Adam C. Maloof

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Education

1998-2004	Harvard University (Cambridge, MA) Ph.D., Earth and Planetary Sciences, Advisor: Paul F. Hoffman Thesis: Three non-uniformitarian changes that shaped the Neoproterozoic Earth
1994-1998	Carleton College (Northfield, MN) B.A., Geology, Junior year at the University Courses on Svalbard (Spitsbergen, Norway)

Professional Experience

2006 →	Assistant Professor of Geosciences, Princeton University
2004-2006	Agouron Postdoctoral Fellow, Massachusetts Institute of Technology
1999 & 2002	Teaching Fellow, Harvard University, two *Distinction in Teaching* awards

Research Interests

My interests center on the relationship between ancient life, climate and geography. The Neoproterozoic Era (900-540 million years ago (Ma)) is a particularly important interval in Earth history because, at the same time that Earth endured radical drift of the continents and a glaciation that sealed the global ocean in ice for millions of years, animals first evolved and quickly became large and diverse. I choose precipitated sedimentary rocks such as limestone as my history books because a single outcrop of limestone may contain physical evidence for the energetics of winds, waves and currents, biological imprints of ecology and evolution, chemical records of the climate system, and magnetic evidence of latitude and geography. My group conducts extended field campaigns to map these physical and chemical records into a three-dimensional landscape of ancient environments. My goal is to tell rich stories of Earth history that shed light on the origin of animals and the evolution of Earth's climate.

Active Grants

NSF EAR-0842946, Sedimentary Geology and Paleobiology: Fluctuating tidewater glaciers, chemical weathering and survival of reef-dwelling organisms: the Marinoan snowball, South Australia (2009-2011).

NSF EAR-0638660, Sedimentary Geology and Paleobiology: Collaborative Research: Calibrating Rates and Duration for Isotopic Variability During the Early Cambrian Radiation of Animals, Anti-Atlas Mountains, Morocco (2007-2010).

NSF EAR-0514657, Sedimentary Geology and Paleobiology: An integrated paleomagnetic, isotopic, and stratigraphic test of the inertial interchange true polar wander hypothesis, Bitter Springs Stage, Australia (2006-2010).

Princeton University: Earth's Changing Surface & Climate. Award to fund the FRS-145(9) Freshman Seminar field trip for 3 years (2007-2009).

