

# CURRICULUM VITAE

## Kyle C. Armour

### Contact

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### Academic Appointments & Research Experience

UNIVERSITY OF WASHINGTON, SEATTLE, WA

**2020-present** Associate Professor

School of Oceanography and Department of Atmospheric Sciences

**2015-2020** Assistant Professor

School of Oceanography and Department of Atmospheric Sciences

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA

**2012-2015** James S. McDonnell Foundation Postdoctoral Fellow

Program in Atmospheres, Oceans and Climate

UNIVERSITY OF WASHINGTON, SEATTLE, WA

**2007-2012** Research Assistant

School of Oceanography

**2005-2007** Teaching Assistant

Department of Physics

### Education

UNIVERSITY OF WASHINGTON, SEATTLE, WA

**2012** Ph.D., Physics

Thesis: Reversibility of sea ice and climate under global change

UNIVERSITY OF WASHINGTON, SEATTLE, WA

**2007** M.S., Physics

UNIVERSITY OF CALIFORNIA, SAN DIEGO, CA

**2005** B.S., Physics and B.A., Applied Mathematics

### Awards & Fellowships

Alfred P. Sloan Research Fellowship, 2020

*AGU* Editors' Highlight: 'Sources of uncertainty in the meridional pattern of climate change', 2018

AGU Editors' Highlight: 'Radiative feedbacks from stochastic variability in surface temperature and radiative imbalance', 2018

NSF CAREER Award, 2018

CLIVAR Science Highlight: 'Energy budget constraints on climate sensitivity in light of inconstant climate feedbacks', 2017

*Nature Climate Change* Research Highlight and CLIVAR Science Highlight: 'Southern Ocean warming delayed by circumpolar upwelling and equatorward transport', 2016

*Nature Climate Change* Research Highlight: 'The ocean's role in polar climate change: asymmetric Arctic and Antarctic responses to greenhouse gas and ozone forcing', 2014

*Environmental Research Letters* Monthly Highlight: 'Rapid and extensive warming following cessation of solar radiation management', 2014

James S. McDonnell Foundation Postdoctoral Fellowship in Complex Systems, 2012

AGU Editors' Highlight: 'The reversibility of sea ice loss in a state-of-the-art climate model', 2011

AGU Editors' Highlight and *Nature Climate Change* Research Highlight: 'Climate commitment in an uncertain world', 2011

Achievement Rewards for College Scientists (ARCS) Fellowship, 2005–2008

Shang-keng Ma Award, UC San Diego, Department of Physics, 2005

## Peer-Reviewed Publications

\*student or postdoctoral advisee

39. Donohoe A., **K.C. Armour**, G.H. Roe, D.S. Battisti and L. Hahn\* (2020) The partitioning of meridional heat transport from the Last Glacial Maximum to CO<sub>2</sub> quadrupling in coupled climate models, *Journal of Climate*, doi: 10.1175/JCLI-D-19-0797.1
38. Loeb N.G., H. Wang, R. Allan, T. Andrews, **K.C. Armour**, J.N.S. Cole, J.-L. Dufresne, P. Forster, A. Gettelman, H. Guo, T. Mauritsen, Y. Ming, D. Paynter, C. Proistosescu\*, M.F. Stuecker, U. Willen and K. Wyser (2020) New generation of climate models track recent unprecedented changes in Earth's radiation budget observed by CERES, *Geophysical Research Letters*, doi: 10.1029/2019GL086705
37. Stuecker M.F., A. Timmermann, F.-F. Jin, C Proistosescu\*, S.M. Kang, D. Kim, K.-S. Yun, E.-S. Chung, J.-E. Chu, C.M. Bitz, **K.C. Armour** and M. Hayashi (2020) Strong remote control of future equatorial warming by off-equatorial forcing, *Nature Climate Change*, doi: 10.1038/s41558-019-0667-6
36. Y. Dong\*, C. Proistosescu\*, **K.C. Armour** & D.S. Battisti (2019) Attributing historical and future evolution of radiative feedbacks to regional warming patterns using a Green's function approach: The preeminence of the western Pacific. *Journal of Climate*, **32**, 5471–5491, doi: 10.1175/JCLI-D-18-0843.1
35. **K.C. Armour**, N. Siler, A. Donohoe & G.H. Roe (2019) Meridional atmospheric heat transport constrained by energetics and mediated by large-scale diffusion. *Journal of Climate*, **32**, 3655–3679 doi: 10.1175/JCLI-D-18-0563.1
34. R.C. Jnglin Wills\*, D.S. Battisti, C. Proistosescu\*, L. Thompson, D.L. Hartmann & **K.C. Armour** (2019) Ocean circulation signatures of North Pacific decadal variability. *Geophysical Research Letters*, **46**, 1690–1701, doi: 10.1029/2018GL080716

