Batbaatar Jigjidsuren

Curriculum Vitae

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Address: 6189 NE Radford Dr
Apt 1914
Seattle, WA 98115

Email: bjigjidsuren@highline.edu
Website: https://bataa.github.io

Professional Appointments

2019–present **Affiliate Instructor**, *University of Washington Tacoma, SIAS, Tacoma, WA*

2023–present **Paleontologist**, *Stantec Inc. Seattle, WA*

2020–2023 **Visiting Assistant Professor of Geology**, *Bucknell University, Lewisburg, PA*

2018–2020 **Postdoctoral Scholar**, *Univ. of Washington, Earth and Space Sciences, Seattle, WA*

2008–2018 **Graduate Research/Teaching Associate**, *University of Washington, Seattle, WA*

2003–2008 **Lecturer**, *Mongolian University of Science and Technology, Ulaanbaatar, Mongolia*

Part-time positions:

2024–present **Part Time Faculty**, *Highline College, Des Moines, WA*

2012 Aug **Guest Researcher**, *Australian Nuclear Science and Technology Organisation*

2012 Feb **Visiting Researcher**, *The Hebrew University of Jerusalem, Jerusalem, Israel*

2008 Feb **Visiting Scholar**, *University of Washington, Earth and Space Sciences, Seattle, WA*

Education

2018 Ph.D. in Geological Sciences, *University of Washington*, Seattle
Dissertation: Quaternary glaciation in Central Asia. Advisor: Alan R. Gillespie

2003 M.Sc. in Geology, *Mongolian University of Science and Technology*, Ulaanbaatar
Dissertation: Formation features of geological environment of Darkhan city, Mongolia.
Advisor: Naidangiin Batsukh

2002 B.Sc. in Geology, Mongolian University of Science and Technology, Ulaanbaatar

Publications

Published / In press (peer-reviewed):

9. **Batbaatar, J.**, Gillespie, A.R., Koppes, M., Clark, D.H., Chadwick, O.A., Fink, D., Matmon, A., Rupper, S., 2020. Glacier development in continental climate regions of central Asia, in Waitt, R.B., Thackray, G.D., and Gillespie, A.R., eds., Untangling the Quaternary Period: A Legacy of Stephen C. Porter: *Geological Society of America Special Paper 548*, p. 119–149, https://doi.org/10.1130/2020.2548(07)
8. **Batbaatar, J.**, Gillespie, A.R., Sletten, R.S., Mushkin, A., Amit, R., Trombotto Liaudat, D., Liu, L., Petrie, G., 2020. Toward the detection of permafrost using land-surface temperature mapping. *Remote Sensing* 12, 695. https://doi.org/10.3390/rs12040695
7. Mushkin, A., Gillespie, A.R., Abbott, E.A., **Batbaatar, J.**, Hulley, G., Tan, H., Tratt, D.M., Buckland, K.N., 2020. Validation of ASTER emissivity retrieval using the Mako airborne TIR imaging spectrometer at the Algodones dune field in southern California, USA. *Remote Sensing* 12, 815. https://doi.org/10.3390/rs12050815

6. **Batbaatar, J.**, Gillespie, A.R., Fink, D., Matmon, A., Fujioka, T., 2018. Asynchronous glaciations in arid continental climate. *Quaternary Science Reviews* 182, 1–19. https://doi.org/10.1016/j.quascirev.2017.12.001
5. Herget, J., Carling, P., Agatova, A., **Batbaatar, J.**, Borodavko, P., Gillespie, A., Nepop, R., 2017. Comment on Gribenski, N. et al., 2016. Complex patterns of glacier advances during the late glacial in the Chagan Uzun Valley, Russian Altai. Quaternary Science Reviews 149, 288–305. *Quaternary Science Reviews* 168, 216–219. https://doi.org/10.1016/j.quascirev.2017.04.014
4. **Batbaatar, J.**, and Gillespie, A.R., 2016. Outburst floods of the Maly Yenisei. Part II – new age constraints from Darhad basin. *International Geology Review* 58, 1753–1779. https://doi.org/10.1080/00206814.2016.1193452
3. **Batbaatar, J.**, and Gillespie, A.R., 2016. Outburst floods of the Maly Yenisei. Part I. *International Geology Review* 58, 1723–1752. https://doi.org/10.1080/00206814.2015.1114908
2. Amit, R., Enzel, Y., Mushkin, A., Gillespie, A., **Batbaatar, J.**, Crouvi, O., Vandenberghe, J., An, Z., 2013. Linking coarse silt production in Asian sand deserts and the accretion of the Chinese Loess Plateau. *Geology* 42, 23–26. https://doi.org/10.1130/G34857.1
1. Smith, M. R., Gillespie, A.R., Montgomery, D.R., and **Batbaatar, J.**, 2009. Crater-fault dating: A new technique for dating fault zones on planetary surfaces. *Earth and Planetary Science Letters* 284, 151–156. https://doi.org/10.1016/j.epsl.2009.04.025

