

Dr. Michael John Willis

Fellow of Cooperative Institute for Research in Environmental Sciences (CIRES).

Assistant Professor of Geodesy and Remote Sensing.

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RESEARCH INTERESTS I blend geodetic and remote sensing tools with big-data and in situ measurements to answer questions about the sea level change, natural hazards, landscape change and the cryosphere. I am interested in the evolution of megacities, landslides, earthquakes, volcano and coastal hazards, how problems scale both spatially and temporally and how computer vision and machine learning algorithms can be applied to geophysical problems.

EDUCATION

Ph.D. Ohio State University, Columbus, Geological Sciences

2008

RECENT PUBLICATIONS

Van Wyk de Vries, M., Wickert, A.D., MacGregor, K.R., Rada, C., **Willis, M.J.** (2022) "Atypical landslide induces speedup, advance, and long-term slowdown of a tidewater glacier." *Geology*. Accepted.

Corsa, B.D.* Jacquemart, M., **Willis, M.J.**, Tiampo, K.F. (2022) "Characterization of large tsunamigenic landslides and their effects using digital surface models: A case study from Taan Fiord, Alaska." *Remote Sensing of Environment*, 270, <https://doi.org/10.1016/j.rse.2021.112881>.

Pitcher L.H.,* Smith L.C., Cooley S.W., Zaino A., Carlson R., Pettit J., Gleason C.J., Minear J.T., Fayne J.V., **Willis M.J.**, et. al. (2020) "Advancing Field-Based GNSS Surveying for Validation of Remotely Sensed Water Surface Elevation Products." *Frontiers In Earth Science*. 8 (November 23, 2020). <https://doi.org/10.3389/feart.2020.00278>

Hamlington, B.D., and the NASA Sea Level Team (2020) "Understanding of Contemporary Regional Sea Level Change and the Implications for the Future." *Reviews of Geophysics*. <https://doi.org/10.1029/2019RG000672>

Zheng, W.* Pritchard, M.E., **Willis, M.J.**, Stearns., L.E. (2019) "The possible transition from glacial surge to ice stream on Vavilov Ice Cap." *Geophysical Research Letters*. <https://doi.org/10.1029/2019GL084948>

Perkins, J.P., Finnegan, N.J., de Silva, S.L., **Willis, M.J.** (2019) "Controls on Eolian Landscape Evolution in Fractured Bedrock." *Geophysical Research Letters*. <https://doi.org/10.1029/2019GL083955>.

Brideau, M-A., Shugar, D.H., Bevington, A., **Willis, M.J.**, Wong, C. (2019) "Characterizing the evolution of the 2014 Vulcan Creek landslide-dammed lake, Yukon, Canada – using field and remote survey techniques." *Landslides*. <https://doi.org/10.1007/s10346-019-01199-3>

Bevis, M.G, Harig, C., Khan, S.A, Brown, A., Simons, F.J., **Willis, M.J.**, Fettweis, X., van den Broeke M.R., Madsen, F.B., Kendrick, E., Caccamise II, D.J., van Dam, T., Knudsen, P., Nylén T. (2019) "Accelerating changes in ice mass within Greenland, and the ice sheet's sensitivity to atmospheric forcing." *Proceedings of the National Academies of Sciences*. January 22, 2019 <https://doi.org/10.1073/pnas.1806562116>

Shugar, D.H., Colorado, K.A., Clague, J.J., **Willis, M.J.** and Best J.L. (2019) "Boundary –

Mapping and Visualizing Climatically Changed Landscapes at Kaskawulsh Glacier and Kluane Lake, Yukon” *Journal of Maps*. <https://doi.org/10.1080/17445647.2018.1467349>.

