

# BRIAN J. BUTTERWORTH

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NOAA Physical Sciences Laboratory  
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## EDUCATION

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University at Albany, State University of New York	Atmospheric Science	Ph.D.	2016
University of Colorado, Boulder	Geography	M.A.	2011
University of Delaware	Environmental Science	B.S.	2007

## PROFESSIONAL EXPERIENCE

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<b>Associate Scientist III</b> – CIRES, CU Boulder; NOAA PSL	2023 – present
<b>Associate Scientist II</b> – CIRES, CU Boulder; NOAA PSL	2021 – 2023
<b>Research Associate</b> – University of Wisconsin–Madison	2019 – 2021
<b>Postdoctoral Associate</b> – University of Calgary	2016 – 2019
<b>Research Assistant</b> – Atmospheric Sciences Research Center, UAlbany	2012 – 2016
<b>Affiliate Faculty</b> – Metropolitan State University of Denver	2011 – 2012
<b>GIS Analyst</b> – University of Wisconsin – Madison	2011 – 2012
<b>Teaching Assistant</b> – University of Colorado Boulder	2008 – 2011
<b>Research Assistant</b> – University of Delaware	2006

## PEER-REVIEWED PUBLICATIONS

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— 2024 —

- 25 **Butterworth, B.J.**, G. de Boer, and D. Lawrence, 2024: A Study of Intermittent Turbulence in Stable Arctic Boundary Layers. *Boundary-Layer Meteorology*. 190, 2. <https://doi.org/10.1007/s10546-023-00847-5>
- 24 **Butterworth, B.J.**, A. R. Desai, D. Durden, H. Kadum, D. LaLuzerne, M. Mauder, S. Metzger, S. Paleri, and L. Wanner, 2024: Characterizing energy balance closure over a heterogeneous ecosystem using multi-tower eddy covariance. *Frontiers in Earth Science*. 11:1251138. <https://doi.org/10.3389/feart.2023.1251138>

- 23 Lappin, F., and Coauthors (incl. **B.J. Butterworth**). Data collected using small uncrewed aircraft system during the TRacking Aerosol Convection Interactions ExpeRiment (TRACER). *Earth System Science Data*. 16, 2525–2541. <https://doi.org/10.5194/essd-16-2525-2024>
- 22 de Boer, G., **B. J. Butterworth**, et al., 2024: Evaluation and Intercomparison of Small Uncrewed Aircraft Systems Used for Atmospheric Research. *Journal of Atmospheric and Oceanic Technology*, 41, 127–145, <https://doi.org/10.1175/JTECH-D-23-0067.1>
- 21 Wanner, L., M. Jung, S. Paleri, **B. J. Butterworth**, A. R. Desai, M. Sühring, and M. Mauder, 2024: Towards Energy-Balance Closure with a Model of Dispersive Heat Fluxes. *Boundary-Layer Meteorology*. 190, 25. <https://doi.org/10.1007/s10546-024-00868-8>
- 20 Shveytser, V., P. C. Stoy, **B. J. Butterworth**, S. Wiesner, T. H. Skaggs, B. Murphy, T. Wutzler, T. S. El-Madany, A. R. Desai, 2024: Evaporation and transpiration from multiple proximal forests and wetlands. *Water Resources Research*, 60, e2022WR033757. <https://doi.org/10.1029/2022WR033757>

— 2023 —

- 19 de Boer, G., and Coauthors (incl. **B.J. Butterworth**), 2023: Supporting Advancement in Weather and Water Prediction in the Upper Colorado River Basin: The SPLASH Campaign. *Bulletin of the American Meteorological Society*. <https://doi.org/10.1175/BAMS-D-22-0147.1>
- 18 Sims, R. P, M. Ahmed, **B. J. Butterworth**, P. J. Duke, S. F. Gonski, S. F. Jones, K. A. Brown, C. J. Mundy, W. J. Williams, and B. G. T. Else, 2023: High interannual surface pCO<sub>2</sub> variability in the Southern Canadian Arctic Archipelago's Kitikmeot Sea. *Ocean Science*. 19(3), 837–856. <https://doi.org/10.5194/os-19-837-2023>
- 17 Tirado, J., A. O. Torti, **B. J. Butterworth**, K. Wangen, A. Voon, B. Kies, J. Hupy, G. de Boer, R. B. Pierce, T. J. Wagner, P. A. Cleary, 2023: Observations of Coastal Dynamics During Lake Breeze at a Shoreline Impacted by High Ozone. *Environmental Science: Atmospheres*, 3(3), 494–505. <https://doi.org/10.1039/D2EA00101B>

