Daniel J. Kirshbaum

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Curriculum vitae (May 2024)

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Education

Ph.D., Atmospheric Sciences, University of Washington, Seattle, 2004
M.S., Electrical Engineering, Johns Hopkins University, 1999
B.S., Mechanical Engineering, University of Illinois, Urbana-Champaign, 1996

Experience

McGill University — 2011 – present
Montréal, Québec (Canada)
Associate Professor, Dept. of Atmos. and Oceanic Sci. (2016-present)
Assistant Professor, Dept. of Atmos. and Oceanic Sci. (2011-2016)

University of Reading — 2008 – 2011
Reading, Berkshire (UK)
Lecturer (Assistant Professor), Department of Meteorology

Yale University — 2006 – 2007
New Haven, CT (USA)
Postdoctoral associate, Department of Geology and Geophysics
Supervisor: Ronald B. Smith

National Center for Atmospheric Research — 2004 – 2006
Boulder, CO (USA)
Postdoctoral fellow, Advanced Studies Program (ASP)
Supervisor: Rich Rotunno (MMM)

University of Washington — 1999 – 2004
Seattle, WA (USA)
Graduate research assistant, Department of Atmospheric Sciences
Supervisor: Dale Durran

Honors and awards

NSERC Discovery Accelerator Award, 2017

Featured research article "Upstream blocking over heated mountain ridges" in *Q. J. R. Meteorol. Soc.*, 2017

School award for outstanding contributions to teaching and learning, University of Reading, 2009

"Paper of note" selection, *Bulletin of the American Meteorological Society*, 2005

Advanced Study Program (ASP) postdoctoral fellowship, NCAR, 2004

Outstanding Student Oral Presentation Award, AMS 10$^{\text{th}}$ Conference on Mesoscale Processes, 23-27 June 2003

Outstanding Student Poster Presentation Award, AMS 10$^{\text{th}}$ Conference on Mountain Meteorology, 17-21 June 2002

Achievement Rewards for College Scientists (ARCS) Fellowship, University of Washington, 1999-2002

Bronze tablet award (summa cum laude), University of Illinois, 1996

Professional service

American Meteorological Society Mesoscale Processes Committee, 2020-present

International Commission on Dynamical Meteorology (ICDM), 2020-present

Coordination and Implementation Group, TEAMx programme, 2015-present

Chair, AOS Department, McGill University, 2019-2022

Editor, *Monthly Weather Review*, 2015-2020

Graduate Program Director, AOS Department, McGill University, 2017-2019

Undergraduate Program Director, AOS Department, McGill University, 2012-2016

Associate Editor, *Monthly Weather Review*, 2012-2014

Guest Editor, *Frontiers in Atmospheric Sciences*, 2015

American Meteorological Society Mountain Meteorology Committee, 2013-2015

Co-chair, AMS 16th Conference on Mountain Meteorology, San Diego, 2014

Co-chair, Global Energy and Water Exchanges (GEWEX) MOUNTerrain project, 2015-2017

Research trainees (graduate through postdoctoral levels)

