

Mark G. Flanner

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PROFESSIONAL APPOINTMENTS

- 2021–*present* *Professor*, Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor MI
- 2015–2021 *Associate Professor*, Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor MI
- 2016–2017 Visiting scholar at the Institut des Géosciences de l'Environnement (IGE), Université Grenoble Alpes, France
- 2009–2015 *Assistant Professor*, Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor MI
- 2007–2009 *Postdoctoral Fellow*, Advanced Study Program (ASP), National Center for Atmospheric Research, Boulder CO

EDUCATION

- Ph.D. (2007) Earth System Science, University of California, Irvine.
Thesis advisor: [Charlie Zender](#)
- B.S. (2002) Biomedical Engineering, University of Wisconsin, Madison
(2000: visiting student at the Technical University of Budapest, Hungary)

OUTREACH, SERVICE, and SYNERGISTIC ACTIVITIES

- 2018–*present* U. of M. representative to the University Corporation of Atmospheric Research (UCAR)
- 2007–*present* Peer-reviewer for more than 100 unique journal article submissions
- 2004–*present* Author and maintainer of the Snow, Ice, and Aerosol Radiative (SNICAR) model (online at: <http://snow.engin.umich.edu/>)
- 2016–2022 Co-chair, Arctic Monitoring and Assessment Programme (AMAP) Short-lived Climate Forcers Expert Group
- 2018–2022 Associate Editor for *The Cryosphere*
- 2017–2021 Member of the NSF Advisory Committee for the Office of Polar Programs
- 2020–2021 Member of AGU Macelwane Medal Selection Committee
- Sept. 2020 Panelist for event: “The Future of the Outdoor State: Climate Impacts in the Midwest”, hosted by Protect Our Winters (POW)
- 2015–2019 Member of the *Eos* Editorial Advisory Board
- 2015–2018 Steering committee member for the snow model intercomparison project: ESM-SnowMIP
- January 2017 Guest lecturer for the [European Research Course on Atmospheres](#) (ERCA), Grenoble France
- 2009–2015 U.S. representative to the Arctic Monitoring and Assessment Programme (AMAP) Short-Lived Climate Forcers Expert Group. A lead author of 2011 AMAP report: [The Impact of Black Carbon on Arctic Climate](#), and 2015 report: [Black carbon and ozone as Arctic climate forcers](#)
- July 2014 Guest lecturer at [2014 Connaught Summer Institute in Arctic Science](#) (“Atmosphere, Cryosphere, and Climate”), Alliston, Ontario

- 2010–2013 Contributing author to [Chapter 7 \(Clouds and Aerosols\) of the IPCC Working Group 1 Fifth Assessment Report](#)
- June 2012 Guest lecturer at [Alpine Summer School Course XX \(“Climate, Aerosols and the Cryosphere”\)](#), Valsavarenche, Italy
- 2010–2011 A lead author of 2011 UNEP/WMO report: [Integrated Assessment of Black Carbon and Tropospheric Ozone](#)

HONORS

- 2022 Recipient of the John F. Ullrich Education Excellence Award
- 2018 [Named a Highly Cited Researcher](#) by [Clarivate Analytics](#)
- 2017 Nominated by students for the U-M Golden Apple Award, which recognizes outstanding university teaching
- 2015 AGU 2014 Editors' Citation for Excellence in Refereeing – *Journal of Geophysical Research Atmospheres*
- 2013 Awarded Faculty Early Career Development (CAREER) grant from the National Science Foundation
- 2012 On [invitation from Secretary of State Hillary Clinton](#), attended State Department announcement of new U.S.-led Climate & Clean Air Coalition (CCAC) to reduce short-lived climate pollutants
- 2005–2007 NASA Earth System Science Fellowship
- 2006 Outstanding Student Presentation Award (oral), Fall 2005 Meeting of the American Geophysical Union
- 2005 UCI Medal student award

TEACHING / ADVISING (as of Mar. 2025)

- CLIMATE 105 *Our Changing Atmosphere* (5 semesters)
- CLIMATE 380 *Introduction to Atmospheric Radiation* (6 semesters)
- CLIMATE 473 *Climate Physics* (11 semesters)
- CLIMATE 532 *Radiative Transfer* (5 semesters)
- Advising Chairing/chaired thesis committees of 1 current / 7 former Ph.D. students
Serving/served on thesis committees of 2 current / 33 former PhD students
Advised research projects for 3 M.S. students
Advised research projects for 18 undergrad and REU students

JOURNAL PUBLICATIONS (advised students underlined, post-docs italicized)

Google Scholar: [Mark Flanner](#) (total citations: >28,000; h-index: 61)
Web of Science: [C-6139-2011](#) (total citations: >19,000; h-index: 53)
ORCID: [0000-0003-4012-174X](#)

97) [Xie, Y.](#), [Pettersen, C.](#), [Flanner, M.](#), and [Shates, J.](#) (2024), [Ground-observed snow albedo changes during rain-on-snow events in northern Alaska](#), *Journal of Geophysical Research: Atmospheres*, 129, e2024JD040975, doi: 10.1029/2024JD040975.