In preparation:

Batbaatar, J., Erdene-Ochir, B., Chamberlin, E.P., (*in prep.*) Degradation of moraines under different climate conditions on Earth and implications for moraines on Mars.

Batbaatar, J., (*in prep.*) Staircase surfaces in glacial landscapes.

Gillespie, A.R., **Batbaatar, J.**, Mushkin, A. (*in prep.*) Precision of ASTER nighttime thermal emissivity retrieval from a homogeneous geological test site.

Published (not peer-reviewed):

7. **Batbaatar, J.**, Gillespie, A.R., Feathers J.K., Fedotov A., and Bayasgalan A., 2008. The 92-m sediment core from Paleolake Darhad, Mongolia. The 7th International Symposium on Environmental Changes in East Eurasia and Adjacent Areas-High resolution environmental records of terrestrial sediments, Ulaanbaatar-Hatgal, Mongolia, August 23–29.
6. **Batbaatar, J.** and Gillespie, A.R., 2008. Glacial chronology on the southern margin of Siberia. The XIV Glaciological Symposium on Glaciology from International Geophysical Year to International Polar Year, Glaciological Association, Institute of Geography RAS and Institute of Geography of Siberian Branch of RAS, Irkutsk, 3–11 September.
5. Gillespie, A.R., **Batbaatar, J.**, and Mushkin, A., 2007. Report on the expedition to the Gov'i, July 2007. Darcy Law and Modern Science Annual Scientific Congress, Mongolian University of Science and Technology, Ulaanbaatar, 10 November.
4. Aley, M., **Batbaatar, J.**, Jadambaa, N., Tserenjav, G., 2006. Regional Groundwater system of Mongolia. Full papers of 34th Congress of International Hydrogeologists Association.
3. Narantsetseg, Ts., Tomorkhuu, D., Dolgorsuren, H., Oyunchimeg, Ts., Baigal, O., Tuvshinjargal, H., Krivinogov, S., Kazanskyi, A., Matasova, G., Bezrukova, E., Gillespie, A., Bayasgalan, A., and **Batbaatar, J.**, 2006. Research of the sediments from paleolake in Darkhad depression. Institute of Minerals and Resources, Mongolian Academy of Sciences, Ulaan Baatar, Mongolia, 15 pp. (in Mongolian)

2. **Batbaatar, J.**, 2004. Formation features of geological environment of Darkhan city. Mongolian Geoscientists, no.25, Abstract Issue on Geology and Geoecology of Mongolia, March 1, Darkhan-Uul aimag. (in Mongolian)
1. **Batbaatar, J.**, Munkh-Aldar, M., 2001. Contamination of the snow water in Ulaanbaatar city. Geology Journal, School of Geology, MUST, Ulaanbaatar. (in Mongolian)

Teaching Experience

2024–present Highline College: *Part Time Faculty*
Physical Geology (GEO 101; Fall 2024; 24 students); Lectures and hands-on laboratory exercises.

2019–present University of Washington Tacoma: *Affiliate Instructor*
Climate Change and the Environment from Space (TCORE 102; Fall 2024; 24 students); In-peprson lectures, hands-on activity in the field, and computer lab assignments. Novel class developed for the core curriculum of the UW Tacoma, to introduce remote sensing and GIS techniques in addressing land use changes and environmental issues due to climate change.
Geography of the Physical Environment (TGEOS 243; Winter 2020–24; ~40 students); Lectures and class-activity based assignments. Updated the digital assets and the instructions for two homework assignments. Developed the course into 100% asynchronous online format in winter of 2022.
Physical Geology (TGEOS 117; Spring 2020, -24; 24 students); Lectures and hands-on laboratory exercises. Wrote new instructions for rocks and minerals kit; updated and improved the digital assets of the lab exercises, designed, and compiled new exams and question banks. The course was delivered online in 2020, and in-person in 2024.
Energy and the Environment (TESC 239; Fall 2023-24; 40 students); Asynchronous online course for non-majors. Combination of weekly assignments and reading quizzes. Emphasis on the technical writing styles, literature research, and data analysis.

