

## Francis A. Macdonald

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### Education

Ph.D. Earth and Planetary Sciences, Harvard University, Cambridge, MA, 2009.

B.S. Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA, 2001.

### Experience

- Professor of Geology, University of California, Santa Barbara, CA, 2018-present.
- Professor of Earth and Planetary Sciences, Harvard University, Cambridge, MA, 2017-2018.
- John L. Loeb Associate Professor of the Natural Sciences, Harvard University, Cambridge, MA, 2014-2017.
- Associate Professor, Harvard University, Cambridge, MA, 2013-2014.
- Assistant Professor, Harvard University, Cambridge, MA, 2009-2013.
- Research Assistant, USGS Astrogeology, Flagstaff, AZ, 2004.
- Lab Manager, Paleomagnetism Laboratory, Caltech, Pasadena, CA, 2002-2004.
- Field Technician, Aguror Paleoproterozoic Drilling Project, South Africa, 2002-2003.
- Field Technician, Geophysical cruise ship, South Pacific, 2000-2001.
- Research Assistant, Caltech, 1999-2000.

### Awards

- Macelwene Medal (American Geophysical Union Early Career Award), 2019.
- Reviewer Award, *Geology*, for consistently prompt, insightful, meticulous, and tactful reviews, 2015.
- Donath Medal (Geological Society of America Young Scientist Award), 2014.
- Star Family Prize for Excellence in Advising Award, Harvard College, 2012.
- Ian Hamilton Golden Brunton Award, for excellence in field mapping, Caltech, 2001.

### Grants & Fellowships

- NSF Frontier Research in Earth Systems: *Do arc-continent collisions in the tropics set global climate state?* 2019-present
- NSF Sedimentary Geology and Paleontology: *Collaborative Research: Did the formation of the Great Unconformity trigger oxygenation and the Cambrian explosion?* 2018-present.
- Inter-Continental Drilling Program (ICDP): Geological Research through Integrated Neoproterozoic Drilling, Ediacaran-Cambrian transition (GRIND-ECT) for scientific drilling in Brazil, Namibia, and South China.
- NSF Geophysics, EAR-1547434: *Collaborative Research: Testing proposed rapid true polar wander in the Neoproterozoic Zavkhan Volcanics of Mongolia and the Banxi Group of South China*, 2016-2019.

- Harvard University Milton Fund, *Weathering the Snowball*, 2015.
- NSF Sedimentary Geology and Paleontology, EAR-1148058: *Collaborative Research: Calibrating the Cryogenian in the Yukon*, 2012-2014.
- NASA Astrobiology: Exobiology and Evolutionary Biology, NNH10ZDA001N-EXO: *Exploring Cryogenian biological and environmental change in Mongolia*, 2011-2013.
- NSF Tectonics, EAR-1049463: *Collaborative Research: Comparative Studies of Circum-Arctic Neoproterozoic-Paleozoic terranes*, 2011-2013.
- MIT-NAI Astrobiology Node, 2011-2017.
- External Research Partner, Yukon Geological Survey: *Defining the Neoproterozoic margin in the Yukon*, 2010-2012.
- Presidents January Innovation Fund: *Mojave Map, developing a digital mapping project for EPS 74, Field Geology*, 2011-2012.
- NSF Graduate Research Fellowship, 2005-2008.
- Geological Society of America Research Grant: *Neoproterozoic strata of the North Slope of Alaska*, 2005.
- Barringer Family Fund: *The geology of impact structures in Australia*, 2003.
- Thomas J. Watson Fellowship: *The geology of impact structures in Australia*, 2001-2002.
- Summer Undergraduate Research Fellowship: *Magnetics of the Martian Meteorite ALH84001*, Caltech, 1999-2000.
- NASA Fellowship, Juneau Icefield Research Program, Juneau Icefield, AK, 1997.

### Professional Affiliations

- Geological Society of America, Fellow, 2015-present.
- American Geophysical Union, Fellow, 2019-present.

### Publications

[\*author is or was a student or postdoc working with Macdonald]

2020

111. Park, Y., Maffre, P., Godderis, Y., **Macdonald, F.A.**, \*Anttila, E.A., and Swanson-Hysell, N.L., 2020. Emergence of the Southeast Asian islands as a driver for Neogene cooling, *Proceedings of National Academy of Science*.
110. **Macdonald, F.A.**, 2020. Deep-time paleoclimate proxies, *AGU Advances*, 1(3), e2020AV000244.
109. \*Bold, U., Ahm, A-S.C., Schrag, D.P., Higgins, J.A., Jamsrand, E., and **Macdonald, F.A.**, 2020. Effect of dolomitization on isotopic records from Neoproterozoic carbonates in southwestern Mongolia, *Precambrian Research*, 350, 105902.
108. Laakso, T.A., Waldeck, A., Johnston, D.T., **Macdonald, F.A.**, 2020. Volcanic controls on seawater sulfate over the last 100 Ma, *Proceedings of National Academy of Science*.
107. Liljestr and, F.L., **Macdonald, F.A.**, Schrag, D.P., Laakso, T.A., and Johnston, D.T., 2020. Isotopically anomalous carbon cycling in the aftermath of the Marinoan Snowball Earth, *Geobiology*, 18(4), 476-485.
106. \*Nelson, L.L., \*Smith, E.F., \*Hodgin, E.B., Crowley, J., Schmitz, M., and **Macdonald, F.A.**, 2020. Precise geochronological constraints on Neoproterozoic rifting and onset of the Marinoan glaciation from the Kingston Peak Formation in Death Valley, California, *Geology*, doi: 9443/10.1130/G47668.1

