

Gordon R. M. Bromley
GEOGRAPHY, PALAEOENVIRONMENTAL RESEARCH UNIT
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Appointments

UNIVERSITY OF GALWAY

2017– Lecturer Above the Bar, Physical Geography & Climate

UNIVERSITY OF MAINE

2017– Adjunct Research Professor

2014–2017 Research Assistant Professor

Professor/preceptor, Honors College

2012–2014 Postdoctoral Research Associate

LAMONT-DOHERTY EARTH OBSERVATORY OF COLUMBIA UNIVERSITY, NEW YORK

2011–2012 Lamont Doherty Postdoctoral Fellowship

Education

UNIVERSITY OF MAINE

2010 Ph.D., Earth Sciences

Thesis: *A glacial-geologic approach to investigating climate and ice fluctuations in the Southern Hemisphere.*

2005 M.Sc., Quaternary and Climate Studies

UNIVERSITY OF ST ANDREWS

2003 B.Sc. (Hons.), Geography (2:1)

Honours and Awards

2020 Dean's Award for climate science-based public art exhibition, NUI Galway.

2017 Marie Skłodowska-Curie Actions Seal of Excellence

2011 Outstanding Ph.D. Award, College of Nat. Sci., Forestry & Ag. (U. Maine)

2006 Geologic Society of America Research Grant Outstanding Mention

2006 Elected to Sigma Xi Associate Membership

2003 Mathieson Prize for Excellence in Geography, University of St Andrews

Selected Publications

[ORCID: 0000-0002-5671-7065]

Bromley, G., et al., 2023. Lateglacial shifts in seasonality reconcile conflicting North Atlantic temperature signals. *Journal of Geophysical Research. Earth Surface*, 128(1).

Rademaker, K., Glascock, M.D., Reid, D.A., Zuñiga, E., **Bromley, G.R.M.**, 2022. Comprehensive mapping and compositional analysis of the Alca obsidian source, Peru. *Quaternary International* 619, 56-71.

Holmes, D., Babila, T., Ninnemann, U., **Bromley, G.**, et al., 2022. Reorganization of Atlantic Waters at sub-polar latitudes linked to deep-water overflow in both glacial and interglacial climate states. *Climate of the Past* 18, 989-1009.

Foreman, A., **Bromley, G.**, et al., 2022. A ¹⁰Be-dated record of glacial retreat in Connemara, Ireland, following the Last Glacial Maximum and implications for regional climate. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 592, p.110901. <https://doi.org/10.1016/j.palaeo.2022.110901>

Balter-Kennedy, A., **Bromley, G.**, et al., 2020. A 14.5-million-year record of East Antarctic Ice Sheet fluctuations from the central Transantarctic Mountains, constrained with cosmogenic ³He, ¹⁰Be, ²¹Ne, and ²⁶Al. *The Cryosphere* 14, 2647-2672.