2020–2023 Bucknell University: *Visiting Assistant Professor*
Physical/Environmental Geology (GEOL 203; Fall of 2020, -21, -22, Spring of 2021; 48 students each); Lectures and laboratory activities. Field trips to local sites. Modified laboratory exercises for in-person and online instruction.
Earth and the Environment (GEOL 201; Summer 2021; 8 students); Developed a new summer course for undergraduate and high school students. Teaching materials were modified to fit my new curriculum of daily activities over four weeks.
Geology for Engineers (GEOL 250; Spring 2022; 36 students); Introductory geology course for engineering majors. Quantitative analyses in Earth sciences. Combination of lectures and laboratory activities.

2009–2018 University of Washington, Dept. of Earth and Space Sciences: *Teaching Assistant*
Introduction to Geological Sciences (ESS 101; 8 quarters); Co-lectured. Lab exercises with 30 students, leading local field trips to introduce glacial, fluvial, volcanic deposits and basalt flows. Moderated student debates on environmental and societal issues.
Physical Geology (ESS 210; Winter 2016); Lab exercises on mineral and rock identification, mapping techniques, and basic GIS tools (Google Earth, ArcGIS). Assisted in the field trip.
Physical Processes of the Earth (ESS 211; Fall 2017); Lab exercises on analogue and numerical modeling of hillslope evolution; geological mapping techniques.
Geomorphology (ESS 326; Fall 2016); Developed two new lab exercises. Led lab sections and co-led the field trips. Lab works included mapping techniques, GIS analysis, landslide assessment, and introductory numerical modeling.

Introduction to Geological Remote Sensing (ESS 421; Spring 2014); Lectured and led lab sessions on photo interpretation (color mixing, shading), analysis of multispectral, radar, and elevation data, and application of spectroscopy. The lab exercises used ENVI, Google Earth, Excel. Advised students to develop scientific project of their interests (geology, forestry, civil engineering, biology).

Application in GIS for the Earth Sciences (ESS 520; Winter 2016); Assisted students on GIS analysis using ArcMap and ENVI. Mentored and evaluated students' research proposals in engineering geology.

2003–2008 Mongolian University of Science and Technology: *Lecturer*

Introduction to Hydrogeology (300-level course; 5 semesters); Full responsibility on lectures and lab exercises: groundwater systems, hydraulic conductivity, Darcy's law, chemical composition of groundwater, water balance & recharge estimation.

Investigation Methods in Hydrogeology (400-level course; Spring 2004); Full responsibility on lectures and lab exercises: drilling and logging techniques, well design, monitoring, data analysis, water quality measurements, writing and reporting. Advised students on their senior's theses.