105. Liljestrand, F.L., Knoll, A.H., Tosca, N.J., Cohen, P.A., **Macdonald, F.A.**, Peng, Y., Johnston, D.J., 2020. The triple oxygen isotope composition of Precambrian chert, *Earth and Planetary Science Letters*, 537, 116167.
104. \*Rooney, A.D., 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(6), 625-629.
103. Flowers, R.M., **Macdonald, F.A.**, Siddoway, C.S., and Havranek, R., 2020. Diachronous development of Great Unconformities before Neoproterozoic Snowball Earth, *Proceedings of National Academy of Science*, 117 (19), 10172-10180.
102. Park, Y., Swanson-Hysell, N.L., and **Macdonald, F.A.**, 2020. Evaluating the connections between large igneous province paleogeography and climate from the Cryogenian to present, in: Ernst, R.E., Dickson, A.J., Bekker, A. (eds). Large Igneous Provinces: A Driver of Global Environmental and Biotic Changes. AGU Geophysical Monograph 255 (7), 149-164.
101. \*Eyster, A.E., Weiss, B.P., Karlstrom, K., Kremers, J., and **Macdonald, F.A.**, 2020. Paleomagnetism of the Chuar Group and evaluation of the 780-720 Ma apparent polar wander path of Laurentia with implications for the makeup and breakup of Rodinia, *Geological Society of America Bulletin*, 132 (3-4), 710-738.

2019

100. Rose, C., Prave, A., Bergmann, K., Condon, D. and Kasemann, S., **Macdonald, F.A.**, Hoffmann, K.-H., Trindade, R.I.F., and Zhu, M., 2019. Project Report: Grinding Through the Ediacaran-Cambrian Transition. *Communications of the Geological Survey of Namibia*, 21: 1-14.
99. Galili, N., Shemesh, A., Yam, R., Brailovsky, I., Sela-Adler, M., Schuster, E.M., Collom, C., Bekker, A., Pr eat, A., Rudmin, M., Trela, W., Planavsky, N., **Macdonald, F.A.**, Sturesson, U., Heikoop, J.M, Aurell, M., Ramajo, J., and Halevy, I., 2019. The geologic history of seawater oxygen isotopes from marine iron oxides, *Science*, 365 (6452), 469-473.
98. **Macdonald, F.A.**, Swanson-Hysell, N.L., Park, Y., Lisiecki, L., and Jagoutz, O., 2019. Arc-continent collision in the tropics set Earth's climate state, *Science*, 364(6436): 181-184.
97. Ahm, A.-S.C., Maloof, A.C., **Macdonald, F.A.**, Hoffman, P.F., Bjerrum, C.J., Bold, U., Rose, C.V., \*Strauss, J.V., and Higgins, J.A., 2019. An early diagenetic deglacial origin for basal Ediacaran "cap dolostones", *Earth and Planetary Science Letters*, 506: 292-307.
96. Anderson, R.P., McMahon, S., **Macdonald, F.A.**, Jones, D.S., and Briggs, D.E.G., 2019. Paleobiology of latest Ediacaran phosphorites from the upper Khesen Formation, Khuvsgul Group, northern Mongolia, *Journal of Systematic Paleontology*.
95. Pruss, S.B., Dwyer, C.H., \*Smith, E.F., **Macdonald, F.A.**, and Tosca, N.J., 2019. Phosphatized early Cambrian archaeocyaths and small shelly fossils (SSFs) of southwestern Mongolia, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 513: 166-177.

2018

94. Karabinos, P., **Macdonald, F.A.**, and Crowley, J.L., 2018. A traverse through the suture zone between Laurentia and the Moretown terrane in northwestern Massachusetts, *In 110<sup>th</sup> NEIGC Annual Meeting: Field Guide C3-1-33*.

