

# KAREN L. SMITH – CURRICULUM VITAE

Dept. of Physical and Environmental Sciences  
University of Toronto Scarborough  
1065 Military Trail Toronto, Ontario Canada M1C 1A4  
Email: karen.smith@utoronto.ca  
Phone: 416-208-2785  
Web: kls2177.github.io

## A. EDUCATION

2011 Ph.D, Physics, University of Toronto, Toronto, Canada  
2007 M.Sc., Nutritional Sciences, University of Toronto, Toronto, Canada  
2004 M.Sc., Environmental Science and Engineering, California Institute of Technology, Pasadena, CA, USA  
2002 B.Sc. (1<sup>st</sup> Class), Mathematics and Engineering, Queen's University, Kingston, Canada

## B. PROFESSIONAL EXPERIENCE

### 1. Current Academic Appointments

2017 - present **Assistant Professor, Teaching Stream**  
**Director, Climate Change Impacts and Adaptation MEnvSc Program**  
University of Toronto Scarborough (UTSC), Toronto, Canada  
2017 - present **Adjunct Associate Research Scientist**  
Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA

### 2. Previous Academic Appointments

2014 - 2017 Associate Research Scientist  
Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA  
2015 - 2017 Visiting Scientist  
NASA Goddard Institute for Space Studies, New York, NY, USA  
2013 - 2015 Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellow  
Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA  
2011 - 2013 Postdoctoral Research Scientist  
Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA

## C. GRANTS, AWARDS, CERTIFICATES AND PROFESSIONAL DEVELOPMENT

### 1. Grants

#### 1.1 Current

*“Engineering in a Changing Climate - A Transdisciplinary Workshop Series for Engineering and Climate Science Students”*, Co-PIs: Karen Smith (UTSC) and Oya Mercan (UTSG), Team: Marianne Hatzopoulou (UTSG), Paul Kushner (UTSG), Reza Najafi (Western), Graeme Norval (UTSG), Daniel Posen (UTSG), Marianne Touchie (UTSG), eCampus Ontario Virtual Learning Strategy, from 04/15/2021 to 04/30/2022; \$39,456.45.

*“Building and Governing Climate Resilient Cities”*, Principal Investigator: Fadi Masoud (UTSG); Team: Amy Buitenhuis (City of Toronto), Fariha Husain (City of Toronto), Jia Lu (City of Toronto), Paul Kushner (UTSG), Heather Marshall (Toronto Environmental Alliance), Oya Mercan (UTSG), Blake Poland (UTSG), Rehana Rajabali (TRCA), Imara Rolston (UTSG), John Robinson (UTSG), Karen Smith (UTSC), Linda Swanston (City of Toronto), University of Toronto School of Cities Urban Challenge Group (Stage 1 Approved, February 2019; Stage 2 Approved, March 2021).

*"Climate Science for Engineering Decision, Education and Policy (CSE)"*, Project Lead: Oya Mercan, Team: Marianne Hatzopoulou, Paul Kushner, Graeme Norval, Daniel Posen, Karen Smith, Marianne Touchie. University of Toronto, Faculty of Applied Science, Dean's Strategic Fund, DSF18-30, from 02/01/2019 to 06/30/2022; \$384,000.

*"The Impact of the Stratosphere on Arctic Climate"*, Principal Investigator: Karen L. Smith (LDEO); Co-Principal Investigators: Lorenzo M. Polvani (LDEO), Bruno Tremblay (McGill), Michael Previdi (LDEO); Collaborator: Douglas E. Kinnison (NCAR), National Science Foundation (USA) PLR-1603350, from 07/15/2016 to 12/31/2021; \$600,795.

## 1.2 Previously Funded

*"Enhancing Climate Change Science Education at UTSC using Authentic, Model-based Inquiry"*, Principal Investigator: Karen L. Smith (UTSC); Co-Principal Investigator: Tanzina Mohsin (UTSC), UTSC Teaching Grant, Winter 2018, \$2,647.30.

