

Curriculum Vitae
Howard D. Mooers, Professor Emeritus

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Education

Ph.D., Geology, University of Minnesota, Minneapolis, 1988, emphasis in glacial geology, glaciology, and hydrogeology. Dissertation title: Quaternary history and ice dynamics of the Late Wisconsin Rainy and Superior lobes, central Minnesota.

B.S., Science and Environmental Change (Earth Science Emphasis), University of Wisconsin, Green Bay, 1979.

Professional Summary

Professor Emeritus, Department of Earth and Environmental Sciences, University of Minnesota Duluth, 2023 – Present.

Professor, Department of Earth and Environmental Sciences, University of Minnesota Duluth, 2004-2023.

Professor and Head, Department of Earth and Environmental Sciences, University of Minnesota Duluth, 2006-2009, 2013-2019.

R. L. Heller Professor of Geology, Department of Earth and Environmental Sciences, University of Minnesota Duluth, 1991 – 2023.

Associate Professor, Department of Geological Sciences, University of Minnesota Duluth, 1991-2004.

Director, University Honors, 2009-2012.

Director, Marshall Alworth Planetarium, Dec. 2005 – 2015.

President, Sigma Xi – The Scientific Research Society, University of Minnesota Duluth Chapter.

Associate Editor, Journal of Sedimentary Research, 1996 – 2000.

Awards

Horace T. Morse University of Minnesota Alumni Association Award for Outstanding Contributions to Undergraduate Education, 2004. This is the highest award given to faculty for teaching in the University of Minnesota System.

Member, Academy of Distinguished Teachers, University of Minnesota (inducted 2004)

Sabra and Dennis Anderson Teacher/Scholar Award, College of Sciences and Engineering, University of Minnesota Duluth, 2008

Professional Society Memberships

Geological Society of America, Fellow of the Society

American Geophysical Union

International Glaciological Society

General Research Interests

- a. Environmental impacts of industrialization, acid rain, heavy metal contamination (England).
- b. Quaternary history of the southern margin of the Laurentide Ice Sheet (North America).
- c. Groundwater flow and characteristic scales of variability in glacial sedimentary sequences
- d. Processes and spatial distribution of aquifer recharge;
- e. Geoarchaeology and early human settlement in the Midwestern United States, Neolithic landscapes of Great Britain.

Program Development

Co-developer, Natural History Minor Program, UMD, 2008

Co-developer, Astronomy Minor Program, UMD, 2007

Co-developer, Environmental Science Major, UMD, 2006

Co-developer, Environmental Studies Major, UMD, 1994

Graduate Student Theses Completed

40. [Glacial History of the Late Wisconsin Des Moines Lobe in Minnesota: Geomorphic, Lithologic and Stratigraphic Evidence for Two Advances](#). Heather Anderson Arends, MS, Geological Sciences, 2024.
39. [Geomorphological and Archaeoastronomical Analysis of a Neolithic Landscape, Cranborne Chase, Southern Britain](#). P. Burley, PhD, Earth Sciences, Twin Cities, 2024.
38. [Characterization of preserved remnants of the Pre-Pleistocene Saprolite on the Canadian Shield: Examples from Northeastern Minnesota](#). Christa Wood, MS, Earth Science, 2023.
37. Alteration Geochemistry and 3D Modeling of the Back Forty Volcanogenic Massive Sulfide (VMS) Deposit, Stephenson, Upper Peninsula of Michigan, USA. Margaret Upton, MS, Geological Sciences, 2023.
36. [Characterizing provenance of the Late Wisconsin Rainy Lobe Using Fine-fraction Geochemistry and Detrital Zircon Geochronology](#). Audray Hinkemeyer, MS, Earth Science, 2023.
35. [A Possible Late Pleistocene Impact Crater in Central North America and its Relation to the Younger Dryas Stadial](#). David Tovar, MS, Geological Sciences, 2020.
34. [Ore Liberation and Characterization Using Electric Pulse Disaggregation and Other Novel Techniques](#). Matthew Matko, Geological Sciences, 2020.
33. [Long-Term Hydrologic Sustainability of Calcareous Fens along Glacial Lake Agassiz Beach Ridges, Northwestern MN](#). Nicholas Budde, Geological Sciences, 2020
32. [A Genetic Model of Pillowed Dike and Peperite Formation Interpreted From Pleistocene and Archean Volcanogenic Sequences](#). Jacqueline Drazan, Geological Sciences 2019.
31. [A tunnel speleothem based stable-isotope record of Atlantic Multi-Decadal Oscillation forcing of precipitation in the Midlands, United Kingdom](#). Carolyn Shull, MS, Water Resources Sciences 2019.
30. [Estimating the Sliding Velocity of the Rainy Lobe Using Intermediate Clast Size in Lodgement Tills](#). Kristi Kotrapu, MS. Geological Sciences 2018.