Willis, M.J., Zheng, W., Durkin, W.J., Pritchard, M.E., Ramage, J.M., Dowdeswell, J.A., Benham, T.J., Bassford, R.P., Glazovsky, A., Macheret, Y., Stearns, L.E., Porter, C.E. (2018) “Massive destabilization of an Arctic ice cap” *Earth and Planetary Science Letters*. <https://doi.org/10.1016/j.epsl.2018.08.049>. **Generated a large amount of media coverage.**

Barletta, V.R., Bevis, M.G., Smith, B.E., Wilson, T.J., Brown, A., Bordoni, A., **Willis, M.J.**, Khan, S.A., Rovira-Navarro, M., Dalziel, I., Smalley Jr., R., Kendrick, E.C., Konfal, S.A., Caccamise II, D.J., Aster, R.C., Nyblade, A., Wiens, D.A. (2018) “Observed rapid bedrock uplift in Amundsen Sea Embayment promotes ice-sheet stability.” *Science*. <https://doi.org/10.1126/science.aa01447>. **Generated a large amount of media coverage.**

Berthier, E., Larsen, C., Durkin, W.J., **Willis, M.J.**, Pritchard, M.E., (2018). Brief communication: Unabated wastage of the Juneau and Stikine icefields (southeast Alaska) in the early 21st century. *The Cryosphere* 12. <https://doi.org/10.5194/tc-12-1523-2018>

Higman, B., Shugar, D.H., Stark, C.P., Ekström, G., Koppes, M.N., Lynett, P., Dufresne, A., Haeussler, P.J., Geertsema, M., Gulick, S., Mattox, A., Venditti, J.G., Walton, M.A.L., McCall, N., Mckittrick, E., MacInnes, B., Bilderback, E.L., Tang, H., **Willis, M.J.**, Richmond, B., Reece, R.S., Larsen, C., Olson, B., Capra, J., Ayca, A., Bloom, C., Williams, H., Bonno, D., Weiss, R., Keen, A., Skanavis, V., and Loso, M. (2018) “The 2015 landslide and tsunami in Taan Fiord, Alaska.” *Scientific Reports*. <https://doi.org/10.1038/s41598-018-30475-w>

Zheng, W.*, Pritchard, M.E., **Willis, M.J.**, Tepes, P., Gourmelen, N., Benham, T.J. and Dowdeswell, J.A. (2018) “Accelerating glacier mass loss on Franz Josef Land, Russian Arctic.” *Remote Sensing of Environment*. <https://doi.org/10.1016/j.rse.2018.04.004>.

Dufresne, A., Geertsema, M., Shugar, D.H., Koppes, M., Higman, B., Haeussler, P.J., Stark, C., Venditti, J.G., Bonno, D., Larsen, C., Gulick, S.P.S., McCall, N., Walton, M., Loso M.G. and **Willis, M.J.** (2017) “Sedimentology and geomorphology of a large tsunamigenic landslide, Taan Fiord, Alaska.” *Sedimentary Geology*, <https://doi.org/10.1016/j.sedgeo.2017.10.004>.

Smith, L.C., Yang, K., Pitcher, L.H., Overstreet, B.T., Chu, V.W.E., Rennermalm, A.K., Ryan, J.C., Cooper, M.G., Gleason, C.G., Tedesco, M., Jeyaratnam, J., van As, D., van den Broeke, M.R., van de Berg, W.J., Noël, B., Langen, P.L., Cullather, R.I., Zhao, B., **Willis, M.J.**, Hubbard, A., Box, J.E., Jenner, B.A. and Behar, A.E. (2017) “Direct Measurements of Meltwater Runoff on the Greenland Ice Sheet Surface” *Proceedings of the National Academies of Science*. December, 114 (50) E10622-E10631. <https://doi.org/10.1073/pnas.1707743114> **Generated a large amount of media coverage.**

Durkin W.J.*, Bartholomaus T.C., **Willis M.J.** and Pritchard, M.E. (2017) “Dynamic Changes at Yahtse Glacier, the Most Rapidly Advancing Tidewater Glacier in Alaska.” *Frontiers in Earth Science*, 5. <https://doi.org/10.3389/feart.2017.00021>.

