

Ariel L. Morrison

Postdoctoral Research Fellow

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Research Interests and Skills

Polar climate dynamics
Cloud feedbacks

Machine learning in geoscience
Global and regional climate modeling

STEM education
Python, MATLAB, ICAR

Education

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|-------------|---|
| 2016 – 2019 | PhD, Atmospheric and Oceanic Sciences
University of Colorado Boulder |
| 2013 – 2015 | MSc, Atmospheric and Oceanic Sciences
University of Colorado Boulder |
| 2006 – 2010 | BA, Earth Sciences (cum laude), Marine Sciences minor
Boston University |

Academic Positions

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| 2020 – Present | Postdoctoral Research Fellow – Polar Climate Dynamics
School of Earth and Ocean Sciences, University of Victoria
Victoria, BC, Canada |
| 2019 | Postdoctoral Research Fellow – Geoscience Education
Cooperative Institute for Research in Environmental Sciences (CIRES)
University of Colorado Boulder
Boulder, CO, USA |
| 2014 – 2019 | PhD Student
Department of Atmospheric and Oceanic Sciences, University of Colorado Boulder
Boulder, CO, USA |
| 2016 – 2017 | STEM Chateaubriand Fellow
Laboratoire Météorologie Dynamique (LMD), École Polytechnique
Palaiseau, France |

Publications

- 2022 | **Morrison, A.L.**, Singh, H.A., and Rasch, P.J. Observations indicate that clouds amplify mechanisms of Southern Ocean heat uptake. *Journal of Geophysical Research: Atmospheres*, 127: e2021JD035487.
- Singh, H.A., Kay, J.E., Feldl, N., and **Morrison, A.L.** Ocean Heat Transport Changes with CO₂ Forcing Impact Global Climate Sensitivity through Lapse Rate and Cloud Feedbacks. Accepted to *Journal of Climate*, January 2022.
- 2020 | **Morrison, A.L.**, Rozak, S., Gold, A.U., and Kay, J.E. Quantifying student engagement in learning about climate change using galvanic hand sensors in a controlled educational setting. *Climatic Change*, 159(1): 17-36.
- 2019 | **Morrison, A.L.**, Kay, J.E., Frey, W.R., Chepfer, H., and Guzman, R. Cloud response to Arctic sea ice loss and implications for future feedback in the CESM1 climate model. *Journal of Geophysical Research: Atmospheres*, 124(2): 1003-1020.
- 2018 | Frey, W.R., **Morrison, A.L.**, Kay, J.E., Guzman, R., and Chepfer, H. The combined influences of observed Southern Ocean clouds and sea ice on top-of-atmosphere albedo. *Journal of Geophysical Research: Atmospheres*, 123(9): 4461-4475.
- Morrison, A.L.**, Kay, J.E., Chepfer, H., Guzman, R., and Yettella, V. Isolating the liquid cloud response to recent Arctic sea ice variability using spaceborne lidar observations. *Journal of Geophysical Research: Atmospheres*, 123(1): 427-490.
- 2016 | Kay, J.E., L'Ecuyer, T., Chepfer, H., Loeb, N., **Morrison, A.L.**, and Cesana, G. Recent Advances in Cloud and Climate Research. *Current Climate Change Reports*, 2(4): 159-169.
- Kay, J.E., Bourdages, L., Miller, N., **Morrison, A.L.**, Yettella, Y., Chepfer, H., and Eaton, B. Evaluating and improving cloud phase in the Community Atmosphere Model version 5 using spaceborne lidar observations. *Journal of Geophysical Research: Atmospheres*, 121(8): 4162-4176.
- 2011 | Orlosk, J.L., Walker, J.M., **Morrison, A.L.**, and Atema, J. Conditioning the crab *Carcinus maenas* against instinctive light avoidance. *Marine and Freshwater Behaviour and Physiology*, 44(6): 375-381.

In Progress Publications

Morrison, A.L., Heyblom, K., Singh, H.A., and Rasch, P.J. Projected Antarctic extreme heat events in a warming world. Submitted to *Geophysical Research Letters*, March 2022.