29. [A method for correlation of gravestone weathering and air quality \(SO₂\), West Midlands, UK](#), Michael Carlson, MS., Geological Sciences, 2017.
28. [Myth as True History: Medicine Wheels and Landmarks as Boundary Markers of the Lakota World](#), P. Burley, MS, Geological Sciences, 2016.
27. [The Mid-Holocene record of lake level fluctuations and episodic eolian activity, Lake Winnibigoshish, North Central Minnesota](#). Lisa Broderius, MS. Geological Sciences, 2015
26. [A Hydrothermal Model for Metasomatism of Neoproterozoic Algoma-Type Banded Iron Formation to Massive Hematite Ore at the Soudan Mine, NE Minnesota](#). Adam Thompson, MS. Geological Sciences 2015.
25. [Surface boulder concentrations of the Late Wisconsinan Rainy lobe, Minnesota, USA](#), Angela Berthold, M.S. Geological Sciences, 2015.
24. [Statistical analysis of the spatial and temporal distribution of acid deposition in the West Midlands, England, United Kingdom](#). Avery Cota, M.S. Geological Sciences, 2012.
23. [Potential for slumps, sediment volcanoes, and excess turbidity in the Nemadji river Basin, Carlton County, MN](#). Irvin Mossberger, M.S. Geological Sciences, 2010.
22. [Conceptual and numerical techniques for optimization of groundwater flow systems in glacial sedimentary environments](#): John J. Quinn, Ph.D., Geology, 2009.
21. Controls on the spatial variability of mercury in fish, Boundary Waters Canoe Area Wilderness, Minnesota. Andrea Grygo, M.S. Water Resources Sciences (D. Branstrator, co-advisor), 2009.
20. [Paleoglaciological context of Rögen moraine, northeastern Minnesota](#), Margretta Meyer, M.S., Geology, 2009.
19. Quantification of glacial indicator dispersal processes and rates: Phillip Larson, Ph.D., Geology, 2008. <http://hdl.handle.net/11299/201536>, <http://hdl.handle.net/11299/201537>, <http://hdl.handle.net/11299/201525>.
18. Intensive cranberry cultivation and environmental impact of pesticide application on receiving waters: Deborah Anderson, Ph.D., Water Resources Sciences, 2006.
17. [Landscape evolution and a relict fish community, North Slope, Alaska](#). H. Rantala, M.S. Water Resources Sciences, 2005.
16. [Late glacial and Holocene history of the Glacial Lake Aitkin/Upham basin. North Central Minnesota](#), L. Marlow, M.S. Geology, 2004.
15. [Development of a county-scale wellhead protection strategy, Cass County, Minnesota](#), B. Bertsch, M.S., Water Resources Sciences, 2002.
14. Outlet glaciers, ice scoured troughs, and piedmont lobes along the margin of the Des Moines Lobe, Central Minnesota, USA: M. Whitehill, M.S. 2002, Geology.
13. Application of the revised universal soil loss equation within a geographical information system: David Stark, M.S. Water Resources Sciences, 2000.
12. Hydrology and hydrogeology of a barrier island system, Nag's Head Woods, N.C: Mark Holmes, M.S., Geology, 1999.