Name	Level (year)	Institution	Current Affiliation
Kapil Dev Sindhu	Postdoc (2021-2023)	McGill U.	—
Madalina Surcel	Postdoc (2017-2018)	McGill U.	ECCC
Jonathan Fairman, Jr.*	Postdoc (2012-2015)	U. Manchester	Athenium Analytics, USA
Andrew Barrett*	Postdoc (2012-2014)	U. Reading	KIT (Karlsruhe)
Kirsty Hanley	Postdoc (2008-2011)	U. Reading	Met Office (UK)
Jialin Liu	Ph.D (2021-)	McGill U.	—
Dustin Fraser*	Ph.D (2021-)	McGill U.	—
Andrés Lopez	Ph.D (2020-)	McGill U.	—
Shanhe Liu	Ph.D (2020-)	McGill U.	—
Sonja Drueke*	Ph.D (2021)	McGill U.	AECOM, Montreal, QC
Ting-Chen Chen*	Ph.D (2021)	McGill U.	KIT (Karlsruhe)
Chun-Chih (David) Wang	Ph.D (2019)	McGill U.	U. Manitoba
Carly Wright*	Ph.D (2018)	U. Reading	Cedar Mount Academy, UK
Robert Warren*	Ph.D (2014)	U. Reading	Monash U.
Dirk Cannon	Ph.D (2012)	U. Reading	Digital Engineering Ltd., UK
Jonathan Doyle*	RA (2016-2017)	McGill U.	Selkirk College, BC
Meera Mohan*	M.Sc (2023)	McGill U.	Monash University
Daniel Tootill	M.Sc (2022)	McGill U.	Met Office (UK)
Michael Tang	M.Sc (2019)	McGill U.	U. Calgary
Zhong Yi Chia*	M.Sc (2018)	McGill U.	Met. Service Singapore
David Purnell	M.Sc (2017)	McGill U.	Ph.D. student, McGill
Phillipa Cookson-Hills	M.Sc (2016)	McGill U.	Stantec, AB
Raphaël Rousseau-Rizzi*	M.Sc (2016)	McGill U.	Hydro-Québec
Michael Kovacs	M.Sc (2015)	McGill U.	Tri-Tex Inc., QC
Chun-Chih (David) Wang	M.Sc (2014)	McGill U.	U. Manitoba
Brett Soderholm	M.Sc (2013)	McGill U.	The Weather Network, ON

* Co-supervision with other faculty at McGill or elsewhere

Refereed publications (* denotes supervised or co-supervised research trainee)

73. Lu, G., D. J. Kirshbaum, and H. Xue, 2025: The role of orography on convection initiation over Hainan Island. Submitted to *Q. J. Roy. Meteorol. Soc.*

72. Wang, D., S. Lee, T. Zhang, C. P. Lackner, D. Kirshbaum, M. P. Jensen, 2025: Causal directions matter: how environmental factors drive convective cloud detrainment heights. Submitted to *Geophys. Res. Lett.*.

71. Kirshbaum, D. J., K. D. Sindhu*, and D. D. Turner, 2025: An observational evaluation of RKW theory over the US southern Great Plains. Submitted to *J. Atmos. Sci.*

70. Schultz, D. M., M. V. Young, and D. J. Kirshbaum, 2025: The "Spanish Plume" elevated mixed layer: review of its use and misuse within the scientific literature. *Mon. Wea. Rev.*, in press, DOI: 10.1175/MWR-D-24-0139.1.

69. Lopez*, A., D. J. Kirshbaum, and N. Lareau, 2025: Convection-permitting ensembles of an isolated mountain thunderstorm during RELAMPAGO/CACTI. *Mon. Wea. Rev.*, **152**(2): 205-224. DOI: 10.1175/MWR-D-24-0125.1.

68. Liu*, J. and D. J. Kirshbaum, 2025: Environmental conditions controlling the morphology of shallow orographic convection. *J. Atmos. Sci.*, **82**(3): 483-500. DOI: 10.1175/JAS-D-24-0113.1.

67. Robinson, F. J., D. Kirshbaum, S. Sherwood, L. Cahill, E. Juliano, and C. Liu, 2025: Investigating the effects of orography and ambient wind on deep convection over tropical islands. *J. Atmos. Sci.*, **82**: 139-157. DOI: 10.1175/JAS-D-23-0204.1.

66. Lareau, N., T. Knopp, and D. J. Kirshbaum, 2024: Mechanical and thermal forcing for upslope flows and cumulus convection over the Sierras de Córdoba. *Mon. Wea. Rev.*, **152**: 2149–2167. DOI: 10.1175/MWR-D-23-0254.1

65. Kirshbaum, D. J., H. Morrison, and J. M. Peters, 2024: Simplified approximations of direct cumulus entrainment and detrainment. *J. Atmos. Sci.*, **81**: 1049-1066. DOI: 10.1175/JAS-D-23-0232.1.