## 2. Awards

### 2.1 Postdoctoral and Student Fellowships and Awards

2016	Insight Data Science Fellowship, New York, NY, USA
2013	Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship
2009	Marie Curie Sklodowska Association Award, University of Toronto
2009	Seymour H. Vosko Memorial Prize, University of Toronto
2009	Canadian Meteorological and Oceanographic Society Best Student Poster Prize
2007	NSERC Postgraduate Scholarship (PGS), Doctoral
2006	Max and Ruth Wiseman Graduate Student Fellowship, Baycrest Centre for Geriatric Care
2006	NSERC PGS, Master's
2003	Bill Davidow Graduate Student Fellowship, California Institute of Technology
2002	Vito Vanoni Fellowship, California Institute of Technology
2002	Special Institute Fellowship, California Institute of Technology
2002	Annie Bentley Lillie Prize in Mathematics, Queen's University

## 3. Certificates

2019 - 2020	Centre for Teaching and Learning (CTSI) - Association for College and University Educators (ACUE) Certificate in Effective Teaching Practice Certificate
2018	UTSC Centre for Teaching and Learning (CTL) Instructional Skills Workshop Certificate

## 4. Professional Development

This list shows a selection of professional development workshops attended (see Tables 7 and 8 of Teaching Dossier for a complete list).

2019	Earth Educators' Rendez-Vous, Nashville, TN, USA
2018	CTSI Course Design/Redesign Institute, Centre for Teaching Support and Innovation, University of Toronto
2018	Growing into Principled Climate Change Adaptation Professionals and Transforming the Adaptation Field Workshop, American Geophysical Union Fall Meeting
2017	Establishing and Sustaining an Undergraduate Research Program Workshop, American Geophysical Union Fall Meeting

## D. TEACHING EXPERIENCE

### 1. Graduate Courses Taught

I developed the syllabus and all lectures, labs and assessments for the following University of Toronto graduate courses, for which I have sole responsibility (except for EES1100 which is co-taught; more details in Teaching Dossier).

- 2017 - present      **EES1133: Climate Change Science and Modeling**, 8-21 students, 2 h/w lecture, 1h/w computer lab, Fall 2017, 2018, 2019, 2020 (online in 2020)
- 2017 - present      **EES1132: Geophysical and Climate Data Analysis**, 8-21 students, 3 h/w lecture, Fall 2017, 2018, 2019, 2020 (online in 2020)
- 2017 - present      **EES1117: Climate Change Impact Assessment**, 8-16 students, 1.5 h/w lecture, 1.5 h/w computer lab, Winter 2018, 2019, 2020, 2021 (online in 2020)
- 2017 - present      **EES1100: Advanced Topics in Environmental Science**, 85-100 students, co-taught (three instructors), 1.5 h/w, every other week, Fall-Winter 2017-2018, 2018-2019, 2019-2020, 2020-2021 (online)

### 2. Undergraduate Courses Taught

- 2018 – present      **EESC24: Advanced Readings in Environmental Science** (Supervisor Only), 1-7 students, Fall-Winter-Summer, 2018-2019, 2019-2020, 2020-2021

### 3. Co-curricular Workshops

- 2018 – present      Graduate Professional Skills Workshop: Basic and Intermediate Python, University of Toronto
- 2020                      Centre for Climate Science and Engineering Workshop: Global Climate Modeling and Regional Downscaling, University of Toronto

### 4. Other

- 2012 – 2016              Course Scientist, Seminars on Science  
American Museum of Natural History, New York, NY
- 2008 – 2011              Teaching Assistant, Patterns from Chaos  
Dept. of Physics, University of Toronto, Toronto, Canada
- 2006                      Teaching Assistant, Advanced Nutritional Sciences  
Dept. of Nutritional Sciences, University of Toronto, Toronto, Canada
- 2004                      Teaching Assistant, Atmosphere and Ocean Dynamics  
Dept. of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA

## E. ACADEMIC AND RESEARCH SUPERVISION

### 1. Graduate Supervision

- Jun. 2021 – present      **Supervisor**, Ravi Tiwari, MEnvSc, UTSC, DPES, EES1116 Internship
- Jan. 2021 – present      **Supervisor**, Justin Wiens, MEnvSc, UTSC, DPES, EES1114 Directed Readings in Environmental Science, EES1101 Research Paper in Environmental Science
- Dec. 2019 – present      **PhD Committee**, John Virgin, PhD, University of Waterloo, Dept. of Geography
- Sept. 2019 – present      **Advisory Committee**, Elise LaGlance, MEng, UTSG, Dept. of Civil Engineering
- Sept. 2017 – present      **Advisory Committee**, Tyler Janoski, Columbia University, Dept. of Earth and Environmental Sciences

- Jan. – Sept. 2020 **Supervisor**, Lukas Cheung, MEnvSc, UTSC, DPES, EES1114 Directed Readings in Environmental Science, EES1101 Research Paper in Environmental Science
- May – Sept. 2020 **Supervisor**, Eric Moraitis, MEnvSc, UTSC, DPES, EES1116 Internship
- Jan. – Apr. 2020 **Supervisor**, Abigail Harrichand, MEnvSc, UTSC, DPES, EES1116 Internship
- May – Sept. 2019 **Supervisor**, Ricky Wong, MEnvSc, UTSC, DPES, EES1116 Internship
- May – Dec. 2018 **Supervisor**, Teaching Fellow, Conor Anderson, PhD, UTSC, DPES, EES1117 Lab Book Development
- Jan. – Sept. 2018 **Supervisor**, Sarah Maleska, MEnvSc, UTSC, DPES, EES1114 Directed Readings in Environmental Science, EES1101 Research Paper in Environmental Science
- Jan. – Sept. 2018 **Supervisor**, John Virgin, MEnvSc, UTSC, DPES, EES1114 and EES1115 Directed Readings in Environmental Science, EES1101 Research Paper in Environmental Science

## 2. Undergraduate Supervision

- May – Aug. 2021 **Supervisor**, Maggie Kou, Summer Research Volunteer
- May – Aug. 2021 **Supervisor**, Patricia Lumanto, UTSC Centre for Research in Earth System Science Summer Research Student
- May – Aug. 2021 **Co-Supervisor**, Kerryn Van Rooyen, University of Toronto, Centre for Global Change Science (CGCS) Summer Research Student
- May – Aug. 2020 **Co-Supervisor**, Natacha Prostran, CGCS Summer Research Student
- May – Aug. 2019 **Supervisor**, Michael Maligaya, UTSC, DPES, PSCB90 Physical Sciences Research Experience
- Sept. 2018 –
- Feb. 2019 **Supervisor**, Afzal Patel, MEnvSc web content update work-study
- May-Sept. 2018 **Co-Supervisor**, Jun Zheng, Graduate Professional Skills Python Workshop development work-study

## F. PUBLICATIONS

### 1. Refereed; Published and In Press

08/29/2021: 28 Peer-reviewed publications; 1111 citations; h-index = 18; i10-index=22 (\* indicates current or former graduate student)

28. Previdi, M., **K. L. Smith**, and L. M. Polvani: Arctic amplification of climate change: a review of underlying mechanisms, *Environmental Research Letters*, in press.
27. **Smith, K. L.** and L. M. Polvani: Modeling-evidence for large, ENSO-driven interannual wintertime AMOC variability, *Environmental Research Letters*, in press.
26. Previdi, M., T. P. Janoski\*, G. Chiodo, **K. L. Smith** and L. M. Polvani, 2020: Arctic amplification as a rapid adjustment to increased CO<sub>2</sub>, *Geophysical Research Letters*, 47, e2020GL089933, doi:10.1029/2020GL089933.