11. Multi-variate analyses of stream hydrographs and the determination of the spatial variability of infiltration and recharge, N. Arbit, M.S., Geology, 1999.
10. Late glacial and Holocene alluvial history of Mississippi Valley, St. Paul, MN, to Guttenburg, IA. T. Madigan, M.S., Geology, 1999.
9. Influence of free-flowing saline wells on regional groundwater flow and water quality on the Sheyenne delta sand plain, eastern North Dakota, K. Knoke, M.S., Geology, 1999.
8. Shallow ground-water quality beneath cropland in the Red River of the North Basin, Minnesota and North Dakota, 1993-1995, T. K. Cowdery, Geology, 1997.
7. Quantitative paleohydrology of the Portage and Brule outlets of Glacial Lake Duluth, S. Carney, M.S., Geology, 1996.
6. Aerial photo reconnaissance-level mapping of landform assemblages and the development of the "Land Type Association" layer for the Minnesota Ecological Classification System, J. Sharkey, M.S., Geology, 1996.
5. Determination of groundwater recharge and residence time in the Itasca moraine, north central Minnesota, by hydrogeochemical mass-balance and age-dating, S. Kanuit, M.S., Geology, 1996.
4. A landform-based approach to the quantification of recharge in a complex glacial sedimentary setting: the Itasca moraine, northwestern Minnesota, L. St. George, M.S., Geology, 1994.
3. Paleoenvironmental reconstruction of the Saginaw basin, Michigan, and its influence on human settlement during the Archaic period, S. Beaverson, M.S., June Geology, 1993.
2. Sedimentology and geochemistry of selected glacial sediments from central Minnesota as a method for correlation and provenance studies of glacial stratigraphic units, A. Gowan, M.S., June Geology, 1993.
1. Groundwater mapping and the determination of the optimum level of information for the assessment of groundwater sensitivity to contamination in complex glacial drift aquifers, J.J. Quinn, M.S., co-advising with H-O. Pfannkuch, March Geology, 1992.

Undergraduate Research Projects Supervised

37. Identification of Karst Features in the Portsdown Chalk Fm. from Aerial Photography, Dorset, UK. Morena Hammer, completed.
36. Trends in lilac bloom dates across England, 1880-2015: Climate, elevation, and environmental effects. Nathan Koski, completed.
35. Slope morphology of Icelandic fagurpúfur, Iceland, Brittany Hoover, completed.
34. 3-Dimensional structure and origin of Rögen Moraine NE Minnesota, Robert Kryzer, completed.
33. A Mathematical Framework for Biological Evolution based on Entropy, Haitao Shang, completed.
32. Development of a radio telescope, Zack Grimley, completed.
31. Conversion of satellite antenna to a radio telescope. Ben Rutter, completed May 2011.
30. Development of a Radio Telescope at UMD, Derrick Keffeler, completed June 2009.
29. An atmospheric turbulence and clarity sensor, Ryan Bezdicek, Completed Dec. 2009.
28. Age and morphology of Neoglacial moraines, Skaftafellsjökull, Iceland, Cara Leitheiser, proposal, completed June 2009.
27. Oh! Those Rebellious Stars! CCD photometry of variable stars, Li-Ping Mai, completed.
26. Flow Patterns of the Laurentide Ice Sheet and Dispersal of Erratics, Grace Johnson (Completed May 2007).
25. Capturing the light spectra of binary star systems and bright galaxies, Jessica Irwin (Completed Spring 2006).
24. Tombstone Corrosion and the Peppered Moth: Impacts of Acid Rain in England's Black Country, Amanda Putz (Completed Spring 2006).
23. 3D visualization of geological data using GEOWALL stereo projection, Mark Nelson (Completed Spring 2006, co-advised with Nigel Watrus)
22. Industrial Revolution, acid rain, and the increase in carbonate weathering rates near Birmingham, England: Part 1, Point-source emissions and proximal weathering rates, Amanda Putz (completed Spring 2005).
21. Industrial Revolution, acid rain, and the increase in carbonate weathering rates near Birmingham, England: Part 2, Prevailing winds and baseline weathering rates, Jaclyn Berger (completed Spring 2005).
20. Glacial landforms and recent retreat of Lewis Glacier, South Sister Mountain, Oregon, David Demmer (completed Spring 2005).
19. Integration of geological structure and variable erosivity into a simulation of stream network evolution, Luke Miller (Completed May 2004).
18. Evaluation of the effect of culverts on stream channel morphology, Superior National Forest, Josh Dark (Completed May 2003).
17. 3-D visualization of geologic data, Colin Gillis (Completed May 2002).
16. A quantitative evaluation of the relative contribution of locally vs. distally-derived rock types in till, Gregory E. Miron, (Completed December 2001).
15. A geostatistical evaluation of glacial stratigraphy in northeastern Minnesota, Undergraduate Research Opportunities Program, University of Minnesota, Lori Tuovila (Completed May 2001).
14. Processes and rates of comminution in the basal debris layer of ice sheets, Undergraduate Research Opportunities Program, University of Minnesota, Keri Hager (Completed December 2000).
13. On the origin of sedimentary variability in till, Undergraduate Research Opportunities Program, University of Minnesota, Kurt Carlson (Completed June 1999).