- Bromley, G.**, et al., 2020 The Berlin moraine complex of northern New Hampshire: Age and implications for interstadial ice sheet dynamics and climate. *Quaternary Research* 1-14. doi:10.1017/qua.2019.66.
- Bromley, G.**, et al., 2019. *In situ* cosmogenic ^3He and ^{36}Cl and radiocarbon dating of volcanic deposits refine the Pleistocene and Holocene eruption chronology of SW Peru. *Bull. Volcanol.* 81: 64.
- Hall, B., Lowell, T., **Bromley, G.**, et al., 2019. Holocene glacier fluctuations on the northern flank of Cordillera Darwin, southernmost South America. *Quaternary Science Reviews* 222, 105904.
- Putnam, A., **Bromley, G.**, et al., 2019. An *in situ* ^{10}Be production-rate calibration from a ^{14}C -dated late-glacial moraine belt in Rannoch Moor, central Scottish Highlands. *Quat. Geochr.* 50, 109–125.
- Farnsworth, L., Kelly, M., **Bromley, G.**, et al., 2018. Holocene History of the Greenland Ice Sheet Margin in Northern Nunatarssuaq, Northwest Greenland. *Arktos* 4, 10.
- Bromley, G.**, et al., 2018. Interstadial rise and Younger Dryas demise of Scotland's last ice fields. *Palaeoceanography & Paleoclimatology* 33, 412–429.
- Hall, B.L., Borns, H.W., **Bromley, G.R.M.**, et al., 2017. Age of the Pineo Ridge System: Implications for behavior of the Laurentide Ice Sheet in eastern Maine, U.S.A., during the last deglaciation. *Quat. Sci. Rev.* 169, 344–356.
- Hall, B.L., Denton, G.H., Lowell, T.V., **Bromley, G.R.M.**, et al., 2017. Retreat of the Cordillera Darwin icefield during the Termination I. *Cuadernos de investigación geográfica/Geographical Res. Lett* 43, 751–766.
- Spector, P., Stone, J., Cowdery, S.G., Hall, B., Conway, H., **Bromley, G.**, 2017. Rapid early-Holocene deglaciation in the Ross Sea, Antarctica. *Geophysical Research Letters* 44, 7817–7825.
- Bromley, G.R.M.**, et al., 2016. Comment on ‘Was Scotland deglaciated during the Younger Dryas?’ by Small and Fabel (2016). *Quat. Sci. Rev.* 152, 203–206.
- Bromley, G.R.M.**, et al., 2016. A cosmogenic ^{10}Be chronology for the local last glacial maximum and termination in the Cordillera Oriental, southern Peruvian Andes: Implications for the tropical role in global climate. *Quat. Sci. Rev.* 148, 54–67.
- Rademaker, K., Hodgins, G., Moore, K., Zarrillo, S., Miller, C., **Bromley, G.R.**, et al. 2016. Cuncaicha Rockshelter, a Key Site for Understanding Colonization of the High Andes: Reply to Capriles et al. *Current Anthropology* 57, 101–103.
- Bromley, G.R.M.**, et al., 2015. Late glacial fluctuations of the Laurentide Ice Sheet in the White Mountains of Maine and New Hampshire, U.S.A. *Quat. Res.* 83, 522-530.
- Rademaker, K., Hodgins, G., Moore, K., Zarrillo, S., Miller, C., **Bromley, G.R.M.**, et al., 2014. Paleoindian settlement of the high-altitude Peruvian Andes. *Science* 346, 466-469.
- Bromley, G.R.M.**, et al., 2014. Pyroxene separation by HF leaching and its impact on helium surface-exposure dating. *Quaternary Geochronology* 23, 1-8.
- Bromley, G.R.M.**, et al., 2014. Younger Dryas Deglaciation Of Scotland Driven By Warming Summers. *PNAS* 111, 6215-6219.
- Rademaker, K., **Bromley G.R.M.**, Sandweiss, D.H., 2013. Peru Archaeological Radiocarbon Database, 13,000-7000 ^{14}C B.P. *Quaternary International* 301, 34-45.
- Hall, B.L., Porter, C.T., Denton, G.H., Lowell, T.V., **Bromley, G.R.M.**, 2013. Extensive recession of Cordillera Darwin glaciers in southernmost South America during Heinrich Stadial 1. *Quat. Sci. Rev.* 62, 49-55.
- Bromley, G.R.M.**, et al., 2012. Late Pleistocene evolution of Scott Glacier, southern Transantarctic Mountains: Implications for the Antarctic contribution to deglacial sea level. *Quat. Sci. Rev.* 50, 1-13.
- Rademaker, K., Reid, D.A., **Bromley, G.R.M.**, 2012. Connecting the Dots: Least-Cost Analysis, Paleogeography, and the Search for Palaeoindian Sites in Southern Highland Peru. In White & Evans (eds.) *Least Cost Analysis of Social Landscapes: Archaeological Case Studies*, University of Utah.
- Bromley, G.R.M.**, et al., 2011. Late Pleistocene snowline fluctuations at Nevado Coropuna (15S), southern Peruvian Andes. *J. Quat. Sci.* 26, 305-317.
- Bromley, G.R.M.**, et al., 2011. Glacier fluctuations in the southern Peruvian Andes during the late-glacial period, constrained with cosmogenic ^3He . *J. Quat. Sci.* 26, 37-46.

- Bromley, G.R.M.**, et al., 2010. Late Cenozoic deposits at Reedy Glacier, Transantarctic Mountains: implications for former thickness of the West Antarctic Ice Sheet: *Quat. Sci. Rev.* 29, 384-398.
- Todd, C.E., Stone, J.O., Conway, H., Hall, B.L., **Bromley, G.R.M.**, 2010. Late-Quaternary evolution of Reedy Glacier. *Quaternary Science Reviews* 29, 1328-1341.
- Bromley, G.R.M.**, et al., 2009. Relative timing of last glacial maximum and late glacial events in the tropical Andes. *Quaternary Science Reviews* 28, 2514-2526.