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 led by climate-driven glacier retreat” *Nature Geosciences*. <https://doi.org/10.1038/ngeo2932> **Generated a large amount of media coverage.**

Stahl, T.A., Clark, M.K., Zekkos, D., Athanasopoulos-Zekkos, A., **Willis, M.J.**, Medwedeff, W., Knoper,

- L., Townsend, K. and Jonson, J. (2017) “Earthquake science in resilient societies” *Tectonics*.
<https://doi.org/10.1002/2017TC004604>
- Khan, S.A., Sasgen, I., Bevis, M.G., van Dam, T., Bamber, J., Wahr, J., Wouters, B., Helm, V., **Willis, M.J.**, Kjær, Kurt K., Csatho, B., Fleming, K., Knudsen, P. and Munneke, P.K. (2016) “Geodetic measurements reveal similarities between post Last Glacial Maximum and present-day mass loss from the Greenland ice sheet.” *Science Advances*, 21 Sept, 2016.
<https://doi.org/10.1126/sciadv.1600931> **Generated a large amount of media coverage.**
- Larsen, S.H., Khan, S.A., Ahlstrøm, A.P., Hvidberg, C.S., **Willis, M.J.** and Andersen, S.B. (2016) “Increased Mass Loss and Asynchronous Behavior of Marine-Terminating Outlet Glaciers at Upernavik Isstrøm, NW Greenland.” *Journal of Geophysical Research*,
<https://doi.org/10.1002/2015JF003507>
- Melkonian, A.K. *, **Willis, M.J.** and Pritchard, M.E. (2016) “Stikine Icefield Mass Loss Between 2000 and 2013/2014.” *Frontiers in Earth Science*. 4, <https://doi.org/10.3389/feart.2016.00089>
- Melkonian, A.K. *, **Willis, M.J.**, Pritchard, M.E. and Stewart, A.J. (2016) “Recent changes in glacier velocities and thinning at Novaya Zemlya.” *Remote Sensing of Environment*, 174, 244-257,
<https://doi.org/10.1016/j.rse.2015.11.001>
- Pope, A., Scambos, T.A., Moussavi, M., Tedesco, M., **Willis, M.J.**, Shean, D. and Grigsby, S. (2016) “Estimating supraglacial lake depth in western Greenland using Landsat 8 and comparison with other multispectral methods”, *The Cryosphere*, 10, 15-27, <https://doi.org/10.5194/tc-10-15-2016>

*First author under my mentorship.

RECENT DATA PRODUCTS

- 2022 (Pending approval of National Geospatial Intelligence Agency). Kaikoura Earthquake Topographic Changes.
- 2022 (Pending approval of National Geospatial Intelligence Agency). NASA Sea Level Change Team. Inundation Risks at Coastal Cities. Part 1. Africa.
- 2022 (Pending approval of National Geospatial Intelligence Agency). NASA Sea Level Change Team. Inundation Risks at Coastal Cities. Part 2. South America
- 2019 Willis, MJ; Barnhart, WD; Cassotto, R; Klassen, J; Corcoran, J; Host, T; Huberty, B., Pelletier, K., Knight, J.F. *CaliDEM: Ridgecrest, CA Region 2m Digital Surface Elevation Model*. Funding by NSF and USGS. Data collection by DigitalGlobe. Distributed by OpenTopography.
<https://doi.org/10.5069/G998854C>
- 2018 ArcticDEM release V7. Publicly available 2m posting version-3 digital surface models of Entire Arctic. <https://Arcticdem.org>.
- 2018 ArcticDEM release V6. Publicly available 2m posting version-2 digital surface models of Siberia and Scandinavia. <https://Arcticdem.org>.
- 2018 ArcticDEM release V5. Publicly available 2m posting digital surface models Nunavut and Northwest Territories, Northern Siberia, and central and southeastern Regions of Greenland. Arcticdem.org.

- 2017 ArcticDEM release V4. publicly available 2m posting version-2 digital surface models of Kamchatka Peninsula, Canadian Arctic Islands of Nunavut and Northwest Territories, Faroe Islands, and northern and Western Regions of Greenland. Arcticdem.org.
- 2016 ArcticDEM release V3. publicly available 2m posting version-2 digital surface models of Alaska, Novaya Zemlya, Franz Josef Land, Svalbard, Iceland and Baffin Island. Arcticdem.org.
- 2016 ArcticDEM release 2. publicly available 2m posting digital surface models of Novaya Zemlya, Franz Josef Land. Arcticdem.org.
- 2016 ArcticDEM release 1. publicly available 2m posting digital surface model of Alaska. Arcticdem.org.