Awards and Certificates

- 2020 | **Certificate in College Teaching**
Graduate Teaching Program
University of Colorado Boulder
Boulder, CO, USA
- 2019 | **Innovative Research Proposal**
"Assessing the potential of biometric sensors to measure engagement and learning in the classroom"
Cooperative Institute for Research in Environmental Sciences (CIRES)
University of Colorado Boulder
Boulder, CO, USA
- 2018 | **Excellence in Teaching Award**
Atmospheric and Oceanic Sciences Laboratory/Recitation Instructor
University of Colorado Boulder
Boulder, CO, USA
- 2018 | **Outstanding Student Presentation Award (OSPA)**
Cryosphere Section, American Geophysical Union (AGU) Fall Meeting
Washington, D.C., USA
- 2015 | **First Place, 'Aerosols, Clouds, and Precipitation' category**
"Processes controlling seasonal variability of Arctic Ocean liquid cloud profiles"
Earth System & Space Science Poster Conference
University of Colorado Boulder
Boulder, CO, USA

Teaching Experience

- 2020 – 2021 | **Guest lecturer**
EOS365 (undergraduate), "Climate and Society"
EOS433 (undergraduate/graduate), "The Climate System"
School of Earth and Ocean Sciences, University of Victoria
Victoria, BC, Canada
- 2018 – 2019 | **Graduate teacher – Recitation Instructor**
ATOC1060 (undergraduate), "Our Changing Environment"
Department of Atmospheric and Oceanic Sciences, University of Colorado Boulder
Boulder, CO, USA
- 2016 | **Summer Intensive Course instructor**
"Introduction to Climate Change"
Boulder Preparatory High School
Boulder, CO, USA

2013 – 2014 | **Graduate teaching assistant**
ATOC1060 (undergraduate), "Our Changing Environment"
Department of Atmospheric and Oceanic Sciences, University of Colorado Boulder
Boulder, CO, USA

Mentoring Experience

2022 – Present | **Undergraduate Student Research Awards co-supervisor**
Natural Sciences and Engineering Research Council of Canada
School of Earth and Ocean Sciences, University of Victoria
Victoria, BC, Canada

2021 – Present | **Undergraduate Honours Thesis supervisor**
School of Earth and Ocean Sciences, University of Victoria
Victoria, BC, Canada

2021 | **Writing mentor**
Research Experience for Undergraduates (REU) program
Department of Atmospheric and Oceanic Sciences, University of Colorado Boulder
Boulder, CO, USA

2018 | **Research mentor**
Research Experience for Community College Students (RECCS) program
Cooperative Institute for Research in Environmental Sciences (CIRES)
University of Colorado Boulder
Boulder, CO, USA

Invited Talks

2019 | "Arctic cloud and sea ice feedbacks from satellite observations and a global climate model." Morrison, A.L., Kay, J.E., Frey, W., Chepfer, H., Guzman, R. American Physical Society March Meeting, Boston, MA, USA, March 2019

2018 | "Cloud response to Arctic sea ice loss and implications for future feedbacks in the CESM1 climate model." Morrison, A.L., Kay, J.E., Frey, W., Chepfer, H., Guzman, R. American Geophysical Union Fall Meeting, Washington, D.C., USA, December 2018

2016 | "Observing the Cloud Response to Arctic Sea Ice Loss." Morrison, A.L., Kay, J.E., Chepfer, H., Guzman, R. American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2016

Selected Conference Talks

2021 | "Teleconnections between El Niño events and Southern Ocean heat uptake in CMIP6". Morrison, A.L., Singh, H.A., Rasch, P.J. American Geophysical Union Fall Meeting, New Orleans, LA, USA, December 2021

- 2021 | “Clouds amplify mechanisms of Southern Ocean heat uptake.” Morrison, A.L., Singh, H.A., Rasch, P.J. American Meteorological Society’s 16th Conference on Polar Meteorology and Oceanography, June 2021
- 2020 | “Impact of atmospheric processes on mechanisms of Southern Ocean heat uptake.” Morrison, A.L., Singh, H.A., Rasch, P.J. American Geophysical Union Fall Meeting, December 2020
- 2019 | “Increasing student engagement by incorporating authentic climate science research in the classroom.” Morrison, A.L., Gold, A.U., Kay, J.E. American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2019
- 2018 | “Evaluating the impact of educational activities on student engagement in climate science using galvanic hand sensors.” Morrison, A.L., Gold, A.U., Kay, J.E., Rozak, S. American Geophysical Union Fall Meeting, Washington, D.C., USA, December 2018
- 2017 | “Observing the Cloud Response to Arctic Sea Ice Loss.” Morrison, A.L., Kay, J.E., Chepfer, H., Guzman, R. European Geophysical Union General Assembly, Vienna, Austria, April 2017 (abstract noted by session conveners as being of public interest)
- “CALIPSO Observations of the Cloud Response to Recent Arctic Sea Ice Loss.” Morrison, A.L., Kay, J.E., Chepfer, H., Guzman, R. Expecting EarthCare, Learning from A-Train (EECLAT), St-Valery-sur-Somme, France, January 2017
- 2015 | “How is Arctic sea ice loss affecting our clouds?” Morrison, A.L., Kay, J.E. Graduate Climate Conference, Woods Hole, MA, USA, November 2015