— 2022 —

- 16 Paleri, S., A. R. Desai, S. Metzger, D. Durden, **B. J. Butterworth**, M. Mauder, et al. 2022: Space-scale resolved surface fluxes across a heterogeneous, mid-latitude forested landscape. *Journal of Geophysical Research: Atmospheres*, 127, e2022JD037138. <https://doi.org/10.1029/2022JD037138>
- 15 Desai, A. R., B. A. Murphy, S. Wiesner, J. Thom, **B. J. Butterworth**, N. Koupaei-Abyazani, et al., 2022: Drivers of decadal carbon fluxes across temperate ecosystems. *Journal of Geophysical Research: Biogeosciences*, 127, e2022JG007014. <https://doi.org/10.1029/2022JG007014>
- 14 Yang, M., T. G. Bell, J. R. Bidlot, B. W. Blomquist, **B. J. Butterworth**, Y. Dong, C. W. Fairall, S. Landwehr, C. A. Marandino, S. D. Miller, E. S. Saltzman, and A. Zavarisky, 2022: Global synthesis of air-sea CO<sub>2</sub> transfer velocity estimates from ship-based eddy covariance measurements. *Frontiers in Marine Science*, 9. doi: 10.3389/fmars.2022.826421.
- 13 Murphy, B. A., J. A. May, **B. J. Butterworth**, C. G. Andresen, A. R. Desai, 2022: Unravelling Forest Complexity: Resource Use Efficiency, Disturbance, and the Structure-

Function Relationship. *Journal of Geophysical Research: Biogeosciences*, 127, e2021JG006748. <https://doi.org/10.1029/2021JG006748>.

- 12 Wohl, C., A. E. Jones, W. T. Sturges, P. D. Nightingale, B. Else, **B. J. Butterworth**, and M. Yang, 2022: Sea ice concentration impacts dissolved organic gases in the Canadian Arctic, *Biogeosciences*, 19, 1021–1045, <https://doi.org/10.5194/bg-19-1021-2022>
- 11 Watts, J., T. G. Bell, K. Anderson, **B. J. Butterworth**, S. Miller, B. Else, and J. Shutler, 2022: Impact of sea ice on air-sea CO<sub>2</sub> exchange – a critical review of polar eddy covariance studies. *Progress in Oceanography*, 201, p. 102741. doi: 10.1016/j.pocean.2022.102741.

— 2021 —

- 10 **Butterworth, B. J.** and Coauthors, 2021: Connecting Land-Atmosphere Interactions to Surface Heterogeneity in CHEESEHEAD19. *Bulletin of the American Meteorological Society*, **102**, E421–E445, <https://doi.org/10.1175/BAMS-D-19-0346.1>
- 9 Desai, A. R., A. M. Khan, T. Zheng, S. Paleri, **B. J. Butterworth**, T. R. Lee, J. B. Fisher, G. Hulley, T. Kleynhans, A. Gerace, P. A. Townsend, P. Stoy, and S. Metzger, 2021: Multi-Sensor Approach for High Space and Time Resolution Land Surface Temperature. *Earth Sp. Sci.*, 8, 1–18, <https://doi.org/10.1029/2021EA001842>.
- 8 Metzger, S., D. Durden, S. Paleri, M. Sühling, **B. J. Butterworth**, C. Florian, M. Mauder, D. M. Plummer, L. Wanner, K. Xu, and A. R. Desai, 2021: Novel approach to observing system simulation experiments improves information gain of surface–atmosphere field measurements, *Atmospheric Measurement Techniques*, 14, 6929–6954, <https://doi.org/10.5194/amt-14-6929-2021>.
- 7 Helbig, M., T. Gerken, et al. (29 coauthors inc. **B. J. Butterworth**), 2021: Integrating continuous atmospheric boundary layer and tower-based flux measurements to advance understanding of land-atmosphere interactions. *Agricultural and Forest Meteorology*, 307, 108509, <https://doi.org/10.1016/j.agrformet.2021.108509>.