Selected Grants Awarded

- 2022 – ‘Geologic Perspectives on Abrupt Climate Change (GeoPAC²): Strengthening Ireland’s capacity for projecting future change’. PI **G. Bromley**, SFI Frontiers for the Future award.
- 2022 – ‘A multi-proxy geology approach to resolving critical uncertainties in Irish cosmogenic nuclide geochronology’. GSI Short Call programme.
- 2022 – ‘A cosmogenic-nuclide approach to quantifying the drivers of rocky coastline erosion under changing climate and sea-level conditions.’ PI **G. Bromley**; iCRAG PhD Call.
- 2022 – ‘The Irish Cosmogenic Nuclide Facility (ICNF): Growing Ireland’s capacity for cutting-edge cosmogenic nuclide geochronology.’ PI **G. Bromley**; GSI Equipment Call programme.
- 2021 - Europlanet Transnational Access Research Award, European Commission. PI **G. Bromley**.
- 2020 – ‘Quantifying Ireland’s Dust Bowl: An interdisciplinary assessment of potential loess genesis, deposition, and dynamics in the Burren.’ PI **G. Bromley**; GSI Short Call programme.
- 2020 – ‘Abrupt Climate Change in Ireland: Redefining our climate future through a lens of high-resolution glacial reconstruction.’ PI Margaret Jackson, Co-PI **G. Bromley**; GSI Short Call programme.
- 2019 – ‘CoNTESTA: A geologic approach to resolving critical uncertainties in the impact of geomagnetic flux on *in situ* cosmogenic nuclide production’. Applicant: M. Jackson, written with PI: **G. Bromley**; Marie Skłodowska-Curie Actions Individual Fellowships programme.
- 2018 – Franklin Research Grant: PI **G. Bromley**; American Philosophical Society.
- 2018 – ‘Testing the age and origin of the Chivay subglacial labyrinth, Peru.’ PI **G. Bromley**; British Society for Geomorphology.
- 2016 – ‘Resolving the impact of so-called “Heinrich Stadial 1” on the terrestrial cryosphere of the North Atlantic region.’ PI **G. Bromley**; Comer Family Foundation grant.
- 2016 – ‘Blowing Hot or Cold? Resolving the terrestrial impact of North Atlantic stadials.’ PI **G. Bromley**; National Geographic/WAITT Grants Program.
- 2016 – ‘Research Experiences for Undergraduates (REU) Supplement.’ PI and student thesis advisor: **G. Bromley**; U.S. National Science Foundation (PLR).
- 2015 – ‘Collaborative Research: Potential direct geologic constraints on ice-sheet thickness in the central Transantarctic Mountains during the Pliocene warm period.’ PI **G. Bromley**; Co-PI: G. Balco; U.S. National Science Foundation (PLR).
- 2012 – ‘Constraining late Quaternary glacier and environmental change in the high Colombian páramo.’ PIs **G. Bromley** and D. Ruiz Carrascal; Institute for Latin American Studies (ILAS) grant.
- 2012 – ‘Building Peruvian capacity for monitoring and modeling the effects of climate change on the Coropuna Glacier and associated watersheds in Arequipa, Peru.’ Written by **G. Bromley** and K. Kraft (Assoc. Sust. Development, Arequipa). USAID-NSF (PEER program).
- 2010 – ‘Collaborative Research: Timing and structure of the last glacial maximum and termination in southern Peru: Implications for the role of the tropics in climate change.’ Conceived and written by **G. Bromley** (as Ph.D. student). PIs B. Hall, J. Schaefer, G. Winckler. U.S. NSF (P2C2).
- 2009 – ‘A Late Pleistocene chronology of glacier fluctuation in the tropical Andes.’ PI **G. Bromley**; Comer Science and Education Foundation Grant.

