

## DAN H. SHUGAR, PH.D.

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### PROFESSIONAL APPOINTMENTS

2019-present Director, Environmental Science Program, University of Calgary, AB  
2019-present Associate Professor, Dept of Geoscience, University of Calgary, AB  
2016-present Adjunct Assistant Professor, Dept of Earth & Space Sciences, University of Washington, WA  
2015-2018 Assistant Professor, Interdisciplinary Arts & Sciences, University of Washington Tacoma, WA  
2011-2015 Hakai/MITACS Postdoctoral Fellow, Dept of Geography, University of Victoria, BC

### EDUCATION

2011 Ph.D., Earth Sciences, Simon Fraser University, BC (Dissertation: Rock avalanches on glaciers)  
2005 M.Sc., Physical Geography, University of Guelph, ON (Dissertation: Dynamics and evolution of coherent flow structures over dunes, Rio Paraná, Argentina)  
2003 B.Sc., Physical Geography, Carleton University, ON (Undergraduate thesis: Ground ice in peat, central Yukon Territory (Highest Honours))

### MANUSCRIPTS IN REVIEW (<sup>Ω</sup> denotes student author) (1 currently in review)

- **Shugar, D.H.**, <sup>Ω</sup>Burr, A., Haritashya, A.K., Kargel, J.S., Watson, C.S., Kennedy, M.C., Bevington, A.R., Betts, R.A., Harrison, S., and Stratton, K. Rapid worldwide growth of glacial lakes since 1990. (accepted pending revisions)

### PEER-REVIEWED JOURNAL ARTICLES (29 published)

#### 2020

- Bloom, C.K., MacInnes, B., Higman, B., **Shugar, D.H.**, Venditti, J.G., Richmond, B., Bilderback, E.L., Stark, C.P. *In Press*. Catastrophic landscape modification from a massive landslide tsunami in Taan Fiord, Alaska. *Geomorphology*, 353: 107029. doi: 10.1016/j.geomorph.2019.107029
- Watson, C.S., Kargel, J.S., **Shugar, D.H.**, Haritashya, U.K., and Schiassi, E. 2020. Mass loss from calving and melting of icebergs in Himalayan proglacial lakes. *Frontiers Earth Sci.*, 7: 342. doi: 10.3389/feart.2019.00342

#### 2019

- Brideau, M.A., **Shugar, D.H.**, Bevington, A., Willis, M., and Wong, C. 2019. Evolution of the 2014 Vulcan Creek landslide-dammed lake, Yukon, Canada, using field and remote survey techniques. *Landslides*, 16: 1823-1840.
- Byers, A., Rounce, D., **Shugar, D.H.**, Lala, J.M., Byers, E.A., and Regmi, D. 2019. A rockfall-induced glacial lake outburst flood, upper Barun valley, Nepal. *Landslides*, 16: 533-549.
- Kirschbaum, D.L., Watson, C.S., Rounce, D.R., **Shugar, D.H.**, Kargel, J.S., Haritashya, U.K., Amatya, P., Shean, D., Anderson, E.R., and Jo, M. 2019. Remote sensing of cascading hazards over High Mountain Asia. *Frontiers Earth Sci.*, 7: 197. doi: 10.3389/feart.2019.00197
- Schiassi, E., Furfaro, R., Kargel, J.S., Watson, C.S., **Shugar, D.H.**, and Haritashya, U.K. 2019. GLAM BioLith-RT for GMELT Toolbox: A semi-analytical tool for remote sensing of lake water characterization. *Frontiers Earth Sci.*, 7: 267. doi: 10.3389/feart.2019.00267

#### 2018

- Dufresne, A., Geertsema, M., **Shugar, D.H.**, ...<sup>Ω</sup>Bonno, D., and 10 other authors. 2018. Sedimentology and geomorphology of a large tsunamigenic landslide, Taan Fiord, Alaska. *Sed. Geology*, 364: 302-318.