— 2020 —

- 6 Ahmed, M. M. M., B. G. T. Else, **B. J. Butterworth**, D. W. Capelle, C. Guéguen, L. A. Miller, C. Meilleur, and T. Papakyriakou, 2020: Widespread surface water pCO<sub>2</sub> undersaturation during ice melt season in an Arctic continental shelf sea (Hudson Bay, Canada). *Elementa: Science of the Anthropocene*, **9**, 1, <https://doi.org/10.1525/elementa.2020.00130>
- 5 Duke, P. J., B. G. T. Else, S. Jones, S. Marriot, M. Ahmed, V. Nandan, **B. J. Butterworth**, S. Gonski, R. Dewey, L. Miller, K. Simpson, and H. Thomas, 2020: Seasonal Marine Carbon System Processes in an Arctic Coastal Landfast Sea Ice Environment Using an Innovative Underwater Sensor Platform. *Elementa: Science of the Anthropocene*, **9**, 1, <https://doi.org/10.1525/elementa.2021.00103>

— 2018 and earlier —

- 4 **Butterworth, B. J.**, and B. G. T. Else, 2018: Dried, closed-path eddy covariance method for measuring carbon dioxide flux over sea ice. *Atmospheric Measurement Techniques*, **11**, 6075–6090, <https://doi.org/10.5194/amt-11-6075-2018>.

- 3 **Butterworth, B. J.**, and S. D. Miller, 2016: Air-sea exchange of carbon dioxide in the Southern Ocean and Antarctic marginal ice zone. *Geophysical Research Letters*, **43**, 7223–7230, <https://doi.org/10.1002/2016GL069581>
- 2 **Butterworth, B. J.** and S. D. Miller, 2016: Automated Underway Eddy Covariance System for Air–Sea Momentum, Heat, and CO<sub>2</sub> Fluxes in the Southern Ocean. *Journal of Atmospheric and Oceanic Technology*, **33**, 635–652, <https://doi.org/10.1175/JTECH-D-15-0156.1>
- 1 Hough-Goldstein, J., M. Schiff, E. Lake and **B. Butterworth**, 2008: Impact of the biological control agent *Rhinoncomimus latipes* (Coleoptera : Curculionidae) on mile-a-minute weed, *Persicaria perfoliata*, in field cages. *Biological Control*, **46**, 417–423, <https://doi.org/10.1016/j.biocontrol.2008.04.001>

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## MANUSCRIPTS IN REVIEW

Cox, C. J., Intrieri, J. M., **Butterworth, B.**, de Boer, G., Gallagher, M. R., Hamilton, J., Hulm, E., Meyers, T., Morris, S. M., Osborn, J., Persson, P. O. G., Schmatz, B., Shupe, M. D., and Wilczak, J. M.: Observations of surface energy fluxes and meteorology in the seasonally snow-covered high-elevation East River Watershed during SPLASH, 2021–2023, *Earth Syst. Sci. Data Discuss.* [preprint], <https://doi.org/10.5194/essd-2024-158>, in review, 2024.

Davis, J., Thomson, J., Houghton, I., Fairall, C., **Butterworth, B.**, Thompson, E., de Boer, G., Doyle, J., and Moskaitis, J.: Ocean surface wave slopes and wind-wave alignment observed in Hurricane Idalia, *Journal of Geophysical Research: Oceans.* [preprint], [10.22541/essoar.172656818.87657270/v1](https://doi.org/10.22541/essoar.172656818.87657270/v1), 2024.

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## OTHER PUBLICATIONS

Davis J. R., J. Thomson, **B. J. Butterworth**, I. A. Houghton, C. Fairall, E. J. Thompson, G. DeBoer, 2024: Multiscale measurements of hurricane waves using buoys and airborne radar, *2024 IEEE/OES Thirteenth Current, Waves and Turbulence Measurement (CWTM)*, Wanchese, NC, USA, pp. 1-8, doi: 10.1109/CWTM61020.2024.10526332. [conference proceeding]

Paleri, S., **B. J. Butterworth**, and A. R. Desai: Here, there, and everywhere: Spatial patterns and scales. *Conceptual Boundary Layer Meteorology: The Air Near Here*, A.L. Hiscox and A.G. McCombs, Eds., Elsevier, 2022. [book chapter]

Helbig, M., T. Gerken, E. Beamesderfer, D. D. Baldocchi, T. Banerjee, S. C. Biraud, N. A. Brunzell, S. P. Burns, **B. J. Butterworth**, et al.: Whitepaper: Understanding land-atmosphere interactions through tower-based flux and continuous atmospheric boundary layer measurements, AmeriFlux Management Project, 47 pp., 2020. [white paper]

## PUBLISHED DATASETS

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Cox, C. J., J. M. Intrieri, **B. J. Butterworth**, G. de Boer, M. R. Gallagher, J. Hamilton, E. Hulm, S. Morris, J. Osborn, B. Schmatz and M. D. Shupe (December 2023): Atmospheric Surface Flux Station #30 measurements (level 1 Raw), Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology (SPLASH), September 2021-July 2023. Zenodo, Dataset, <https://doi.org/10.5281/zenodo.10307826>.