33. R.C. Jnglin Wills\*, **K.C. Armour**, D.S. Battisti & D.L. Hartmann (2019) Ocean-atmosphere dynamic coupling fundamental to the Atlantic Multidecadal Oscillation. *Journal of Climate*, **32**, 251–272, doi: 10.1175/JCLI-D-18-0269.1
32. M. Stuecker\*, C.M. Bitz, **K.C. Armour**, C. Proistosescu\*, S.M. Kang, S.-P. Xie, D. Kim, S. McGregor, W. Zhang, S. Zhao, W. Cai, Y. Dong\* & F.-F. Jin (2018) Polar amplification dominated by local forcing and feedbacks. *Nature Climate Change*, **8**, 1076–1081, doi: 10.1038/s41558-018-0339-y
31. D.B. Bonan\*, **K.C. Armour**, G.H. Roe, N. Siler & N. Feldl (2018) Sources of uncertainty in the meridional pattern of climate change. *Geophysical Research Letters*, **45**, 9131–9140, doi: 10.1029/2018GL079429
30. D. Oldenburg\*, **K.C. Armour**, L. Thompson & C.M. Bitz (2018) Distinct mechanisms of ocean heat transport into the Arctic under internal variability and climate change. *Geophysical Research Letters*, **45**, 7692–7700, doi: 10.1029/2018GL078719
29. T. Andrews, J.M. Gregory, D. Paynter, L.G. Silvers, C. Zhou, T. Mauritsen, M.J. Webb, **K.C. Armour**, P.M. Forster & H. Titchner (2018) Accounting for changing temperature patterns increases historical estimates of climate sensitivity. *Geophysical Research Letters*, **45**, 8490–8499, doi: 10.1029/2018GL078887
28. N. Siler, G.H. Roe & **K.C. Armour** (2018) Insights into the zonal-mean response of the hydrologic cycle to global warming from a diffusive energy balance model. *Journal of Climate*, **31**, 7481–7493, doi: 10.1175/10.1175/JCLI-D-18-0081.1
27. S. Po-Chedley, C. Proistosescu\*, **K.C. Armour** & B.D. Santer (2018) Climate constraint reflects forced signal. *Nature*, **563**, E6–E9, doi: 10.1038/s41586-018-0640-y
26. N. Siler, G.H. Roe & **K.C. Armour** (2018) Insights into the zonal-mean response of the hydrologic cycle to global warming from a diffusive energy balance model. *Journal of Climate*, doi: 10.1175/10.1175/JCLI-D-18-0081.1
25. C. Proistosescu\*, A. Donohoe, **K.C. Armour**, G.H. Roe, M.F. Stuecker\* & C.M. Bitz (2018) Radiative feedbacks from stochastic variability in surface temperature and radiative imbalance. *Geophysical Research Letters*, **45**, doi: 10.1029/2018GL077678
24. H. Goosse, J.E. Kay, **K.C. Armour**, A. Bodas-Salcedo, H. Chepfer, D. Docquier, A. Jonko, P.J. Kushner, O. Lecomte, F. Massonnet, H.-S. Park, F. Pithan, G. Svensson & M. Vancoppenolle (2018) Quantifying climate feedbacks in polar regions. *Nature Communications*, **9**:1919, doi: 10.1038/s41467-018-04173-0
23. S. Po-Chedley\*, **K.C. Armour**, C.M. Bitz, M.D. Zelinka, B.D. Santer & Q. Fu (2018) Sources of intermodel spread in the lapse rate and water vapor feedbacks. *Journal of Climate*, **31**, 3187–3206, doi: 10.1175/JCLI-D-17-0674.1
22. Y. Kostov, D.G. Ferreira, **K.C. Armour** & J. Marshall (2018) Contributions of greenhouse gas forcing and the Southern Annular Mode to historical Southern Ocean surface temperature trends. *Geophysical Research Letters*, **45**, 1086–1097, doi: 10.1002/2017GL074964
21. **K.C. Armour** (2017) Energy budget constraints on climate sensitivity in light of inconstant climate feedbacks. *Nature Climate Change*, **7**, 331–335, doi: 10.1038/nclimate3278
20. A.D. Haugstad\*, **K.C. Armour**, D.S. Battisti & B.E.J. Rose (2017) Relative roles of surface temperature and climate forcing patterns in the inconstancy of radiative feedbacks. *Geophysical Research Letters*, **44**, doi: 10.1002/2017GL074372