2008	Anti-Atlas Mnts, Morocco [4 weeks], Team leader A.C. Maloof *U-Pb ash calibrated multi-proxy record of Early Cambrian global change*
2008	South China [2 weeks], Team leader S.A. Bowring & A.C. Maloof *U-Pb ash calibrated multi-proxy record of Early Cambrian global change*
2007 - 2009	South Australia [16 weeks], Team leader A.C. Maloof *Testing the snowball Earth model for Marinoan glaciation 635 Ma*
2006 - 2008	Central Australia [18 weeks], Team leader A.C. Maloof *Testing the true polar wander hypothesis for global change 800 Ma*
2007	Okanagan Highlands, B.C. Canada [2 weeks], Team leaders A.C. Maloof and R.E. Kopp *Early Eocene climate sensitivity recorded in varved lacustrine sediments*
2005 & 2006	Lonar, India [6 weeks], Team leaders A.C. Maloof, S.T. Stewart-Mukhopadhyay, B.P. Weiss *Bolide impact in basalt as an analog for surface processes on Mars*
2005	Ontario, Canada [2 weeks], Team leaders A.C. Maloof *Non-dipole geomagnetic fields recorded in 1.1 Ga large igneous provinces*
2005	Andros Island, Bahamas [6 weeks], Team leader A.C. Maloof *The origin of magnetism and parasequence architecture in platformal carbonates*
2004	Fjordland, East Greenland [4 weeks], Team leaders A.C. Maloof and P.F. Hoffman *Sedimentation under sea ice during a Neoproterozoic glaciation*
2004	Victoria Island, Arctic Canada [4 weeks], Team leader A.C. Maloof *Coincident paleomagnetic, carbon-isotopic and sea level excursions in 800 Ma rocks*
2001 & 2003	Mackenzie Mountains, Canada [8 weeks], Team leaders P.F. Hoffman and A.C. Maloof *Testing the snowball Earth hypothesis in the Windemere Supergroup*
1999-2002	East Svalbard, Norway [13 weeks], Team leaders A.C. Maloof and G.P. Halverson *Sequence/chemo/magneto-stratigraphy through 250 myr of the Neoproterozoic era*
2000-2002	Anti-Atlas Mountains, Morocco [23 weeks], Solo A.C. Maloof *Global carbon cycling during the Latest Neoproterozoic and Early Cambrian*
2002	W. Newfoundland, Canada [3 weeks], Team leader J. Bedard *Early Ordovician oceanic crust and the oxygen-isotopic evolution of seawater*
2001	Southern Namibia [3 weeks], Team leader A.C. Maloof *Neoproterozoic glaciation of a continental slope*
2000	Adrar, Mauritania [2 weeks], Team leaders P.F. Hoffman and A.C. Maloof *A terrestrial Neoproterozoic glacial deposit and its cap carbonate*
2000	Talkeetna Arc, Alaska [2 weeks], Team leader L.M. Mehl *Structural and compositional mapping of the upper mantle beneath an accreted arc*
1999	Paradox Basin, SE Utah [2 weeks], Team leader D.L. Barbeau *Evolution of a Pennsylvanian-Permian flexural basin beside a basement cored uplift*
1998	E. Newfoundland, Canada [2 weeks], Team leaders A.C. Maloof and G.P. Halverson *Sedimentologic and detrital zircon study of the Late Neoproterozoic Gaskiers Fm diamictite*
1998	E. Greenland [8 weeks], Team leaders A. Andresen and E.H. Hartz *Structure of the Fjord Region Detachment and deposition of Devonian old red sandstone*
1998	Northern Norway [2 weeks], Team leader Jack Kohler *Basal sliding and subglacial hydrology of Svartisen glacier*
1998	Anti-Atlas Mountains, Morocco [4 weeks], Team leader J.L. Kirschvink *Magnetostratigraphy of Early Cambrian carbonates and lava flows*
1997	Northern Namibia [10 weeks], Team leader P.F. Hoffman *Subject of undergraduate thesis: Otavi Group stratigraphy and Pan African deformation*
1997	W. Spitsbergen, Norway [3 weeks], Team leader A.C. Maloof *Genesis and time-evolution of an arctic valley pingo field*

Swanson-Hysell, N.L, **Maloof, A.C.**, B.P. Weiss and D.A.D. Evans 2009, No asymmetric geomagnetic reversals recorded by 1.1-billion-year-old Keweenawan basalts, *Nature Geoscience*, DOI: 10.1038/NGEO622.

Louzada, K.L., Weiss, B.P., **Maloof, A.C.**, Swanson-Hysell, N. and Soule, S.A. 2008, Paleomagnetism of Lonar Impact Crater, India, *Earth and Planetary Science Letters*, 275 pp. 308-319.

Halverson, G.P., Dudas, F.O., **Maloof, A.C.** and Bowring, S.A. 2007, Evolution of the $^{87}Sr/^{86}Sr$ composition of Neoproterozoic seawater; *Palaeogeography, Palaeoclimatology, Palaeoecology*, 256 (3-4) pp. 103-129.

Maloof, A.C., Kopp, R.E., Grotzinger, J.P., Fike, D., Bosak, T., Vali, H., Weiss, B.P. and Kirschvink, J.L. 2007,Sedimentary iron cycling and the origin and preservation of magnetization in platform carbonate muds, Andros Island, Bahamas; *EPSL*, 259 pp. 581-598.

Halverson, G.P., **Maloof, A.C.**, Schrag, D.P., Dudas, F.Ö. and Hurtgen, M.T. 2007, Stratigraphy and geochemistry of a ca 800 Ma negative carbon isotope interval in northeastern Svalbard; *Chemical Geology*, 237 pp. 5-27.

