

# Mark G. Flanner

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## PROFESSIONAL APPOINTMENTS

- 2015–*pres* Associate Professor, Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor MI, and dry appointment in the Department of Earth and Environmental Sciences
- 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, and dry appointment in the Department of Earth and Environmental Sciences
- 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. Dissertation title: “Effects of vertically-resolved solar heating, snow aging, and black carbon on snow-albedo feedback”. Thesis advisor: [Charlie Zender](#)
- B.S. (2002) Biomedical Engineering, University of Wisconsin, Madison (2000: visiting student at the Technical University of Budapest, Hungary)

## TEACHING / ADVISING (as of May 2018)

- CLIMATE 105 *Our Changing Atmosphere* (1 semester)
- CLIMATE 380 *Introduction to Atmospheric Radiation* (5 semesters)
- CLIMATE 473 *Climate Physics* (6 semesters)
- CLIMATE 532 *Radiative Transfer* (2 semesters)
- Advising Chairing/chaired thesis committees of 2 current / 4 former Ph.D. students  
Serving/served on thesis committees of 3 current / 18 former PhD students  
Advised research projects for 2 former M.S. students  
Advised research projects for 10 former undergrad and REU students

## OUTREACH, SERVICE, and SYNERISTIC ACTIVITIES

- 2018–*pres* U. of M. representative to the University Corporation of Atmospheric Research (UCAR)
- 2018–*pres* Editor for *The Cryosphere*
- 2017–*pres* Member of the NSF Advisory Committee for the Office of Polar Programs
- 2016–*pres* Co-chair, Arctic Monitoring and Assessment Programme (AMAP) Short-lived Climate Forcers Expert Group
- 2015–*pres* Steering committee member for the snow model intercomparison project: ESM-SnowMIP
- 2015–*pres* Member of the *Eos* Editorial Advisory Board
- 2007–*pres* Peer-reviewer for about 100 unique journal article submissions
- 2004–*pres* Author and maintainer of the Snow, Ice, and Aerosol Radiative (SNICAR) model (online at: <http://snow.engin.umich.edu/>)

- 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

- 2015 AGU 2014 Editors' Citation for Excellence in Refereeing – *Journal of Geophysical Research Atmospheres*
- 2014 Authorship of 11 Essential Science Indicators<sup>SM</sup> *Highly Cited Papers* (3 as lead-author, 8 as co-author), as of December 2014
- May 2013 Awarded [Faculty Early Career Development \(CAREER\) grant](#) from the National Science Foundation
- Feb. 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

## JOURNAL PUBLICATIONS (advised students underlined)

ResearcherID: [C-6139-2011](#) (total citations: 5800; h-index: 31)  
 Google Scholar: [Mark Flanner](#) (total citations: 10,700; h-index: 38)  
 ORCID: [0000-0003-4012-174X](#)

64) Matsui, H., Mahowald, N. M., Moteki, N., Hamilton, D. S., Ohata, S., Yoshida, A., Koike, M., Scanza, R. A., and **Flanner, M. G.** (2018), [Anthropogenic combustion iron as a complex climate forcer](#), *Nature Communications*, 9, 1593, doi: 10.1038/s41467-018-03997-0.

63) Singh, D., **Flanner, M. G.**, and Millour, E. (2018), [Improvement of Mars surface snow albedo modeling in LMD Mars GCM with SNICAR](#), *J. Geophys. Res. Planets*, 123, 780–791, doi:10.1002/2017JE005368.

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.