93. Pruss, S.B., Blättler, C., **Macdonald, F.A.**, and Higgins, J.A., 2018. Calcium isotope evidence that the earliest animal biomineralizers formed aragonite shells, *Geology*, 46(9): 763-766.
92. \*Strauss, J.V., **Macdonald, F.A.**, and McClelland, W.C., 2018. Pre-Mississippian stratigraphy and provenance of the North Slope subterranean of Arctic Alaska I: Platformal rocks of the northeastern Brooks Range and their significance in circum-Arctic evolution, in: Piepjohn, K., McClelland, W.C., Reinhardt, L. and Strauss, J.V., eds., *Circum-Arctic Structural Events (CASE): Tectonic evolution of the Arctic margins and trans-Arctic links with adjacent orogens*, *Geological Society of America Special Papers*, 451.
91. \*Nelson L.L., \*Strauss, J.V., Crockford, P.W., Cox, G.M., Johnson, B.G., Ward, W., Colpron, M., McClelland, W.C., and **Macdonald, F.A.**, 2018. Geochemical constraints on the provenance of pre-Mississippian sedimentary rocks in the North Slope of Yukon and Alaska, in: Piepjohn, K., McClelland, W.C., Reinhardt, L. and Strauss, J.V., eds., *Circum-Arctic Structural Events (CASE): Tectonic evolution of the Arctic margins and trans-Arctic links with adjacent orogens*, *Geological Society of America Special Papers*, 451.
90. Liu, C., Wang, Z., and **Macdonald, F.**, 2018. Sr and Mg isotope geochemistry of the basal Ediacaran cap limestone sequence of Mongolia: Implications for carbonate diagenesis, mixing of glacial meltwaters, and seawater chemistry in the aftermath of Snowball Earth, *Chemical Geology*, 491: 1-13.
89. Swanson-Hysell, N.L. and **Macdonald, F.A.**, 2018. Tropical weathering of the Taconic orogeny as a driver for Ordovician cooling: REPLY, *Geology* 46 (3): e437.
88. \*Eyster, A.E., Ferri, F., Schmitz, M. D., and **Macdonald, F.A.**, 2018. One diamictite and two rifts: Stratigraphy and geochronology of the Gataga Volcanics of northern British Columbia, *American Journal of Science*, 318.
87. \*Rooney, A.D., Austermann, J., Smith, E.F., Yang, L., Selby, D., Dehler, C.M., Schmitz, M.D., Karlstrom, K.E., and **Macdonald, F.A.**, 2018. Coupled Re-Os and U-Pb geochronology of the Neoproterozoic Chuar Group, Grand Canyon, *Geological Society of America Bulletin*, 130(7-8): 1085-1098.
86. Cox, G.M., Halverson, G.P., Denyszyn, S., Foden, J., and **Macdonald, F.A.**, 2018. Cryogenian magmatism along the northwestern margin of Laurentia: plume or rift? *Precambrian Research*, 319: 144-157.
85. **Macdonald, F.A.**, Schmitz, M.D., \*Strauss, J.V., Halverson, G.P., Gibson, T.M., \*Eyster, A., Cox, G., Mamrol, P., and Crowley, J.C., 2018. Cryogenian of Yukon, *Precambrian Research*, 266: 194-211.
- 2017
84. Moore, K.R., Bosak, T., **Macdonald, F.A.**, Du, K., Newman, S., and Pruss, S., 2017. Pyritized Cryogenian cyanobacterial fossils from Arctic Alaska, *Palaios*, 32: 769-778.
83. Anderson, R.P., **Macdonald, F.A.**, Jones, D.S., McMahan, S., and Briggs, D.E.G., 2017. Doushantuo-type microfossils from latest Ediacaran phosphorites of northern Mongolia, *Geology*, 45(12): 1079-1082.
82. Hoffman, P.F., Abbot, D.S., Ashkenazy, Y., Benn, D.I., Cohen, P.A., Cox, G.M., Creveling, J.R., Donnadieu, Y. Erwin, D.H., Fairchild, I.J., Ferreira, D., Goodman, J.C., Halverson, G.P., Jansen, M.F., Le Hir, G., Love, G.D., **Macdonald, F.A.**, Maloof, A.C., Ramstein, G., Rose, G.E.J., Rose, C.V., Tziperman, E., Voigt, A., and Warren, S.G., 2017. Climate dynamics of Snowball Earth and Cryogenian geology-geobiology, *Science Advances*, 3 (11): e1600983.