- Eamer, J.B.R., **Shugar, D.H.**, Walker, I.J., Neudorf, C., Lian, O., Eamer, J., Bryce, J., Biln, L. 2018. Late Quaternary landscape evolution in a region of stable postglacial relative sea-levels, British Columbia central coast. *Boreas*, 47:738-753.
- Haeussler, P.J.,...**Shugar, D.H.**, and 8 other authors. 2018. Submarine deposition of a subaerial landslide in Taan Fiord, Alaska. *J. Geophys. Res. – Earth Surface*, 123:2443-2463. doi: 10.1029/2018JF004608
- Haritashya, U.K., Kargel, J.S., **Shugar, D.H.**,...and 7 others. 2018. Evolution and controls of large glacial lakes in the Nepal Himalaya. *Remote Sensing*, 10: 798.
- Harrison, S., Kargel, J., Huggel, C., Reynolds, J., **Shugar, D.**, and 10 other authors. 2018. Climate change and the global pattern of moraine-dammed glacial lake outburst floods. *The Cryosphere*, 12: 1195-1209.
  - Blog write-up hosted on Earth Institute at Columbia University, GlacierHub, ClimateWire
- Higman, B., **Shugar, D.H.**,...<sup>Ω</sup>Bonno, D., and 29 other authors. 2018. Glacier retreat and the largest landslide-triggered marine tsunami since 1958. *Scientific Reports*, 8: 12993
  - Press coverage in Washington Post, The Independent (UK), CBC, Der Spiegel, etc
  - Article has AltMetric score of ~530
- **Shugar, D.H.**, Clague, J.J., and McSaveney, M.J. 2018. Late Holocene activity of Sherman and Sheridan glaciers, Prince William Sound, Alaska. *Quat. Sci. Rev.*, 194: 116-127.
- **Shugar, D.H.**, Colorado, K.A., Clague, J.J., Willis, M., and Best, J.L. 2018. Boundary - Mapping and visualizing climatically changed landscapes at Kaskawulsh Glacier and Kluane Lake, Yukon. *J. Maps*.

## 2017

- Eamer, J.B., **Shugar, D.H.**, Walker, I.J., Lian, O.B., and Neudorf, C.M. 2017. Distinguishing depositional setting for sandy deposits in coastal landscapes using grain shape. *J. Sedimentary Res.*, 87: 1-11.
- Eamer, J.B., **Shugar, D.H.**, Walker, I.J., Lian, O.B., Neudorf, C.M., and Telka, A.M. 2017. A unique late Pleistocene glacial re-advance during retreat of Cordilleran Ice Sheet. *Quat. Res.*, 87: 468-481
- **Shugar, D.H.**, Clague, J.J., Best, J.L., Schoof, C., Willis, M.J., Copland, L., and Roe, G.H. 2017. River piracy and drainage basin reorganization driven by climate-led glacier retreat. *Nature Geosci.* 10: 370-375.
  - Press coverage in New York Times, Guardian, Washington Post, Globe and Mail, CBC, etc.
  - Article has AltMetric score of ~1330, which is the highest for any *Nature Geoscience* paper of similar age, and 150th for all papers of similar age published in all fields (~320,000 articles)
  - Nature News & Views article written about the study.

## 2016

- Kargel, J.S.\* Leonard, G.J., **Shugar, D.H.**, Haritashya, U.K., and 60 others. 2016. Geomorphic and geologic controls of geohazards induced by Nepal's 2015 Gorkha earthquake. *Science*, 351: 140.
  - Press coverage in BBC, Popular Science, etc.

## 2010-2015

- Neudorf, C., Lian, O.B., Walker, I.J., **Shugar, D.H.**, Eamer, J.B.R., and Griffin, L.C. 2015. Toward a luminescence chronology for coastal dune and beach deposits on Calvert Island, British Columbia central coast, Canada. *Quat. Geochronology*, 30: 275-281.
- McLaren, D., Fedje, D., Hay, M., Mackie, Q., Walker, I.J., **Shugar, D.H.**, Eamer, J.B.R., Lian, O.B., and Neudorf, C. 2014. A postglacial sea-level hinge on the central Pacific coast of Canada. *Quat. Sci. Rev.*, 97: 148-169.
- **Shugar, D.H.**, Walker, I.J., Lian, O.B., Eamer, J.B., Neudorf, C., McLaren, D., and Fedje, D. 2014. Post-glacial sea-level change along the Pacific coast of North America. *Quat. Sci. Rev.*, 97: 170-192.
- Walker, I.J., and **Shugar, D.H.**, 2013. Secondary flow deflection in the lee of transverse dunes with implications for dune morphodynamics and migration. *Earth Surf. Proc. & Landforms*, 38: 1642-1654.
- **Shugar, D.H.**, Rabus, B.T., Clague, J.J., and Capps, D.M. 2012. The response of Black Rapids Glacier,

Alaska, to the Denali earthquake rock avalanches. *J. Geophys. Res. - Earth Surface*, 117, F01006.