RECENT HONORS

- 2021 Certificate of Excellence in Mentoring – CU RECCS program.
- 2019 AGU Top 10 most downloaded paper in GRL for “The Possible Transition From Glacial Surge to Ice Stream on Vavilov Ice Cap”
- 2018 Carbonbrief.org 15th most featured climate paper in the media in 2017, measured on news and social media exposure as measured using altmetrics score.
- 2018 Top 20 most downloaded paper in Tectonics.
- 2017 WIRED – High performance computing innovation team award.
- 2017 Hyperion Research - High Performance Computing Innovation Excellence Award.
- 2017 Recognition from Government of Greenland for coordinating US science response to Karrat Fjord Landslide and Tsunami, West Greenland – June 2017.

RECENT SERVICE

- 2022 Career Track Promotion Committee - CIRES
- 2021-present **Science Team Lead**, Lockheed Martin Orbital Mission Concept. **V**egetation, **I**ce and **T**opography from Geiger mode **A**ltimetric **L**idar (VITAL)
- 2021-present Committee member - University of Colorado, Visioning and Big data collaboration with UC Anschutz teaching hospital.
- 2021 Summer Invited Speaker on Coastal Changes and Hazards. IEEE Remote Sensing in the Geosciences, Virtual & Brussels, Belgium.
- 2021 Summer Convenor, Coastal and Ocean Hazards. AGU Alerts Conference on Natural Hazards. Virtual.
- 2021 Spring “Short-Fuse” High Performance Computing Future Committee on at Rocky Mountain Advanced Computing Consortium.
- 2021 Spring CIRES Postdoctoral and sabbatical selection committee, University of Colorado, Boulder.
- 2021 Co-Mentor – Phillip Choi, Marie Lim, Aislynn Connel. **Undergraduate UNAVCO RECESS and RECCS under-represented students doing summer research.**
- 2020-present CRADA LIDAR operations with NGA.

2020-present	Proposer and awarded access to AGU Bridge Program that increases opportunities for students from underrepresented populations to obtain graduate degrees and create a network of peers, mentors and advisers to support and serve them before, during and after grad school. One student accepted through this program so far.
2020-2021	Curriculum Assessment Team, Dept of Geological Sciences. University of Colorado, Boulder.
2020 Summer	Participant to specify Surface Topography and Vegetation Mission Requirements. JPL/NASA.
2019	Co-Mentor – Beth Schaeffer. Undergraduate UNAVCO RECESS under-represented student doing summer research.
2019 Spring	NASA Science Review Panel for NISAR Mission.
2019 Spring	National Academy of Sciences expert panel to identify key connections between geodesy and priority Earth science questions from the 2018 Decadal Survey and to explore how to improve geodetic infrastructure to meet new science needs.
2019 Spring	NSF Earth Science Program Reviewer
2018-present	CU Proponent and Organizer of CRADA (Cooperative Research and Development Agreement) with National Geospatial Intelligence Agency.
2018-2019	US Host and sponsor for Prof. Ian Willis, Cambridge University, visiting scholar to CIRES.
2018 Fall	Session Convener Geodesy Section at Fall AGU.
2018 Fall	Invited Speaker - Cryosphere Section at Fall AGU.
2018 Fall	CU Boulder Campus Cyber-security committee.
2018 Fall	Invited Speaker – Denver Academy of Lifelong Learning.
2018 Fall	Local TEDx Salon speaker on Cryospheric change.
2018 Fall	“Parade of Professors.” Presenting research to Graduate students for the fourth time at the Department of Geological Sciences, University of Colorado, Boulder.
2018 Summer	Invited talk on Structure from Motion in the Geosciences, University of Santa Cruz de la Sierra, Bolivia.
2018 Summer	Keynote Speaker at Community Surface Dynamics Modeling System Annual Conference and Workshop. University of Colorado, Boulder.