96) [Duspayev, A.](#), [Flanner, M. G.](#), and [Riihelä, A.](#) (2024), [Earth's sea ice radiative effect from 1980 to](#)

2023, *Geophysical Research Letters*, 51, e2024GL109608. doi: 10.1029/2024GL109608.

95) Fair, Z., **Flanner, M.**, Neumann, T., Vuyovich, C., Smith, B., and Schneider, A. (2024), [Quantifying volumetric scattering bias in ICESat-2 and Operation IceBridge altimetry over Greenland firn and aged snow](#), *Earth and Space Science*, 11, e2022EA002479, doi: 10.1029/2022EA002479.

94) Whicker-Clarke, C. A., Antwerpen, R., **Flanner, M. G.**, Schneider, A., Tedesco, M., and Zender, C. S. (2024), [The effect of physically based ice radiative processes on Greenland ice sheet albedo and surface mass balance in E3SM](#), *Journal of Geophysical Research: Atmospheres*, 129, e2023JD040241, doi: 10.1029/2023JD040241.

93) He, C., **Flanner, M.**, Lawrence, D. M., and Gu, Y. (2024), [New features and enhancements in community land model \(CLM5\) snow albedo modeling: Description, sensitivity, and evaluation](#), *Journal of Advances in Modeling Earth Systems*, 16, e2023MS003861, doi: 10.1029/2023MS003861.

92) Gerlein-Safdi, C., P. Köhler, S. Wang, **M. Flanner**, G. Keppel-Aleks and C. Frankenberg (2023), [Algae Blooms on the Greenland Ice Sheet Detected Through Solar-Induced Fluorescence](#), *IEEE Trans. Geosci. Remote Sens.*, 61, 1-9, 4302309, doi: 10.1109/TGRS.2023.3305194.

91) Bonilla, E. X, L. J. Mickley, E. G. Beaudon, L. G. Thompson, W. E. Rodriguez, R. Cruz Encarnación, C. A. Whicker, **M. G. Flanner**, C. G. Schmitt, and P. Ginot (2023), [Contribution of biomass burning to black carbon deposition on Andean glaciers: consequences for radiative forcing](#), *Environ. Res. Lett.*, 18, 024031, doi: 10.1088/1748-9326/acb371.

90) Whaley, C. H., Law, K. S., Hjorth, J. L., Skov, H., Arnold, S. R., Langner, J., Pernov, J. B., Bergeron, G., Bourgeois, I., Christensen, J. H., Chien, R.-Y., Deushi, M., Dong, X., Effertz, P., Faluvegi, G., **Flanner, M.**, Fu, J. S., Gauss, M., Huey, G., Im, U., Kivi, R., Marelle, L., Onishi, T., Oshima, N., Petropavlovskikh, I., Peischl, J., Plummer, D. A., Pozzoli, L., Raut, J.-C., Ryerson, T., Skeie, R., Solberg, S., Thomas, M. A., Thompson, C., Tsigaridis, K., Tsyro, S., Turnock, S. T., von Salzen, K., and Tarasick, D. W. (2023), [Arctic tropospheric ozone: assessment of current knowledge and model performance](#), *Atmos. Chem. Phys.*, 23, 637–661, doi: 10.5194/acp-23-637-2023.

89) von Salzen, K., C. H. Whaley, S. C. Anenberg, R. Van Dingenen, Z. Klimont, **M. G. Flanner**, R. Mahmood, S. R. Arnold, S. Beagley, R.-Y. Chien, J. H. Christensen, S. Eckhardt, A. M. L. Ekman, N. Evangeliou, G. Faluvegi, J. S. Fu, M. Gauss, W. Gong, J. L. Hjorth, U. Im, S. Krishnan, K. Kupiainen, T. Kühn, J. Langner, K. S. Law, L. Marelle, D. Olivié, T. Onishi, N. Oshima, V.-V. Paunu, Y. Peng, D. Plummer, L. Pozzoli, S. Rao, J.-C. Raut, M. Sand, J. Schmale, M. Sigmond, M. A. Thomas, K. Tsigaridis, S. Tsyro, S. T. Turnock, M. Wang, and B. Winter (2022), [Clean air policies are key for successfully mitigating Arctic warming](#), *Commun. Earth Environ.*, 3, 222, doi: 10.1038/s43247-022-00555-x.