25. Maleska, S\*. **K. L. Smith** and J. Virgin\*, 2020: Impacts of stratospheric ozone extremes on Arctic high cloud, *Journal of Climate*, doi.org/10.1175/JCLI-D-19-0867.1
24. Polvani, L. M, M. Previdi, M. England, G. Chiodo and **K. L. Smith**, 2020: Large Arctic warming from ozone depleting substances in the latter half of the 20th Century. *Nature Climate Change*, 10, 130–133, doi.org/10.1038/s41558-019-0677-4.
23. Virgin, J.\* and **K. L. Smith**, 2019: Is Arctic Amplification dominated by regional radiative forcing and feedbacks? Perspectives from the World-Avoided scenario, *Geophysical Research Letters*, 46, 7708–7717, doi.org/10.1029/2019GL082320.
22. Zhang, P., Y Wu, I Simpson, **K. L. Smith**, B. De, P. Callaghan, 2018: A stratospheric pathway linking a colder Siberia to Barents-Kara sea ice loss, *Science Advances*, 4, 7, eaat6025, doi.org/10.1126/sciadv.aat6025.
21. **Smith, K. L.**, L. M. Polvani and L. Bruno Tremblay, 2018: The impact of stratospheric circulation extremes on minimum Arctic sea ice extent, *Journal of Climate*, 31, 7169–7189, doi:10.1175/JCLI-D-17-0495.1.
20. **Smith, K. L.**, G. Chiodo, M. Previdi and L. M. Polvani, 2018: No surface cooling over Antarctica from the negative greenhouse effect associated with instantaneous quadrupling of CO<sub>2</sub> concentrations, *Journal of Climate*, 31, 317–323, doi.org/10.1175/JCLI-D-17-0418.1.
19. Zhang, P., Y. Wu and **K. L. Smith**, 2017: Prolonged effect of the stratospheric pathway in linking Barents-Kara Sea sea ice variability to the midlatitude circulation in a simplified model, *Climate Dynamics*, doi.org/10.1007/s00382-017-3624-y.
18. **Smith, K. L.** and L. M. Polvani, 2017: Spatial patterns of recent Antarctic surface temperature trends and the importance of natural variability: Lessons from multiple reconstructions and the CMIP5 models, *Climate Dynamics*, doi.org/10.1007/s00382-016-3230-4.
17. England, M. R., L. M. Polvani, **K. L. Smith**, L. Landrum and M. M. Holland, 2016: Robust response of the Amundsen Sea Low to stratospheric ozone depletion, *Geophysical Research Letters*, doi.org/10.1002/2016GL070055.
16. Wu, Y. and **K. L. Smith**, 2016: Response of the Northern Hemisphere midlatitude circulation to Arctic amplification in a simple atmospheric general circulation model, *Journal of Climate*, doi.org/10.1175/JCLI-D-15-0602.1.
15. **Smith, K. L.** and R. K. Scott, 2016: The role of planetary waves in the tropospheric jet response to stratospheric cooling, *Geophysical Research Letters*, doi.org/10.1002/2016GL067849.
14. Previdi, M., **K. L. Smith** and L. M. Polvani, 2015: How well do the CMIP5 models simulate the Antarctic Atmospheric Energy Budget, *Journal of Climate*, doi.org/10.1175/JCLI-D-15-0027.1.
13. Solomon, A., L. M. Polvani, R. Abernathy and **K. L. Smith**, 2015: The ozone hole's effects on the state of the Southern Ocean, *Geophysical Research Letters*, doi.org/10.1002/2015GL064744.
12. Neely, R. R., D. R. Marsh, **K. L. Smith**, S. M. Davis and L. M. Polvani, 2014: Biases in Southern Hemisphere climate trends induced by coarsely specifying the temporal resolution of stratospheric ozone, *Geophysical Research Letters*, doi.org/10.1002/2014GL061627.