64. Meera*, M., T. M. Merlis, and D. J. Kirshbaum, 2024: Response of the current climate to land-ocean contrasts in parameterized cumulus entrainment. *J. Adv. Model. Earth Sy.*, **16**: e2023MS003691. DOI: 10.1029/2023MS003691

63. Liu*, S., K. Sindhu*, and D. J. Kirshbaum, 2023: Observations of boundary-layer convergence lines and associated updrafts in the US Southern Great Plains. *J. Atmos. Sci.*, **80**(12): 2947–2968. DOI: 10.1175/JAS-D-23-0089.1

62. Manzato, A., S. Serafin, M. M. Miglietta, D. Kirshbaum, and W. Schulz, 2022: A pan-Alpine climatology of lightning and convective initiation. *Mon. Wea. Rev.*, **150**(9): 2213-2230. DOI: 10.1175/MWR-D-21-0149.1.

61. Tootill*, D. and D. J. Kirshbaum, 2022: Ensemble sensitivity of precipitation type to initial conditions for a major freezing rain event in Montreal. *Mon. Wea. Rev*, **150**(7): 1761-1780. DOI: 10.1175/MWR-D-21-0254.1.

60. Rotach, M. W., S. Serafin, H. C. Ward, M. Arpagus, I. Colfescu, J. Cuxart, S. F. J. De Wekker, V. Grubisic, N. Kalthoff, T. Karl, D. J. Kirshbaum, M. Lehner, S. Mobbs, A. Paci, E. Palazzi, A. Bailey, J. Schmidli, C. Wittman, G. Wohlfahrt, D. Zardi, 2022: A collaborative effort to better understand, measure and model atmospheric exchange processes over mountains. *Bull. Amer. Meteor. Soc.*, **103(5)**, E1282-E1295. DOI: 10.1175/BAMS-D-21-0232.1.

59. Kirshbaum, D. J., 2022: Large-eddy simulations of convection initiation over heterogeneous, low terrain. *J. Atmos. Sci.*, **79**: 973-987. DOI: 10.1175/JAS-D-21-0197.1.

58. Chen*, T.-C., M. K. Yau, and D. J. Kirshbaum, 2022: A parameterization of slantwise convection in the WRF model. *J. Atmos. Sci.*, **79**: 227-245. DOI: 10.1175/JAS-D-21-0131.1.

57. Drueke*, S., D. J. Kirshbaum, and P. Kollias, 2021: Environmental sensitivities of shallow-cumulus dilution–Part 2: Vertical wind profile. *Atmos. Chem. Phys.*, **21**: 14039–14058. DOI: 10.5194/acp-21-14039-2021.

56. Kirshbaum, D. J. and K. Lamer, 2021: Climatological sensitivities of shallow-cumulus bulk entrainment in continental and oceanic locations. *J. Atmos. Sci.*, **78**: 2429–2443, DOI: 10.1175/JAS-D-20-0377.1.

55. Chen*, T.-C., M. K. Yau, and D. J. Kirshbaum, 2021: Sensitivities of slantwise convection dynamics to model grid spacing under an idealized framework. *Q. J. R. Meteorol. Soc.*, **147**: 1930–1948. DOI: 10.1002/qj.4003.

54. Drueke*, S., D. J. Kirshbaum, and P. Kollias, 2020: Environmental sensitivities of shallow-cumulus dilution. Part I: Selected thermodynamic conditions. *Atmos. Chem. Phys.*, **20**: 13217–13239. DOI: 10.5194/acp-20-13217-2020.

53. Kirshbaum, D. J., 2020: Numerical simulations of orographic convection across multiple grey zones. *J. Atmos. Sci.*, **77**: 3301–3320. DOI: 10.1175/JAS-D-20-0035.1.

52. Tang*, S. L. and D. J. Kirshbaum, 2020: On the sensitivity of deep-convection initiation to horizontal grid resolution. *Q. J. R. Meteorol. Soc.*, **146**: 1085–1105. DOI: 10.1002/qj.3726.

51. Chen*, T.-C., M. K. Yau, and D. J. Kirshbaum, 2020: Towards the closure of momentum budget analyses in the WRF (v3.8.1) model. *Geosci. Model. Dev.*, **13**: 1737-1761. DOI: 10.5194/gmd-13-1737-2020.

50. Kirshbaum, D. J. and D. N. Straub, 2019: Linear theory of shallow convection in deep, vertically sheared atmospheres. *Q. J. R. Meteorol. Soc.*, **145**: 3129–3147. DOI:10.1002/qj.3609.