81. Swanson-Hysell, N.L. and **Macdonald, F.A.**, 2017. Tropical weathering of the Taconic orogeny as a driver for Ordovician cooling, *Geology*, G38985. 1.
80. \*Smith, E.F., **Macdonald, F.A.**, \*Petach, T.A., and \*Bold, U., 2017. Integrated stratigraphic, geochemical, and paleontological late Ediacaran to early Cambrian records from southwestern Mongolia: Reply, *Geological Society of America Bulletin*, B31763.1.
79. **Macdonald, F.A.**, Karabinos, P., Crowley, J.L., \*Hodgin, E., Crockford, P.W., and Delano, J., 2017. Bridging the gap between the foreland and the hinterland II: Geochronology and tectonic setting of Ordovician magmatism and basin formation on the Laurentian margin of New England and Newfoundland, *American Journal of Science*, 371 (5): 555-596.
78. Karabinos, P., **Macdonald, F.A.**, and Crowley, J.L., 2017. Bridging the gap between the foreland and the hinterland I: Geochronology and plate tectonic geometry of Ordovician magmatism and terrane accretion on the Laurentian margin of New England, *American Journal of Science*, 317 (5): 515-554.
77. Yang, J., Jansen, M.F., **Macdonald, F.A.**, and Abbot, D.S., 2017. Persistence of a freshwater layer in the surface ocean after Snowball Earth, *Geology*, 45 (7): 615-618.
76. **Macdonald, F.A.** and Wordsworth, R., 2017. Initiation of Snowball Earth with volcanic sulfur aerosol emissions, *Geophysics Research Letters*, 44 (4): 1938-1946.
75. Miller, A.J., \*Strauss, J.V., Halverson, G.P., **Macdonald, F.A.**, Johnston, D.T., and Sperling, E.A., 2017. Tracking the onset of Phanerozoic-style redox-sensitive trace metal enrichment: New data from basal Ediacaran post-glacial strata in NW Canada, *Chemical Geology*, 475: 24-37.
74. Moore, K.R., Bosak, T., **Macdonald, F.A.**, Lahr, D.J.G., Newman, S., Settens, C., and Pruss, S.B., 2017. Biologically agglutinated eukaryotic microfossils from Cryogenian cap carbonates, *Geobiology*, 15 (4): 499-515.
73. Lau, K.V., **Macdonald, F.A.**, Maher, K., and Payne, J.L., 2017. Uranium isotope evidence for temporary ocean oxygenation in the aftermath of the Sturtian Snowball Earth, *Earth and Planetary Science Letters*, 458: 282-292.

2016

72. Anderson, R.P., McMahon, S., \*Bold, U., **Macdonald, F.A.**, and Briggs, D.E.G., 2016. Palaeobiology of the early Ediacaran Shuurgat Formation, Zavkhan Terrane, south-western Mongolia, *Journal of Systematic Paleontology*, 15 (11): 947-968.
71. \*Pu, J., Bowring, S.A., Ramezani, J., Myrow, P., Landing, E., Raub, T.D., Mills, A., \*Hodgin, E.B., and **Macdonald, F.A.**, 2016. Dodging Snowballs: Geochronology of the Gaskiers glaciation and the first appearance of the Ediacaran biota, *Geology*, 44 (11): 955-958.
70. \*Smith, E.F., \*Nelson, L.L., Strange, M.A., \*Eyster, A.E., Roland, S.M., Schrag, D.P., and **Macdonald, F.A.**, 2016. The end of the Ediacaran: Two new exceptionally preserved body fossil assemblages from Mount Dunfee, Nevada, USA, *Geology*, 44 (11): 911-914.
69. \*Bold, U., Crowley, J.L., \*Smith, E.F., Sambuu, O., and **Macdonald, F.A.**, 2016. Neoproterozoic to early Paleozoic tectonic evolution of the Zavkhan terrane of Mongolia: Implications for continental growth in the Central Asian orogenic belt, *Lithosphere*, 8 (6): 729-750.
68. Kilian, T.M., Swanson-Hysell, N.L., \*Bold, U., Crowley, J.L., and **Macdonald, F.A.**, 2016. Paleomagnetism of the Teel basalts from the Zavkhan terrane: Implications for Paleozoic paleogeography in Mongolia and growth of continental crust, *Lithosphere*, 8 (6): 699-715.

67. \*Eyster, A.E., Fu, R., \*Strauss, J.V., Weiss, B.P., Roots, C.F., Halverson, G.P., Evans, D.A.D., and **Macdonald, F.A.**, 2016. Paleomagnetic evidence for a large rotation of the Yukon block relative to Laurentia: Implications for a low-latitude Sturtian glaciation and the breakup of Rodinia, *Geological Society of America Bulletin*, 129 (1-2): 38-58.
66. Cox, G. M., Halverson, G. P., Stevenson, R.S., Théou-Hubert, L., Vokaty, M., Poirier, A., Kunzmann, M., Li, Z-X, \*Strauss, J.V., and **Macdonald, F.A.**, 2016. Conginental flood basalt weathering as a trigger for Neoproterozoic Snowball Earth, *Earth and Planetary Science Letters*, 446: 89-99.
65. Jagoutz, O., **Macdonald, F.A.**, and Royden, L., 2016. Low-latitude arc-continent collision as a driver for global cooling, *Proceedings of the National Academy of Sciences*, 113 (18): 4935-4940.
64. \*Bold, U., \*Smith, E.F., \*Rooney, A.D., Bowring, S.A., Dudás, F.Ö., Ramezani, J., Buchwaldt, R., Crowley, J.C., Schrag, D.P., and **Macdonald, F.A.**, 2016. Neoproterozoic stratigraphy of the Zavkhan terrane of Mongolia: The backbone for Cryogenian and early Ediacaran chemostratigraphic records, *American Journal of Science*, 316: 1-63.
63. Crockford, P.W., Cowie, B.R., Johnston, D.T., Hoffman, P.F., Sugiyama, I., Pellerin, A., Bui, T.-H., Hayles, J., Halverson, G.P., **Macdonald, F.A.**, and Wing, B.A., 2016. Triple oxygen and multiple sulfur isotope constraints on the evolution of the post-Marinoan sulfur cycle, *Earth and Planetary Science Letters*, 435: 74-83.