Selected Conference Posters

- 2021 | “Terrestrial Antarctic heat waves in CMIP6.” Morrison, A.L., Oghenechovwen, O.C., Heyblom, K., Singh, H.A. American Geophysical Union Fall Meeting, New Orleans, LA, USA, December 2021
- 2017 | “Cloud response to Arctic sea ice loss and implications for feedbacks in the CESM1 climate model.” Morrison, A.L., Kay, J.E., Chepfer, H., Guzman, R., Bonazzola, M. American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2017
- “Measuring engagement and learning outcomes during a teacher professional development workshop about creative climate communication.” Morrison, A.L., Gold, A.U., Soltis, N., McNeal, K.S., Kay, J.E. American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2017
- 2016 | “Assessing the use of polar bear hooks in learning climate science.” Morrison, A.L., Kay, J.E., Gold, A.U., MacFerrin, B., McNeal, K.S. Earth System & Space Science Poster Conference, University of Colorado Boulder, Boulder, CO, USA, December 2016
- 2015 | “Processes controlling seasonal variability of Arctic Ocean liquid cloud profiles.” Morrison, A.L., Kay, J.E. Earth System & Space Science Poster Conference, University of Colorado Boulder, Boulder, CO, USA, November 2015

Seminars

- 2021 | “Clouds amplify mechanisms of Southern Ocean heat uptake.” Morrison, A.L., Singh, H.A., Rasch, P.J. Regional and Global Model Analysis team meeting, February 2021
- 2020 | “Observed and predicted feedbacks between polar clouds, sea ice, and ocean heat uptake.” Morrison, A.L., Kay, J.E., Chepfer, H., Guzman, R., Frey, W., Gold, A.U., Singh, H.A., Rasch, P.J. Earth and Ocean Sciences Fireside Chat seminar series, University of Victoria, Victoria, BC, Canada, October 2020
- 2019 | Invited - “Arctic cloud response to sea ice loss in satellite observations and a global climate model.” Morrison, A.L., Kay, J.E., Frey, W., Chepfer, H., Guzman, R. Atmospheric Sciences departmental seminar, University of Utah, Salt Lake City, UT, USA, January 2019
- 2018 | "Arctic cloud - sea ice feedbacks from CALIPSO and CESM." Morrison, A.L., Kay, J.E., Frey, W., Chepfer, H., Guzman, R. Department of Atmospheric and Oceanic Sciences forum, University of Colorado Boulder, Boulder, CO, USA, September 2018

Professional Affiliations

- 2020 – Present | **Member** - American Alliance of Museums
- 2019 – Present | **Member** - American Meteorological Society
- 2019 – 2020 | **Member** - American Physical Society
- 2017 – 2018 | **Member** - European Geophysical Union
- 2016 – Present | **Member** - American Geophysical Union
- 2016 – 2017 | **Board member** - U.S. Association for Polar Early Career Scientists (USAPECS)

Outreach and Service

- 2020 - 2021 | **Outstanding Student Presentation Award (OSPA) judge**
Atmosphere and Cryosphere Sections, American Geophysical Union Fall Meeting
- 2019 – Present | **Prehistoric Journey exhibition volunteer**
Denver Museum of Nature and Science
Denver, CO, USA
- 2018 | **Presenter**
TEDx Boulder Salon, "The Melting Arctic" theme
Boulder, CO, USA

Reviewer - Journal of Climate, Journal of Geophysical Research: Atmospheres, Geophysical Research Letters, Scientific Reports, Journal of Atmospheric and Oceanic Technology