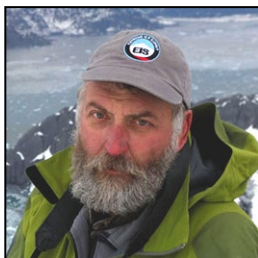


CURRICULUM VITA

W. Tad Pfeffer

Professor, Department of Civil, Environmental, and Architectural Engineering *and*
Fellow, Institute of Arctic and Alpine Research, University of Colorado at Boulder, USA

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Education:

1987 Ph.D. (Geophysics) University of Washington
1981 M.A. (Geology) University of Maine
1976 B.A. (Geology) University of Vermont

Employment:

Professor, Department of Civil, Environmental, and Architectural Engineering, University of Colorado (since 1999)

Fellow of the Institute of Arctic and Alpine Research (INSTAAR), University of Colorado (since 1988)

Consulting:

President, **W.T. Pfeffer Geophysical Consultants LLC**, Nederland Colorado, USA. *contact:*
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Research Interests:

Natural Hazards; global assessment of hydrology and water resources, sea level rise, and glacier and ice sheet mass balance; glacier dynamics; field and experimental methods in ice dynamics, snow physics and hydrology; heat and mass transfer in snow, ice, and porous media; mechanics and thermodynamics of continuous media; ice/ocean and ice/atmosphere interactions; fluid mechanics; numerical methods in analysis of mechanics of continuous media and heat transfer. Documentary photography and photogrammetry (aerial and terrestrial), architectural photography and architectural history.

Consulting Services:

W.T.Pfeffer Geophysical Consultants, LLC, was formed in 2012 to provide contract advice, reviewing, and specific task assignments for Government and private entities concerning sea level assessment and projections, glacier mechanics and dynamics analyses, and glacier/environmental interaction, including field investigations, modeling, and evaluation and review of glaciological and sea level rise models and analytic/projection methods. Clients

include the Prince William Sound Citizen's Advisory Council, Anchorage, AK, RTI International, and Department of Energy.

Service:**Visiting positions:**

Jefferson Science Fellow, US Dept. of State/USAID, Washington DC (2015-16)

Campus/National/International Professional Activities:

Member, University of Colorado Privilege and Tenure Committee (2019 – present)

Departmental Representative, Boulder Faculty Assembly (2005 – present)

Member, Boulder Faculty Assembly Budget and Planning Committee (2018 – present)

Expert Witness testimony, House Committee on Science, Space, and Technology Hearing "Earth's Thermometers: Glacial and Ice-Sheet Melt in a Changing Climate," Washington DC, 2 July 2019.

Committee member and contributor: Arctic Synthesis Workshop (Washington DC, 17-20 April, 2017)

Founding Editor, Oxford University Press *Oxford Research Review/Natural Hazard Science*, 2013-present

Committee Member, National Academy of Sciences, National Committee for the International Union of Geodesy and Geophysics, 2012 – 2017.

Lead Author, IPCC AR5 WGI, Chapter 13 (Sea Level Change); 2010 – 2013.

Panel Member, National Academy of Sciences/National Research Council Committee on Sea Level Rise in California, Oregon, and Washington (2010-2011)

Sigma Xi Distinguished Lecturer (2011-2012)

Member, Climate Science Rapid Response Team (2010 – Present). See <http://www.climate rapid response.org/>

Lead Author, Arctic Monitoring and Assessment Program (AMAP) Snow Water Ice and Permafrost Assessment, Module 3C, Chapter 5 (2008-2010)

Contributor and reviewer, UNEP Climate Change Science Compendium, 2009 - Present.

National Science Foundation, Office of Polar Programs, Antarctic Division, Review Panel Member, 2010

National Science Foundation, Office of Polar Programs Arctic Section Committee of Visitors, November 2006.

Cryosphere Section Executive Committee, American Geophysical Union (2004 - 2010)

American Geophysical Union Fall Meeting Planning Committee, 2012, 2013

Session Convener, American Geophysical Union Fall Meeting, 2001, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013

Invited Speaker, Polar Research Board (National Academies), November 2006; Arctic Climate Impact Assessment, 2005, 2012

Associate Editor, Journal of Geophysical Research, Earth Surface Processes (2003-2006)

Associate Editor, Journal of Geophysical Research, Solid Earth (1998-2003)

Publications Committee, International Glaciological Society.