- **Shugar, D.H.**, and Clague, J.J. 2011. The geomorphology and sedimentology of rock avalanches on glaciers. *Sedimentology*, 58: 1762-1783.
- Capps, D.L., Rabus, B.T., Clague, J.J. and **Shugar, D.H.** 2010. Identification and characterization of alpine subglacial lakes using interferometric synthetic aperture Radar (InSAR), Brady Glacier, Alaska, USA. *J. Glaciology*, 56: 861-870.
- **Shugar, D.H.**, Rabus, B.T., and Clague, J.J. 2010. Elevation changes (1949-1995) of Black Rapids Glacier, Alaska, derived from a multi-baseline InSAR DEM and historical maps. *J. Glaciology*, 56: 625-634.
- **Shugar, D.H.**, Kostaschuk, R., Best, J.L., Lane, S.N., Parsons, D.R., Orfeo, O., and Hardy, R.J. 2010. On the relationship between flow and suspended sediment transport over the crest of a sand dune, Rio Paraná, Argentina. *Sedimentology*, 57: 252-272.

### Pre-2010

- Kostaschuk, R., **Shugar, D.H.**, Best, J.L., Parsons, D.R., Lane, S.N. Hardy, R.J., and Orfeo, O. 2009. Suspended sediment transport and deposition over a dune: Rio Parana, Argentina. *Earth Surf. Proc. & Landforms*, 34: 1605-1611.
- **Shugar, D.H.**, Kostaschuk, R., Ashmore, P., Desloges, J., and Burge, L. 2007. *In-situ* jet testing of the erosional resistance of cohesive streambeds. *Can. J. Civil Eng.*, 34: 1192-1195.

### BOOK CHAPTERS, PROCEEDINGS, REPORTS (12 published)

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- **Shugar, D.H.**, Kane, I. 2019. An adventure in predatory publishing: the contents of two medicine cabinets. *Nature*, 568: 316. doi: 10.1038/d41586-019-01207-5
- Kargel, J.S., Haritashya, U.K., **Shugar, D.H.**, Bishop, M., and Furfaro, R. 2018. High mountain hazard hotspots in seismically and volcanically active cryosphere regions. *NASA White Paper*.
- **Shugar, D.H.**, and Clague, J.J. 2018. Changing glaciers, changing rivers. In: Parrott, L., Robinson, Z., and Hik, D. (Eds) State of the Mountains Report. *Alpine Club of Canada*. pp. 4-11.
- Press coverage in Motherboard/VICE, CBC, Edmonton Star, The Guardian (UK), etc
- Shrestha, A.B., Bajracharya, S.R., Kargel, J.S., Khanal, N.R., Karki, A., Collins, B.D., **Shugar, D.H.**, and 16 others. 2016. The Impact of Nepal's 2015 Gorkha Earthquake-Induced Geohazards. International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, 36pp.
- **Shugar, D.H.** 2016. Book review: Geology Underfoot in Western Washington. *Pacific Northwest Quarterly*, 107: 38-39.
- Brideau, M.-A., **Shugar, D.H.**, and Wong, C., 2016. Preliminary investigation of the 2014 Vulcan Creek landslide dam, Kluane National Park and Reserve, Yukon. Paper 3902, *69th Canadian Geotechnical Conference*, Vancouver, BC, 8 p.
- Phillips, M.R., Burn, C.R., Wolfe, S.A., Morse, P.D., Gaanderse, A.J., O'Neill, H.B., **Shugar, D.H.**, and Gruber, S. 2015. Improving water content description of ice-rich permafrost soils. *Proceedings, GeoQuebec 2015*. Quebec City, QC, 7p.
- **Shugar, D.H.** 2014. Bathymetric and geophysical surveys of the southern end of Kluane Lake. In: MacFarlane, K.E., Nordling, M.G., and Sack, P.J. (Eds) *Yukon Exploration and Geology 2013*. Yukon Geological Survey, Whitehorse, pp. 221-231.
- Deline, P., Hewitt, K., Reznichenko, N., and **Shugar, D.H.** 2014. Rock avalanches onto glaciers. In: Davies, T.R. (Ed) *Landslide Hazards and Disasters*. Elsevier, pp. 263-319.
- **Shugar, D.H.**, Clague, J.J., and Giardino, M., 2013. A quantitative assessment of the sedimentology and geomorphology of rock avalanche deposits. In: Catani, F., Margottini, C., Trigila, A., and Iadanza, C. (Eds) *Landslide Science and Practice, Vol 4: Global Environmental Change*. Springer-Verlag, pp. 321-326.
- **Shugar, D.**, Kostaschuk, R., Best, J., Parsons, D., Lane, S., Hardy, R., and Orfeo, O., 2007. Sediment dynamics over a dune in the Rio Paraná. In: Paola, C., Parker, G., and García, M.H. (Eds) *Workshop on Morphodynamic Processes in Large Lowland Rivers*. Santa Fe, Argentina, 3p.