Conference Proceedings

* denotes student presentations

21. Erdene-Ochir, B.*, **Batbaatar, J.**, Chamberlin, E.P., 2021. Quantifying moraine degradation as a relative dating technique. American Geophysical Union, Fall Meeting. New Orleans, LA, December 13–17 (abstract 971500).
20. Mushkin, A., Sletten, R.S., Trombotto, L.D., **Batbaatar, J.**, Amit, R., Halevy, I., Morag, N., Gillespie, A.R., 2021. A terrestrial brine-seepage analog for Martian slope streaks near Salar de Pedernales in the Atacama Desert, Chile. Geological Society of America Abstracts with Programs. Vol. 53, No. 6, https://doi.org/10.1130/abs/2021AM-369008.
19. **Batbaatar, J.**, Gillespie, A., Sletten, R., Mushkin, A., 2019. Mapping the zero curtain duration. Temperature-Emissivity Separation Working Group, 50th US-Japanese ASTER Science Team Meeting, June 12, 2019, Tokyo, Japan.
18. **Batbaatar, J.**, Gillespie, A.R., Fink, D., Matmon, A., Lai, Z.P., Koppes, M., 2017. Relative equilibrium-line altitude as an indicator of glacier sensitivity to temperature and precipitation. Geological Society of America Abstracts with Programs, Vol. 49, No. 6, https://doi.org/10.1130/abs/2017AM-304129.
17. Gillespie, A.R., **Batbaatar, J.**, Sletten, R.S., Trombotto, D., O'Neal, M., Hanson, B., Mushkin, A., 2017. Monitoring and mapping soil ice/water phase transitions in arid regions. Geological Society of America Abstracts with Programs, Vol. 49, No. 6, https://doi.org/10.1130/abs/2017AM-303402.
16. Gillespie, A., **Batbaatar, J.**, 2017. Satellite remote sensing of the water/ice phase transition in moist soil and permafrost. 48th ASTER Science Team Meeting, June 6, 2017, Tokyo, Japan.
15. Gillespie, A., **Batbaatar, J.**, Sletten, R., Trombotto, D., O'Neal, M., Hanson, B., Mushkin, A., 2017. Monitoring and mapping soil ice/water phase transitions: the role of ASTER thermal imaging. 48th ASTER Science Team Meeting, June 7, 2017, Tokyo, Japan.
14. **Batbaatar, J.**, Gillespie, A., Turzewski, M., 2016. Dynamics of the paleofloods on the Maly Yenisei river. Fifth International Paleoflood Conference, September 12–15, Rapid City, SD, USA.
13. Wiedmer, M., Gillespie, A., Turzewski, M., Greenberg, H., **Batbaatar, J.**, 2016. Revisiting the Glacial Lake Atna megaflood, Alaska. Fifth International Paleoflood Conference, September 12–15, Rapid City, SD, USA.
12. **Batbaatar, J.**, and Gillespie, A.R., 2015. Marine Oxygen Isotope Stage 3 glaciations in continental climate-regions of Central Asia. XIX INQUA Congress, July 27–August 2, 2015, Nagoya, Japan.
11. Gillespie, A.R., and **Batbaatar, J.**, 2014. Climatic mediation of moisture sources on the southern edge of Siberia. Geological Society of America Abstracts with Programs, Vol. 46, No. 6, p. 798.
10. Gillespie, A.R., Ploskey, Z., **Batbaatar, J.**, 2014. Pleistocene ELA depression along the Pacific coast of North America. American Quaternary Association 23rd Biennial Meeting. Seattle, WA, August 8–10.

9. **Batbaatar, J.**, and Gillespie, A.R., 2013. Spatial pattern of equilibrium-line altitude in Central Asia. Geological Society of America, Abstracts with Programs 45 (7), Paper No. 101-9.
8. **Batbaatar, J.**, and Gillespie, A.R., 2013. Equilibrium-line altitudes of glaciers in hyper-arid regions of Central Asia. UW Earth and Space Sciences Research Gala. Seattle, April 4–5.
7. **Batbaatar, J.**, and Gillespie, A.R., 2012. Equilibrium-line altitudes in cold hyperarid settings. American Geophysical Union, Fall Meeting. San Francisco, December 3–7 (abstract C43E-06).
6. **Batbaatar, J.**, Gillespie, A.R., Schreiber, B.C., 2012. Tectonics and Environment at the western end of the Baikal rift: Paleolake sediment record from Darhad Basin, northern Mongolia. GSA Cordilleran Section: Geological Society of America Abstracts with Programs, Vol. 44, No. 3, p. 56.
5. **Batbaatar, J.**, and Gillespie, A.R., 2010. ASTER reflectance and global DEM used to create map of glacial ELA depression in Central Asia. 37th ASTER Science Team Meeting, Tokyo, Japan.
4. **Batbaatar, J.**, Feathers, J.K., and Gillespie A.R., 2009. IRSL feldspar dates for paleolake sediments from Darhad Basin, Mongolia. Geological Society of America Abstracts with Program, Vol. 41, No. 7, p. 382.
3. Gillespie, A.R., **Batbaatar, J.**, Feathers, J.K., 2008. First Direct Dating of MIS-2 Paleolake Sediments from Darhad Basin, Mongolia, GSA Joint Meeting, Geological Society of America Abstracts with Programs, Vol. 40, No. 6, p. 148.
2. **Batbaatar, J.**, Gillespie, A.R., 2008. Glacial chronology on the southern margin of Siberia. The XIV Glaciological Symposium on Glaciology from International Geophysical Year to International Polar Year, Glaciological Association, Institute of Geography RAS and Institute of Geography of Siberian Branch of RAS, Irkutsk, 3–11 September.
1. **Batbaatar, J.**, Batsukh, N., Aley, M., 2006. Possibility to build geothermal power plant in Shargaljuut, Mongolia. Proceedings of the 7th Asian Geothermal Symposium, July 25–26.