12. Spatial and temporal variation in evapotranspiration from boreal ecosystem wetlands, Undergraduate Research Opportunities Program, University of Minnesota, Danial Allison (Completed June 1998).
11. Testing models of Laurentide Ice Sheet inception and evolution, Undergraduate Research Opportunities Program, University of Minnesota, Nicole Ristow (Completed June 1999).
10. Direct measurement of evapotranspiration from boreal ecosystem wetlands using a portable ET chamber, Undergraduate Research Opportunities Program, University of Minnesota, Ryan Peterson (Completed June 1998).
9. A bench-scale model of growth and decay of the Laurentide Ice Sheet and the dispersal of Hudson Bay erratics, Undergraduate Research Opportunities Program, University of Minnesota, Donna Gunderson (Completed June 1997).
8. Dispersal of erratics from Hudson Bay and the development of a mixing model for tills of differing compositions, Undergraduate Research Opportunities Program, University of Minnesota, Stephen DeLong (Completed June 1997).
7. Estimation of groundwater recharge to the Hinckley/Mt. Simon aquifer, Twin Cities Artesian Basin, Undergraduate Research Opportunities Program, University of Minnesota, Jody Hulne (Completed June 1997).
6. Stream hydrograph analysis and quantification of recharge to shallow and deep aquifer systems, Twin Cities Artesian Basin, Undergraduate Research Opportunities Program, University of Minnesota, Carrie Karl (Completed June 1997).
5. On the timing of sand dune formation in Minnesota, independent research project, Eric Liestman (Completed June 1996).
4. Development of a groundwater sensitivity map for the eight county region of the Mississippi Headwaters Board, Undergraduate Research Opportunities Program, University of Minnesota, G. Partch, Completed June 1995.
3. Late Glacial and Holocene sedimentation history of Lake Pepin and the Mississippi River, St. Paul to Red Wing, Minnesota, Undergraduate Research Opportunities Program, University of Minnesota, M.C. Mrachek, Completed June 1994.
2. Development of a wellhead protection strategy for the city of Grand Rapids, Minnesota, Undergraduate Research Opportunities Program, University of Minnesota, B. Jackson, Completed June 1994.
1. Estimation of the spatial distribution of recharge over complex glacial sedimentary settings, Undergraduate Research Opportunities Program, University of Minnesota, P.M. Schulte, Completed June 1993.

Research Funding

A Community of Nature: Development of a support network and curriculum for the recruitment and retention of American Indians in STEM disciplines with emphasis on Tribal Resource Management. Multi-institutional proposal (H.D. Mooers, UMD-PI, Diana Dalbotten, co-PI, Rachel Breckenridge, co-I) 2015 NSF HRD-Tribal Colleges and Universities Program, UMD-portion \$290,000, grant total \$1,059,209. (Funded, Ended 9/2021)

Spatial and temporal distribution of acid rain, West Midlands, UD, \$16,000, University of Minnesota Duluth, Honors Program, Director's discretionary research fund, Sept. 2009 – May 2012.