Scientific Coordinator, National Ice Core Laboratory. 1991-1993.

Proposal and manuscript reviews (approximately 10/yr total).

Various Invited Scientific Lectures: 15-20 per year, 2008 – 2014.

Other Public Lectures: 10-15 per year, 2008 – 2014.

Awards

Jefferson Science Fellowship. National Academy of Sciences, in residence at US Dept. of State/USAID, Washington DC, 2015-2016.

Nye Lecture, American Geophysical Union, December 2011.

University of Colorado Council on Research and Creative Work, Sabbatical year support for 2007-2008.

Graham Foundation for Advanced Studies in the Fine Arts, Chicago, Illinois. Grant support for research and photography for *The Hand of the Small Town Builder*, 2003

American Geophysical Union Editor's Citation for Excellence in Refereeing (JGR Solid Earth), 1999

Science Activities:

Selected Publications:

(Co-authors: †Supervised student; *Supervised post-doc; **Mentored visiting scientist, post-grad or post-doc, ***Advised student)

1. ***MacFerrin, M., Machguth, H., van As, D., Charalampidis, C., Stevens, C., Heilig, A., Vandecrux, B., Langen, P., Mottram, R., Fettweis, X., Van den Broeke, M. R., Pfeffer, W.T., Moussavi, M., Abdalati, W. (2019) Rapid Expansion of Greenland's Low Permeability Ice Slabs. *Nature*, 573(7774), 403-407.

2. Machguth, H., Box, J. E., Fausto, R. S., & Pfeffer, W. T. (2018). Melt Water Retention Processes in Snow and Firn on Ice Sheets and Glaciers: Observations and Modelling. **Frontiers in Earth Science**, 6, 105.
3. Bahr†, D. B., W. T. Pfeffer (2016), Crossover Scaling Phenomena for Glaciers and Ice Caps, **Journal of Glaciology**, 62(232), pp. 299-309. doi:10.11017/jog2-16.6
4. Bahr†, D. B., W. T. Pfeffer, and G. Kaser (2015), A Review of Volume-Area Scaling of Glaciers, **Reviews of Geophysics**, 52, doi:[10.1002/2014RG000470](https://doi.org/10.1002/2014RG000470).
5. Bahr†, D.B., W.T. Pfeffer, and G. Kaser. (2014) Glacier volume estimation as an ill-posed inversion. **Journal of Glaciology**, 60(223), doi: 10.3189/2014JoG14J062
6. Arcone, S., Campbell, S., & Pfeffer, W.T. (2014). GPR profiles of glacial till and its transition to bedrock: interpretation of water content, depth and signal loss from diffractions. **Journal of Environmental and Engineering Geophysics**, 19(4), 207-228.
7. Pfeffer, W.T., A.A. Arendt; A. Bliss; T. Bolch; J.G. Cogley; A.S. Gardner; J-O Hagen; R. Hock; G. Kaser; C. Kleinholz; E.S.Miles; G. Moholdt; N.Mölg; F.Paul; V. Radić; P. Rastner; B.H. Raup†; J. Rich; M.J. Sharp; and the Randolph Consortium. (2014) The Randolph Glacier Inventory: A globally complete inventory of glaciers. **Journal of Glaciology**.
8. Gregory, J.M., J.A. Church, P.U. Clark, A.J. Payne, M.A. Merrifield, R.S. Nerem, P.D. Nunn, W.T. Pfeffer, D. Stammer, (2014). Comment on "Expert assessment of sea-level rise by AD 2100 and AD 2300", by Horton et al. (2014), **Quat. Sci. Rev.**, 97 pp. 193-194, 10.1016/j.quascirev.2014.05.24
9. Straneo, F., P. Heimbach, O. Sergienko, G. Hamilton, G. Catania, S. Griffies, R. Hallberg, A. Jenkins, I. Joughin, R. Motyka, W.T. Pfeffer, S.F. Price, E. Rignot, T. Scambos, M. Truffer, A. Vieli, (2013). **Bull. Amer. Met. Soc.** 94(8), pp. 1131-1144, DOI 10.1175/BAMS-D-12-00100.1
10. Church, J.A., P.U. Clark, A. Cazenave, J.M. Gregory, S. Jevrejeva, A. Levermann, M.A. Merrifield, G.A. Milne, R.S. Nerem, P.D. Nunn, A.J. Payne, W. T. Pfeffer, D. Stammer, A.S. Unnikrishnan, (2013). Sea Level Rise by 2100. **Science**, 342(6165), p. 1445-1445.
11. Welty†, E. Z., Bartholomaeus, T. C., O'Neel†, S., & Pfeffer, W. T. (2013). Instruments and Methods Cameras as clocks. *Journal of Glaciology*, 59(214), 275.
12. Gardner, A. S., G. Moholdt, J. G. Cogley, B. Wouters, A. A. Arendt, J. Wahr, E. Berthier, R. Hock, W. T. Pfeffer, G. Kaser, S. R. M. Ligtenberg, T. Bolch, M. J. Sharp, J. O. Hagen, M. R. van den Broeke & F. Paul, A Reconciled Estimate of Glacier Contributions to Sea Level Rise: 2003 to 2009. **Science**, 340, 852-857, 2013
13. Jacob, T; J. Wahr; W.T. Pfeffer, and S. Swenson, Recent contributions of glaciers and ice caps to sea level rise, **Nature**, doi:10.1038/nature10847, 2012