11. **Smith, K. L.**, R. R. Neely, D. R. Marsh and L. M. Polvani, 2014: The Specified Chemistry Whole Atmosphere Community Climate Model (SC-WACCM). *Journal of Advances in Modeling the Earth System*, doi.org/10.1002/2014MS000346.
10. **Smith, K. L.** and L. M. Polvani, 2014: The surface impacts of Arctic stratospheric ozone anomalies. *Environmental Research Letters*, 9, 074015.
9. **Smith, K. L.**, M. Previdi and L. M. Polvani, 2013: The Antarctic atmospheric energy budget. Part II: The effect of ozone depletion and its projected recovery. *Journal of Climate*, Vol. 26, 9729-9744.
8. Previdi, M., **K. L. Smith** and L. M. Polvani, 2013: The Antarctic atmospheric energy budget. Part I: Climatology and intraseasonal-to-interannual variability. *Journal of Climate*, 26, 6406-6418.
7. Polvani, L. M. and **K. L. Smith**, 2013: Can natural variability explain the observed sea ice trends? New modeling evidence from CMIP5. *Geophysical Research Letters*, 40, 12, 3195–3199.
6. **Smith, K. L.**, L. M. Polvani and D. R. Marsh, 2012: Mitigation of 21st century Antarctic sea ice loss by stratospheric ozone recovery. *Geophysical Research Letters*, 39, 20, L20701.
5. **Smith, K. L.** and P. J. Kushner, 2012: Linear interference and the initiation of extratropical stratosphere-troposphere interactions. *Journal of Geophysical Research*, 117, D13107, doi.org/10.1029/2012JD017587.
4. **Smith, K. L.**, P. J. Kushner, and J. Cohen, 2011: The role of linear interference in Northern Annular Mode variability associated with Eurasian snow cover extent. *Journal of Climate*, 24, 6185-6202.
3. **Smith, K. L.**, C. G. Fletcher, and P. J. Kushner, 2010: The role of linear interference in the Annular Mode response to extratropical surface forcing. *Journal of Climate*, 23, 6036-6050.
2. **Smith, K. L.** and C. E. Greenwood, 2008: Nutritional considerations and Alzheimer's disease. *Journal of Nutrition for the Elderly*, 27, 3, 381-403.
1. Schneider, T., **K. L. Smith**, P. A., O'Gorman, and C. C., Walker, 2006: A climatology of tropospheric zonal-mean water vapor fields and fluxes in isentropic coordinates. *Journal of Climate*, 19, 5918-5933.

## 2. Submitted to Refereed Journals

30. Liang, Y-C., L. M. Polvani, M. Previdi, **K. L. Smith**, M. R. England and G. Chiodo: Stronger Arctic amplification from ozone-depleting substances than from carbon dioxide, in review at *Geophysical Research Letters*.
29. Anderson, C. and **K. L. Smith**: A narrative approach to building computational capacity in professional Master's students, in review at *Journal of Open Source Education*.

## 3. Non-refereed Publications

4. **Smith, K. L.** [The unexpected link between the ozone hole and Arctic warming](#), The Conversation, February 2020.
3. Kushner, P. J., **K. L. Smith**, R. D. Brown, C. Dersken, C. R. Duguay, R. Fernandes, and W. R. Peltier. Workshop report: Simulation of the Canadian cryosphere. *CMOS Bulletin*, 38, 2, 2010, 60-65.

2. **Smith, K. L.**, C. E. Greenwood, H. Payette, and S. M. H. Alibhai, 2007: An approach to the non-pharmacologic and pharmacologic management of unintentional weight loss among older adults. *Geriatrics and Aging*, Vol. 10, No. 2, 91-98.
1. **Smith, K. L.**, C. E. Greenwood, H. Payette, and S. M. H. Alibhai, 2006: An approach to the diagnosis of unintentional weight loss in older adults: prevalence rates and screening. *Geriatrics and Aging*, 9, 10, 679-685.