Kopp, R.E., Weiss, B.P., **Maloof, A.C.**, Vali, H., Nash, C.Z., and Kirschvink, J.L. 2006, Chains, clumps, and strings: Magnetofossil taphonomy with ferromagnetic resonance spectroscopy; *Earth and Planetary Science Letters*, 247 pp. 10-25.

Maloof, A.C., Halverson, G.P., Kirschvink, J.L., Schrag, D.P., Weiss, B.P., and Hoffman, P.F. 2006, Combined paleomagnetic, isotopic and stratigraphic evidence for true polar wander from the Neoproterozoic Akademikerbreen Group, Svalbard; *Geological Society of America Bulletin*, 118 pp. 1099-1124.

Halverson, G.P., Hoffman, P.F., Schrag, D.P., **Maloof, A.C.**, and Rice, A.H.N. 2005, Toward a Neoproterozoic composite carbon-isotope record; Geological Society of America Bulletin 117 pp. 1181-1207.

Maloof, A.C., Schrag, D.P., Crowley, J.L., and Bowring, S.A. 2005, An expanded record of Early Cambrian carbon cycling from the Anti-Atlas Margin, Morocco; *Canadian Journal of Earth Sciences*, 42 pp. 2195-2216.

Halverson, G.P., **Maloof, A.C.**, Hoffman, P.F. 2004, The Marinoan glaciation (Neoproterozoic) in northeast Svalbard, *Basin Research* 16 pp. 297-324.

Hoffman, P.F. and **Maloof, A.C.** 2003, Comment on: A complex microbiota from snowball Earth times: Microfossils from the Neoproterozoic Kingston Peak Formation, Death Valley, USA, by Corsetti, F.A., Awramik, S.M., and Pierce, D., *Proceedings of the National Academy of Sciences* 100 pp. 4399-4404.

Maloof, A.C., Kellogg, J.B., and Anders, A.M. 2002, Neoproterozoic sand wedges: crack formation in frozen soils under diurnal forcing during a snowball Earth; *Earth and Planetary Science Letters* 204 pp. 1-15.

Maloof, A.C. 2000, Superposed folding at the junction of the inland and coastal belts, Damaran orogen, NW Namibia; *Communications of the Geological Survey of Namibia*, Henno Martin Commemorative Volume 12 pp. 89-98.

Hoffman, P.F. and **Maloof, A.C.** 1999, The Snowball theory still holds water; *Nature* 397 p. 384.

Journal Articles in press or in review

Maloof, A.C., Stewart, S.T., Weiss, B.P., Soule, S.A., Swanson-Hysell, N., Garrick-Bethell, I. Louzada, K.L. and Poussart, Pascale M. 2009, The geology of Lonar Crater, *Geological Society of America Bulletin*, *in press.*

Kopp, R.E., Simons, F.J., Mitrovica, J.X., **Maloof, A.C.**, and M. Oppenheimer, Global and local sea level during the Last Interglacial: A probabalistic assessment, *Nature*, *in press.*

Kopp, R.E., Schumann, D., Raub, T.D., Powars, D.S., Godfrey, L.V., Swanson-Hysell, N.L., **Maloof, A.C.**, Vali, H. 2009, An Appalachian Amazon?: Magnetofossil evidence for the development of a tropical river-like system in the mid-Atlantic United States during the Paleocene-Eocene Thermal Maximum, *Paleoceanography*, *in press.*

Maloof, A.C., Bowring, S.A., Ramezani, J., Fike, D.A., Porter, S.M., Mazouad, M. 2009, Timing and duration of the Nemakit-Daldyn—Tommotian boundary δ^{13}C shift, Morocco, *Nature Geoscience*, *in review.*

Journal Articles for Imminent Submission

Maloof, A.C., Porter, S.M. and Bowring, S.A. (2009), An absolute timeline for the radiation of animals across the Nemakit-Daldyn→Tommotian transition in Morocco, Siberia, Mongolia and China, *in prep. for Science.*.