19. M.F. Stuecker\*, C.M. Bitz & **K.C. Armour** (2017) Conditions leading to the unprecedented low Antarctic sea ice extent during the 2016 austral spring season. *Geophysical Research Letters*, **44**, doi: 10.1002/2017GL074691
18. Y. Kostov, J. Marshall, U. Hausmann, **K.C. Armour**, D.G. Ferreira & M.M. Holland (2017) Fast and slow responses of Southern Ocean sea-surface temperature to the SAM in coupled climate models. *Climate Dynamics*, **5**, 1595–1609, doi: 10.1007/s00382-016-3162-z
17. **K.C. Armour**, J. Marshall, J. Scott, A. Donohoe & E.R. Newsom (2016) Southern Ocean warming delayed by circumpolar upwelling and equatorward transport. *Nature Geoscience*, **9**, 549–554, doi: 10.1038/ngeo2731
16. G.H. Roe, N. Feldl, **K.C. Armour**, Y.-T. Hwang & D.M.W. Frierson (2015) The remote impacts of climate feedbacks on regional climate predictability. *Nature Geoscience*, **8**, 135–139, doi: 10.1038/ngeo2346
15. J. Marshall, J. Scott, **K.C. Armour**, J.-M. Campin, M. Kelley & A. Romonou (2015) The ocean’s role in the transient response of climate to abrupt greenhouse gas forcing. *Climate Dynamics*, **44**, 2287–2299, doi: 10.1007/s00382-014-2308-0
14. A. Donohoe, **K.C. Armour**, A. Pendergrass & D.S. Battisti (2014) Shortwave and longwave radiative contributions to global warming under increasing CO<sub>2</sub>. *Proc. Nat. Acad. Sci.*, **111**, 16700–16705, doi: 10.1073/pnas.1412190111
13. Y. Kostov, **K.C. Armour** & J. Marshall (2014) Impact of the Atlantic Meridional Overturning Circulation on global ocean heat storage and transient climate change. *Geophys. Res. Lett.*, **41**, doi: 10.1002/2013GL058998
12. J. Marshall, **K.C. Armour**, J. Scott, Y. Kostov, D. Ferreira, T. Shepherd & C.M. Bitz (2014) The ocean’s role in polar climate change: asymmetric Arctic and Antarctic responses to greenhouse gas and ozone forcing. *Phil. Trans. R. Soc. A.*, **372**, doi: 10.1098/rsta.2013.0040
11. B.E.J. Rose, **K.C. Armour**, D.S. Battisti, N. Feldl & D.D.B. Koll (2014) The dependence of transient climate sensitivity and radiative feedbacks on the spatial pattern of ocean heat uptake. *Geophys. Res. Lett.*, **41**, doi:10.1002/2013GL058955
10. K.E. McCusker, **K.C. Armour**, C.M. Bitz & D.S. Battisti (2014) Rapid and extensive warming following cessation of solar radiation management. *Environ. Res. Lett.*, **9**, 024005, doi:10.1088/1748-9326/9/2/024005
9. A. Donohoe, J. Marshall, D. Ferreira, **K.C. Armour** & D. McGee (2014) The inter-annual variability of tropical precipitation and inter-hemispheric energy transport. *Journal of Climate*, **27**, 3377–3392, doi: 10.1175/JCLI-D-13-00499.1
8. **K.C. Armour**, C.M. Bitz & G.H. Roe (2013) Time-varying climate sensitivity from regional feedbacks. *Journal of Climate*, **26**, 4518–4534, doi: 10.1175/JCLI-D-12-00544.1
7. C.M. Bitz, K.M. Shell, P.R. Gent, D.A. Bailey, G. Danabasoglu, **K.C. Armour**, M.M. Holland & J.T. Kiehl (2012) Climate sensitivity of the Community Climate System Model Version 4. *Journal of Climate*, **25**, 3053–3070, doi: 10.1175/JCLI-D-11-00290.1
6. P. Langebroek, C. Bradshaw, A. Yanchilina, R. Caballero-Gill, C. Pew, **K.C. Armour**, S.-Y. Lee & I.-M. Jansson (2012) Improved proxy record of past warm climates needed. *Eos Trans. AGU*, **93**(14), 144, doi: 10.1029/2012EO140007

5. **K.C. Armour**, I. Eisenman, E. Blanchard-Wrigglesworth, K.E. McCusker & C.M. Bitz (2011) The reversibility of sea ice loss in a state-of-the-art climate model. *Geophys. Res. Lett.*, **38**, L16705, doi: 10.1029/2011GL048739
4. G.H. Roe & **K.C. Armour** (2011) How sensitive is climate sensitivity? *Geophys. Res. Lett.*, **38**, L14708, doi: 10.1029/2011GL047913
3. **K.C. Armour** & G.H. Roe (2011) Climate commitment in an uncertain world. *Geophys. Res. Lett.*, **38**, L01707, doi: 10.1029/2010GL045850
2. E. Blanchard-Wrigglesworth, **K.C. Armour**, C.M. Bitz & E. DeWeaver (2011) Persistence and inherent predictability of Arctic sea ice in a GCM ensemble and observations. *Journal of Climate*, **24**, 231-250, doi: 10.1175/2010JCLI3775.1
1. **K.C. Armour**, C.M. Bitz, L. Thompson & E.C. Hunke (2011) Controls on Arctic sea ice from first-year and multiyear ice survivability. *Journal of Climate*, **24**, 2378-2390, doi: 10.1175/2010JCLI3823.1