- 61) **Flanner, M. G.**, Huang, X., Chen, X., and Krinner, G. (2018), [Climate response to negative greenhouse gas radiative forcing in polar winter](#), *Geophys. Res. Lett.*, 45, 1997–2004, doi:10.1002/2017GL076668.
- 60) **Schneider, A.**, **Flanner, M.**, and **Perket, J.** (2018), [Multidecadal variability in surface albedo feedback across CMIP5 models](#), *Geophys. Res. Lett.*, 45, 1972–1980, doi:10.1002/2017GL076293.
- 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.
- 58) Kuo, C.-P., Yang, P., Huang, X., Feldman, D., **Flanner, M.**, Kuo, C., and Mlawer, E. J. (2017), [Impact of multiple scattering on longwave radiative transfer involving clouds](#), *J. Adv. Model. Earth Syst.*, 9, 3082–3098, doi: 10.1002/2017MS001117.
- 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.
- 56) Thomas, J. L., Polashenski, C. M., Soja, A. J., Marelle, L., Casey, K. A., Choi, H. D., Raut, J.-C., Wiedinmyer, C. and Emmons, L. K., Fast, J. D., Pelon, J., Law, K. S., **Flanner, M. G.**, and Dibb, J. E. (2017), [Quantifying black carbon deposition over the Greenland ice sheet from forest fires in Canada](#), *Geophys. Res. Lett.*, 44, 7965–7974, doi:10.1002/2017GL073701.
- 55) Myhre, G., Aas, W., Cherian, R., Collins, W., Faluvegi, G., **Flanner, M.**, Forster, P., Hodnebrog, Ø., Klimont, Z., Lund, M. T., Mülmenstädt, J., Lund Myhre, C., Olivié, D., Prather, M., Quaas, J., Samset, B. H., Schnell, J. L., Schulz, M., Shindell, D., Skeie, R. B., Takemura, T., and Tsyro, S. (2017), [Multi-model simulations of aerosol and ozone radiative forcing due to anthropogenic emission changes during the period 1990–2015](#), *Atmos. Chem. Phys.*, 17, 2709–2720, doi:10.5194/acp-17-2709-2017.
- 54) Schmale, J., **Flanner, M.**, Kang, S., Sprenger, M., Zhang, Q., Guo, J., Li, Y., Schwikowski, M., Farinotti, D. (2017), [Modulation of snow reflectance and snowmelt from Central Asian glaciers by anthropogenic black carbon](#), *Scientific Reports*, 7, doi:10.1038/srep40501.
- 53) Chen, X. H., X. L. Huang, **C. Y. Jiao**, **M. G. Flanner**, T, Raeker and B. Palen (2017), [Running climate model on a commercial cloud computing environment: A case study using Community Earth System Model \(CESM\) on Amazon AWS](#), *Computers & Geosciences*, 98, 21–25, doi:10.1016/j.cageo.2016.09.014.
- 52) **Singh, D.** and **M. G. Flanner** (2016), [An improved carbon dioxide snow spectral albedo model: Application to Martian conditions](#), *J. Geophys. Res. Planets*, 121, 2037–2054, doi:10.1002/2016JE005040.
- 51) van den Hurk, B., Kim, H., Krinner, G., Seneviratne, S. I., Derksen, C., Oki, T., Douville, H., Colin, J., Ducharne, A., Cheruy, F., Viovy, N., Puma, M. J., Wada, Y., Li, W., Jia, B., Alessandri, A., Lawrence, D. M., Weedon, G. P., Ellis, R., Hagemann, S., Mao, J., **Flanner, M. G.**, Zampieri, M., Matera, S., Law, R. M., and Sheffield, J. (2016), [LS3MIP \(v1.0\) contribution to CMIP6: the Land Surface, Snow and Soil moisture Model Intercomparison Project – aims, setup and expected outcome](#), *Geosci. Model Dev.*, 9, 2809–2832, doi:10.5194/gmd-9-2809-2016.
- 50) Mahmood, R., K. von Salzen, **M. Flanner**, M. Sand, J. Langner, H. Wang, and L. Huang (2016), [Seasonality of global and Arctic black carbon processes in the Arctic Monitoring and Assessment](#)

[Programme models](#), *J. Geophys. Res. Atmos.*, 121, 7100–7116, doi:10.1002/2016JD024849.

49) Wobus, C., **Flanner, M.**, Sarofim, M. C., Moura, M. C. P. and Smith, S. J. (2016), [Future Arctic temperature change resulting from a range of aerosol emissions scenarios](#), *Earth's Future*, 4, 270–281, doi:10.1002/2016EF000361.

48) Arnold S. R., K. S. Law, C. A. Brock, J. L. Thomas, S. M. Starkweather, K. von Salzen, A. Stohl, S. Sharma, M. T. Lund, **M. G. Flanner**, T. Petäjä, H. Tanimoto, J. Gamble, J. E. Dibb, M. Melamed, N. Johnson, M. Fidel, V.-P. Tynkkynen, A. Baklanov, S. Eckhardt, S. A. Monks, J. Browse, H. Bozem (2016), [Arctic air pollution: Challenges and opportunities for the next decade](#), *Elem. Sci. Anth.*, 4, 000104, doi: 10.12952/journal.elementa.000104.