88) Fair, Z., **Flanner, M.**, Schneider, A., and Skiles, S. M. (2022), [Sensitivity of modeled snow grain size retrievals to solar geometry, snow particle asphericity, and snowpack impurities](#), *The Cryosphere*, 16, 3801–3814, doi: 10.5194/tc-16-3801-2022.

87) Whaley, C. H., Mahmood, R., von Salzen, K., Winter, B., Eckhardt, S., Arnold, S., Beagley, S., Becagli, S., Chien, R.-Y., Christensen, J., Damani, S. M., Dong, X., Eleftheriadis, K., Evangeliou, N., Faluvegi, G., **Flanner, M.**, Fu, J. S., Gauss, M., Giardi, F., Gong, W., Hjorth, J. L., Huang, L., Im, U., Kanaya, Y., Krishnan, S., Klimont, Z., Kühn, T., Langner, J., Law, K. S., Marelle, L., Massling, A., Olivié, D., Onishi, T., Oshima, N., Peng, Y., Plummer, D. A., Popovicheva, O., Pozzoli, L., Raut, J.-C., Sand, M., Saunders, L. N., Schmale, J., Sharma, S., Skeie, R. B., Skov, H., Taketani, F., Thomas, M. A., Traversi, R., Tsigaridis, K., Tsyro, S., Turnock, S., Vitale, V., Walker, K. A., Wang, M., Watson-Parris, D., and Weiss-Gibbons, T. (2022), [Model evaluation of short-lived climate forcers for the Arctic Monitoring and Assessment Programme: a multi-species, multi-model study](#), *Atmos. Chem. Phys.*, 22, 5775–5828, doi: 10.5194/acp-22-5775-2022.