Cox, C. J., J. M. Intrieri, **B. J. Butterworth**, G. de Boer, M. R. Gallagher, J. Hamilton, E. Hulm, S. Morris, J. Osborn, B. Schmatz and M. D. Shupe (December 2023): Atmospheric Surface Flux Station #50 measurements (level 1 Raw), Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology (SPLASH), October 2021-June 2023. Zenodo, Dataset, <https://doi.org/10.5281/zenodo.10310521>.

Cox, C. J., M. R. Gallagher, J. M. Intrieri, **B. J. Butterworth**, T. Meyers and P. O. G. Persson (December 2023): Atmospheric Surface Flux Station #30 measurements (level 2 Processed), Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology (SPLASH), October 2021-June 2023. Zenodo, Dataset, <https://doi.org/10.5281/zenodo.10313895>.

Cox, C. J., M. R. Gallagher, J. M. Intrieri, **B. J. Butterworth**, T. Meyers and P. O. G. Persson (December 2023): Atmospheric Surface Flux Station #50 measurements (level 2 Processed), Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology (SPLASH), October 2021-June 2023. Zenodo, Dataset, <https://doi.org/10.5281/zenodo.10313364>.

de Boer, G., J. Hamilton, R. Calmer, M. Rhodes, **B. J. Butterworth**, J. Buchli, M. Ritsch, A. Miller, C. Gomez-Faulk, S. Borenstein, E. Asher, T. Thornberry, B. Argrow (December 2023): TRACER UAS CU RAAVEN Flight Data (v1.0). ARM Data Center, Dataset, <https://doi.org/10.5439/1985470>.

Desai, A. R., **B. J. Butterworth**, S. P. Oncley, (2019), CHEESEHEAD19 Datasets:

AmeriFlux US-PFb	AmeriFlux US-PFi	AmeriFlux US-PFp
AmeriFlux US-PFc	AmeriFlux US-PFj	AmeriFlux US-PFq
AmeriFlux US-PFd	AmeriFlux US-PFk	AmeriFlux US-PFr
AmeriFlux US-PFe	AmeriFlux US-PFl	AmeriFlux US-PFs
AmeriFlux US-PFg	AmeriFlux US-PFm	AmeriFlux US-PFt
AmeriFlux US-PFh	AmeriFlux US-PFn	

Miller, S. and **B. J. Butterworth**, (2016). Eddy covariance air-sea momentum, heat, and carbon dioxide fluxes in the Southern Ocean from the Nathaniel B. Palmer (cruise NBP1210). Integrated Earth Data Applications (IEDA). doi: <http://dx.doi.org/10.1594/IEDA/323564>.

Miller, S. and **B. J. Butterworth**, (2016). Eddy covariance air-sea momentum, heat, and carbon dioxide fluxes in the Southern Ocean from the Nathaniel B. Palmer (cruise NBP1402). Integrated Earth Data Applications (IEDA). doi: <http://dx.doi.org/10.1594/IEDA/323565>.

## INVITED TALKS

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**Butterworth, B. J.**, Adler, B., C. Cox, G. de Boer, M. Gallagher, J. Intrieri. Influence of mountain wind regimes on surface energy balance during the SPLASH field campaign. *SAIL/SPLASH seminar*. Aug 21, 2024. [oral presentation]

**Butterworth, B. J.**, 2023: CO<sub>2</sub> EC Fluxes: Do we need to dry the sample airstream? *Ocean Best Practices – Air-Sea CO<sub>2</sub> Flux Workshop*. London, UK. Mar 26, 2023. [oral presentation]

**Butterworth, B. J.** and A. R. Desai, 2020: Be a CHEESEHEAD: Results from the Chequamegon Heterogeneous Ecosystem Energy-Balance Study Enabled by a High-Density Extensive Array of Detectors study. *National Center for Atmospheric Research (NCAR) Earth Observatory Laboratory (EOL) Seminar Series*. Dec 1, 2020.