47) [Jiao C.](#), and **M. G. Flanner** (2016), [Changing black carbon transport to the Arctic from present day to the end of 21st century](#), *J. Geophys. Res. Atmos.*, 121, 4734–4750, doi:10.1002/2015JD023964.

46) Sand, M., T. K. Berntsen, K. von Salzen, **M. G. Flanner**, J. Langner, and D. G. Victor (2016), [Response of Arctic temperature to changes in emissions of short-lived climate forcers](#), *Nature Clim. Change*, 6, 286-290, doi: 10.1038/nclimate2880.

45) Polashenski, C. M., J. E. Dibb, **M. G. Flanner**, J. Y. Chen, Z. R. Courville, A. M. Lai, J. J. Schauer, M. M. Shafer, and M. Bergin (2015), [Neither dust nor black carbon causing apparent albedo decline in Greenland's dry snow zone: Implications for MODIS C5 surface reflectance](#), *Geophys. Res. Lett.*, 42, 9319–9327, doi:10.1002/2015GL065912.

44) [Singh, D.](#), **Flanner, M. G.**, and [Perket, J.](#) (2015), [The global land shortwave cryosphere radiative effect during the MODIS era](#), *The Cryosphere*, 9, 2057-2070, doi:10.5194/tc-9-2057-2015.

43) Eckhardt, S., Quennehen, B., Olivie, D. J. L., Berntsen, T. K., Cherian, R., Christensen, J. H., Collins, W., Crepinsek, S., Daskalakis, N., **Flanner, M.**, Herber, A., Heyes, C., Hodnebrog, Ø., Huang, L., Kanakidou, M., Klimont, Z., Langner, J., Law, K. S., Lund, M. T., Mahmood, R., Massling, A., Myriokefalitakis, S., Nielsen, I. E., Nøjgaard, J. K., Quaas, J., Quinn, P. K., Raut, J.-C., Rumbold, S. T., Schulz, M., Sharma, S., Skeie, R. B., Skov, H., Uttal, T., von Salzen, K., and Stohl, A. (2015), [Current model capabilities for simulating black carbon and sulfate concentrations in the Arctic atmosphere: a multi-model evaluation using a comprehensive measurement data set](#), *Atmos. Chem. Phys.*, 15, 9413-9433, doi:10.5194/acp-15-9413-2015.

42) Oaida, C. M., Y. Xue, **M. G. Flanner**, S. M. Skiles, F. De Sales, and T. H. Painter (2015), [Improving snow albedo processes in WRF/SSiB regional climate model to assess impact of dust and black carbon in snow on surface energy balance and hydrology over western U.S.](#), *J. Geophys. Res. Atmos.*, 120, 3228–3248. doi: 10.1002/2014JD022444.

41) Qian, Y., T. J. Yasunari, S. J. Doherty, **M. G. Flanner**, W. K. M. Lau, J. Ming, H. Wang, M. Wang, S. G. Warren, and R. Zhang (2015), [Light-absorbing particles in snow and ice: Measurement and modeling of climatic and hydrological impact](#), *Advances in Atmospheric Sciences*, 32, 1, 64-91, doi: 10.1007/s00376-014-0010-0.

40) Doherty, S. J., Bitz, C. M., and **Flanner, M. G.** (2014), [Biases in modeled surface snow BC mixing ratios in prescribed-aerosol climate model runs](#), *Atmos. Chem. Phys.*, 14, 11697-11709, doi:10.5194/acp-14-11697-2014.

39) Zhao, C., Hu, Z., Qian, Y., Ruby Leung, L., Huang, J., Huang, M., Jin, J., **Flanner, M. G.**, Zhang, R., Wang, H., Yan, H., Lu, Z., and Streets, D. G. (2014), [Simulating black carbon and dust and their radiative forcing in seasonal snow: a case study over North China with field campaign measurements](#), *Atmos. Chem. Phys.*, 14, 11475-11491, doi:10.5194/acp-14-11475-2014.