## Other Publications

3. **K.C. Armour** (2016) Projection and prediction: Climate sensitivity on the rise. *Nature Climate Change*, **6**, 896–897, doi: 10.1038/nclimate3079
2. **K.C. Armour** & C.M. Bitz (2015) Observed and projected trends in Antarctic sea ice. *US CLIVAR Variations*, 13.4, 13–19
1. **K.C. Armour** (2012) Reversibility of sea ice and climate under global change. PhD Thesis, University of Washington, Seattle, WA

## Submitted Manuscripts

6. Proistosescu C., D.S. Battisti, **K.C. Armour** and G.H. Roe (2020) Equilibrium climate sensitivity controls uncertainty in regional climate change over the 21st century
5. Zarakas C.M.\*, A.L. Swann, M.M. Laguë, **K.C. Armour** and J.T. Randerson (2020) Plant physiology increases the magnitude and spread of the transient climate response in CMIP6 Earth System Models
4. Dong Y.\*, **K.C. Armour**, M. Zelinka, C. Proistosescu, D. Battisti, C. Zhou and T. Andrews (2020) Inter-model spread in the pattern effect and its contribution to climate sensitivity in CMIP5 and CMIP6 models
3. Wills R.C.J.\*, D.S. Battisti, **K.C. Armour**, T. Schneider and C. Deser (2020) Pattern recognition methods to separate forced responses from internal variability in climate model ensembles and observations
2. Sherwood S., M.J. Webb, J.D. Annan, **K.C. Armour**, P.M. Forster, J.C. Hargreaves, G. Hegerl, S.A. Klein, K.D. Marvel, E.J. Rohling, M. Watanabe, T. Andrews, P. Braconnot, C.S. Bretherton, G.L. Foster, Z. Hausfather, A.S. von der Heydt, R. Knutti, T. Mauritsen, J.R. Norris, C. Proistosescu, M. Rugenstein, G.A. Schmidt, K.B. Tokarska and M.D. Zelinka (2020) An assessment of Earth's climate sensitivity using multiple lines of evidence
1. H. Zanowski\*, F.D.W. Christie, **K.C. Armour**, C.M. Bitz & E.J. Steig (2020) West Antarctic continental shelf temperature variability in high-resolution coupled climate models

## Current Research Grants

Alfred P. Sloan Research Fellowship; 09/15/2020-09/14/2022

NSF OCE-2002276; 06/01/2020–05/31/2023; “Collaborative Research: Quantifying the sea-surface temperature pattern effect for LGM and Pliocene constraints on climate sensitivity.” (PI)

NSF OCE-1850900; 04/01/2019–03/31/2022; “The role of oceans in climate asymmetries.” (PI)

NSF AGS-1752796; 06/01/2018–05/31/2023; “CAREER: Understanding the time- and state-dependence of climate sensitivity.” (PI)

## Previous Research Grants

NSF OCE-1523641; 08/31/2015–09/01/2018; “OCE-RIG: Identifying the role of ocean circulation in polar climate change.” (PI)

James S. McDonnell Foundation Postdoctoral Fellowship; 10/01/2012–04/30/2015; “Investigating regional climate feedbacks, spatial patterns of warming, and time-varying climate sensitivity.”

## Advising

### Graduate students

Lily Hahn, Department of Atmospheric Sciences (2018-present; Co-advisor w/David Battisti)

Tyler Cox, Department of Atmospheric Sciences (2018-present; Co-advisor w/Gerard Roe)

Sarah Ragen, School of Oceanography (2017-present; Primary advisor)

Yue Dong, Department of Atmospheric Sciences (2016-present; Co-advisor w/David Battisti)

Dylan Oldenburg, School of Oceanography (2015-present; Primary advisor)

#### *Former graduate students:*

Alexander Haugstad, Department of Atmospheric Sciences (MS 2017; Master’s Thesis Co-advisor w/David Battisti); Now a data scientist at APi Group, Inc.