49. McTaggart-Cowan, R., P. Vaillancourt, A. Zadra, L. Separovic, and D. J. Kirshbaum, 2019: A Lagrangian perspective on parameterizing deep convection. *Mon. Wea. Rev.*, **147**(11): 4127–4149, DOI: 10.1175/MWR-D-19-0164.1.

48. Wang*, C.-C., D. J. Kirshbaum, and D. M. L. Sills, 2019: Convection initiation aided by lake-breeze convergence over the Niagara Peninsula. *Mon. Wea. Rev.*, **147**(11): 3955–3979. DOI: 10.1175/MWR-D-19-0123.1.

47. Drueke*, S., D. J. Kirshbaum, and P. Kollias, 2019: Evaluation of shallow cumulus entrainment rate retrievals using large-eddy simulation. *J. Geophys. Res.-Atmos*, **124**: 9624–9643. DOI: 10.1029/2019JD030889.

46. Kirshbaum, D. J. and D. M. Schultz, 2018: Convective cloud bands downwind of mesoscale mountain ridges. *J. Atmos. Sci.*, **75**: 4265–4286. DOI: 10.1175/JAS-D-18-0211.1.

45. Chen*, T.-C., M. K. Yau, and D. J. Kirshbaum, 2018: Assessment of conditional symmetric instability from global reanalysis data. *J. Atmos. Sci.*, **75**: 2425–2443. DOI: 10.1175/JAS-D-17-0221.1

44. Purnell*, D. J. and D. J. Kirshbaum, 2018: Synoptic control over orographic precipitation during the Olympics Mountains Experiment (OLYMPEX). *Mon. Wea. Rev.*, **146**: 1023–1044.

43. Serafin, S., B. Adler, J. Cuxart, S. F. J. De Wekker, A. Gohm, B. Grisogono, N. Kalthoff, D. J. Kirshbaum, M. W. Rotach, J. Schmidli, I Stiperski, Z. Vecenaj, D. Zardi, 2018: Exchange processes in the atmospheric boundary layer over mountainous terrain. *Atmosphere*, **9**(3): 102, doi:10.3390/atmos9030102.

42. Kirshbaum, D. J., B. Adler, N. Kalthoff, C. Barthlott, and S. Serafin, 2018: Moist orographic convection: physical mechanisms and links to surface-exchange processes. *Atmosphere*, **9**(3): 80, doi:10.3390/atmos9030080.

41. Kirshbaum, D. J., T. M. Merlis, J. R. Gyakum, and R. McTaggart-Cowan, 2018: Sensitivity of idealized moist baroclinic waves to environmental temperature and moisture content. *J. Atmos. Sci.*, **75**: 337–360.

40. Fairman*, J. G. Jr., D. M. Schultz, D. J. Kirshbaum, S. L. Gray, and A. I. Barrett*, 2017: Climatology of size, shape and intensity of precipitation features over the United Kingdom and Republic of Ireland. *J. Hydromet.*, **18**: 1595–1615.

39. Cookson-Hills*, P., D. J. Kirshbaum, M. Surcel, J. G. Doyle*, L. Fillion, D. Jacques, and S.-J. Baek, 2017: Verification of 24-hour quantitative precipitation forecasts over the Pacific Northwest from a high-resolution Ensemble Kalman Filter system. *Wea. Forecasting*, **32**: 1185–1208.

38. Wang*, C.-C. and D. J. Kirshbaum, 2017: Idealized simulations of sea breezes over mountainous islands. *Q. J. R. Meteorol. Soc.*, **143**: 1657–1669.

37. Harrison, R. G., G. Pretor-Pinney, G. J. Marlton, G. D. Anderson, D. J. Kirshbaum, and R. J. Hogan, 2017: Asperitas—a newly identified cloud supplementary feature. *Weather* **72**, 5: 132–141.

36. Rousseau-Rizzi*, R., D. J. Kirshbaum, and M. K. Yau, 2017: Initiation of deep convection over an idealized mesoscale convergence line. *J. Atmos. Sci.* **74**: 835–853.