- 38) Young, C. L., I. N. Sokolik, **M. G. Flanner**, and J. Dufek (2014), [Surface radiative impacts of ash deposits from the 2009 eruption of Redoubt volcano](#), *J. Geophys. Res. Atmos.*, 119, 11387–11397, doi:10.1002/2014JD021949.
- 37) Chen, X., X. Huang, and **M. G. Flanner** (2014), [Sensitivity of modeled far-IR radiation budgets in polar continents to treatments of snow surface and ice cloud radiative properties](#), *Geophys. Res. Lett.*, 41, 6530–6537, doi:10.1002/2014GL061216.
- 36) **Flanner, M. G.**, A. S. Gardner, S. Eckhardt, A. Stohl, J. Perket (2014), [Aerosol radiative forcing from the 2010 Eyjafjallajökull volcanic eruptions](#), *J. Geophys. Res. Atmos.*, 119, 9481–9491, doi: 10.1002/2014JD021977.
- 35) **Lin, G.**, J. E. Penner, **M. G. Flanner**, S. Sillman, L. Xu, and C. Zhou (2014), [Radiative forcing of organic aerosol in the atmosphere and on snow: Effects of SOA and brown carbon](#), *J. Geophys. Res. Atmos.*, 119, 7453–7476, doi:10.1002/2013JD021186.
- 34) Qian, Y., H. Wang, R. Zhang, **M. G. Flanner**, and P. J. Rasch (2014) [A sensitivity study on modeling black carbon in snow and its radiative forcing over the Arctic and Northern China](#), *Environ. Res. Lett.*, 9, 064001, doi:10.1088/1748-9326/9/6/064001.
- 33) Perket, J., **M. G. Flanner**, and J. E. Kay (2014), [Diagnosing shortwave cryosphere radiative effect and its 21st century evolution in CESM](#), *J. Geophys. Res. Atmos.*, 119, 1356–1362, doi:10.1002/2013JD021139.
- 32) **Jiao, C.**, **Flanner, M. G.**, Balkanski, Y., Bauer, S. E., Bellouin, N., Berntsen, T. K., Bian, H., Carslaw, K. S., Chin, M., De Luca, N., Diehl, T., Ghan, S. J., Iversen, T., Kirkevåg, A., Koch, D., Liu, X., Mann, G. W., Penner, J. E., Pitari, G., Schulz, M., Seland, Ø., Skeie, R. B., Steenrod, S. D., Stier, P., Takemura, T., Tsigaridis, K., van Noije, T., Yun, Y., and Zhang, K. (2014), [An AeroCom assessment of black carbon in Arctic snow and sea ice](#), *Atmos. Chem. Phys.*, 14, 2399–2417, doi:10.5194/acp-14-2399-2014.
- 31) Kay, J. E., B. Medeiros, Y.-T. Hwang, A. Gettelman, J. Perket, and **M. G. Flanner** (2014), [Processes controlling Southern Ocean shortwave climate feedbacks in CESM](#), *Geophys. Res. Lett.*, 41, 616–622, doi:10.1002/2013GL058315.
- 30) N. Mahowald, S. Albani, J. F. Kok, S. Engelstaeder, R. Scanza, D. S. Ward, **M. G. Flanner** (2014), [The size distribution of desert dust aerosols and its impact on the Earth system](#), *Aeolian Research*, 15, 53–71, doi: 10.1016/j.aeolia.2013.09.002.
- 29) Painter, T. H., **M. G. Flanner**, G. Kaser, B. Marzeion, R. A. VanCuren, and W. Abdalati (2013), [End of the Little Ice Age in the Alps forced by industrial black carbon](#), *Proc. Natl. Acad. Sci.*, 110, 15216–15221, doi:10.1073/pnas.1302570110.
- 28) Bond, T. C., S. J. Doherty, D. W. Fahey, P. M. Forster, T. Berntsen, B. J. DeAngelo, **M. G. Flanner**, S. Ghan, B. Kärcher, D. Koch, S. Kinne, Y. Kondo, P. K. Quinn, M. C. Sarofim, M. G. Schultz, M. Schulz, C. Venkataraman, H. Zhang, S. Zhang, N. Bellouin, S. K. Guttikunda, P. K. Hopke, M. Z. Jacobson, J. W. Kaiser, Z. Klimont, U. Lohmann, J. P. Schwarz, D. Shindell, T. Storelvmo, S. G. Warren, and C. S. Zender (2013), [Bounding the role of black carbon in the climate system: A scientific assessment](#), *J. Geophys. Res. Atmos.*, 118, 5380–5552, doi: 10.1002/jgrd.50171.
- 27) **Flanner, M. G.** (2013), [Arctic climate sensitivity to local black carbon](#), *J. Geophys. Res. Atmos.*, 118, 1840–1851, doi:10.1002/jgrd.50176.
- 26) Shindell, D. T., J.-F. Lamarque, M. Schulz, **M. Flanner**, **C. Jiao**, M. Chin, P. J. Young, Y. H. Lee, L.