### Undergraduate students

#### *Former undergraduate students:*

David Bonan, Department of Atmospheric Sciences (2017-2019; Research advisor for Mary Gates Research Scholarship); Now a graduate student at Caltech

### Postdoctoral Researchers

Robert Jnglin Wills, Department of Atmospheric Sciences (2017-present; Co-mentor w/ David Battisti and LuAnne Thompson)

#### *Former postdoctoral researchers:*

Cristian Proistosescu, JISAO Postdoctoral Fellow (2017-2019; Co-mentor w/ Gerard Roe); Now an Assistant Professor at University of Illinois Urbana-Champaign

Hannah Zanowski, JISAO Postdoctoral Fellow (2017-2019; Co-mentor w/ Cecilia Bitz and Greg Johnson); Now a postdoctoral researcher at CU Boulder

## Teaching

- OCEAN 423: Ocean Circulation and Climate (Spring 2016, 2017, 2018, 2019, 2020)
- OCEAN/ATMS/ESS 475/586: Current Research in Climate Change (Winter 2018)
- ATMS 587: Fundamentals of Climate Change (Autumn 2015, 2016, 2017, 2018, 2019)
- OCEAN 569/ATMS 591/ESS 590: Climate Dynamics (Winter 2017, 2019)
- Atmospheric Sciences Colloquium (coordinator Autumn 2016)
- Physical Oceanography Seminar (coordinator Spring 2017)
- Atmospheric and Climate Dynamics Seminar (coordinator Autumn 2019)

## Presentations

- 78. GFDL Formal Seminar: An update on the pattern effect and its confounding role in estimates of equilibrium climate sensitivity. Princeton, NJ, January 2020. (*invited*)
- 77. AGU Fall Meeting: Dynamics don't matter: Paleoclimate constraints on climate sensitivity modified by radiative feedback dependence on sea-surface temperature patterns. San Francisco, CA, December 2019.
- 76. 22nd Conference on Atmospheric and Oceanic Fluid Dynamics (AOFD): Meridional atmospheric heat transport constrained by energetics and mediated by large-scale diffusion. Portland, ME, June 2019.
- 75. Advanced Climate Dynamics Course (ACDC) 10-Year Reunion Conference: The dependence of climate sensitivity on the spatial structure of sea-surface warming. Rondane, Norway, March 2019.
- 74. The Center for Ocean-Land-Atmosphere Studies Seminar: The dependence of climate sensitivity on the spatial structure of sea-surface warming. George Mason University, Fairfax, VA, March 2019. (*invited*)
- 73. The Oceanography All-Student Education Retreat (TOAStER). Friday Harbor, WA, January 2019. (*invited*)
- 72. AGU Fall Meeting: Dynamics don't matter: Meridional atmospheric heat transport constrained by energetics and mediated by large-scale diffusion. Washington, DC, December 2018.
- 71. Atmospheric and Climate Dynamics Seminar, UW: Three perspectives on meridional atmospheric heat transport and its changes. Seattle, WA, October 2018.
- 70. Cloud Feedback Model Intercomparison Project (CFMIP) Annual Meeting: Commensurate comparisons of models with energy budget observations reveal consistent climate sensitivities. Boulder, CO, October 2018.
- 69. Scientific Committee on Antarctic Research (SCAR/POLAR2018): Relative roles of radiative feedbacks and atmospheric heat transport in polar amplification. Davos, Switzerland, June 2018.
- 68. Scientific Committee on Antarctic Research (SCAR/POLAR2018): Distinct mechanisms of ocean heat transport into the Arctic under internal variability and climate change. Davos, Switzerland, June 2018.

67. Clouds and the Earth's Radiant Energy System (CERES) Science Team Meeting: Challenges in inferring radiative feedbacks from observations of Earth's energy budget. NASA Langley Research Center, Hampton, VA, May 2018. *(invited)*
66. University of Washington, Center for Studies in Demography and Ecology Climate Change Panel: Combining climate models with observations to improve global warming projections. Seattle, WA, March 2018.
65. PCC Mini-symposium: Commensurate comparisons of models with energy budget observations reveal consistent climate sensitivities. Seattle, WA, February 2018.
64. Ocean Sciences Meeting: When are we committed to crossing critical temperature thresholds? Portland, OR, February 2018.
63. University of Washington, PCC Current Research in Climate Change Seminar: What are the major uncertainties in climate prediction? Seattle, WA, January 2018.
62. AGU Fall Meeting: Commensurate comparisons of models with energy budget observations reveal consistent climate sensitivities. New Orleans, LA, December 2017. *(invited)*
61. AGU Fall Meeting: When will we be committed to crossing 1.5 and 2 °C temperature thresholds? New Orleans, LA, December 2017.
60. Colorado State University, Atmospheric Sciences Colloquium: The relative roles of radiative feedbacks and poleward heat transport in the spatial pattern of climate change. Fort Collins, CO, November 2017. *(invited)*
59. 20th Conference on Atmospheric and Oceanic Fluid Dynamics (AOFD): Predicting zonal-mean climate change with a moist energy balance model. Portland, OR, June 2017.
58. Aspen Global Change Institute Polar Amplification Workshop: The relative roles of radiative feedbacks and heat transport in polar amplification. Aspen, CO, June 2017. *(invited)*
57. Institute for Atmospheric and Climate Science Seminar, ETH: Energy budget constraints on climate sensitivity in light of inconstant climate feedbacks. Zürich, Switzerland, January 2017. *(invited)*
56. AMS Annual Meeting: Energy budget constraints on climate sensitivity in light of inconstant climate feedbacks. Seattle, WA, January 2017.
55. AGU Fall Meeting: Understanding the spatial patterns of ocean heat uptake and storage under global warming. San Francisco, CA, December 2017.
54. Atmospheric and Climate Dynamics Seminar, UW: Energy budget constraints on climate sensitivity in light of inconstant climate feedbacks. Seattle, WA, November 2016.
53. University of Washington, School of Oceanography Colloquium: Why has the Southern Ocean cooled while the Arctic has warmed rapidly? Seattle, WA, October 2016.
52. PCC Summer Institute Public Lecture: A polar climate change puzzle. Friday Harbor, WA, September 2016.
51. Department Seminar, University of Victoria: What causes polar amplification, and why does it emerge more rapidly in the Arctic? Victoria, Canada, June 2016. *(invited)*
50. Polar bear specialist group meeting: The polar bear commitment. Anchorage, AK, June 2016. *(invited)*
49. Atmospheric Physics Seminar, University of Oxford: What causes polar amplification, and why does it emerge more rapidly in the Arctic? Oxford, UK, May 2016. *(invited)*