14. Harper, J.T.*, N.F. Humphrey, J. Brown, J, and X. Fettweis, Greenland ice-sheet contribution to sea-level rise buffered by meltwater storage in firn, **Nature Geosciences**, doi:10.1038/nature11566, 2012
15. Humphrey, N. F., J. T. Harper*, and W. T. Pfeffer, Thermal Tracking of Meltwater Retention In Greenland's Accumulation Area, **Journal of Geophysical Research**, 117, F1, doi:10.1029/2011JF002083, 2012
16. Brown, J., Bradford, J., Harper*, J., W. Tad Pfeffer, Humphrey, N., Mosley-Thompson, E., Georadar-derived estimates of firn density in the percolation zone, western Greenland ice sheet. **Journal of Geophysical Research - Earth Surface**, 117: F01011. doi:10.1029/2011JF002089, 2012
17. McNabb, R.W.; R. Hock; S. O'Neel[†]; L.A. Rasmussen; Y. Ahn; M. Braun; H. Conway; S. Herreid; I. Joughin; W.T. Pfeffer, B. Smith; and M. Truffer, Using Surface Velocities to Calculate Ice Thickness and Bed Topography: A Case Study at Columbia Glacier, Alaska," **Journal of Glaciology**, Vol 58 No 212, doi: 10.3189/2012JoG11j249
18. Colgan et al, Monte Carlo ice flow modeling projects a new stable configuration for Columbia Glacier, Alaska, by c. 2020, **The Cryosphere Discussions**, 6, 1395-1409, doi: 10.5194/tc-6-1395-2012
19. National Research Council, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, **The National Academies Press**, Washington, D.C., 2012
20. Pfeffer, W.T., Adaptation to a Non-steady Coastal Environment: Designing Infrastructure in a Non-Steady World, **The International Journal of the Constructed Environment**, V 2, No. 3, pp. 81-92, 2012
21. Winkler, M, W.T. Pfeffer, and K. Hanke, Kilimanjaro Ice Cliff Monitoring with Close Range Photogrammetry. **International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences**, Volume XXXIX-B5, 2012
22. Arcone, S. A., and Pfeffer, W. T., 2012, GPR profiles of partially to completely unstratified geologic formations: **Proc. 14th Inter. Conf. on Ground Penetrating Radar**, IEEE Conf. Pub. DOI: 10.1109/IGPR.2012.6254823, 7–12.
23. Pfeffer, W.T., Land Ice and Sea Level Rise: A Thirty-Year Perspective, **Oceanography** 24(2): 94–111, <http://dx.doi.org/10.5670/oceanog.2011.30>, 2011
24. Sharp, M., M. Ananicheva, A. Arendt, J-O Hagen, R. Hock, E. Josberger, R. Dan Moore, W. Tad Pfeffer, and G.J. Wolken, Mountain Glaciers and Ice Caps: **Snow, Water, Ice and Permafrost in the Arctic (SWIPA), Arctic Monitoring and Assessment Program (AMAP)**. Oslo. 149 ms. 2011
25. Winkler, M, G. Kaser; N. J. Culler; T. Mölg; D.R. Hardy; W.T. Pfeffer, Land-based ice cliffs: Focus on Kilimanjaro. **Erkunde**, 64(2), pp. 179-193, 2010.

