

Alan D. Rooney

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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

NSF funding

Collaborative Research: *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

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

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

Peer-Reviewed Publications

(† represents student or postdoc author)

In Press/Review

31. 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 (*in press*) *Geology*

30. 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. (*in press*). *GSA Bulletin*.

2022

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): 506–510. doi: <https://doi.org/10.1130/G49593.1>

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* p.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. <https://doi.org/10.1111/gbi.12462>
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. <https://DOI:10.1126/sciadv.abf4382>
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. <https://doi.org/10.1139/cjes-2020-0132>
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**, 240-255. <https://doi.org/10.1016/j.gca.2020.10.029>
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**, 779-783. <https://doi.org/10.1130/G48521.1>

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 <https://doi.org/10.1016/j.epsl.2020.116492>
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. <https://doi.org/10.1073/pnas.2002918117>

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. <https://doi.org/10.1130/G47246.1>

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. <https://doi.org/10.1130/G45812.1>

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. <https://doi.org/10.1016/B978-0-12-824360-2.00006-1>
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. https://doi10.1007/978-94-007-6326-5_17-5

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.

- **Spring 2022:** The Geology of North America through its National Parks (EPS 210)*
- **Fall 2021:** Isotope Geochemistry (EPS 310/510); Earth System Science (EPS 755) Co-Instructor along w. L. Tarhan, N. Planavsky, P. Hull & J. Lora
- **Spring 2021:** Isotope Geochemistry (EPS 310/510); Earth System Science (EPS 756) Co-Instructor along w. L. Tarhan, N. Planavsky, P. Hull & J. Lora
- **Fall 2020:** Topics in Geobiology (EPS 721) Co-Instructor along with L. Tarhan; Earth System Science (EPS 755) Co-Instructor along w. L. Tarhan, N. Planavsky, P. Hull & J. Lora
- **Spring 2020:** Isotope Geochemistry (EPS 310/510)
- **Spring 2019/ Fall 2019:** On leave
- **Fall 2018:** *Isotope Geochemistry (G&G 310/510)*
- **Spring 2018:** *Global Tectonics (G&G 212)* co-Instructor along with D. Evans; *Geochemistry of Earth's Past Climates, (G&G 830)*
- **Fall 2017:** Isotope Geochemistry Co-Instructor along with N. Planavsky
- **Spring 2017:** *Radiometric Age Dating (G&G 642)* Graduate level seminar course focused on

geochronology, metrology and traceability of radiometric age constraints

Professional Service Activities

- Session Co-convener, GSA 2022: T81: *Radiogenic isotopes as tracers of geologic processes: dates, rates, and proxies*;
- Session Co-convener, GSA 2022 Pardee Session
- 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 and Paleontology* and *Geobiology and Low-Temperature Geochemistry*), NASA and NERC (UK).

Department Service

- 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
- Yale Future of the Geosciences Committee, 2018
- Laboratories and Facilities Safety, 2017 – 2018

Graduate Student Mentees († indicates principal supervisor)

†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)	2021 – Present
Sally Stevens (U of Wisconsin)	Graduated 2022
Qinting Jiang	2019 – Present
†Alexie Millikin	2018 – Present
Joahchim Kartchinoff	Graduated 2022
Boriana Kalderon-Asael	Graduated 2022
Zheng Gong	Graduated 2021
Devon Cole	Graduated 2019
Terry Tang Isson	Graduated 2019

Postdoctoral Mentees

Timothy Gibson: NSF Postdoctoral Awardee	2019 – present
Ann Bauer: Simons Foundation Postdoctoral Awardee (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 Flint Postdoctoral Awardee (now faculty at University of North Carolina)	2017 – 2019

Undergraduate Mentees

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 Grisar, Senior Thesis <i>“Applying the Re-Os Isotope System to a Survey of Cratonic Bedrock in Northeastern Canada”</i>	Graduated 2019
Evelyn Larson, Senior Thesis <i>“Highly-Siderophile Elements: Geochronological and Geochemical applications”</i>	Year 2023

Invited Contributions (conferences and workshops)

• 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	2019
• Scottish Universities Environment Research Center, Research Seminar	2019
• Gordon Research Conference, Geobiology,	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

• Sedimentary Geochemistry and Paleoenvironments Project Proxy Primer Lecture https://www.youtube.com/watch?v=pFRMgyohXbo	2021
• Yale University Climate Day, Peabody Museum	2019