48. WCRP Workshop on Polar Climate Feedbacks: Why has the Southern Ocean cooled while the Arctic has warmed rapidly? Louvain-la-Neuve, Belgium, May 2016.
47. UW Polar Day, University of Washington: Why has the Southern Ocean cooled while the Arctic has warmed rapidly? Seattle, WA, March 2016.
46. Ocean Sciences Meeting: Understanding the spatial patterns of ocean heat uptake and storage under global warming. New Orleans, LA, February 2016. *(invited)*
45. NAS Workshop on Antarctic Sea Ice Variability: Antarctic sea-ice expansion in a warming world. Boulder, CO, January 2016.
44. AMS/Joint Mathematics Meeting: Wind-driven expansion of the Antarctic sea-ice cover. Seattle, WA, January 2016. *(invited)*
43. WCRP Grand Challenge Workshop: Earth's Climate Sensitivities: Robust increase in effective climate sensitivity with transient warming. Ringberg, Germany, March 2015.
42. University of Chicago, GeoSci Seminar: The ocean's role in polar climate change. Chicago IL, February 2015. *(invited)*
41. Brown University: The ocean's role in polar climate change. Providence, RI, February 2015. *(invited)*
40. AGU Fall Meeting: Robust increase in effective climate sensitivity with transient warming in CMIP5 GCMs. San Francisco, CA, December 2014. *(invited)*
39. AGU Fall Meeting: Trends and variability of Southern Ocean temperature and salinity in models and observations. San Francisco, CA, December 2014. *(invited)*
38. US CLIVAR Ocean Heat and Carbon Uptake Meeting: Mechanisms of delayed Southern Ocean Warming. San Francisco, CA, December 2014.
37. US AMOC Meetin: Role of the AMOC in ocean heat storage and transient climate change. Seattle, WA, September 2014.
36. Latsis Symposium: New perspectives on the ocean's role in transient climate change. Zurich, Switzerland, June 2014.
35. Caltech, ESE Seminar: New perspectives on the ocean's role in transient climate change. Pasadena, CA, May 2014. *(invited)*
34. MIT, Sack Lunch Seminar: New perspectives on the ocean's role in transient climate change. Cambridge, MA, April 2014. *(invited)*
33. University of Washington, Seattle, Future of Ice Seminar: New perspectives on the ocean's role in transient climate change. Seattle, WA, April 2014. *(invited)*
32. SUNY Albany, EPS Seminar: The ocean's role in polar climate change. Albany, NY, April 2014. *(invited)*
31. University of Toronto, Physics Department Seminar: New perspectives on the ocean's role in transient climate change. Toronto, Canada, April 2014. *(invited)*
30. University of California, Berkeley, EPS Seminar: New perspectives on the ocean's role in transient climate change. Berkeley, CA, April 2014. *(invited)*
29. Columbia University, Applied Physics and Mathematics Colloquium: Causes and consequences of time-varying climate sensitivity. New York, NY, March 2014. *(invited)*