- Parsons, D.R., Best, J.L., Lane, S.N., Hardy, R.J., Kostaschuk, R.A., **Shugar, D.H.**, and Orfeo, O., 2006. Morphology, flow and sediment transport over a natural 3D dune field: Rio Paraná, Argentina. In: Ferreria, R.M., Alves, E.C., Leal, J.G., and Cardos, A.H. (Eds) *RiverFlow 2006: Intl. Conference on Fluvial Hydraulics*. Lisbon. Taylor & Francis Group, London, pp. 997-1004.

#### **Public Seminars (2017-20 only)**

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- **Shugar, D.H.**, 2020. What's happening to the world's glacial lakes? Arizona State University, USA.
- **Shugar, D.H.**, 2020. Where are the world's glacial lakes? Simon Fraser University, Canada.
- **Shugar, D.H.**, 2020. Where (and how big) are the world's glacial lakes? Alberta Parks, Canada.
- **Shugar, D.H.**, 2020. What happens to glacier meltwater? University of Illinois, USA. (postponed to fall 2020 due to coronavirus)
- **Shugar, D.H.**, 2019. Where (and how big) are the world's glacial lakes? University of Calgary, Canada.
- **Shugar, D.H.**, 2019. Where (and how big) are the world's glacial lakes? University of Toronto Mississauga, Canada.
- **Shugar, D.H.**, 2018. Changing glaciers, changing rivers: an update from the St Elias Mountains. Yukon Science Institute, Destruction Bay, YT, Canada.
- **Shugar, D.H.**, 2018. Changing glaciers, changing rivers: an update from the St Elias Mountains. Yukon Science Institute, Haines Junction, YT, Canada.
- **Shugar, D.H.** and Lipovsky, P., 2018. Changing glaciers, changing rivers: an update from the St Elias Mountains. Yukon Science Institute, Whitehorse, YT, Canada.
- **Shugar, D.H.**, 2017. Inspector Kaskawulsh and the Case of the Disappearing River. 'Sigma Gamma Epsilon National Honor Society' seminar series, University of Puget Sound, Tacoma, USA.
- **Shugar, D.H.**, 2017. Inspector Kaskawulsh and the Case of the Disappearing River. 'Thursday Nights at the Zoo' seminar series, Point Defiance Zoo, Tacoma, WA.

#### **RESEARCH GRANTS, FELLOWSHIPS AND AWARDS**

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##### **Pending Research Grants and Awards**

- Canada Foundation for Innovation "High-resolution mapping of the Earth's surface"; Sole PI; \$603,980 budget.
- ROLEX Awards for Enterprise (LOI invited for full proposal) "GLOAS: Glacier Lake Outburst Alert System"; PI of four senior personnel; 200,000 CHF budget.
- NSERC Science Communication Skills Grant "Training the scientists of today and tomorrow around the communication challenges of the future"; PI of five senior personnel; \$20,000 budget.

##### **Current Research Grants and Awards (>\$5,000, CAD unless otherwise noted)**

- 2021-21 Mitacs-UKRI UK-Canada Doctoral Exchange Scheme "Modelling glacial overdeepenings and future lake locations for the western Canadian Cordillera" Co-I of two senior personnel; \$15,500 CAD.
- 2020-25 NSERC Discovery Grant "Evolution and morphodynamics of proglacial environments"; Sole PI; \$187,500.
- 2020-23 NSERC Discovery Accelerator Supplement "Evolution and morphodynamics of proglacial environments"; Sole PI; \$120,000.
- 2020-23 Tula Foundation "Environmental Change in the Owikeno Lake Watershed"; Co-I of three senior personnel; \$279,000 (Shugar \$161,000).
- 2020-21 Alpine Club of Canada Environment Grant "Will sockeye salmon return to the upper Alsek watershed under a changing climate?"; Sole PI; \$5,000.
- 2020-21 Anonymous Donor/Foundation "Will climate change lead to a return of sockeye salmon in Alsek River?"; Anonymous Donor; Sole PI; \$10,000.
- 2020-21 Polar Continental Shelf Program "Tweedsmuir Glacier and the end of Alsek River's migratory sockeye salmon run"; Sole PI; \$32,000.