Invited Talks and Seminars

2021 **Mount Holyoke College**, Department of Geology colloquium: Glacial landscapes from local, regional and planetary perspectives. December 2, 2021

Mongolian University of Science and Technology, School of Geology and Mining, Seminar on hydrogeology, engineering geology and environmental geology: Last ice age in Mongolia. May 19, 2021

2020 **Bucknell University**, Department of Geology and Environmental Geosciences, Online seminar: Paleoclimate reconstruction from glacial records. July 28, 2020.

2019 **Rowan University**, Department of Geology colloquium: Understanding the past to predict the future: perspectives from glaciers and permafrost. December 4, 2019.

Western Washington University, Geology Department colloquium: Glacier development in continental climate regions of central Asia. April 9, 2019.

Dartmouth College, Department of Earth Sciences colloquium: Glacier asynchrony in continental climate settings. February 28, 2019.

2014 **Humboldt State University**, Geology Colloquium: Local LGM in the hyperarid Gobi of Mongolia. April, 2014.

2012 **Australian Nuclear Science and Technology Organisation**, Institute for Environmental Research: Using cosmogenic ^{10}Be to study the peculiar glaciers of Central Asia. August, 2012. Seminar.

Hebrew University of Jerusalem, Institute of Earth Sciences colloquium: Use of in-situ ^{10}Be for studying peculiar glaciers in Central Asia. February, 2012.

2011 **Chinese Academy of Sciences**, Qinghai Institute of Salt Lakes: Glaciers as climate recorders: How do we invert geological deposits into paleoclimate data? September, 2011. Seminar.

Honors and Awards

2015 Competitive travel grants from International Union for Quaternary Research (INQUA), College of the Environment, University of Washington.
2014 UW: Harry E. Wheeler Scholarship
2013 UW: Bourgeois Graduate Fund (independent research proposal); Vance Fellowship in Geology
2012 Geol. Soc. of America: Cordilleran Section Travel Grant; UW: Kenneth C. Robbins field study endowment; Vance Fellowship in Geology Sciences; Graduate School Fund for Excellence and Innovation.
2011 UW: Peter Misch Fellowship; Department of Earth and Space Sciences Fellowship; Graduate and Professional Student Senate Travel Grant.
2001 Best student award, Mongolian University of Science and Technology

Grants

2021 *Bucknell University* Dalal Innovation and Creativity Grant for Student-Faculty Collaboration, Batbaatar, J. (PI) "Quantifying the degradation of glacial landforms after ice ages", $4,205 for student salary and research expenses. Directly supports undergraduate student research.
2018 *Quaternary Research Center,* Sletten, R. (PI), Gillespie, A., Batbaatar, J. "New tool for permafrost map using remotely sensed data", $7,480.
2016 *NASA ROSES,* Sletten, R., (PI), Gillespie, A. (PI), Liu, L., Batbaatar, J. "Changes in spatial temporal distribution of permafrost in High Mountain Asia" (*not recommended for funding*)
2013 *Quaternary Research Center*, Batbaatar, J. & Gillespie, A. (PI) "Dating newly suspected MIS2 moraines in Central Asia by CRN", $15,000.
2013 *Bourgeois Graduate Fund, ESS, UW*, Batbaatar, J. (PI) "Mass and Energy Balance of Glaciers in Hyper-arid Settings", $1850
2012 *Dept. of Earth and Space Sciences, UW,* Batbaatar, J. (PI) "Characteristics of glaciations in hyper-arid regions of Central Asia", $2800.
2011 *Dept. of Earth and Space Sciences, UW,* Batbaatar, J. (PI) "Mapping distribution of paleo-precipitation in Central Asia", $1130.

Professional Services

Referee for: Quaternary Research (2013–), Annals of Glaciology (2015–), Quaternary Science Reviews (2018–), Journal of Quaternary Science (2018–), Boreas (2018–), Earth-Science Reviews (2019–), Journal of Glaciology (2019–), Journal of Geophysical Research: Earth Surface (2020–), Remote Sensing of Environment (2021–), The Cryosphere (2021–), Journal of Geophysical Research: Biogeosciences (2021–), PLOS ONE (2022–); Quaternary Science Advances (2023–), Ad-hoc reviewer for National Science Foundation, EAR (2020–), Expert reviewer for Working group II contribution to IPCC AR6 (2021). Associate Editor for Geomorphica (2023–).

Professional Affiliations

Quaternary Research Center (affiliate member, 2016–); Geological Society of America (2008–); American Geophysical Union (2012–); American Quaternary Association (2014–).