- 86) Brown, H., Wang, H., **Flanner, M.**, Liu, X., Singh, B., Zhang, R., Yang, Y., and Wu, M. (2022), [Brown carbon fuel and emission source attributions to global snow darkening effect](#), *J. Adv. Model. Earth Syst.*, 14, e2021MS002768, doi: 10.1029/2021MS002768.
- 85) **Whicker, C. A., Flanner, M. G.**, Dang, C., Zender, C. S., Cook, J. M., and Gardner, A. S. (2022), [SNICAR-ADv4: a physically based radiative transfer model to represent the spectral albedo of glacier ice](#), *The Cryosphere*, 16, 1197–1220, doi: 10.5194/tc-16-1197-2022.
- 84) **Flanner, M. G.**, Arnheim, J. B., Cook, J. M., Dang, C., He, C., Huang, X., Singh, D., Skiles, S. M., Whicker, C. A., and Zender, C. S. (2021), [SNICAR-ADv3: a community tool for modeling spectral snow albedo](#), *Geosci. Model Dev.*, 14, 7673–7704, doi: 10.5194/gmd-14-7673-2021.
- 83) **Ward, J. L., Flanner, M. G.**, and Dunn-Sigouin, E. (2020), [Impacts of Greenland block location on clouds and surface energy fluxes over the Greenland Ice Sheet](#). *J. Geophys. Res. Atmos.*, 125, e2020JD033172, doi:10.1029/2020JD033172.
- 82) **Fair, Z., Flanner, M.**, Brunt, K. M., Fricker, H. A., and Gardner, A. S. (2020), [Using ICESat-2 and Operation IceBridge altimetry for supraglacial lake depth retrievals](#), *The Cryosphere*, 14, 4253–4263, doi: 10.5194/tc-14-4253-2020.
- 81) Snide, C. E., L. Gilbert, A. Meyer, P. Samson, **M. Flanner**, and J. Bassis (2020), [Seeing the Greenland Ice Sheet through students' eyes](#), *Eos*, 101, doi:10.1029/2020EO139739.
- 80) Cook, J. M., Tedstone, A. J., Williamson, C., McCutcheon, J., Hodson, A. J., Dayal, A., Skiles, M., Hofer, S., Bryant, R., McAree, O., McGonigle, A., Ryan, J., Anesio, A. M., Irvine-Fynn, T. D. L., Hubbard, A., Hanna, E., **Flanner, M.**, Mayanna, S., Benning, L. G., van As, D., Yallop, M., McQuaid, J. B., Gribbin, T., and Tranter, M. (2020), [Glacier algae accelerate melt rates on the south-western Greenland Ice Sheet](#), *The Cryosphere*, 14, 309–330, doi:10.5194/tc-14-309-2020.
- 79) Wang, H., R. C. Easter, R. Zhang, P.-L. Ma, B. Singh, K. Zhang, D. Ganguly, P. J. Rasch, S. M. Burrows, S. J. Ghan, S. Lou, Y. Qian, Y. Yang, Y. Feng, **M. Flanner**, R. L. Leung, X. Liu, M. Shrivastava, J. Sun, Q. Tang, S. Xie, J.-H. Yoon (2020), [Aerosols in the E3SM Version 1: New developments and their impacts on radiative forcing](#), *J. Adv. Model. Earth Syst.*, 12, e2019MS001851, doi:10.1029/2019MS001851.
- 78) Lawrence, D. M., R. A. Risher, C. D. Koven, K. W. Oleson, S. C. Swenson, G. Bonan, N. Collier, B. Ghimire, L. van Kampenhout, D. Kennedy, E. Kluzek, P. J. Lawrence, F. Li, H. Li, D. Lombardozzi, W. J. Riley, W. J. Sacks, M. Shi, M. Vertenstein, W. R. Wieder, C. Xu, A. A. Ali, A. M. Badger, G. Bisht, M. van den Broeke, M. A. Brunke, S. P. Burns, J. Buzan, M. Clark, A. Craig, K. Dahlin, B. Drewniak, J. B. Fisher, **M. Flanner**, A. M. Fox, P. Gentine, F. Hoffman, G. Keppel-Aleks, R. Knox, S. Kumar, J. Lenaerts, L. R. Leung, W. H. Lipscomb, Y. Lu, A. Pandey, J. D. Pelletier, **J. Perket**, J. T. Randerson, D. M. Ricciuto, B. M. Sanderson, A. Slater, Z. M. Subin, J. Tang, R. Q. Thomas, M. V. Martin, X. Zeng (2019), [The Community Land Model version 5: Description of new features, benchmarking, and impact of forcing uncertainty](#), *J. Adv. Model. Earth Syst.*, 11, doi:10.1029/2018MS001583.
- 77) Dang, C., Zender, C. S., and **Flanner, M. G.** (2019), [Intercomparison and improvement of two-stream shortwave radiative transfer schemes in Earth system models for a unified treatment of cryospheric surfaces](#), *The Cryosphere*, 13, 2325–2343, doi:10.5194/tc-13-2325-2019, 2019.
- 76) Chen, Y.-H., X.L. Huang, X. H. Chen, and **M. G. Flanner** (2019), [The Effects of Surface Longwave Spectral Emissivity on Atmospheric Circulation and Convection over the Sahara and Sahel](#), *J. Climate*, 32(15), 4873-4890, doi:10.1175/JCLI-D-18-0615.1.
- 75) **Schneider, A., Flanner, M.**, De Roo, R., and Adolph, A. (2019), [Monitoring of snow surface near-infrared bidirectional reflectance factors with added light-absorbing particles](#), *The Cryosphere*, 13, 1753-