- Relative impacts of shallow vs. deep groundwater inputs on eutrophication of Roosevelt Lake: a model for central Minnesota Lakes, Center for Community and Regional Research, university of Minnesota, \$6600.00, March 2009.
- Stratigraphy and hydrogeology of the headwaters of Deer Creek, Carlton County, MN. Environmental Protection Agency, section 319, \$30,000 (co-PI with Nigel Wattrus), 2005.
- Incorporation of geological structure into a numerical simulation of landscape evolution, University of Minnesota Duluth Chancellors small grant, \$750, Sept. 2003 – May, 2004.
- A detailed surface water and groundwater investigation of the Tenmile Lake watershed, Cass County, Minnesota. Mississippi Headwaters Board, \$2700, August 2003 – June 2004, H. Mooers PI.
- Paleoenvironmental response of the Mississippi Headwaters watershed to Holocene climate change, Water Resources Research Initiative, Water Resources Center, \$46,256, March 1, 2001 – June 30, 2003, H. Mooers, PI.
- Paleoenvironmental response of the Mississippi Headwaters watershed to Holocene climatic change, University of Minnesota Faculty Grant-In-Aid, \$20,246, July 1, 2000 – December 31, 2001, H. Mooers, PI.
- Development of water and environmental management plan, Camp Ripley Military Reserve, Minnesota. Minnesota Army National Guard, \$1,383,000, December 1999 – September 2004, H. Mooers PI.
- Development of a groundwater well database for Crow Wing County, Minnesota. Minnesota Department of Health, \$64,000, H. Mooers, PI.
- Productivity and plant species in beaver meadows, National Science Foundation, \$600,000, March 1, 1997 - April 30, 2001, (Carol Johnston, PI, John Pastor, Co PI, and Howard Mooers, Co PI).
- Development of a regional groundwater flow model for Cass County, Minnesota, and its utility for streamlining wellhead protection. Minnesota Department of Health, \$59,464, H. Mooers, PI.
- Coordination and management of the Cold Spring, Minnesota, Clean Water Partnership. Cold Spring, Minnesota, \$29,878, H. Mooers, PI.
- Evaluation of mineral potential of a granite-greenstone terrane and the utility of glacial drift geochemistry as an exploration tool: Minnesota Department of Natural Resources –
- Division of Minerals, \$45,000, January 1, 1998 – August 31, 1998, (R.L. Morton PI, H.D. Mooers, Co-PI, and G. Hudak, Co-PI).
- Development of a groundwater well database for Cass County, Minnesota. Cass County Environmental Services and Minnesota Department of Health, \$39,023.
- 1995 - Development of a wellhead protection strategy for Cass County, Minnesota. Cass County Environmental Services, \$45,394, Sept. 1, 1995 - June 30, 1997, (H.D. Mooers, PI).
- Development of an archaeological sensitivity model for a pipeline corridor, North Dakota and Minnesota. IMA Consulting, \$30,228, December 1, 1996 - August 31, 1997, (H.D. Mooers, PI).
- Development of an archaeological sensitivity model for the Lakehead Pipeline corridor, Wisconsin and Illinois. IMA Consulting, \$14,659, April 1, 1996 - May 31, 1997, (H.D. Mooers, PI).

