insights into euxinia and enhanced continental weathering from radiogenic isotopes. *Geology* 50 (6), pp.716-720
28. †Millikin, A.E.G., Strauss, J.V., Halverson, G.P., Bergmann, K., Tosca, N.J., **Rooney, A.D.**, 2022, Calibrating the Russøya excursion in Svalbard, Norway, and implications for Neoproterozoic chronology. *Geology*. 50 (4): pp.506–510.

2021

27. †Gibson, T.M., †Millikin, A.E.G., Anderson, R.P., Myrow, P.M., **Rooney, A.D.**, 2021, Tonian deltaic sedimentation on the edge of Laurentia: the Veteranen Group of northeastern Spitsbergen, Svalbard, *Sedimentary Geology* pp.106011.
26. Yang, C., **Rooney, A.D.**, Condon, D.J., Li, X-H., Grazhdankin, D.V., Bowyer, F.T., Hu, C., Macdonald, F.A., Zhu, M., 2021, The tempo of Ediacaran evolution. *Science Advances*, 7(45), p.eabi9643.

25. †Katchinoff, J.A.R., Syverson†., D.D., Evans† E.S.J.E., Planavsky, N.J., **Rooney, A.D.**, 2021, Seawater chemistry and hydrothermal controls on the Cenozoic osmium cycle. *Geophysical Research Letters*. p.e2021GL095558
 24. Farrell, Ú. C., et al. 2021. The Sedimentary Geochemistry and Paleoenvironments Project. *Geobiology*, 00, 1– 12.
 23. Sperling, E.A. et al., 2021, A long-term record of early to mid-Paleozoic marine redox change: *Science Advances*, v. 7, p. eabf4382.
 22. Busch, J.F., **Rooney, A.D.**, Meyer, E.E., Town, C.F., Moynihan, D.P., Strauss, J.V. 2021. Late Neoproterozoic – early Paleozoic basin evolution in the Coal Creek inlier of Yukon, Canada: implications for the tectonic evolution of northwestern Laurentia. *Canadian Journal of Earth Sciences*. **58**(4): 355-377.
 21. Syverson†, D.D., Katchinoff†, J.A.R., Yohe, L.R., Tutolo, B.M., Seyfried, W.E., **Rooney, A.D.**, 2021, Experimental partitioning of osmium between pyrite and fluid: Constraints on the mid-ocean ridge hydrothermal flux of osmium to seawater, *Geochimica et Cosmochimica Acta*, **293**, pp. 240-255.
 20. Greenman, J.W., **Rooney, A.D.**, Patzke, M., Ielpi, A., Halverson, G.P., 2021 Re-Os geochronology highlights widespread latest Mesoproterozoic (ca. 1090-1050 Ma) cratonic basin development on northern Laurentia, *Geology* **49**, pp. 779-783.
- 2020**
19. Rainbird, R.H., **Rooney, A.D.**, Creaser, R.A., Skulski, T., 2020, Shale and pyrite Re-Os ages from the Hornby Bay and Amundsen basins provide new chronological markers for Mesoproterozoic stratigraphic successions of northern Canada, *Earth and Planetary Science Letters*, **458**, p. 116492
 18. **Rooney, A.D.**, Cantine, M.D., Bergman, K.D., Boag, T.H., Busch, J.F., Sperling, E.A., Strauss, J.V., 2020, Calibrating the co-evolution of Ediacaran life and environment, *Proceedings of the National Academy of Sciences*, **117**, p. 16824-16830.
 17. **Rooney, A.D.**, Chang, Y., Condon, D.J., Zhu., M and Macdonald, F.A., 2020, U-Pb and Re-Os geochronology tracks stratigraphic condensation in the Sturtian Snowball aftermath, *Geology*, **48**, p. 625-629.
- 2019**
16. Penman, D.E., and **Rooney, A.D.**, 2019, Coupled carbon and silica cycle perturbations during the Marinoan snowball Earth deglaciation: *Geology*, **47**, p. 317–320.
- 2018**
15. Li, Y†., Zhang, S., Hobbs, R., Caiado, C., Sproson, A.D., Selby, D. and **Rooney, A.D.**, 2018. Monte Carlo sampling for error propagation in linear regression and applications in isochron geochronology. *Science Bulletin*. **64**, p. 189-197.
 14. **Rooney, A.D.**, Austermann, J., Smith, E.F., Li, Y†., Selby, D., Dehler, C.M., Schmitz, M.D., Karlstrom, K.E., Macdonald, F.A., 2018, Coupled Re-Os and U-Pb geochronology of the Tonian Chuar Group, Grand Canyon. *Geological Society of America Bulletin*, **130**, p. 1085-1098.
- 2017**
13. Cohen, P.A., Strauss, J.V., **Rooney, A.D.**, Sharma, M., Tosca, N., 2017, Controlled hydroxyapatite biomineralization in an ~810 million-year-old unicellular eukaryote. *Science Advances*, **3**, e1700095