- 74) Rasch, P. J., S. Xie, P.-L. Ma, W. Lin, H. Wang, Q. Tang, S. M. Burrows, P. Caldwell, K. Zhang, R. C. Easter, P. Cameron-Smith, B. Singh, H. Wan, J.-C. Golaz, B. E. Harrop, E. Roesler, J. Bacmeister, V. E. Larson, K. J. Evans, Y. Qian, M. Taylor, L. R. Leung, Y. Zhang, L. Brent, M. Branstetter, C. Hannay, S. Mahajan, A. Mametjanov, R. Neale, J. H. Richter, J.-H. Yoon, C. S. Zender, D. Bader, **M. Flanner**, J. G. Foucar, R. Jacob, N. Keen, S. A. Klein, X. Liu, A.G. Salinger, M. Shrivastava, Y. Yang (2019), [An Overview of the Atmospheric Component of the Energy Exascale Earth System Model](#), *J. Adv. Model. Earth Syst.*, 11, 2377– 2411, doi:10.1029/2019MS001629.
- 73) Golaz, J.-C., P. M. Caldwell, L. P. Van Roekel, M. R. Petersen, Q. Tang, J. D. Wolfe, G. Abeshu, V. Anantharaj, X. S. Asay-Davis, D. C. Bader, S. A. Baldwin, G. Bisht, P. A. Bogenschutz, M. Branstetter, M. A. Brunke, S. R. Brus, S. M. Burrows, P. J. Cameron-Smith, A. S. Donahue, M. Deakin, R. C. Easter, K. J. Evans, Y. Feng, **M. Flanner**, J. G. Foucar, J. G. Fyke, B. M. Griffin, C. Hannay, B. E. Harrop, M. J. Hoffman, E. C. Hunke, R. L. Jacob, D. W. Jacobsen, N. Jeffery, P. W. Jones, N. D. Keen, S. A. Klein, V. E. Larson, L. R. Leung, H.-Y. Li, W. Lin, W. H. Lipscomb, P.-L. Ma, S. Mahajan, M. E. Maltrud, A. Mametjanov, J. L. McClean, R. B. McCoy, R. B. Neale, S. F. Price, Y. Qian, P. J. Rasch, J. E. J. R. Eyre, W. J. Riley, T. D. Ringler, A. F. Roberts, E. L. Roesler, A. G. Salinger, Z. Shaheen, X. Shi, B. Singh, J. Tang, M. A. Taylor, P. E. Thornton, A. K. Turner, M. Veneziani, H. Wan, H. Wang, S. Wang, D. N. Williams, P. J. Wolfram, P. H. Worley, S. Xie, Y. Yang, J.-H. Yoon, M. D. Zelinka, C. S. Zender, X. Zeng, C. Zhang, K. Zhang, Y. Zhang, X. Zheng, T. Zhou, Q. Zhu (2019), [The DOE E3SM coupled model version 1: Overview and evaluation at standard resolution](#), *J. Adv. Model. Earth Syst.*, 11, 2089– 2129, doi:10.1029/2018MS001603.
- 72) Sun, T., Liu, L., **Flanner, M. G.**, Kirchstetter, T. W., Jiao, C., Preble, C. V., Chang, W. L., and Bond, T. C. (2019), [Constraining a historical black carbon emission inventory of the United States for 1960–2000](#), *J. Geophys. Res. Atmos.*, 124, 4004–4025, doi:10.1029/2018JD030201.
- 71) Krinner, G., Derksen, C., Essery, R., **Flanner, M.**, Hagemann, S., Clark, M., Hall, A., Rott, H., Brutel-Vuilmet, C., Kim, H., Ménard, C. B., Mudryk, L., Thackeray, C., Wang, L., Arduini, G., Balsamo, G., Bartlett, P., Boike, J., Boone, A., Chéruy, F., Colin, J., Cuntz, M., Dai, Y., Decharme, B., Derry, J., Ducharne, A., Dutra, E., Fang, X., Fierz, C., Ghattas, J., Gusev, Y., Haverd, V., Kontu, A., Lafaysse, M., Law, R., Lawrence, D., Li, W., Marke, T., Marks, D., Ménégou, M., Nasonova, O., Nitta, T., Niwano, M., Pomeroy, J., Raleigh, M. S., Schaedler, G., Semenov, V., Smirnova, T. G., Stacke, T., Strasser, U., Svenson, S., Turkov, D., Wang, T., Wever, N., Yuan, H., Zhou, W., Zhu, D. (2018), [ESM-SnowMIP: assessing snow models and quantifying snow-related climate feedbacks](#), *Geosci. Model Dev.*, 11, 5027-5049, doi: 10.5194/gmd-11-5027-2018.
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[measurements caused by scattering of green light in snow](#), *Remote Sens. Environ.*, 215, 398-410, doi:10.1016/j.rse.2018.06.012.

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62) [Huang, X., X. Chen, M. Flanner, P. Yang, D. Feldman, and C. Kuo \(2018\), Improved representation of surface spectral emissivity in a global climate model and its impact on simulated climate](#), *J. Climate*, 31, 3711–3727, doi:10.1175/JCLI-D-17-0125.1.

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59) [Kuo, C., Feldman, D. R., Huang, X., Flanner, M., Yang, P., and Chen, X. \(2018\), Time-dependent cryospheric longwave surface emissivity feedback in the Community Earth System Model](#), *J. Geophys. Res. Atmos.*, 123, 789–813, doi:10.1002/2017JD027595.

(*Article retracted due to a coding error that affected the results.)

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57) [Cook, J. M., Hodson, A. J., Gardner, A. S., Flanner, M., Tedstone, A. J., Williamson, C., Irvine-Fynn, T. D. L., Nilsson, J., Bryant, R., and Tranter, M. \(2017\), Quantifying bioalbedo: a new physically based model and discussion of empirical methods for characterising biological influence on ice and snow albedo](#), *The Cryosphere*, 11, 2611-2632, doi: 10.5194/tc-11-2611-2017.

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