2015

62. Sperling, E.A., Carbonne, C., \*Strauss, J.V., Johnston, D.T., Narbonne, G.M., and **Macdonald, F.A.**, 2016. Oxygen, facies, and secular controls on the appearance of Cryogenian and Ediacaran body and trace fossils in the Mackenzie Mountains of northwestern Canada, *Geological Society of America Bulletin*, 128 (3-4): 558-575.
61. \*Smith, E.F., \*Petach, T.A., \*Bold, U., Schrag, D.P., and **Macdonald, F.A.**, 2015. Integrated stratigraphic, geochemical, and paleontological late Ediacaran to early Cambrian records from southwestern Mongolia, *Geological Society of America Bulletin*, 128 (3-4): 442-468.
60. \*Strauss, J.V., **Macdonald, F.A.**, Halverson, G.P., Tosca, N.J., Schrag, D.P., and Knoll, A.H., 2015. Stratigraphic evolution of the Neoproterozoic Callison Lake Formation: Linking the break-up of Rodinia to the Islay carbon isotope excursion, *American Journal of Science*, 315: 881-944.
59. Condon, D.J., Boggani, P., Fike, D., Halverson, G.P., Kasemann, S., Knoll, A., **Macdonald, F.A.**, Prave, A.R., and Zhu, M., 2015. Accelerating Neoproterozoic Research through Scientific Drilling, *Scientific Drilling*, 19: 17-25.
58. Cohen, P.A., and **Macdonald, F.A.**, 2015. The Proterozoic record of eukaryotes, *Paleobiology*, 41 (4): 610-632.
57. Sperling, E.A., Wolock, C., Morgan, A.S., Gill, B.C., Halverson, G.P., **Macdonald, F.A.**, Knoll, A.H., and Johnston, D.T., 2015. Statistical analysis of iron geochemical data suggests limited late Proterozoic oxygenation, *Nature*, 523 (7561): 451-454.
56. \*Rooney, A.D., \*Strauss, J.V., Brandon, A.D., and **Macdonald, F.A.**, 2015. A Cryogenian chronology: Two long-lasting, synchronous Neoproterozoic glaciations, *Geology*, 43 (5): 459-462.
55. **Macdonald, F.A.**, Ryan-Davis, J., Coish, R.A., Crowley, J.C., and Karabinos, P., 2015. Forum Comment & Reply, *Geology*, 42 (6): 539-542.
54. Cox, G.M., \*Strauss, J.V., Halverson, G.P., Stevenson, R.S., Schmitz, M.D., McClelland, W.C., and **Macdonald, F.A.**, 2015. Kikiktat Volcanics of Arctic Alaska – Melting of