28. University of Colorado, Boulder, CIRES Seminar: The ocean's role in polar climate change. Boulder, CO, March 2014. *(invited)*
27. American Physical Society March Meeting: Causes and consequences of time-varying climate sensitivity. Denver, CO, March 2014. *(invited)*
26. Ocean Sciences Meeting: Mechanisms of delayed Southern Ocean warming. Honolulu, HI, February 2014.
25. CESM Polar Climate Working Group Meeting: The ocean's role in polar climate change. Boulder, CO, January 2014.
24. University of Colorado, Boulder, INSTAAR Seminar: New perspectives on the role of oceans in transient climate change. Boulder, CO, January 2014. *(invited)*
23. AGU Fall Meeting: Mechanisms of delayed Southern Ocean warming. San Francisco, CA, December 2013.
22. Harvard University, ClimaTea Seminar: What sets the patterns and timescales of climate response to forcing? Cambridge, MA, October 2013. *(invited)*
21. Lamont-Doherty Earth Observatory, OCP Seminar: New perspectives on the role of oceans in transient climate change. Palisades, NY, September 2013. *(invited)*
20. Stony Brook University, TAOS Seminar: Time-varying climate sensitivity and the spatial pattern of ocean heat uptake. Stony Brook, NY, September 2013. *(invited)*
19. University of Bergen, GFI/BCCR Seminar: Time-varying climate sensitivity and the oceans. Bergen, Norway, September 2013. *(invited)*
18. 19th Conference on Atmospheric and Oceanic Fluid Dynamics (AOFD): Causes and consequences of delayed Southern Ocean warming. Newport, RI, June 2013.
17. Harvard University, ClimaTea Seminar: New perspectives on the role of oceans in transient climate change. Cambridge, MA, April 2013. *(invited)*
16. MIT, Sack Lunch Seminar: Oceanic controls on climate sensitivity and the structure of global warming. Cambridge, MA, February 2013.
15. MIT, Oceans at MIT Symposium: Delayed Southern Ocean warming. Cambridge, MA, January 2013.
14. AGU Fall Meeting: Time-varying climate sensitivity from regional feedbacks. San Francisco, CA, December 2012.
13. Scripps Institution of Oceanography, CASPO Seminar: Time-varying climate sensitivity from regional feedbacks. San Diego, CA, July 2012. *(invited)*
12. Paleoclimate Model Intercomparison Workshop: Regional feedbacks and climate change. Honolulu, HI, March 2012.
11. AGU Fall Meeting: Sea ice age characteristics in a global climate model and observations. San Francisco, CA, December 2011. *(invited)*
10. 5th Graduate Climate Conference: Climate change reversibility. Woods Hole, MA, October 2011.
9. Geophysical Fluid Dynamics Laboratory Seminar: Climate change commitment and reversibility. Princeton, NJ, November 2011. *(invited)*

8. University of Chicago, Geophysical Sciences Seminar: Climate change commitment and reversibility. Chicago, IL, June 2011. *(invited)*
7. AGU Fall Meeting: Is sea ice loss reversible? San Francisco, CA, December 2010.
6. 4th Graduate Climate Conference: Climate commitment in an uncertain world. Pack Forrest, WA, October 2010
5. AGU Fall Meeting: Controls on Arctic sea ice from first-year and multiyear ice survivability. San Francisco, CA, December 2009.
4. CCSM Annual Meeting: Ice-ocean interactions, tidal mixing, and dense shelf water formation within the Sea of Okhotsk. Breckenridge, CO, June 2009.
3. ARCUS Sea Ice Outlook Workshop: A simple model for Arctic sea ice area trends and variability. Boulder, CO, April 2009.
2. CCSM Polar Climate Working Group Meeting: A simple model for Arctic sea ice area trends and variability. Sante Fe, NM, March 2009.
1. AGU Fall Meeting: Ice-ocean interactions, tidal mixing, and dense shelf water formation within the Sea of Okhotsk. San Francisco, CA, December 2008.

## Workshops

26. UW Program on Climate Change Summer Institute: Sources of uncertainty in long-term climate projections. Seattle, WA, September 2018. *(organizer)*
25. WCRP Climate Sensitivity workshop. Edinburgh, Scotland, July 2018.
24. UW Program on Climate Change mini-symposium: What observational information best constrains future climate change projections? Seattle, WA, January 2018. *(organizer)*
23. NCAR Southern Ocean Workshop. Boulder, CO, April 2017. *(participant and session convener)*
22. UW PCC Summer Institute: Southern Ocean and Antarctic Climate. Friday Harbor, WA, September 2016. *(participant)*
21. UW College of the Environment Science Communication Training. Seattle, WA, May 2016. *(participant)*
20. WCRP Workshop: Polar Climate Feedbacks. Louvain-la-Neuve, Belgium, May 2016. *(participant)*
19. NAS Workshop: Antarctic Sea Ice Variability. Boulder, CO, January 2016. *(participant)*
18. UW PCC Summer Institute: Terrestrial ecosystems, land surface, and climate change. Friday Harbor, WA, September 2015. *(participant)*
17. WCRP Grand Challenge Workshop: Earth's Climate Sensitivities. Ringberg, Germany, March 2015. *(participant)*
16. US CLIVAR Ocean heat and carbon uptake Meeting. San Francisco, CA, December 2014. *(participant)*
15. Princeton University AOS Workshop: Ice in the climate system. Princeton, NJ, September 2014. *(lecturer)*
14. UW PCC Summer Institute: Climate variability and uncertainty. Friday Harbor, WA, September 2014. *(participant)*