Rotstayn, N. Mahowald, G. Milly, G. Faluvegi, Y. Balkanski, W. J. Collins, A. J. Conley, S. Dalsoren, R. Easter, S. Ghan, L. Horowitz, X. Liu, G. Myhre, T. Nagashima, V. Naik, S. T. Rumbold, R. Skeie, K. Sudo, S. Szopa, T. Takemura, A. Voulgarakis, J.-H. Yoon, and F. Lo (2013), [Radiative forcing in the ACCMIP historical and future climate simulations](#), *Atmos. Chem. Phys.*, 13, 2939-2974, doi:10.5194/acp-13-2939-2013.

25) Lee, Y. H., J.-F. Lamarque, **M. G. Flanner**, C. Jiao, D. T. Shindell, T. Berntsen, M. M. Bisiaux, J. Cao, W. J. Collins, M. Curran, R. Edwards, G. Faluvegi, S. Ghan, L. W. Horowitz, J. R. McConnell, J. Ming, G. Myhre, T. Nagashima, V. Naik, S. T. Rumbold, R. B. Skeie, K. Sudo, T. Takemura, F. Thevenon, B. Xu and J.-H. Yoon (2013), [Evaluation of preindustrial to present-day black carbon and its albedo forcing from Atmospheric Chemistry and Climate Model Intercomparison Project \(ACCMIP\)](#), *Atmos. Chem. Phys.*, 13, 2607-2634, doi:10.5194/acp-13-2607-2013.

24) Sterle, K. M., J. R. McConnell, J. Dozier, R. Edwards, and **M. G. Flanner** (2013), [Retention and radiative forcing of black carbon in eastern Sierra Nevada snow](#), *The Cryosphere*, 7, 365-374, doi:10.5194/tc-7-365-2013.

23) Zhou, C., J. E. Penner, **M. G. Flanner**, M. M. Bisiaux, R. Edwards, and J. R. McConnell (2012), [Transport of black carbon to polar regions: Sensitivity and forcing by black carbon](#), *Geophys. Res. Lett.*, 39, L22804, doi:10.1029/2012GL053388.

22) **Flanner, M. G.**, X. Liu, C. Zhou, J. E. Penner, and C. Jiao (2012), [Enhanced solar energy absorption by internally-mixed black carbon in snow grains](#), *Atmos. Chem. Phys.*, 12, 4699-4721, doi:10.5194/acp-12-4699-2012.

21) Liu, X., Easter, R. C., Ghan, S. J., Zaveri, R., Rasch, P., Shi, X., Lamarque, J.-F., Gettelman, A., Morrison, H., Vitt, F., Conley, A., Park, S., Neale, R., Hannay, C., Ekman, A. M. L., Hess, P., Mahowald, N., Collins, W., Iacono, M. J., Bretherton, C. S., **Flanner, M. G.**, and Mitchell, D. (2012), [Toward a minimal representation of aerosols in climate models: description and evaluation in the Community Atmosphere Model CAM5](#), *Geosci. Model Dev.*, 5, 709-739, doi:10.5194/gmd-5-709-2012.

20) Lawrence, D. M., K. W. Oleson, **M. G. Flanner**, C. G. Fletcher, P. J. Lawrence, S. Levis, S. C. Swenson, and G. B. Bonan (2012), The CCSM4 land simulation, 1850–2005: [Assessment of surface climate and new capabilities](#), *J. Climate*, 25, 2240-2260, doi: 10.1175/JCLI-D-11-00103.1.