2016–2010

12. **Rooney, A.D.**, Selby, D., Lloyd, J.M., Roberts, D.H., Lückge, A., Sageman, B.B., and Prouty, N.G., 2016, Tracking millennial-scale Holocene glacial advance and retreat using Osmium isotopes: Insights from the Greenland Ice Sheet: *Quaternary Science Reviews*, **138**, p. 49-61.
11. Bold, U., Smith, E.F., **Rooney, A.D.**, Ramezani, J., Buchwaldt, R., Crowley, J.L., Schrag, D.P., Macdonald, F.A., 2016. Neoproterozoic stratigraphy of Zavkhan terrane of Mongolia: the backbone for Cryogenian and Early Ediacaran chemostratigraphic records. *American Journal of Science*, **316**, p. 1-63.
10. **Rooney, A.D.**, Strauss, J.V., Brandon, A.D., Macdonald, F.A., 2015. A Cryogenian Chronology: Two long-lasting, synchronous Neoproterozoic glaciations, *Geology*, **43**, p. 459-462.
9. Swanson-Hysell, N.L., Maloof, A.C., Condon, D.J., Jenkin, R.T.G., Alene, M., Tremblay, M.M., Tesema, T., **Rooney, A.D.**, Haileab, B., 2015. Age, synchronicity and duration of the Neoproterozoic Bitter Springs Stage constrained by the Tambien Group of Ethiopia, *Geology*, **43**, p. 323-326.
8. Bertoni, M.E., **Rooney, A.D.**, Selby, D., Alkmim, F.F., Le Heron, D.P., 2014. Neoproterozoic Re-Os systematics of organic-rich rocks in the São Francisco Basin, Brazil and implications for hydrocarbon exploration. *Precambrian Research*, **255**, p. 355-366.
7. Strauss, J.V., **Rooney, A.D.**, Macdonald, F.A., Brandon, A.D., Knoll, A.H., 2014. 740 Ma vase-shaped microfossils from the Yukon Territory: Implications for Neoproterozoic chronology and biostratigraphy. *Geology*, **42**, p. 659-662.
6. Sperling, E.A., **Rooney, A.D.**, Hays, L., Sergeev, V.N., Sergeeva, N.D., Pearson, A., Selby, D., Johnston, D.T., Knoll, A.H. 2014. Redox heterogeneity of subsurface waters in the Mesoproterozoic. *Geobiology*, doi: 10.1111/gbi.12091
5. **Rooney, A.D.**, Macdonald, F.A., Strauss, J.V., Dudás, F. Ö., Hallmann, C., Selby, D., 2014. Re-Os Geochronology and Coupled Os-Sr Isotope Constraints on the Sturtian Snowball Earth. *Proceedings of the National Academy of Sciences*, **111**, p. 51-56.
4. Cumming, V.M., Poulton, S.W., **Rooney, A.D.**, Selby, D., 2013. Anoxia in the Terrestrial Environment During the Late Mesoproterozoic. *Geology*, **41**, p. 583-586.
3. **Rooney, A.D.**, Selby, D., Lewan, M., Lillis, P.G., Houzay, J-P., 2012. Re and Os complexation and systematics in organic-rich sediments: implications for Re-Os fractionation from hydrous pyrolysis. *Geochimica et Cosmochimica Acta*, **77**, p. 275-291.
2. **Rooney, A.D.**, Chew, D.M., Selby, D. 2011. Re-Os geochronology of the Neoproterozoic-Cambrian Dalradian Supergroup of Scotland and Ireland: Implications for Neoproterozoic stratigraphy, glaciations and Re-Os systematics. *Precambrian Research*, **185**, p. 202-214.
1. **Rooney, A.D.**, Selby, D., Houzay, J-P., Renne, P.R. 2010. Re-Os geochronology of a Mesoproterozoic sedimentary succession, Taoudeni basin, Mauritania: Implications for basin-wide correlations and Re-Os organic-rich sediments systematics. *Earth and Planetary Science Letters*, **289**, p. 486-496.