**Butterworth, B. J.**, 2019: Carbon Dioxide Exchange over Oceans and Sea Ice. *Center for Sustainability and the Global Environment (SAGE) and Nelson Institute Center for Climatic Research (CCR) Spring Meeting*, Madison, Wisconsin.

**Butterworth, B. J.**, 2019: Air-Sea Carbon Dioxide Exchange in the Southern Ocean and Antarctic Sea Ice Zone. *UW-AOS Colloquium*, Madison, Wisconsin.

## PRESENTATIONS

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**Butterworth, B. J.**, Adler, B., C. Cox, G. de Boer, M. Gallagher, J. Intrieri. Influence of mountain wind regimes on surface energy balance during the SPLASH field campaign. *21st Conference on Mountain Meteorology*. July 22, 2024. [oral presentation]

**Butterworth, B. J.**, C. Cox, G. de Boer, M. Gallagher, J. Intrieri, O. Persson, M. Shupe. Characterizing the Annual Surface Energy Balance in Gothic Valley during the SPLASH Field Campaign. *SPLASH/SAIL/SOS (S3) Combined Workshop*. Nov 3, 2023. [oral presentation]

**Butterworth, B. J.**, C. Cox, G. de Boer, M. Gallagher, J. Intrieri, O. Persson, M. Shupe. Characterizing the Annual Surface Energy Balance in Gothic Valley during the SPLASH Field Campaign. *Rendezvous 2023*. Boulder, CO. May 16, 2023. [poster presentation]

**Butterworth, B. J.**, C. Cox, G. de Boer, M. Gallagher, J. Intrieri, O. Persson, M. Shupe. Characterizing the Annual Surface Energy Balance in Gothic Valley during the SPLASH Field Campaign. *SAIL/SPLASH ATOC meeting*. Boulder, CO. June 15, 2023. [oral presentation]

**Butterworth, B. J.**, C. Cox, G. de Boer, M. Gallagher, J. Intrieri, O. Persson, M. Shupe. Characterizing the Annual Surface Energy Balance in Gothic Valley during the SPLASH Field Campaign. *Scaling land-atmosphere interactions mini-conference*. May 25, 2023. [oral presentation]

**Butterworth, B. J.**, G. de Boer, 2023: A Study of Intermittent Turbulence in Stable Arctic Boundary Layers. *24th Symposium on Boundary Layers and Turbulence at the 103rd American Meteorological Society Annual Meeting*. Denver, CO. Jan 11, 2023. [oral presentation]

**Butterworth, B. J.**, G. de Boer, 2022: Northern Alaska Site Science: A Study of Intermittent Turbulence in Stable Arctic Boundary Layers during ERASMUS. *2022 Joint Atmospheric Radiation Measurement (ARM) User Facility/Atmospheric System Research (ASR) Principal Investigators Meeting*. [poster presentation]

**Butterworth, B. J.**, G. de Boer, 2022: A Study of Intermittent Turbulence in Stable Arctic Boundary Layers during ERASMUS. *17th Conference on Polar Meteorology and Oceanography*. [poster presentation]

**Butterworth, B. J.**, G. de Boer, 2022: A Study of Intermittent Turbulence in Stable Arctic Boundary Layers during ERASMUS. *Rendezvous 2022*. [poster presentation]

**Butterworth, B. J.**, A. Desai, S. Paleri, S. Metzger, D. Durden, C. Florian, M. Mauder, L. Wanner, M. Sühling, and K. Xu, 2021: A Comparison of Temporal and Spatial Eddy Covariance for Investigating Energy Balance Closure over a Heterogeneous Ecosystem. *34th Conference on Agricultural and Forest Meteorology*, 22 June 2021. [Oral Presentation]

A. Desai, A. M. Khan, T. Zheng, S. Paleri, **B. J. Butterworth (presenter)**, T. Lee, J. Fisher, G. Hulley, T. Kleynhans, A. Gerace, P. Townsend, P. Stoy, and S. Metzger, 2021: Resolving Fine-Scale Variation in Drivers of Surface-Atmosphere Fluxes: A Case Study for Land Surface Temperature in CHEESEHEAD19. *Conf. on Ag. Forest Met.*, 22 June 2021. [Oral Presentation]