Maloof, A.C. and Grotzinger, J.P. 2009, Migration rates of tidal channels on a Modern carbonate platform and the origin of stratigraphic parasequences, Triple Goose Creek, Andros Island, Bahamas, *in prep. for Journal of Sedimentary Research.*

Swanson-Hysell, N.L, **Maloof, A.C.**, Halverson, G.P. and Hurtgen, M.T., Covariation of $\delta^{13}C_{carb}$ and $\delta^{13}C_{org}$ across the Bitter Springs Stage - No pre-Sturtian Rothman ocean, *in prep for Nature Geoscience.*

Maloof, A.C., Dudas, F.Ö. and Bowring, S.A. (2010), Rapid $^{87}Sr/^{86}Sr$ decrease between the late Ediacaran high and Early Cambrian low leading δ^{13}C volatility in the Nemakit-Daldyn, ∼525 Ma, Morocco, *in prep. for Geology.*

Rose, C.V. and **Maloof, A.C.** 2009, Diachronous deposition of the Marinoan cap-carbonate in South Australia and the magnitude of Neoproterozoic glacioeustasy, *in prep for EPSL.*

Swanson-Hysell, N.L and **Maloof, A.C.** 2010, Determining relative paleolongitude between Australia and Laurentia from a record of early Neoproterozoic true polar wander, *in prep. for Science.*

Memberships

Geological Society of America (GSA)
American Geophysical Union (AGU)
American Association of Petroleum Geologists (AAPG)
Society for Sedimentary Geology (SEPM)
Sigma Xi

FRS 145(9) *Earth's Changing Surface & Climate [Fall '06, '07, '08 & '0, with F.J. Simons]:* How does Earth's surface evolve in response to internal (e.g., tectonic), external (e.g., extraterrestrial), and anthropogenic (e.g., engineering and resource use) forcing? This course is composed of weekly 3-hour seminars on the size and shape of Earth in our solar system, topography, gravity, tectonics, climate and Earth history designed to provide a basic understanding of the processes that shape Earth's surface. We emphasize data collection and analysis using free internet data sources and software such as MatLab and ARCGIS. The centerpiece of the course is a 7 day field trip to the Mono-Inyo Crater system on the south shore of Mono Lake, where students combine geologic observations with quantitative measurements of topography, gravity, and weather to tell a story of Earth surface change in the region. The course culminates in group presentations and written reports that combine original field observations, internet data sources and modern software. Field Trips: Sierra Nevada, Californa [7 days], New York [2 days], Campus [2 afternoons]

GEO 450 *Earth Surface Processes [Spring '07 & '09]:* This course presents a treatment of the physical processes that shape Earth's surface, such as solar radiation, the flow of water (vapor, liquid, and solid) under the influence of gravitational and capillary forces, and deformation of the solid Earth. In particular, the generation, transport, and preservation of sediment in response to these processes is studied in order to better read stories of Earth history in the geologic record and to better understand processes involved in modern and ancient environmental change. Field Trips: Bahamas or New Mexico [8 days], Kentucky [4 days], New York [4 days].

GEO 506 *Fundamentals of Geosciences II - The Evolution of Earth's Orbit [February 18-29, 2008 & April 20 - May 01, 2009]:* This two week module examines the evolution of Earths orbit over the last 4.5 Gy. Topics include the length of day, Earth-Moon distance, modulation of the precession parameters and the relationship between Earths orbit and its radiative balance.

GEO 538 *Paleoclimatology [Spring '07, with M. Bender]:* The first section of the class involves a series of lectures discussing the physical processes that govern Earths climate; numerical models, in which these processes are encoded to simulate climate change; and key properties of sediments from which the nature of past climates can be deduced by reading the geological record. The second section of the class investigates the major events of Earths climate history, from the faint early sun paradox to global change. In this section students will be asked to present 1 paper from the literature each week. This course requires a 2000 word paper on a topic of the students choice. The third part of the course will be oral presentations of these papers.