Book Chapters

2. Schmitz, M.D., Singer, B.S., **Rooney, A.D.**, Radiogenic Isotope Geochronology. In: *The Geologic Time Scale 2020*, Gradstein, F.M., Ogg, J.G., Schmitz, M.D., Ogg, G.M., (Eds.) Elsevier, **v.1**, pp. 193-209.
1. Selby, D., Cumming, V.M., **Rooney, A.D.**, Finlay, A.J., 2013, Hydrocarbons/Rhenium-Osmium (Re-Os): Organic-rich sedimentary rocks. In: Rink, W.J., Thompson, J.W., (Eds.), *Encyclopedia of Scientific Dating Methods*. Springer, pp. 330-334.

Selected Awards

NASA Astrobiology Institute Postdoctoral Fellowship	2015 – 2017
Harvard University Milton Fund, Co-PI (with Prof. Francis Macdonald)	2013
Durham University Ustinov College travel grants	2008 – 2010
CeREES Total Petroleum Geosciences PhD scholarship	2007 – 2011
AAPG Grants-In-Aid: Gustavus E. Archie Memorial International Grant	2008

Yale Teaching

* Indicates completely new course I designed and organized. [n] Number of students

- **Fall 2023:** *Earth's Past Climates*, (EPS 830) [7] Sole instructor for this graduate reading seminar, I provide an introductory lecture to every class and facilitate discussion.
- **Spring 2023:** *Isotope Geochemistry* (EPS 310/510) [10] Sole instructor for this lecture-based class. Devised all problem sets, mid-term and final exam. This course met two days a week for 75 minutes each class.
- **Fall 2022** – On leave
- **Spring 2022:** *The Geology of North America through its National Parks* (EPS 210)* [17] Newly-devised undergraduate class with Spring break trip to Arizona National Parks. Primary instructor for this class and designed lectures, labs, problem sets, mid-term and final exam and presentations along with Associate in Teaching, Alexie Millikin.
- **Fall 2021:** *Isotope Geochemistry* (EPS 310/510) [8] Sole instructor for this lecture-based class. Devised all problem sets, mid-term and final exam. This course met two days a week for 75 minutes each class.
Earth System Science (EPS 755) [19] Graduate reading seminar and lecture course co-instructor along w. L. Tarhan, N. Planavsky, P. Hull & J. Lora. Class met once a week for 90 minutes.
- **Spring 2021:** *Isotope Geochemistry* (EPS 310/510) [4] Sole instructor for this lecture-based class. Devised all problem sets, mid-term and final exam This course met online two days a week for 75 minutes each class.
Earth System Science (EPS 756) [19] Graduate reading seminar and lecture course co-instructor along w. L. Tarhan, N. Planavsky, P. Hull & J. Lora. This course met online for 90 minutes.
- **Fall 2020:** *Topics in Geobiology* (EPS 721) [9] Co-Instructor along with L. Tarhan for graduate-level reading seminar. This class met online for 90 minutes to discuss recent papers and emerging ideas.
- **Spring 2020:** *Isotope Geochemistry* (G&G 310/510) [11] Sole instructor for this lecture-based class. Devised all problem sets, mid-term and final exam This course met online two days a week for 75 minutes each class.
- **Spring 2019/Fall 2019:** On leave but co-taught EPS 757 [9] w. Mary-Louise Timmermans in Spring 2019. Graduate student seminar course with fieldtrip to Alaska & Yukon, Class met weekly for 75 minutes.
- **Fall 2018:** *Isotope Geochemistry* (G&G 310/510) [10] Sole instructor for this lecture-based class. Devised all problem sets, mid-term and final exam This course met two days a week for 75 minutes each class.
- **Spring 2018:** *Global Tectonics* (G&G 212) [12] co-Instructor along with D. Evans, I taught