**Butterworth, B. J.**, A. Desai, S. Paleri, L. Wanner, M. Mauder, 2020: Influence of Mesoscale Eddies on Energy Balance Closure over a Heterogeneous Ecosystem. *AGU Fall Meeting 2020*, H192-08. [Oral Presentation]

**Butterworth, B. J.**, A. Desai, S. Paleri, S. Metzger, D. Durden, C. Florian, M. Mauder, L. Wanner, D. LaLuzerne, 2020: Advances in Energy Balance Research from CHEESEHEAD19. *AmeriFlux Annual Meeting*, 8 Oct. 2020. [Poster Presentation]

**Butterworth, B. J.**, Desai, A., Paleri, S., Metzger, S., Durden, D., Florian, C., Mauder, M., Wanner, L., Sühling, M., and Xu, K., 2020: Using Spatial Eddy Covariance to Investigate Energy Balance Closure over a Heterogeneous Ecosystem, *A CHEESEHEAD virtual mini-session*, 17 June 2020. [Oral Presentation]

**Butterworth, B. J.**, Desai, A., Paleri, S., Metzger, S., Durden, D., Florian, C., Mauder, M., Wanner, L., Sühling, M., and Xu, K., 2020: Using Spatial Eddy Covariance to Investigate Energy Balance Closure over a Heterogeneous Ecosystem, *EGU General Assembly 2020, Online*, 4–8 May 2020, EGU2020-22480, <https://doi.org/10.5194/egusphere-egu2020-22480>. [Chat-based presentation]

**Butterworth, B. J.**, Desai, A. R., Metzger, S., and Paleri, S. 2019: Impact of the Spatial Distribution of Surface Fluxes on Energy Balance Closure over a Heterogeneous Ecosystem. *AGU Fall Meeting 2019*, B41K-2496. [Poster Presentation]

**Butterworth, B. J.**, A. Desai, S. Oncley, W. Brown, S. Metzger, D. Durden, P. Townsend, E. Kruger, P. Stoy, G. Petty, M. Schwartz, E. Olson, H. Vogelmann, S. Paleri, K. Xu, and J. Mineau, 2019: Updates on the Chequamegon Heterogeneous Ecosystem Energy-balance Study Enabled by a High-density Extensive Array of Detectors. *Ameriflux Annual Meeting*, Boulder, Colorado. [Poster Presentation]

**Butterworth, B. J.**, B. Else, 2019: Annual Carbon Dioxide Flux over Seasonal Sea Ice in the Canadian Arctic. *Annual AOSS Community Poster Reception*, Madison, Wisconsin. [Poster]

**Butterworth, B. J.**, and B. Else (Presenter), 2017: Eddy Covariance Measurements of Greenhouse Gas Exchange in an Arctic Marine Environment. *ArcticNet 2017 Annual Scientific Meeting*, Winnipeg, Manitoba. [Poster Presentation]

**Butterworth, B. J.**, and S.D. Miller, 2016: Air-Sea Exchange of Carbon Dioxide in the Antarctic Marginal Ice Zone. *ArcticNet 2016 Annual Scientific Meeting*, Winnipeg, Manitoba. [Oral Presentation]

- Butterworth, B. J.**, and S.D. Miller, 2016: Air-Sea Exchange of Carbon Dioxide in the Southern Ocean and Antarctic Marginal Ice Zone. *Air-sea Gas Flux; Progress and Future Prospects Science Workshop*, IFREMER, Brest, France. [Oral Presentation]
- Butterworth, B. J.**, and S.D. Miller, 2015: Air-Sea CO<sub>2</sub> Flux by Eddy Covariance in the Southern Ocean and Antarctic Sea Ice Zone. *7th International Symposium on Gas Transfer at Water Surfaces*, Seattle, WA. [Oral Presentation]
- Butterworth, B. J.**, and S.D. Miller, 2015: Unattended Measurements of High Latitude Air-sea CO<sub>2</sub> Exchange by Eddy Covariance, *19th Conference on Air-Sea Interaction*, Phoenix, AZ. [Oral Presentation]
- Butterworth, B. J.**, and S.D. Miller, 2014: Long-term Southern Ocean Air-sea CO<sub>2</sub> Flux by Eddy Covariance from an Ice Breaker. *Ocean Sciences Meeting*, Honolulu, HI. [Oral Presentation]
- Butterworth, B. J.**, and S.D. Miller, 2013: Air-sea Fluxes of CO<sub>2</sub> over the Southern Ocean. *6th International SOLAS Summer School*, Xiamen, China. [Oral and Poster Presentation]