- Geomorphological mapping for the development of the Land Type Association layer of the Ecological Classification system, northern Minnesota. Minnesota Department of Natural Resources - Division of Forestry, \$45,000, July 1, 1994 - August 31, 1995, (H.D. Mooers, PI).
- Hydrogeology of the Itasca moraine, northcentral Minnesota: spatial distribution of recharge, groundwater residence time, flow system dynamics, and regional influence. Water Resources Research Center, \$41,244, July 1993 through June 1995, (H.D. Mooers, PI).
- Topographic control of regional groundwater hydrology and implications on surface water quality and supply, Itasca moraine, northwestern Minnesota. Legislative Commission on Minnesota Resources through the Mississippi Headwaters Board, \$35,273, July 1993 through June 1995, (H.D. Mooers, PI).
- Statistical analysis of geochemical and mineralogical data in support of mineral prospecting, Minnesota Department of Natural Resources - Division of Minerals, \$500, March - April 1995, (H.D. Mooers, PI).
- Geomorphological investigation of archaeological sensitivity for landforms at site 47-PT-42, Portage Co., Wisconsin. Midwest Archaeological Consultants, \$11,000, July 1, 1994 - Sept. 30, 1995, (H.D. Mooers, PI).
- Late glacial and Holocene alluvial history of Mississippi Valley tributaries in the Red Wing locality, Minnesota, and the potential for buried cultural materials, State Historical Society of Wisconsin, and the Institute for Minnesota Archaeology, \$4434, and the Center for Community and Regional Research, \$3705.20, July 1, 1993 - June 30, 1994, (H.D. Mooers, PI).
- A landform-based approach to the determination of groundwater vulnerability to contamination, Nemadji River watershed, Carlton Co., Minnesota. Carlton County Soil and Water Conservation District, \$9600.00; Center for Community and Regional Research, \$5000, May 1992 to December 1993, (H.D. Mooers, PI).
- Topographic Control of Regional Groundwater Hydrology and Implication for Surface Water Quality and Supply, University of Minnesota Graduate School, \$11,762, July 1992 through June 1994, (H.D. Mooers, PI).
- Paleoenvironmental setting and human interaction during Archaic through Late Woodland time in eastern Michigan. Institute for Minnesota Archaeology, \$36,000, Sept. 1991 through May 1993, (H.D. Mooers, PI).
- Groundwater mapping and the assessment of groundwater sensitivity to contamination in complex glacial drift aquifers. Water Resources Research Center, Federal funds \$30,228, State matching funds \$54,072, July 1989 through June 1991. (H.D. Mooers, PI, with H-O. Pfannkuch)
- Geomorphic evolution, climatic change, and early human settlement in the Upper Mississippi Valley, Minnesota. U.S. Army Corps of Engineers, \$21,150, September 1988. (C.A. Dobbs, PI, H.D. Mooers, Co-PI).