2018 Summer	Co-Mentor, RESESS Student - University of Colorado, Boulder. <i>My Postdoc and I supervised an intern recruited from a historically underrepresented group via the UNAVCO RESESS program. Beth Schaeffer will be presenting her work at the Fall AGU Meeting.</i>
2018 Spring	Keynote Speaker at International Glaciological Society Meeting, University of Colorado, Boulder. Observations of Cryosphere changes in Russia and Greenland.
2018 Spring	Invited speaker NOAA coastal processes group, Scaggs building, Boulder, Colorado.
2018 Spring	NSF reviewer for Arctic Natural Sciences Program
2017-Present	NASA Sea Level Team.
2017-Present	Users Working Group of the Alaska SAR Facility DAAC
2017-2018	CIRES Postdoctoral and sabbatical selection committee, University of Colorado, Boulder.
2017-2018	Diversity award committee, Dept. of Geology, University of Colorado, Boulder.
2017-2018	Chancellors award Committee, Dept. of Geology, University of Colorado, Boulder.
2017-2018	Graduate Student Intake Committee, Dept. of Geology, University of Colorado, Boulder.
2017	“Parade of Professors.” Presenting research to Graduate students for the third time at the Department of Geological Sciences, University of Colorado, Boulder.
2017	Invited speaker at Institute of Alpine and Arctic Research, University of Colorado, Boulder.
2017	Keynote speaker at Geological Society of America Meeting, Seattle, Oct, 2017. Hazard and Cryosphere.
2017	“Parade of Professors.” Presenting research to Graduate students a second time at the Department of Geological Sciences, University of Colorado, Boulder.
2017	Invited speaker, Amazon “Earth Analytics in the Cloud” Workshop, University of Colorado, Boulder.
2017	Invited speaker on Changes in the Russian Arctic at Purdue University.
2017	Coordinator for US academic response to Karrat Fjord Tsunami disaster, Greenland. Letter of thanks received from Government of Greenland.
2017	Invited speaker on Changes in the Russian Arctic at Colorado State University.

- 2017 Author/Editor with Tonie van Damn on “Ice Mass Discharge from the Greenland Ice Sheet” section of white paper on the future of the Greenland GPS Network. To be sent to NASA/NSF and the Danish Space Center.
- 2017 CIRES Graduate Student Research Award Committee
- 2017 Multiple National Science Foundation Proposal Review Panels.
- 2017 “Parade of Professors.” Presenting research to Graduate students at the Department of Geological Sciences, University of Colorado, Boulder.
- 2016 Presentation to National Snow and Ice Data Center Cryospheric group on the “Joys and Pains of High Performance Computing with Polar Applications.” University of Colorado, Boulder.
- 2016 Presentation of Research to the Geology Department Review Board, University of Colorado, Boulder.
- 2016 Faculty participant in meeting with Boulder City Council regarding the future climate commitments of the city.
- 2016 Invited Speaker at American Geophysical Union, Fall Meeting. Cryosphere.
- 2016 Invited participant and presenter at NASA “High mountain hazards” planning meeting.
- 2016 Briefing participant at National Geospatial Intelligence Agency
- 2016 Invited speaker at University of New Hampshire on geodetic imaging techniques.
- 2016 Adviser to ArcticSDI and ArcticDEM international partners meeting. University of Minnesota, Minneapolis, Minnesota.
- 2016 Instructor: Polar imagery cyberinfrastructure workshop. University of Minnesota, Minneapolis, Minnesota.
- 2016 **Session Convener:** Ice Mass Change in West Antarctica session. 2016 A-NET Polenet Science Meeting, Ohio State University, Columbus Ohio.
- 2016 Produced Digital Elevation Models along the entire route of the Greenland Inland Logistics Traverse at the request of NSF and the Cold Regions Research and Engineering Laboratory.
- 2016 National Aerospace and Space Administration Proposal Review Panel.
- 2016 Invited presentation at University of Colorado, Boulder on “Geodetic imaging of the Earth using Surveillance Satellites.”