## TEACHING EXPERIENCE

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### **Metropolitan State University of Denver**

Introduction to Physical Geography	2012 (2 courses)
Map Use	2012
Weather and Climate	2011

### **University of Colorado, Boulder**

Laboratory for Physical Geography I	2009 (3 courses), 2010 (2 courses), 2011 (3 courses)
Laboratory for Physical Geography II	2008 (3 courses), 2009 (3 courses), 2010 (3 courses)
Mountain Meteorology (TA)	2009

### **Mentoring**

Mentored 7 undergraduate and graduate students from 2014 – present

## GRANTS

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Department of Energy Atmospheric Systems Research – Integrated Perspectives on Clouds, Precipitation, and the Surface Energy Budget in the Colorado Rocky Mountains using Observations from SAIL and SPLASH 2023 (Contributor)	2023
Travel Grant – 2 <sup>nd</sup> International workshop of Air-Sea Gas Fluxes (France)	2016
Travel Grant – Surface Ocean Lower Atmosphere Study summer school (China)	2013
Travel Grant – University at Albany Graduate Student Association	2013
Adam Kolff Memorial Research Fellowship	2010



## HONORS & AWARDS

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Narayan R. Gokhale Distinguished Research Scholarship Award  
United States Antarctic Service Medal  
CU Boulder Geography Scholarship  
Outstanding Senior in Environmental Science Award – University of Delaware  
Member of Phi Beta Kappa – academic fraternity  
Member of Alpha Zeta – honors agricultural fraternity  
Honors Program at University of Delaware  
Tuition Scholarship – University of Delaware

## PROFESSIONAL ACTIVITIES

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Associate Editor	Guest associate editor for JGR-Biogeosciences	2022
Session Convener & Chair	<i>Conference on Agricultural and Forest Meteorology – Advances in Spatial and Temporal Scaling of Surface-Atmosphere Fluxes</i>	2021
Special Collection Organizer	<i>Advances in scaling and modeling of land-atmosphere interactions</i> across JGR: Biogeosciences, JGR: Atmospheres, JAMES, and ESS	2020
Workshop Organizer	Organized a workshop (funded by NEON) on cloud computing resources for processing data from the CHEESEHEAD project	2019
Session Convener & Chair	<i>AGU Meeting – B21C - Surface-Atmosphere Interactions: Advances in Analysis and Scaling of Surface-Atmosphere Fluxes</i>	2019
Early Career Workshop	Participated the AmeriFlux Early Career Workshop at the <i>AmeriFlux Annual Meeting</i> , Boulder, Colorado	2019
Session Chair	<i>ArcticNet Science Meeting – Ocean-Sea-Ice-Atmosphere Interaction</i> , Winnipeg, MB, Canada	2016
Air-Sea Gas Flux Workshop	Presented at the 2 <sup>nd</sup> International workshop on Air-Sea Gas Fluxes: Progress and Future Prospects, IFREMER, Brest, France	2016
Summer School	Surface Ocean Lower Atmosphere Study (SOLAS), Xiamen, China	2013

## OUTREACH

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Representative	PSL Workplace Advisory Committee – BLOPD representative	2022
DEI Town Hall Organizer	Worked with UW Postdoctoral Association’s Diversity & Inclusion Committee to organize a forum on diversity, equity, and inclusion challenges of postdocs from underrepresented groups	2020

Open House Organizer	Helped organize an open house event to illustrate the CHEESEHEAD project to the community of Park Falls, WI	2019
Park Falls Public Library	Presentation on the scientific motivations for the CHEESEHEAD study to community of Park Falls, WI	2019
Sexual Harassment Prevention Training Organizer	Helped organize a sexual harassment prevention training event for the participants of the CHEESEHEAD project	2019
Ark Community Charter School	Presentation on the Southern Ocean gas exchange experiment to 3 <sup>rd</sup> grade class in Troy, NY	2014