several lectures and helped plan the Spring Break field trip. This course met two days a week for 75 minutes each class.

Geochemistry of Earth's Past Climates, (G&G 830) [10] Sole instructor for graduate level seminar course meeting weekly (2hrs) and with final presentations as exams.

- **Fall 2017:** *Isotope Geochemistry* (G&G 310/510) [14] Co-Instructor along with N. Planavsky. I taught 50% of the lectures and devised the problem sets, mid-term and final exam. This course met two days a week for 75 minutes each class.
- **Spring 2017:** *Radiometric Age Dating* (G&G 642) [6] Sole instructor for graduate level seminar course (2 hrs) focused on geochronology, metrology and traceability of radiometric age constraints with final presentations as exams.

Professional Service Activities

- Session co-convener, Goldschmidt 2023; *Advances in isotope geochemistry for characterizing and dating the environmental evolution from the early Earth to today*
- Session co-convener, GSA 2022: T81: *Radiogenic isotopes as tracers of geologic processes: dates, rates, and proxies.*
- Session co-convener, GSA 2022 Pardee Session: *The Proterozoic-Phanerozoic Transition: Laying the Foundation for the Modern Earth System.*
- Joint Technical Program Committee Officer: GSA Annual Meeting, 2019, 2020, 2021
- Discussion Leader: Gordon Research Conference *Geochronology Conference*, 2019,
- Associate Editor of GSA Bulletin 2019–2022
- Reviewer for: *Nature*, *Nature Communications*, *Geology*, *Applied Geochemistry*, *Earth and Planetary Science Letters*, *G-cubed*, *Precambrian Research*, *Arktos*, *Geochimica et Cosmochimica Acta*, *Science Advances*
- Past chair of Geological Society of America, 2021-2022 *Geochronology Division* (founding board member)
- Ad-hoc proposal reviewer for NSF (*Sedimentary Geology*, *Marine Geology and Geophysics*, and *Paleontology* and *Geobiology and Low-Temperature Geochemistry and Geobiology*), NASA and NERC (UK)
- Internal Reviewer: *Yale Center for Natural Carbon Capture* post-doctoral researchers 2023; *Yale Institute for Biospheric Sciences*, Seed Grants in Climate and Climate Change, 2023

Department Service

- Faculty Search Committees: Geochemistry; Planetary Sciences 2019, 2021, 2023
- Graduate Admissions and Recruiting Committee 2021 – 2022
- Yale EPS Climate Symposium committee with M.L Timmermans, 2019
- Flint Committee 2020 – 2022
- IDEA Committee 2020 – 2021
- Colloquium Committee, 2017 – 2019, 2021 – 2022
- Program Review and Exam Committee, 2017, 2018, 2021, 2023
- Yale Future of the Geosciences Committee, 2018
- Laboratories and Facilities Safety, 2017 – 2018