13. Forum for Arctic Modeling and Observational Synthesis Workshop, Woods Hole, MA, October 2013. *(participant)*
12. Advanced Climate Dynamics Course: Dynamics of the last deglaciation. Nyksund, Norway, September 2013. *(participant)*
11. Oceans at MIT Southern Ocean Workshop. Cambridge, MA, January 2013. *(participant)*
10. UW PCC Summer Institute: Ice sheet and ocean interactions. Friday Harbor, WA, September 2012. *(participant)*
9. Heat Transport in Aquaplanet Models Workshop, University of Washington. Seattle, WA, 2012. *(participant)*
8. Paleoclimate Model Intercomparison Project Workshop. Honolulu, HI, March 2012. *(participant)*
7. Advanced Climate Dynamics Course: Dynamics of past warm climates. Friday Harbor, WA, September 2011. *(participant)*
6. UW PCC Summer Institute: Hydrological cycle and climate change. Friday Harbor, WA, September 2011. *(participant)*
5. UW PCC Summer Institute: Climate feedbacks. Friday Harbor, WA, September 2010. *(participant)*
4. UW PCC Summer Institute: Climate impacts on the Pacific Northwest. Friday Harbor, WA, September 2009. *(participant)*
3. ARCUS Sea Ice Outlook Workshop. Boulder, CO, April 2009. *(participant)*
2. UW PCC Summer Institute: The ocean circulation and climate change. Friday Harbor, WA, September 2008. *(participant)*
1. UW PCC Summer Institute: Couplings between changes in the climate system and biogeochemistry. Friday Harbor, WA, September 2007. *(participant)*

## Service and Synergistic Activities

*Lead Author*, Intergovernmental Panel on Climate Change Sixth Assessment Report, Working Group I, Chapter 7: The Earth's energy budget, climate feedbacks, and climate sensitivity, 2018-present

*Contributing Author*, Intergovernmental Panel on Climate Change Sixth Assessment Report, Working Group I, Chapter 4: Future global climate: scenario-based projections and near-term information, 2018-present

*Contributing Author*, Intergovernmental Panel on Climate Change Sixth Assessment Report, Working Group I, Chapter 9: Ocean, cryosphere, and sea level change, 2018-present

*Member*, Committee on Atmospheric and Oceanic Fluid Dynamics (AOFD), 2017-present

*Reviewer* for Science, Nature Geoscience, Nature Climate Change, Nature Communications, Proceedings of the National Academies of Sciences, Journal of Climate, Geophysical Research Letters, Climate Dynamics, Journal of Physical Oceanography, Journal of Geophysical Research, Climatic Change Letters, The Cryosphere, Environmental Research Letters, Current Climate Change Reports, Progress in Earth and Planetary Science, Ocean Modelling, MDPI Atmospheres, npj Climate and Atmospheric Science, and Journal of Advances in Modeling Earth Systems

*Proposal Reviewer* for the US National Science Foundation (NSF), the New Zealand Antarctic Research Institute (NZARI), Netherlands Organisation for Scientific Research (NWO), National Environment Research Council (NERC), and the UW Royalty Research Fund (RRF)

*Session Convener*, Ocean Sciences Meeting (2016, 2018); AMS Annual Meeting (2017); NCAR Southern Ocean Workshop (2017); AGU Fall Meeting (2012, 2013, 2014); UW Undergraduate Research Symposium (2018)

*Organizer*, UW Program on Climate Change mini-symposium: “What observational information best constrains future climate change projections?”, Seattle, WA, January 2018; 22nd Conference on Atmospheric and Oceanic Fluid Dynamics, Portland, Maine, June 2019; UW Program on Climate Change Summer Institute: “Sources of uncertainty in long-term climate projections”, Friday Harbor, WA, September 2018

*Board member*, UW Program on Climate Change (PCC) Advisory Board, 2017-present

*Lecturer*, Princeton University AOS Workshop: Ice in the climate system. Princeton, NJ, 2014

*Professional Affiliations* with the American Geophysical Union and the American Meteorological Society

## Volunteering & Outreach

*Volunteer and Organizer*, Program on Climate Change climate science workshops for high school science teachers, Seattle, WA, 2015–present

*Speaker*, “A polar climate change puzzle”, Ada’s Bookstore, organized by Cascadia Climate Action, Seattle, WA, April 2016

*Speaker*, “Climate change: history, causes, and what to expect next”, Skyline Retirement Community, Seattle, WA, August 2018

*Volunteer*, UW Polar Science Weekend at Pacific Science Center (2016, 2017)

*Volunteer*, Polar Bears International, Churchill, Manitoba, Canada, October 2015

*Coordinator*, Oceans at MIT outreach, Cambridge, MA, 2012-2015