### **Past Research Grants and Awards (>\$5,000)**

- 2019-20 Polar Continental Shelf Program “Prospecting for a buried paleo-channel, Tweedsmuir Glacier, northern British Columbia”; Sole PI; \$14,400.
- 2015-18 NSF Major Research Instrumentation “Acquisition of a shallow-water autonomous multibeam hydrographic surveying system”; Sole PI; \$250,990 USD.
- 2016-18 NASA Understanding Changes in High Mountain Asia “Interlinked Glacier Dynamics, Lakes, Mountain Hazards, and Critical Vulnerabilities in the Himalaya”; Co-I of 4 senior personnel; \$698,486 USD (Shugar \$77,528).
- 2017-18 University of Washington Tacoma Scholarship and Teaching Funds “Geomorphology of a coastal lake, British Columbia”; Sole PI; \$5,000 USD.
- 2016-18 University of Washington Royalty Research Fund “Morphology, flow and sediment transport in the proglacial Slims River, Yukon, Canada”; Sole PI; \$38,840.
- 2016-17 NSF Geomorphology and Landuse Dynamics “The 2015 Taan Fiord landslide tsunami: An interdisciplinary study of cause & effect”; Co-I of 6 senior personnel; \$323,630 USD (Shugar \$34,761).
- 2016-17 National Geographic Society/Waitt Foundation “Natural hazard processes facing mountain villages in Saptā Koshi basin, eastern Nepal”; Co-I of 6 senior personnel; \$15,000 USD.
- 2013-14 Yukon Geological Survey “High-resolution bathymetric mapping and hazards identification, Kluane Lake, Yukon Territory”; Sole PI; \$10,000.
- 2012-13 Mitacs Elevate Postdoctoral Fellowship “Holocene sea-level history and environmental change, Calvert Island, BC”; \$122,500.
- 2011-12 UK Royal Society Newton International Postdoctoral Fellowship (Oxford University) “Field characterization of dust emissions for climate modelling: turbulence as erosivity driver”; £66,000; Declined the offer.
- 2011-13 Pacific Institute for Climate Solutions “Assessing the potential aquatic habitat value of streams responding to a changing climate”; Co-I of 3 senior personnel; \$50,000.
- 2006-09 NSERC Postgraduate Scholarships ‘D’; Graduate Fellowship “Large catastrophic landslides on glaciers, Coast and St. Elias Mountains”; \$63,000.

### **PROFESSIONAL SERVICE**

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- Conference co-convenor including American Geophysical Union (2019); Canadian Association of Geographers (Western Division) (2014); Canadian Geophysical Union (2008; 2017); Canadian Quaternary Association (2009); Geological Society of America (2014); NASA High Mountain Hazards Workshop (2016)
- Director, Environmental Science Program, University of Calgary (2019-present)
- Canadian Geomorphological Research Group Member-at-Large (2013-present)
- Scientific Editor, J. Glaciology (2017-present)
- Reviewer for: The Cryosphere; Canadian Journal of Earth Science; Earth Surface Processes & Landforms; Environmental Management; Geological Society of London; Geomorphology; Government of Canada - Natural Resources Canada; J. Geophysical Research; J. Glaciology; Land Degradation & Development; Landslides; Mitacs; National Geographic; National Science Foundation; Natural Hazards and Earth System Sciences; Natural Sciences and Engineering Research Council of Canada; Nature Communications; Quaternary Research; Quaternary Science Reviews; Regional Environmental Change; Remote Sensing of Environment
- Supervisory activities
  - Postdoctoral fellow – advisor to one PDF starting February 2021
  - PhD – one graduated in 2016; committee member for one current student
  - MSc – lead supervisor of two current students
  - BSc – nine students graduated between 2016-20
  - Research technician – one from 2017-18