University Service

- Reviewer for YIBS Seed Grants in Climate and Climate Change, 2023
- Reviewer for YCNCC Postdoctoral Fellowship Program, 2023

Graduate Student Mentees († indicates main supervisor, # indicates minor discourse project)

#Jackson Neuhoff	2023 – present
Sydney Riemer	2023 – Present
†Stacey Gerasimov	2022 – Present
†Carey Ciaburri	2022 – Present
†Samuel Shipman	2021 – Present
†Gryphen Goss	2021 – Present
Brian Beatty	2019 – Present
Lisa Zieman (U of Arizona)	Graduated 2023
Sally Stevens (U of Wisconsin)	Graduated 2022
#Qinting Jiang	2019 – Present
†Alexie Millikin	2018 – 2023
Joahchim Kartchinoff	Graduated 2022
Boriana Kalderon-Asael	Graduated 2022
Zheng Gong	Graduated 2021
Devon Cole	Graduated 2019
Terry Tang Isson	Graduated 2019

Postdoctoral Mentees

Jonathan Toma: Department <i>Brian Skinner Postdoctoral Awardee</i>	2023–Present
Timothy Gibson: <i>NSF Postdoctoral Awardee</i>	2019–2023
Ann Bauer: <i>Simons Foundation Postdoctoral Awardee</i> (now faculty at University of Wisconsin, Madison)	2018–2019
Yang Li (now faculty at Institute of Geology and Geophysics, Chinese Academy of Sciences)	2017–2019
Drew Syverson: Department <i>Flint Postdoctoral Awardee</i> (now staff at University of North Carolina, Charlotte)	2017–2019

Postdoctoral Mentee Awards

GSA Doris M. Curtis Outstanding Woman in Science Award Dr. Annie Bauer, 2022
Simons Collaboration on the Origin of Life Postdoctoral Award Dr. Annie Bauer 2018–2020

Undergraduate Mentees

Evelyn Larson, Senior Thesis “ <i>Re-Os geochronology of the Windermere Supergroup: Investigating the age of sedimentary successions in British Columbia</i> ”	Graduated 2023
Katrina White, Senior Thesis “ <i>Investigating the effect of substrate on differential Laurentide Ice Sheet flow in the Hudson Bay region</i> ”	Graduated 2019
Nadia Grisaru, Senior Thesis “ <i>Applying the Re-Os Isotope System to a Survey of Cratonic Bedrock in Northeastern Canada</i> ”	Graduated 2019

Invited Contributions (conferences and workshops)

- University of Arizona, Department Seminar 2023
- Princeton University, Department Seminar, 2022
- Stanford University, Department Seminar, 2022
- University of Copenhagen, Dahl Group Research Seminar, 2021
- University of Connecticut, Department Seminar, 2021
- Geological Society of America Annual Meeting, *Pardee Symposium Keynote* 2019
- Gordon Research Conference, Discussion Leader for the “Origins of Life” session 2019
- NSF-workshop, “Dating In Deep Time”, MIT, *Invited speaker* 2019
- Scottish Universities Environment Research Center, Research Seminar 2019
- Gordon Research Conference, Geobiology, *Invited speaker* 2018
- Department of Terrestrial Magnetism, Department Seminar 2018
- Utah State University, Department Seminar 2017
- University of Alberta, Special Geochemistry Seminar 2017
- MIT, Chemical Oceanography, Geology and Geochemistry Seminar 2017
- Stonybrook University, Department Colloquium 2017
- Geological Society of America Annual Meeting, 2017
- Goldschmidt International Conference, *Keynote Presentation* 2016
- EARTHTIME Europe Meeting, EGU Vienna, 2016

Public Science Contributions

- Geological Society of Australia Victoria Division *Selwyn Conference* Public Lecture 2023
- Sedimentary Geochemistry and Paleoenvironments Project Proxy Primer Lecture 2021
<https://www.youtube.com/watch?v=pFRMgyohXbo>
- Yale University Climate Day, Peabody Museum 2019