- harzburgitic sub-continental lithospheric mantle associated with the Franklin Large Igneous Province, *Lithosphere*, 7 (3): 275-95.
53. Carbone, C., Narbonne, G.M., **Macdonald, F.A.**, and Boag, T., 2015. New Ediacaran fossils from the uppermost Blueflower Formation, northwest Canada: Disentangling biostratigraphy and paleoecology, *Journal of Paleontology*, 89 (02): 281-291.
52. \*Smith, E.F., **Macdonald, F.A.**, Crowley, J.C., and \*Hodgin, E.B., 2015. Tectonostratigraphic evolution of the c. 780-730 Ma Beck Spring Dolomite: Basin Formation in the core of Rodinia, in: Li, Z. X., Evans, D.A.D. & Murphy, J. B. (eds) *Supercontinent Cycles Through Earth History*, v. 424 (1). Geological Society, London, Special Publications, p. 213-239.
51. Cohen, P.A., **Macdonald, F.A.**, Pruss, S.B., Matys, E., and Bosak, T., 2015. Fossils of putative marine algae from the Cryogenian glacial interlude of Mongolia, *Palaios*, 30 (3): 238-247.
- 2014
50. \*Strauss, J.V., Roots, C.F., **Macdonald, F.A.**, Halverson, G.P., \*Eyster, A.E., and Colpron, M., 2014. Geological map of the Coal Creek Inlier, Ogilvie Mountains (NTS 116B/10-15 and 116C/9,16) (1:100,000 scale), Yukon Geological Survey, Open File 2014-15.
49. Liu, C., Wang, Z., Raub, T., **Macdonald, F.A.**, and Evans, D.A.D., 2014. Neoproterozoic cap dolostone deposition in a stratified glacial meltwater plume, *Earth & Planetary Science Letters*, 404: 22-32.
48. \*Strauss, J.V., \*Rooney, A.D., **Macdonald, F.A.**, Brandon, A.D., and Knoll, A.H., 2014. 740 Ma vase-shaped microfossils from Yukon, Canada: Implications for Neoproterozoic chronology and biostratigraphy, *Geology*, 42 (8): 659-662.
47. **Macdonald, F.A.**, Ryan-Davis, J., Coish, R.A., Crowley, J.C., and Karabinos, P., 2014. A newly identified Gondwanan terrane in the Northern Appalachian Mountains: Implications for the Taconic orogeny and closure of the Iapetus Ocean, *Geology*, 42 (6): 539-542.
46. **Macdonald, F.A.**, Pruss, S.B., and \*Strauss, J.V., 2014. Trace fossils with spreite from the late Ediacaran Nama Group, Namibia: Complex feeding patterns five million years before the Ediacaran-Cambrian boundary, *Journal of Paleontology*, 88 (2): 299-308.
45. Kunzmann, M., Halverson, G.P., **Macdonald, F.A.**, Hodgskiss, M., Sansjofre, P.D., Schumann, D., and Rainbird, R.H., 2014. The early Neoproterozoic Chandindu Formation of the Fifteenmile Group in the Ogilvie Mountains. In: *Yukon Exploration Geology 2014*, MacFarlane, K.E., Nordling, M.G. and Sack, P.J., Editors, Yukon Geological Survey, p. 93-107.
44. \*Rooney, A.D., **Macdonald, F.A.**, Dudás, F.Ö., Hallmann, C., \*Strauss, J.V., and 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 (1): 51-56.
- 2013
43. \*Bold, U., **Macdonald, F.A.**, \*Smith, E.F., Crowley, J.L., and Minjin, C., 2013, Elevating the Neoproterozoic Tsagaan-Olom Formation to a Group, *Mongolian Geoscientist*, 39 (5): 1-6.
42. Cox, G. M., Halverson, G. P., Minarik, W. G., Le Heron, D. P., **Macdonald, F. A.**, Bellefroid, E. J., and \*Strauss, J. V., 2013. Neoproterozoic Iron Formation: An evaluation of its temporal, environmental and tectonic significance, *Chemical Geology*, 362: 232-249.

41. Bosak, T., Mariotti, G., **Macdonald, F.A.**, Perron, J.T., and Pruss, S.B., 2013. Microbial sedimentology of stromatolites in Neoproterozoic cap carbonates, in: *Ecosystems Paleobiology and Geobiology, Paleontological Special Papers, v. 19*, Bush, A.M, Pruss, S.B., Payne, J.L., Editors, The Paleontological Society, p. 1-25.
40. \*Strauss, J.V., **Macdonald, F.A.**, Taylor, J.F., Repetski, J.E., and McClelland, W.C., 2013. Laurentian origin for the North Slope of Alaska: Implications for the tectonic evolution of the Arctic, *Lithosphere*, 5 (5): 477-482.
39. Johnston, D.T., Poulton, S.W., Tosca, N.J., O'Brien, T.O., Halverson, G.P., Schrag, D.P., and **Macdonald, F.A.**, 2013. Searching for an oxygenation event in the fossiliferous Ediacaran of northwestern Canada, *Chemical Geology*, 362: 273-286.
38. **Macdonald, F.A.**, \*Strauss, J.V., Sperling, E., Halverson, G.P., Narbonne, G.M., Johnston, D.T., Kunzmann, M., Schrag, D.P., and Higgins, J.A., 2013. The stratigraphic relationship between the Shuram carbon isotope excursion, the oxygenation of Neoproterozoic oceans, and the first appearance of the Ediacara biota and bilaterian trace fossils in northwestern Canada, *Chemical Geology*, 362: 250-272.
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11. **Macdonald, F.A.**, Cohen, P.A., Dudás, F.Ö., and Schrag, D.P., 2010. Early Neoproterozoic scale microfossils in the Lower Tindir Group of Alaska and the Yukon Territory, *Geology*, 38: 43-146.

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10. **Macdonald, F.A.**, Jones, D.S., and Schrag, D.P., 2009. Stratigraphic and tectonic implications of a new glacial diamictite-cap carbonate couplet in southwestern Mongolia. *Geology*, 37: 123-126.
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8. **Macdonald, F.A.**, Neoproterozoic stratigraphy of Arctic Alaska and Mongolia, Ph.D. Thesis, Department of Earth and Planetary Sciences, Harvard University, 2009: Cambridge, MA. p. 179.