19) Mahowald, N., D. S. Ward, S. Kloster, **M. G. Flanner**, C. L. Heald, N. G. Heavens, P. G. Hess, J.-F. Lamarque, and P. Y. Chuang (2011), [Aerosol impacts on climate and biogeochemistry](#), *Annu. Rev. Environ. Resour.*, 36, 45–74, doi: 10.1146/annurev-environ-042009-094507.

18) Lawrence, D., K. W. Oleson, **M. G. Flanner**, P. E. Thornton, S. C. Swenson, P. J. Lawrence, X. Zeng, Z.-L. Yang, S. Levis, K. Skaguchi, G. B. Bonan and A. G. Slater (2011), [Parameterization Improvements and Functional and Structural Advances in Version 4 of the Community Land Model](#), *J. Adv. Model. Earth Syst.*, 3, 27, doi:10.1029/JAMES.2011.3.45.

17) Kuipers Munneke, P., M. R. van den Broeke, J. T. M. Lenaerts, **M. G. Flanner**, A. S. Gardner, and W. J. van de Berg (2011), [A new albedo parameterization for use in climate models over the Antarctic ice sheet](#), *J. Geophys. Res.*, 116, D05114, doi:10.1029/2010JD015113.

16) Qian, Y., **Flanner, M. G.**, Leung, L. R., and Wang, W. (2011), [Sensitivity studies on the impacts of Tibetan Plateau snowpack pollution on the Asian hydrological cycle and monsoon climate](#), *Atmos. Chem. Phys.*, 11, 1929-1948, doi:10.5194/acp-11-1929-2011.

15) **Flanner, M. G.**, K. M. Shell, M. Barlage, D. K. Perovich, and M. A. Tschudi (2011) [Radiative forcing and albedo feedback from the Northern Hemisphere cryosphere between 1979 and 2008](#), *Nature*

*Geosci.*, 4, 151-155, doi: 10.1038/ngeo1062.

14) Kaspari, S. D., M. Schwikowski, M. Gysel, **M. G. Flanner**, S. Kang, S. Hou, and P. A. Mayewski (2011), [Recent increase in black carbon concentrations from a Mt. Everest ice core spanning 1860–2000 AD](#), *Geophys. Res. Lett.*, 38, L04703, doi:10.1029/2010GL046096.

13) Bond, T. C., C. Zarzycki, **M. G. Flanner**, and D. M. Koch (2011) [Quantifying immediate radiative forcing by black carbon and organic matter with the Specific Forcing Pulse](#), *Atmos. Chem. Phys.*, 11, 1505-1525, doi:10.5194/acp-11-1505-2011.

12) Mahowald, N. M., Kloster, S., Engelstaedter, S., Moore, J. K., Mukhopadhyay, S., McConnell, J. R., Albani, S., Doney, S. C., Bhattacharya, A., Curran, M. A. J., **Flanner, M. G.**, Hoffman, F. M., Lawrence, D. M., Lindsay, K., Mayewski, P. A., Neff, J., Rothenberg, D., Thomas, E., Thornton, P. E., and Zender, C. S (2010) [Observed 20th century desert dust variability: impact on climate and biogeochemistry](#), *Atmos. Chem. Phys.*, 10, 10875-10893.

11) Doughty, C. E., **M. G. Flanner**, and M. L. Goulden (2010) [Effect of smoke on sub-canopy shaded light, canopy temperature, and carbon dioxide uptake in an Amazon rainforest](#), *Global Biogeochem. Cycles*, 24, GB3015, doi:10.1029/2009GB003670.

10) Tosca, M. G., J. T. Randerson, C. S. Zender, **M. G. Flanner**, and P. J. Rasch (2010), [Do biomass burning aerosols intensify drought in equatorial Asia during El Niño?](#), *Atmos. Chem. Phys.*, 10, 3515-3528.

9) **Flanner, M. G.**, C. S. Zender, P. G. Hess, N. M. Mahowald, T. H. Painter, V. Ramanathan, and P. J. Rasch (2009), [Springtime warming and reduced snow cover from carbonaceous particles](#), *Atmos. Chem. Phys.*, 9, 2481-2497.

8) **Flanner, M. G.** (2009), [Integrating anthropogenic heat flux with global climate models](#), *Geophys. Res. Lett.*, 36, L02801, doi:10.1029/2008GL036465.