26. Walter[†], F.; S. O'Neel[†], D. McNamara, W.T. Pfeffer; J. Bassis, H.A. Fricker, Iceberg Calving During Transition from Grounded to Floating Ice, Columbia Glacier, Alaska, **Geophysical Research Letters**, Vol. 37, L15501, doi:10.1029/2010GL043201, 2010
27. Haugen[†], B.D.; T.A. Scambos; W.T. Pfeffer; and R.S. Anderson. Twentieth-Century Changes in the Thickness and Extent of Arapaho Glacier, Front Range, Colorado. **Arctic, Antarctic, and Alpine Research**, 2(2), p. 198-209, 2010
28. Pfeffer, W.T., People and Place in the Far North: The Vision of Life, Community, and Change in the Circumpolar Arctic, and its Public Perception. in *Images of the North: Histories-Identities-Ideas*, (S. Jakobsen, Ed), **Studia Imagologica** No. 14, Amsterdam, 2009
29. Owen LA, Thackray GD, Anderson RS, Briner J, Kaufman D, Roe G, Pfeffer W, Yi C. 2008a. Integrated mountain glacier research: current status, priorities and future prospects. **Geomorphology**, V. 103, Issue 2, 15 January 2009, pg. 158-171
30. Fudge, T. J., J. T. Harper, N. F. Humphrey, and W. T. Pfeffer (2009), Rapid Glacier Sliding, Reverse Ice Motion, and Subglacial Water Pressure During an Autumn Rainstorm, **Annals of Glaciology**, 50(51), 1-9.
31. Pfeffer, W.T., J.T. Harper*, and S. O'Neel I[†], Kinematic constraints on glacier contributions to 21st-Century sea-level rise. **Science** 321, 1340 (2008); DOI: 10.1126/science. 1159099. (2008)
32. O'Neel[†] S. and W.T. Pfeffer, Source mechanics for monochromatic icequakes produced during iceberg calving at Columbia Glacier, AK, **Geophysical Research Letters**, VOL. 34, L22502, doi:10.1029/2007GL031370. (2007)
33. Pfeffer, W.T., A Simple Mechanism for Irreversible Tidewater Glacier Retreat, **J. Journal of Geophysical Research Earth Surface**, Vol. 112, No. F3, F03S2 10.1029/2006JF000590, 2007
34. O'Neel[†] S., Marshall[†], H., McNamara, D., and Pfeffer, W.T., Detection and analysis of icequakes at Columbia glacier, AK , **Journal of Geophysical Research Earth Surface**, Vol. 112, No. F2, F03S23 10.1029/2006JF000531, 2007
35. Harper*, J.T., N.F. Humphrey, W.T. Pfeffer, and B. Lazar[†], Two Modes of Accelerated Glacier Sliding related to Water, **Geophysical Research Letters** Vol. 34, L12503, doi:1029/2007GL030233, 2007
36. Meier, M.F., M. B. Dyurgerov, U. K. Rick[†], S. O'Neel[†], W. T. Pfeffer, R. S. Anderson, S. P. Anderson, and A. F. Glazovsky, Glaciers Dominate Eustatic Sea-Level Rise in the 21st Century, **Science** 24 August 2007: 1064-1067.
37. Fudge***, T.J., J. T. Harper*, N. F. Humphrey, and W. T. Pfeffer, Diurnal Water Pressure Fluctuations: Timing and Pattern of Termination Below Bench Glacier, Alaska. **Annals of Glaciology**, 40, pp. 102-106, 2005