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7. **Macdonald, F.A.**, Mitchell, K., and Stewart, A.J., 2005. Amelia Creek: A Proterozoic impact structure in the Davenport Ranges, Northern Territory. *Australian Journal of Earth Sciences*, 52: 631-640.
6. **Macdonald, F.A.**, Wingate, M.T.D., and Mitchell, K., 2005. Geology and age of the Glikson impact structure, Western Australia. *Australian Journal of Earth Sciences*, 52: 641-651.
5. Milton, D.L. and **Macdonald, F.A.**, 2005. Goat Paddock, Western Australia: An impact crater near the simple-complex transition. *Australian Journal of Earth Sciences*, 52: 691-698.
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1. Weiss, B.P., Kirschvink, J.L., Baudenbacher, F.J., Vali, H., Peters, N.T., **Macdonald, F.A.**, and Wikswa, J.P., 2000. A low temperature transfer of ALH84001 from Mars to Earth, *Science*, 290: 791-795.

## Teaching

### *Undergraduate*

- EARTH 104a: Field Methods, Fall 2019
- EARTH 109: California Geology, Spring 2019, Fall 2020
- EPS 21: Dynamic Earth—Geology and Tectonics through time, Fall 2011, 2012, 2013, 2015
- EPS 74/174: Field Geology, January 2011, 2012, 2013, 2015, 2017
- EPS 182: Stratigraphy and Sedimentology, Spring 2010, 2012, 2013, 2015, 2017
- EPS 189: Analytical and Field Methods in Geobiology, Spring 2011

### *Graduate*

- EARTH 201B: Proposals and Presentations, Winter 2019, 2020, 2021
- EPS 274: Advanced Field Geology, January 2013, 2015, 2017
- EPS 282: Topics in Stratigraphy and Earth History, Fall 2010, 2014, 2016, 2018

### *Field Trips Led (associated with classes)*

- Death Valley, Nov 2019, EARTH 104a
- Death Valley-Sierras transect, May 2019, EARTH 109
- Spain, March 2017, EPS 182
- San Juan River, March 2015, EPS 182
- New England Appalachians, October 2011-15, EPS 21; September 2014, EPS 282r
- Newfoundland, September 2014, EPS 282r
- Mojave Desert, January 2012-2013, 2015, 2017, EPS 74/174/274
- Italy, March 2010, 2012, 2013, EPS 182
- Riverside Mountains, January 2011, EPS 74

## Synergistic Activities

### *Committee Service*

- University Committee for Information Technology, 2019-present
- University Committee of Faculty Grants, 2019-present
- EPS co-head tutor for undergraduate curriculum, 2014-2018
- EPS search committees, 2013-2018
- NSF Sedimentary Geology and Paleontology panel, 2013
- EPS Undergraduate Curriculum Committee, 2010-2018
- EPS Collections Committee, 2010-2018
- EPS Colloquium Committee, 2010-2015

### *Field Trips Led (independent of those associated with classes)*

- Death Valley, AGU & Neoproterozoic Stratigraphic Subcommittee, Dec 2014
- Death Valley, NASA MIT Astrobiology Node, Jan 2014, <https://vimeo.com/98359223>
- Hawaii, Harvard undergraduate field trip, Aug 2011

- Taconic Foreland, New York, Harvard graduate students, April 2011
- Maine, Harvard undergraduate Geoclub field trip, Oct 2005
- Northwest Australia, Caltech's Mike Scott field trip, Aug 2004
- Meteor Crater, AZ, Caltech Planetary Science students, May 2004

#### *Symposia and Sessions Organized*

- Assembling Laurentia: Neoproterozoic to Cambrian Rifting and Continental Margin Evolution during Breakup of Rodinia and Pannotia, GSA, 2020
- Evaluating tectonic and volcanic forcing of Earth's climate, AGU, 2017
- Integrating complementary records of Paleozoic orogenies in the Appalachians: Bridging the foreland and hinterland, NEGSA, 2016
- Neoproterozoic glaciations, uniting data and models, AGU, 2014
- The Ediacaran-Cambrian Ecosphere (R)evolution: Emerging records from Central and East Asia, GSA, 2014
- Paul Hoffman: A Life in Earth History and Tectonics, GSA, 2013
- A World in Transition: Geobiology of the Precambrian-Cambrian boundary, Harvard University, April 2008

#### *Exchanges*

- Exchange for Mongolian students to visit Harvard University, audit classes, and gain experience working in laboratories, 2007-2014

#### *Public Outreach*

- NOVA Climate Extremes, <https://www.pbs.org/wgbh/nova/video/polar-extremes/>
- Curation of Snowball Earth exhibit at the Harvard Museum of Natural History, 2018
- LIP of the month, February 2015, <http://www.largeigneousprovinces.org/>
- NASA MIT NAI, <https://vimeo.com/98359223>
- MIT Museum Soapbox lecture, 2014
- Harvard Museum of Natural History Lecture Series, 2013
- Curation of Arctic Geology and Walk Through Time exhibits at the Harvard Museum of Natural History, 2013, <http://vimeo.com/69910461>
- Harvard University Research Journal Lecture Series, 2010
- MIT BLOSSOMS, educational video on geologic time, 2010, <http://blossoms.mit.edu/video/geologic-time.html>