Invited Talks & Selected Abstracts

- Bromley, G., 2023.** (Invited talk) Glacial records of tropospheric temperature downwind of the North Atlantic Ocean. *Comer Climate Conference*, Soldiers Grove, Wisconsin.
- Bromley, G., Bunce, C., Stevens, T., Cabello, M., Nauton, M., Fitzsimmons, K. 2023.** Quantifying Ireland's Dust Bowl: An interdisciplinary assessment of loess genesis, deposition, and dynamics in the Burren. *EGU General Assembly*, Vienna.
- Bromley, G., 2019.** (Invited talk) Cryospheric collapse in the circum North Atlantic during stadial conditions. *Comer Climate Conference*, Soldiers Grove, Wisconsin.
- Bromley, G., 2019.** (Invited talk) A Beryllium-10 Production Rate Calibration from Rannoch Moor, Scotland, and Implications for the British Deglacial Record *Goldschmidt conference*, Barcelona.
- Bromley, G., Putnam, A., Hall, B., Barker, S., Rademaker, K., Balter, A. 2019.** Reconstructing the response of the British-Irish ice sheet to atmospheric temperature during Termination 1 (Poster). *EGU general Assembly*, Vienna.
- Bromley, G., 2019.** A high-resolution glacial perspective on abrupt climate change: New food for model simulations. PAGES 'PALEOLINK' workshop, Murcia.
- Bromley, G., 2018.** (Invited talk) A glacial perspective on the impact of North Atlantic stadials on terrestrial climate. CEREGE climate seminar, Aix-en-Provence, France.
- Bromley, G., 2018.** (Invited talk) A Case Study in Terrestrial Geochronology: Antarctica's ancient ice and the spectre of rising sea level. *Universidad Nacional de Colombia*, Medellin, Colombia.
- Bromley, G., 2018.** (Keynote) Scratching the surface of Antarctic landscape evolution with cosmogenic nuclides and a drill. iCRAG WGS2018, Trinity College, Dublin.
- Bromley, G., Putnam, A., Hall, B., Barker, S., Rademaker, K., Balter, A., Thomas, H. 2018.** A glacial perspective on the impact of North Atlantic stadials on terrestrial climate. *EGU General Assembly*, Vienna.
- Bromley, G., 2017.** (Invited talk) A glacier's-eye view of Heinrich stadials in the North Atlantic. *Comer Climate Conference*, Soldiers Grove, Wisconsin.
- Bromley, G., 2017.** (Invited talk) Exploring climatic impacts on the terrestrial cryosphere via cosmogenic nuclide dating. *iCRAG TP4.1 "Sediment Tracking" Meeting*, Galway.
- Bromley, G., 2017.** (Invited talk) Global climate change and the long arm of the tropics. *POGO-NUIG-AWI Ocean and Climate Scholars Programme*, Galway.
- Bromley, G., Schaefer, J., Hall, B., Rademaker, K., Todd, C., Winckler, G., 2016.** A glacier-derived record of tropical temperature during Termination 1 from the Cordillera Oriental, southern Perú. *Northeastern GSA Meeting*, Albany, New York.
- Bromley, G. 2014** (Invited talk). The tropics: Passive beast or driver of global climate? Colby College, Maine.
- Bromley, G., 2013.** (Invited talk) The Younger Dryas stadial in Scotland. *Comer Abrupt Climate Change Meeting*, Soldiers Grove, Wisconsin.
- Bromley, G., Hall, B., Thompson, W., Garcia, J., Kaplan, M., Schaefer, J., 2013.** Age of the Androscoggin Moraine, western Maine and eastern New Hampshire, from ¹⁰Be surface-exposure age dating. *Northeastern GSA Meeting*, Bretton Woods, New Hampshire.
- Bromley, G., 2012** (Invited talk). Reconstructing late-Quaternary tropical glacier change through surface-exposure dating. *Escuela de Ingeniería de Antioquia*, Medellín, Colombia.
- Bromley, G., Hall, B., Schaefer, J., Winckler, G., Rademaker, K., Todd, C., 2010.** A late-glacial advance in the arid tropical Andes: Cosmogenic He-3 data from Nevado Coropuna, Peru. *Geological Society of America Annual Meeting*, Denver, Colorado.
- Bromley, G., 2010.** (Invited talk) Exploring patterns of glaciation in the tropical Andes since the Last Glacial Maximum. *Comer Abrupt Climate Change Meeting*, Soldiers Grove, Wisconsin.

Fieldwork and Research Expeditions: Antarctica (2003-05, 2007-09, 2010, 2015-2016), Peruvian Andes (2005-2019), Colombian Andes (2012, 2018, 2023), Greenland (2014), Ireland (2018-23), Maine (2010-12), Patagonia (2007), Scotland (2010-22).

Recent Student and Postdoctoral supervision and mentorship

2023–Present PhD supervisor for SFI scholars, P. Rodriguez & A. Roignot (Geography, U. Galway).
2022–Present Postdoctoral mentor, IRC postdoctoral fellow, M. Nauton.
2022–Present PhD supervisor for iCrag scholar, G. Rink (Geography, U. Galway).
2021–Present PhD supervisor for IRC postgraduate scholar, C. Stewart (Geography, U. Galway).
2019–2020 Postdoctoral mentor, Marie Skłodowska-Curie Actions fellow, M. Jackson.
2019–Present PhD supervisor for Galway Foundation scholar, A. Foreman (Geography, U. Galway).
2018–19 MSc dissertation advisor for A. Foreman and R. Smith (Geography, U. Galway).
2017–18 MSc dissertation advisor for E. Bates and H. Goodnow (Geography, U. Galway).
2014–2018 Research MSc thesis advisor (funded by NSF OPP) for A. Balter (U. Maine).
2014–2018 PhD thesis committee member for P. Strand (U. Maine).
2014–2018 MSc thesis committee member for C. Dowey, Jill Pelto (U. Maine), and L. Farnsworth (Dartmouth College).