38. Harper*, J.T., N. F. Humphrey, W. T. Pfeffer, T.J. Fudge***, S. O'Neel†, Evolution of Subglacial Water Pressure along a Glacier's Length. **Annals of Glaciology**, 40, pp. 31-36, 2005.
39. O'Neel†, S., W.T. Pfeffer, R.M. Krimmel, and M.F. Meier, Force Balance Analysis at Columbia Glacier, Alaska, During its Rapid Retreat. **Journal of Geophysical Research Earth Surface**, V. 110, F03012, doi: 10.1029/2005JF000292, 2005
40. Harper*, J.T., N.F. Humphrey, and W.T. Pfeffer, Three-dimensional deformation measured in an Alaskan glacier, **Science (281)**, 1340-1342, 1998.
41. Pfeffer, W.T., and N.F. Humphrey, Formation of ice layers by infiltration and refreezing of meltwater, **Annals of Glaciology (26)**, 83-91, 1998
42. Bahr***, D.B., W.T. Pfeffer, C. Sassolas**, and M.F. Meier, Response time of glaciers as a function of size and mass balance: I. Theory, **Journal of Geophysical Research** 103(B5), 9777-9782, 1998.
43. Pfeffer, W.T., D.B. Bahr***, C. Sassolas**, and M.F. Meier, Response time of Glaciers as a function of size and mass balance: II: Numerical experiments, **Journal of Geophysical Research**, 103(B5), 9783-9789, 1998.
44. Pfeffer, W.T. and N.F. Humphrey, Determination of timing and location of water movement and ice layer formation by temperature measurements in subfreezing snow. **Journal of Glaciology**, 42(141), 292-304. 1996
45. Sassolas**, C., W.T. Pfeffer, and B. Amadei, Stress interaction between multiple crevasses in glacier ice. **Cold Regions Science and Technology (24)**, 107-116. 1996
46. Bahr***, D. B., W. T. Pfeffer, and M. F. Meier. Theoretical limits to englacial stress calculations, **Journal of Glaciology**, 40(136), 509-518. 1995.
47. Braithwaite, R.J., M. Laternser, and W. T. Pfeffer. Variations of Near-Surface Firn Density in the Lower Accumulation Area of the Greenland Ice Sheet, Pakitsoq, West Greenland. **Journal of Glaciology**, 40(136), 477-485. 1995
48. Pfeffer, W. T., M. F. Meier, and T.H. Illangasekare, Retention of Greenland Runoff by Refreezing: Implications for Projected Future Sea-level Change, **Journal of Geophysical Research** 96(C12), 22,117-22,124, 1991
49. Pfeffer, W.T., T.H. Illangasekare, and M.F. Meier, Analysis and Modeling of Meltwater Refreezing in Dry Snow. **Journal of Glaciology**, 36(123), 238-246 1990.
50. Illangasekare, T.H., Walter, R.J., M.F. Meier, and Pfeffer, W.T., Modeling of Meltwater Infiltration in Subfreezing Snow. **Water Resources Research** 26(5), 1001-1012, May, 1990.

51. Kamb, W.B., C.F. Raymond, W.D. Harrison, Herman Engelhardt, K.A. Echelmeyer, N. Humphrey, M.M. Brugman, T. Pfeffer, Glacier Surge Mechanism: 1982-83 Surge of Variegated Glacier, Alaska. **Science**, 227(4686), 469-474, 1985.

Books:

Pfeffer, W.T., **Columbia Glacier at Mid-Retreat: the Opening of a New Landscape**. Book, Published by American Geophysical Union, Washington DC, December 2007.

Pfeffer, W.T. **The Hand of the Small-Town Builder**. David R. Godine, Boston, 2014.

Other Publications:

Pfeffer, W.T., Glaciology Needs To Come Out Of The Ivory Tower, **EARTH Magazine**, November 2012

Art Activities:

Exhibitions:

The House, The Road, and The Valley: Occupation and Change in the Landscape of the American West. National Center for Atmospheric Research, April, 2005; Boulder Public Library, September – November, 2005; Auraria Library, Denver, December 2005 – January 2006.

The Texture of History: Abandonment and Rediscovery in the American West (with photographer R. S. Anderson), March-April, 2004, University of Colorado Andrew J. Macky Gallery.

Boulder Open Studios Tour, October 2003, 2004

Arctic and Alpine: Visions of a Landscape (with painter M.F. Meier), April-May, 2002, University of Colorado Andrew J. Macky Gallery.

Art/Architecture Publications:

W. T. Pfeffer, People and Place in the Far North: A Plan to Present the Vision of Life, Community, and Change in the Circumpolar Arctic. 2010. Reykjavik Academy, Iceland.

Columbia Glacier at Mid-Retreat: The Opening of a New Landscape. Publisher: American Geophysical Union, Washington DC. 2007.

The Hand of the Small Town Builder: Small Summer Cottages of Northern New England. Publisher: David R. Godine, Boston, MA. *In press*. Planned release data March 2014

Art Funding:

Graham Foundation for Advanced Studies in the Fine Arts, Chicago, Illinois. Grant provided to support photography for *The Hand of the Small Town Builder*. \$4900 (2003)