Peer Reviewed Publications

- Mooers, H.D.** (submitted, 3/2025), Lead Lettered Marble Gravestones as a Record of Air Quality and the Efficacy of Urban Vegetation in Mitigating Air Pollution. *Association of Gravestone Studies Quarterly*.
- Mooers, H.D.**, Moen, R., Pastor, J. (in revision). Mastodons and the Late Glacial vegetation of eastern North America. *Quaternary Research*.
- Budde, N.R., **Mooers, H.D.**, Cowdery, T.K., and Wattrus, N.J., (2022), Long-Term Hydrologic Sustainability of Calcareous Fens along the Glacial Lake Agassiz Beach Ridges, northwestern Minnesota, USA. *Wetlands*, 42.4, 1-17, <https://doi.org/10.1007/s13157-022-01544-8>.
- Pfannkuch, H-O., **Mooers, H.D.**, Siegel, D.I., Quinn, J.J., Rosenberry, D.O., and Alexander, Scott C., (2021) "Jacob's Zoo": How Using Jacob's Method for Aquifer Testing Leads to More Intuitive Understanding of Aquifer Characteristics. *Hydrogeology Journal*, 29(6), 2001-2015., <https://doi.org/10.1007/s10040-021-02363-7>.
- Mooers, H.D.**, Larson, P.C., Berthold, A.J., Kotrapu, K.M., Meyer, M.S., Kryzer, R. (submitted) Cyclic evolution of the basal boundary condition of the Laurentide Ice Sheet inferred from sediments and landforms. *Quaternary Science Reviews*.
- Burley, P.D. and **Mooers, H.D.**, (in review) Geomorphic Characteristics of Neolithic Monuments at Cranborne Chase, Dorset, England. *Geoarchaeology*.
- Burley, P.D. and **Mooers, H.D.**, (in review) Long Barrow and Cursus Location and Orientation in the Cranborne Chase Neolithic Landscape. *Archaeological Journal*.
- Burley, P.D. and **Mooers, H.D.**, (in review) Geography, Geology, and Geometry of the Dorset Cursus, Cranborne Chase, Dorset, England. *Antiquity*.
- Mooers, H.D.**, Jones, Kathleen A., and van Scoy, Michael S. (2020) [Duct Tape Occlusion Therapy in the Treatment of Plantar Warts](#). University of Minnesota Digital Conservancy,
- Mooers, H.D.** and Burley, P.D. (2020) [Revisiting the Megalithic Yard](#). University of Minnesota Digital Conservancy,
- Mooers, H.D.** and Massman, W.J., 2017. Gravestone decay and the determination of deciduous bulk canopy resistance to acid deposition. *Science of the Total Environment*, 578, pp. 551-556.
- Mooers, H.D.**, Carlson, M.J., Harrison, R.M., Inkpen, R.J. and Loeffler, S., 2017. Correlation of gravestone decay and air quality 1960–2010. *Atmospheric Environment*, 152, pp.156-171.
- Inkpen, R., **Mooers, H.D.** and Carlson, M.J., 2017. Using rates of gravestone decay to reconstruct atmospheric sulphur dioxide levels. *Area*, 49(2), pp.174-184.
- Mooers, H.D.**, Cota-Guertin, A.R., Regal, R.R., Sames, T.R., Dekan, A.J., and Henlels, L.M., 2016, A 120-year Record of the spatial and temporal distribution of acid deposition, West Midlands, England, United Kingdom, *Atmospheric Environment* (127), February 2016, 139–154.
- Mooers, H.D.**, Wiethoff, W.S., and Evich, A., 2016, Monitoring the Continuing Spectral Evolution of Nova Delphini 2013 (V339 Del) with Low Resolution Spectroscopy, *Journal of the American Association of Variable Star Observers*, v. 44, no. 1.

- Mooers, H.D.** and Wiethoff, W.S., 2014, 125-Day Spectral Record of the Bright Nova 2013 Delphini (V339 Del), *Journal of the American Association of Variable Star Observers*. Vol. 42, 161-165.
- Larson, P.C., Knaeble, A., **Mooers, H.D.**, and Marlow, L.M., 2014, The St. Louis Sublobe and Glacial Lake Upham, Fieldtrip guidebook for the 60th annual meeting of the Institute on lake Superior geology.
- Mooers, H.D.** and Bandli, B., 2013, Lutefisk: Secrets of the taste, texture, and aroma revealed by scanning electron microscopy, *Journal of Irreproducible Results*, v. 52, no. 2.
- Larson, P.C. and **Mooers, H.D.**, 2005, Generation of a heavy mineral glacial dispersal train from a diabase sill, Nipigon region, northwestern Ontario. *Canadian Journal of Earth Sciences*, 42, 1601-1613.
- Knaeble, Alan, Meyer, G.N., Marlow, L.R., Larson, P.C. and **Mooers, H.D.**, 2005, Deposits and landforms in the region glaciated by the St. Louis Sublobe, Field Trip #3, North-central GSA. Geological Society of America Field Trip Guidebook.
- Larson, P.C. and **Mooers, H.D.**, 2005, Comment on: Subglacial erosion and englacial sediment transport modeled for North American Ice Sheets by D.H.D. Hildes, G.K.C. Clarke, G.E. Flowers, D.J. Marshall. *Quaternary Science Reviews*, v. 24, nos. 1-2, 233-234.
- Larson, P.C. and **Mooers, H.D.**, 2004, Glacial indicator dispersal processes: a conceptual model, *Boreas*, vol. 33, no. 3, p. 238-249.
- O'Brien, W.J., Barfield, M., Bettez, N.D.; Gettel, G.M., Hershey, A.E.; McDonald, M.E.; Miller, M.C., **Mooers, H.**, Pastor, J., Richards, C., Schuldt, J., 2004, Physical, chemical, and biotic effects on arctic zooplankton communities and diversity, *Limnology and Oceanography* 49 (4, Part 2), p. 1250-1261.
- Prest, V.K., Donaldson, J.A., and **Mooers, H.D.**, 2001, The Omar story: The role of Omars in assessing glacial history of west central North America, *Géographie Physique et Quaternaire*, vol. 54, no. 3, p. 257-270.
- Brown, T.N, Pastor, J., Johnston, C.A., and **Mooers, H.D.**, 2000, A finite difference type algorithm with pro rata resource allocation, *Ecological Modeling*, V. 126, No. 1, 1-19.
- Hershey, A.E., Gettel, G., McDonald, M.E., Miller, M.C., **Mooers, H.**, O'Brien, W.J., Pastor, J., Richards, C., and Schuldt, J.A., (1999), A geomorphic-trophic model for landscape control of trophic structure in arctic lakes, *Bioscience*, V. 49, No.11, 887-898.
- Mooers, H.D.**, 1999, Comparison of loss on ignition and coulometric titration for determining carbonate content of till. *Glacial Geology and Geomorphology*, tn01.
- Johnson, M.D. and **Mooers, H.D.**, 1998, Ice-margin positions of the Superior lobe during Late Wisconsinan deglaciation. In, Patterson, C.J. and Wright, H.E., Jr., Eds., Contributions to the Quaternary of Minnesota, Minnesota Geological Survey Report of Investigations 49, 7-13.
- Carney, L.M. and **Mooers, H.D.**, 1998, Landform assemblages and glacial history of a portion of the Itasca moraine, north-central Minnesota. In, Patterson, C.J. and Wright, H.E., Jr., Eds., Contributions to the Quaternary of Minnesota, Minnesota Geological Survey Report of Investigations 49, 85-95.
- Shmagin, B.A., Johnston, C.A. and **Mooers, H.D.**, 1998, The systemic model of a hydrosphere of the Earth and temporal-spatial variability of the river runoff in headwaters of the Mississippi. In, A