#### *Community Building*

- Co-organized GRIND: Geological Research through Integrated Neoproterozoic Drilling

#### *Invited Talks*

- 2019: Caltech, UC Riverside, UNLV, UC Davis, USC, Lehigh Hewitt Lecture, AGU
- 2018: UBC, UCSB
- 2017: Colorado, UCLA, Penn State, Princeton
- 2016: Harvard, Chicago, Geological Survey of Canada Logan Lecture, Iowa
- 2015: Washington, Bridgewater State, UNLV, AGU
- 2014: Wisconsin, MIT, UCSB, Stanford, GSA, AGU
- 2013: UC Berkeley
- 2012: Purdue, Proterozoic Symposium at St. Andrews, Durham, FERMOR at Geological Society of London, Boston University

- 2011: Iowa, Boston College, Chicago
- 2010: MIT, Yale, Connecticut, Rice, Vermont
- 2009: Yukon Geoscience Forum, Caltech, Boise State
- 2008: Harvard, McGill, MIT
- 2007: Yale Geobiology Symposium

## Advising

### *Post-Doctoral Fellows*

- Alan Rooney: *Cryogenian Osmium Isotope Stratigraphy*, 2012-2016 (Assistant Professor at Yale, 2017-present).
- Ryan Petterson: *Overlapping Unconformities in the Kingston Peak Formation*, 2010-2011 (Lecturer at Stanford).

### *Doctoral Theses*

- Sam LoBianco: 2019-present.
- Adrian Tasistro-Hart: 2019-present.
- Eliel Anttila: 2017-present.
- Judy Pu: 2016-present.
- Eben Hodgkin: *Neoproterozoic to Paleozoic tectonostratigraphic evolution of the Arequipa Terrane, Peru*, 2014-present.
- Athena Eyster: *Inertial interchange true polar wander and paleomagnetism of Rodinia*, PhD 2017 (Crosby Postdoctoral Fellow at MIT, 2017-present).
- Uyanga Bold: *Neoproterozoic and Paleozoic geology of Mongolia*, PhD 2016 (Japanese Society for the Promotion of Science Postdoctoral Fellow, University of Tokyo, 2016-present).
- Emily Smith: *Constraints on global carbon cycling, basin formation, and early animal evolution during the Neoproterozoic and early Cambrian*, PhD 2015 (Assistant Professor at Johns Hopkins University, 2017-present).
- Justin Strauss: *Topics in Neoproterozoic and Paleozoic stratigraphy in the Northwestern Cordillera*, PhD 2015 (Assistant Professor at Dartmouth College, 2016-present).

### *Undergraduate Theses*

- Max Britt: *The Real McCoy: Correlation of Ediacaran strata in Nevada* (PhD candidate at Arizona)
- Sam LoBianco: *Mesozoic tectonostratigraphic evolution of Peru*, 2018 (MS candidate at UCSB).
- Rachel Hampton: *Neoproterozoic tectonic evolution of Avalon*, 2017 (PhD candidate at Oregon).
- Emma Mackie: *Neoproterozoic rifting and glaciation in Eastern Washington*, 2017 (PhD candidate at Stanford).
- Judy Pu (MIT): *Geochronology of the Trinity Formation and the Gaskiers Glaciation*, 2016 (PhD candidate at UCSB).
- Dan Skarsinski: *Os isotope constraints on the Ordovician weathering and climate change*, 2016 (lab tech at Yale).
- Sarah Moon: *Age and setting of the Mesoproterozoic Crystal Spring Formation, Death Valley*, 2015 (consultant and McKinsey).

- Lyle Nelson: *Epsilon Nd composition of shales in Arctic Alaska reflect the influx of Caledonian detritus*, 2015 (Awarded Hoopes Prize, PhD candidate at Johns Hopkins).
- Tanya Petach: *Sr isotope evolution of Early Cambrian seawater in Mongolia*, 2015 (PhD candidate at Colorado).
- Joe Schaffer (co-advisee with Dave Johnston and Charlie Langmuir): *Is the Utica Shale a Valid Estimator of Global Paleoredox Conditions?* 2015.
- William Thompson-Butler: *A Geochemical Assessment of the Utica Shale in the Mohawk Valley of New York: Evidence for Diachronous Deposition and Ramifications for Potential Hydrocarbon Systems*, 2013 (Stanford PhD).
- Esther Kennedy (co-advisee with Dave Johnston): *Sulfur Isotope Chemostratigraphy of the SPICE in Alaska Northwestern Canada*, 2013.
- Felix Waechter: *Chemostratigraphy of the Virgin Springs Limestone: Implications for stratigraphic correlation in Death Valley, CA*, 2012 (MSc candidate at Imperial College).
- Dylan Trotsuk: *The tectonic and climatic context of Neoproterozoic stratiform mineralization on the western margin of Laurentia*, 2012.
- Trevor Petach: *Neoproterozoic oxygenation seen through minor element analyses*, 2010 (Stanford PhD).