## FIELD CAMPAIGNS

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<b>Gothic, Colorado</b> (July & Sep): Performed routine maintenance on eddy covariance systems, performed soil sampling, and helped with project demobilization for SPLASH field campaign.	2023
<b>Houston, Texas</b> (Sep): Worked on a team to collect UAS measurements for the TRACER field campaign.	2022
<b>Boulder, Colorado</b> (Feb): Participated in UAS deployments to measure wake turbulence of a wind turbine near Boulder, CO as part of the AWAKEN project.	2022
<b>Park Falls, Wisconsin</b> (May – Oct): Managed field operations for the CHEESEHEAD field campaign to determine the influence of mesoscale atmospheric processes on the Earth’s energy balance.	2019
<b>Quebec City, QC</b> (May 10 – 23): Installed eddy covariance system on board the CCGS Amundsen for the Summer 2018 Expedition. Sailed (May 17 – 21) as part of equipment testing cruise in the St. Lawrence Estuary.	2018
<b>Hokkaido, Japan</b> (Feb 27 – Mar 11): Deployed under-ice eddy covariance system for measuring O <sub>2</sub> fluxes in Saroma-ko Lagoon in Hokkaido, Japan as part of an international collaboration (SCOR Working Group 152 on Measuring Essential Climate Variables in Sea Ice) to compare methods for measuring biogeochemical properties of sea ice.	2018
<b>Icebreaker: Amundsen Leg 2a</b> (July 5 – 14): Sailed aboard the research vessel CCGS Amundsen from Kuujuarapik, Quebec to Iqaluit, Nunavut to take measurements of air-sea-ice gas exchange in Hudson Bay.	2017
<b>Icebreaker: Amundsen Leg 1</b> (May 22 – June 11): Sailed aboard the research vessel CCGS Amundsen as part of the BaySys project from Quebec City to St. Johns, Newfoundland. Installed eddy covariance system on the bow mast of the ship to collect measurements of air-sea-ice gas exchange of carbon dioxide and methane.	2017

<b>Cambridge Bay, Nunavut</b> (Apr 21 – May 5): Traveled to Qikirtaarjuk Island in Dease Strait to install an eddy covariance tower to collect long-term, continuous measurements of air-sea-ice carbon dioxide flux.	2017
<b>Cranberry Lake, New York</b> (Aug 11 – 22): Lake-atmosphere gas exchange, pilot study collaboration between ASRC, SUNY ESF, Columbia University.	2014
<b>Research Vessel Ice Breaker (RVIB) Nathaniel B. Palmer</b> (June 22 – 29): Equipment repairs and 6-day cruise from Punta Arenas to Valparaiso, Chile	2013
<b>RVIB Nathaniel B. Palmer</b> (Nov 19 – 26): Equipment repair, Punta Arenas, Chile	2013
<b>RVIB Nathaniel B. Palmer</b> (Dec 20, 2012 – Feb 12, 2013): Installed & maintained EC system aboard 40-day cruise from Punta Arenas, Chile to McMurdo Station, Antarctica	2012
<b>Niwot Ridge, Colorado</b> (August): Collaboration with Daniel Wolfe (NOAA) investigating boundary-layer development on Niwot Ridge using tether sonde.	2010
<b>Colorado Springs, Colorado</b> (August): NCAR Bio-hydro-atmosphere interactions of Energy, Aerosols, Carbon, H <sub>2</sub> O, Organics & Nitrogen (BEACHON) study – Weather balloon releases to investigate troposphere over Hayman Fire burn site.	2010
<b>Niwot Ridge, Colorado</b> (summer) – Installed EC equipment and an array (3km x 4km) of temperature probes on Niwot Ridge to investigate the interaction between the local meteorology and vegetation patterns.	2009
<b>White Clay Creek State Park, Delaware</b> (summer) – Tested the effectiveness of using host-specific weevil as a biological control agent for invasive mile-a-minute weed.	2006

## JOURNAL REVIEWER

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Boundary-Layer Meteorology	2021, 2023
Scientific Reports – Nature	2021
Limnology and Oceanography Methods	2020
Forests	2020
Ocean Science	2019
Atmospheric Measurement Techniques	2016, 2018

## ADVISORS

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Postdoctoral –	Dr. Ankur R. Desai	University of Wisconsin – Madison, Atmospheric Sci.
Postdoctoral –	Dr. Brent G. T. Else	University of Calgary, Geography
Ph.D. –	Dr. Scott D. Miller	University at Albany, SUNY, Atmospheric Science
Master’s –	Dr. Peter D. Blanken	University of Colorado Boulder, Geography