- Buccianti, G. Nardi, and R. Potenza (Eds.), Proceedings of the International Association of Mathematical Geologists 1998, p. 484-489.
- Mooers, H.D.** and Lehr, J.D., 1998, Terrestrial record of Laurentide Ice Sheet reorganization during Heinrich events, *REPLY. Geology*, v. 26, no. 7, p. 668-669.
- Mooers, H.D.** and Lehr, J.D., 1997, Terrestrial record of Laurentide Ice Sheet reorganization during Heinrich events, *Geology*, v. 25, no. 11, p. 987-990.
- Mooers, H.D.**, 1997, Numerical reconstruction of a soft-bedded Laurentide Ice Sheet during the last glacial maximum: Comment, *Geology*, v. 25, no. 4, p.379-380.
- Mooers, H. D.**, and Norton, A. R., 1997, Glacial landscape evolution of the Itasca / St. Croix moraine interlobate area including the Shingobee River headwaters area, in Winter, T. C., ed., Hydrological and Biogeochemical Research in the Shingobee River Headwaters Area, North-central Minnesota: Denver, United States Geological Survey Water Resources Investigation Report 96-4215, p. 3-10.
- Shmagin, B. A., Johnston, C. A., and **Mooers, H. D.**, 1997, The temporal-spatial variability of ground-water resources in the headwaters of the Mississippi, in Watson, K. W., and Zaporozec, A., eds., Advanced in Ground-Water Hydrology: A Decade of Progress: St. Paul, American Institute of Hydrology, p. 321-326.
- Mulholland, S.C., Mulholland, S.L., Peters, G.R., Huber, J.K., and **Mooers, H.D.**, 1997, Paleo-Indian occupations in northeastern Minnesota: How early? *North American Archaeologist*, v. 18, no. 4, p. 371-400.
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- Mooers, H.D.** 1995, A landscape classification in support of the development of the Land-Type Association layer of the Ecological Classification System, Northern and Central Minnesota, Minnesota Department of Natural Resources-Division of Forestry, 48 maps (1:100,000) with legend.
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