Directorship, Teaching, Discipline/Administrative, and Synergistic Activities

2023 Co-Chair of inaugural Mary Robinson Climate Conference, Ballina, 5–7 July.
2023 Co-leader, Geopark Academy field trip, Burren & Cliffs of Moher Geopark.
2022–2023 Panel member, Galway Youth Climate Assembly, Galway.
2022 Invited speaker, Meet the Scientist (<https://startcompetition.com/meet-the-scientist-november-18th/>)
2022 Stories of Change (<https://storiesofchange.ie/stories/galway/96-gordon-bromley-2>)
2021–present Lab manager, Irish Cosmogenic Nuclide Facility, University of Galway.
2020–present Committee member, IQUA (Irish Quaternary Association).
2019–2020 Vice President, **NARI** Network of Arctic Researchers in Ireland.
2019–present Module creator/leader, new Transition Year Sustainability curriculum for Irish secondary education institutions: <https://www.ecoed4all.com/>
2019–present Director of new BSc programme: *Geography & Geosystems* (U. Galway).
2020 Session co-chair: CL.1.12 ‘*Exploring spatiotemporal variability of abrupt climate change through the INTegration of Ice core, MARine and TERrestrial records (INTIMATE)*’ EGU General Assembly 2020, Vienna (online).
2019 Session chair: ‘*Are North Atlantic ‘Heinrich Stadials’ cooling or warming events...or both?*’ INQUA Congress 2019, Dublin.
2018–present Environmental Change cluster leader (Geography, U. Galway).
2018–present Director of Graduate Studies (Geography, U. Galway).
2018–present Research Ethics Committee member (U. Galway).
2018 Workshop Coordinator and Leader: ‘*Terrestrial Cosmogenic nuclides: New Geochronologic and Isotopic Techniques in Geomorphology, Tectonics, Glaciology & Palaeoclimatology*’; Provided for 30 international postgraduate geoscience students and hosted by Universidad Nacional, Medellin, Colombia, for my ongoing capacity-building and international collaboration initiative with Colombian and US colleagues.
2017–2021 Coordinated development of U. Galway’s new cosmogenic nuclide facility, including sourcing of heavy equipment (crusher, pulveriser, Frantz electromagnetic separator, ultrasonic: > €30K) and clean lab for geochemistry (under construction as of Jan 2021). This facility is part of the Geography’s Palaeoenvironmental Research Unit.

2019 Climate science outreach programme with Merlin College (Galway City) Transition Year secondary school students, inclusive of climate theory and hands-on field methods.

2007–present Mentoring undergraduate and graduate students in Antarctic, Andean, Greenlandic, and Irish field and lab (including cosmogenic nuclide lab) work, U. Maine & U. Galway.

2016–present Conducting Antarctic science outreach in Maine and Galway schools.

2013 Columbia Earth Institute educational outreach (<http://www.ldeo.columbia.edu/news-events/climate-peruvian-andes-early-humans-modern-challenges>).

2012 Coordinator for the Lamont Geochemistry Seminar series.

2011 Maintained research blog for Columbia Earth Institute 'State of the Planet' series (<http://blogs.ei.columbia.edu/2011/06/17/to-the-tip-of-the-andes/>).

2007–10 NSF-sponsored outreach, 'The Science of Climate Change: Journey to Reedy Glacier, Antarctica', Acadia National Park.

2019–present Lecturer: TI216 'Weather & Climate'; TI6134 (graduate level) 'Dynamics of Climate Change', U. Galway.

2018–present Lecturer: TI151 'Fundamentals of Physical Geography'; TI6124 (graduate level) 'Tropical Oceans and Global Climate', U. Galway.

2014–2017 Preceptor: HON 111 and 112 'Civilizations', Honors College, UMaine.

2014 Lecturer: ERS 201 'Global Environmental Change', ERS 369 'Climate & Energy', UMaine.

2010–2013 Lecturer: 'Ice Age Earth', 'Footprints of Climate Change', Penobscot Valley Senior College; 'Impacts of Climate Change on Maine', Belfast Senior College.