35. Kirshbaum, D. J., 2017: On upstream blocking over heated mountain ridges. *Q. J. R. Meteorol. Soc.*, **143**: 53–68.

34. Fairman*, J. G. Jr., D. M. Schultz, D. J. Kirshbaum, S. L. Gray, and A. I. Barrett*, 2016: Climatology of banded precipitation over the contiguous United States. *Mon. Wea. Rev.*, **144**: 4553–4568.

33. Teixeira, M. A. C., D. J. Kirshbaum, H. Ólafsson, P. F. Sheridan, and I. Stiperski, 2016: Editorial: The Atmosphere over Mountainous Regions. *Front. Earth Sci.*, **4**: 84.

32. Kovacs*, M. and D. J. Kirshbaum, 2016: Topographic impacts on the spatial distribution of deep convection over southern Québec. *J. Appl. Meteorol. Clim.*, **55**: 743–762.

31. Barrett*, A. I., S. L. Gray, D. J. Kirshbaum, N. M. Roberts, D. M. Schultz, and J. G. Fairman*, Jr., 2016: The utility of convection-permitting ensembles for the prediction of stationary convective bands. *Mon. Wea. Rev.*, **144**: 1093–1114.

30. Kirshbaum, D. J., F. Fabry, and Q. Cazenave, 2016: The Mississippi Valley convection minimum on summer afternoons: observations and numerical simulations. *Mon. Wea. Rev.*, **144**: 263–272.

29. Wang*, C.-C. and D. J. Kirshbaum, 2015: Thermally forced convection over a mountainous tropical island. *J. Atmos. Sci.*, **72**: 2484–2506.

28. Barrett*, A. I., S. L. Gray, D. J. Kirshbaum, N. M. Roberts, D. M. Schultz, and J. G. Fairman*, Jr., 2015: Synoptic versus orographic control on stationary convective banding. *Q. J. R. Meteorol. Soc.*, **141**: 1101–1113.

27. Fairman*, J. G., Jr., D. M. Schultz, D. J. Kirshbaum, S. L. Gray, and A. I. Barrett*, 2015: A radar-based rainfall climatology of Great Britain and Ireland. *Weather*, **70**: 153–158.

26. Kirshbaum, D. J. and J. G. Fairman*, Jr., 2015: Cloud trails past the Lesser Antilles. *Mon. Wea. Rev.*, **143**: 995–1017.

25. Cannon*, D. J., D. J. Kirshbaum, and S. L. Gray, 2014: A mixed-phase orographic precipitation model with embedded convection. *Q. J. R. Meteorol. Soc.*, **140**: 1997–2012.

24. Kirshbaum, D. J. and C.-C. Wang, 2014: Boundary-layer updrafts driven by airflow over heated terrain. *J. Atmos. Sci.*, **71**: 1425–1442.

23. Soderholm*, B., B. Ronalds*, and D. J. Kirshbaum, 2014: The evolution of convective storms initiated by an isolated mountain ridge. *Mon. Wea. Rev.*, **142**: 1430–1451.

22. Warren*, R. A., D. J. Kirshbaum, R. S. Plant, and H. W. Lean, 2014: A 'Boscastle-type' quasi-stationary convective system over the UK southwest peninsula. *Q. J. R. Meteorol. Soc.*, **140**: 250–257.

21. Barthlott, C. and D. J. Kirshbaum, 2013: Sensitivity of deep convection to terrain forcing over Mediterranean islands. *Q. J. R. Meteorol. Soc.*, **139**: 1762–1779.

20. Lawson*, J., D. M. Schultz, G. Vaughan, and D. J. Kirshbaum, 2013: Multiple bands near fronts in VHF wind-profiling radar and radiosonde data. *Atmos. Sci. Lett.*, **14**: 146–152.

19. Kirshbaum, D. J., 2013: On thermally forced circulations over heated terrain. *J. Atmos. Sci.*, **70**: 1690–1709.

18. Hanley*, K. E., D. J. Kirshbaum, N. M. Roberts, and G. Leoncini, 2013: Sensitivities of a squall line over central Europe in a convective-scale ensemble. *Mon. Wea. Rev.*, **141**: 112–133.