7) Quinn, P. K., T. S. Bates, E. Baum, N. Doubleday, A. M. Fiore, **M. Flanner**, A. Fridlind, T. J. Garrett, D. Koch, S. Menon, D. Shindell, A. Stohl, and S. G. Warren (2008), [Short-lived pollutants in the Arctic: Their climate impact and possible mitigation strategies](#), *Atmos. Chem. Phys.*, 8, 1723-1735.

6) McConnell, J. R., R. Edwards, G. L. Kok, **M. G. Flanner**, C. S. Zender, E. S. Saltzman, J. R. Banta, D. R. Pasteris, M. M. Carter, and J. D. W. Kahl (2007), [20th Century industrial black carbon emissions altered Arctic climate forcing](#), *Science*, 317, 1381-1384.

5) **Flanner, M. G.**, C. S. Zender, J. T. Randerson, and P. J. Rasch (2007), [Present day climate forcing and response from black carbon in snow](#), *J. Geophys. Res.*, 112, D11202, doi: 10.1029/2006JD008003.

4) Painter, T. H., N. P. Molotch, M. Cassidy, **M. Flanner**, and K. Steffen (2007), [Contact spectroscopy for determination of stratigraphy of snow grain size](#), *J. Glaciol.*, 53, 180, 121-127.

3) Randerson, J. T., H. Liu, **M. G. Flanner**, S. D. Chambers, Y. Jin, P. G. Hess, G. Pfister, M. C. Mack, K. K. Treseder, L. R. Welp, F. S. Chapin, J. W. Harden, M. L. Goulden, E. Lyons, J. C. Neff, E. A. G. Schuur and C. S. Zender (2006), [The impact of boreal forest fire on climate warming](#), *Science*, 314, 1130-1132.

2) **Flanner, M. G.**, and C. S. Zender (2006), [Linking snowpack microphysics and albedo evolution](#), *J. Geophys. Res.*, 111, D12208, doi:10.1029/2005JD006834.

1) **Flanner, M. G.**, and C. S. Zender (2005), [Snowpack radiative heating: Influence on Tibetan Plateau](#)

## OTHER PUBLICATIONS

5) AMAP Assessment (2015): [Black carbon and ozone as Arctic climate forcers](#). Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. vii + 116 pp.

4) Contributing author to [Chapter 7 \(“Clouds and Aerosols”\) of the IPCC Working Group 1 Fifth Assessment Report](#):

Boucher, O., D. Randall, P. Artaxo, C. Bretherton, G. Feingold, P. Forster, V.-M. Kerminen, Y. Kondo, H. Liao, U. Lohmann, P. Rasch, S.K. Satheesh, S. Sherwood, B. Stevens and X.Y. Zhang (2013): Clouds and Aerosols. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

3) UNEP/WMO (2011) [Integrated Assessment of Black Carbon and Tropospheric Ozone](#), United Nations Environmental Programme, Nairobi, Kenya, 285 pp. The report also includes a [Summary for Decision Makers](#).

2) AMAP (2011): [The Impact of Black Carbon on Arctic Climate](#), P. K. Quinn, A. Stohl, A. Arneth, T. Berntsen, J. F. Burkhart, J. Christensen, **M. Flanner**, K. Kupiainen, H. Lihavainen, M. Shepherd, V. Shevchenko, H. Skov, and V. Vestreng. Arctic Monitoring and Assessment Programme (AMAP), Oslo. 72 pp.

1) Oleson, K.W., D.M. Lawrence, G.B. Bonan, **M. G. Flanner**, E. Kluzek, P.J. Lawrence, S. Levis, S.C. Swenson, P.E. Thornton, A. Dai, M. Decker, R. Dickinson, J. Feddema, C.L. Heald, F. Hoffman, J.-F. Lamarque, N. Mahowald, G.-Y. Niu, T. Qian, J. Randerson, S. Running, K. Sakaguchi, A. Slater, R. Stockli, A. Wang, Z.-L. Yang, Xi. Zeng, and Xu. Zeng (2010): [Technical Description of version 4.0 of the Community Land Model \(CLM\)](#). NCAR Technical Note NCAR/TN-478+STR, National Center for Atmospheric Research, Boulder, CO, 257 pp.