17. Smith, R. B., J. R. Minder, A. D. Nugent, T. Storelvmo, D. J. Kirshbaum, R. Warren*, N. Lareau, P. Palany, A. James, and J. French, 2012: Orographic precipitation in the tropics: The Dominica Experiment. *Bull. Amer. Meteor. Soc.*, **93**: 1567–1579.

16. Kirshbaum, D. J., and A. L. M. Grant, 2012: Invigoration of cumulus cloud fields by mesoscale ascent. *Q. J. R. Meteorol. Soc.*, **138**: 2136–2150.

15. Cannon*, D. J., Kirshbaum, D. J., and S. L. Gray, 2012: Under what conditions does embedded convection enhance orographic precipitation? *Q. J. R. Meteorol. Soc.*, **138**: 391–406.

14. Doyle, J. D., S. Gabersek, Q. Jiang, L. Bernardent, J. M. Brown, A. Dornbrack, E. Filaus, V. Grubisic, D. J. Kirshbaum, O. Knoth, S. Koch, J. Schmidli, I. Stiperski, S. Vosper, and S. Zhong, 2011: An intercomparison of T-REX mountain-wave simulations and implications for mesoscale predictability. *Mon. Wea. Rev.*, **139**: 2811–2831.

13. Kirshbaum, D. J., 2011: Cloud-resolving simulations of deep convection over a heated mountain. *J. Atmos. Sci.*, **68**: 361–378.

12. Hanley*, K. E., D. J. Kirshbaum, S. E. Belcher, N. M. Roberts, and G. Leoncini, 2011: Ensemble predictability of an isolated mountain thunderstorm in a high-resolution model. *Q. J. R. Meteorol. Soc.*, **137**: 2124–2137.

11. Robinson, F. R., S. C. Sherwood, D. Gerstle, C. Liu, D. J. Kirshbaum, 2011: Exploring the land-ocean contast in convective vigor using islands. *J. Atmos. Sci.*, **68**: 602–618.

10. Barthlott, C., R. Burton, D. Kirshbaum, K. Hanley*, E. Richard, J.-P. Chaboureau, J. Trentmann, B. Kern, H.-S. Bauer, T. Schwitalla, C. Keil, Y. Seity, A. Gadian, A. Blyth, S. Mobbs, C. Flamant, J. Handwerker, 2010: Initiation of deep convection at marginal instability in an ensemble of mesoscale models: A case study from COPS. *Q. J. Roy. Meteor. Soc.*, **137**: 118–136.

9. Kirshbaum, D. J. and Smith, R. B., 2009: Orographic precipitation in the tropics: large-eddy simulations and theory. *J. Atmos. Sci.*, **66**: 2559–2578.

8. Smith, R. B., P. Schafer, D. J. Kirshbaum, and E. Regina, 2009: Orographic precipitation in the tropics: Experiments in Dominica. *J. Atmos. Sci.*, **66**: 1698–1716.

7. Smith, R. B., P. Schafer, D. J. Kirshbaum, and E. Regina, 2009: Orographic enhancement of precipitation inside Hurricane Dean. *J. Hydromet.*, **10**: 820–831.

6. Kirshbaum, D. J. and R. B. Smith, 2008: Temperature and moist-stability effects on midlatitude orographic precipitation. *Q. J. Roy. Meteor. Soc.*, **134**: 1183–1199.

5. Kirshbaum, D. J., R. Rotunno, and G. H. Bryan, 2007: The spacing of orographic rainbands triggered by small-scale topography. *J. Atmos. Sci.*, **64**: 4222–4245.

4. Kirshbaum, D. J., G.H. Bryan, R. Rotunno, and D.R. Durran, 2007: The triggering of orographic rainbands by small-scale topography. *J. Atmos. Sci.*, **64**: 1530–1549.

3. Kirshbaum, D. J. and D.R. Durran, 2005: Atmospheric factors governing banded orographic convection. *J. Atmos. Sci.*, **62**: 3758–3774.

2. Kirshbaum, D. J. and D.R. Durran, 2005: Observations and modeling of banded orographic convection. *J. Atmos. Sci.*, **62**: 1463–1479.

1. Kirshbaum, D. J. and D.R. Durran, 2004: Factors governing cellular convection in orographic precipitation. *J. Atmos. Sci.*, **61**: 682–698.