#### 4. Creative Works

1. Livingstone, S. and **K. L. Smith**, Emerging Environments Podcast, Season 1 (13 Episodes), 2021.

#### G. INVITED INSTITUTIONAL PRESENTATIONS

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|------|--|
| 2021 | University of Toronto, CGCS, Toronto, Canada   |
| 2019 | Royal Conservatory of Music, Toronto, Canada   |
| 2018 | Université de Québec à Montréal, ESCER, Montréal, Canada   |
| 2017 | Aspen Global Change Institute, Aspen, CO, USA  |
| 2016 | American Geophysical Union, San Francisco, CA, USA   |
| 2016 | University of Toronto, Department of Physics, Toronto, Canada                                    |
| 2016 | University of Toronto Scarborough, DPES, Toronto, Canada   |
| 2016 | University of Waterloo, Department of Applied Mathematics, Waterloo, Canada                      |
| 2015 | NASA GISS, New York, NY, USA   |
| 2015 | Stony Brook University, School of Marine and Atmospheric Sciences, Stony Brook, NY               |
| 2015 | University of California, Berkeley, Department of Earth and Planetary Science, Berkeley, CA, USA |
| 2015 | Lamont-Doherty Earth Observatory, Palisades, NY, USA   |
| 2014 | University of Toronto, Department of Physics, Toronto, Canada                                    |
| 2014 | York University, Department of Earth and Space Science and Engineering, Toronto, Canada          |
| 2013 | NASA GISS, New York, NY, USA   |
| 2013 | Dalhousie University, Department of Physics and Atmospheric Science, Halifax, Canada             |
| 2013 | MIT, Department of Earth, Atmospheric and Planetary Sciences, Boston, MA                         |
| 2013 | McGill University, Department of Atmospheric and Oceanic Sciences, Montreal, Canada              |
| 2013 | Pennsylvania State University, Department of Meteorology, State College, PA                      |
| 2012 | Johns Hopkins University, Department of Earth and Planetary Sciences, Baltimore, MD              |
| 2012 | New York University, Courant Institute, New York, NY, USA  |
| 2011 | Lamont-Doherty Earth Observatory, Palisades, NY, USA   |
| 2010 | United Kingdom Meteorological Office, Exeter, UK   |
| 2010 | University of Reading, Department of Meteorology, Reading, UK                                    |
| 2009 | A.E.R., Inc., Lexington, MA, USA   |

## H. SERVICE AND OUTREACH

### 1. Institutional Service

2017 – present	Director of Climate Change Impacts and Adaptation MEnvSc Program, DPES, UTSC
2017 - present	DPES Graduate Program and Curriculum Committee
2018 - present	DPES MEnvSc Admissions Committee
2018 - present	DPES Teaching and Curriculum Committee
2018 - present	DPES Outreach Committee
2020 - present	UTSC Library Advisory Committee
2021	DPES PTR Committee

### 2. Professional Service

#### 2.1 Scientific Assessments

2021 – present	Co-author, Chapter 5: Stratospheric ozone changes and climate, World Meteorological Organization Scientific Assessment of Ozone Depletion 2022
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#### 2.2 Organizations and Committees

2019 – present	Executive Team Member, Centre for Climate Science and Engineering, University of Toronto
2020 – present	Chair, Canadian Meteorological and Oceanographic Society (CMOS) School and Public Education Committee
2019 – 2020	Member, CMOS School and Public Education Committee

#### 2.3 Peer-reviewer

Journals: Science, Nature Climate Change, Nature Communications, Journal of Climate, Journal of the Atmospheric Sciences, Journal of Geophysical Research (Atmospheres), Geophysical Research Letters\*, Climate Dynamics, Environmental Research Letters  
*\*Received 2019 Editors' Citation for Excellence in Refereeing*

Funding Agencies: Natural Sciences and Engineering Research Council (Canada), National Science Foundation (USA), Israel Science Foundation (Israel), Marsden Foundation (New Zealand), New Zealand Antarctic Research Institute, Swiss Federal Institute of Technology

Scientific Assessments: World Meteorological Organization Scientific Assessment of Ozone Depletion 2014, 2018.

### 3. Other

2021	JupyterHub for Researchers 101 Panelist, Centre for Research and Innovation Support, University of Toronto
2020	Computer Science Education Week, Elementary School Outreach, Coding Demo
2019	Building a Post-Carbon World: Designing 2050 Symposium Panelist, School for the Environment, University of Toronto
2018, 2019	DPES, High School Science Outreach, "Weather in a Tank" Demo
2019	Sidney Ledson Institute Primary School presentation
2018	Science Rendez-Vous faculty volunteer, UTSC
2018	Let's Talk Science High School Science Open House, UTSC
2018	ECO Canada, Toronto Environmental Professional Networking Event Panelist
2017	Earth-Sun Day volunteer at the American Museum of Natural History, NY



2015	Secondary School Field Research Program mentor, LDEO
2012, 2014	American Geophysical Union Fall Meeting Session Convener
2012	Ocean and Climate Physics Seminar Convener, LDEO
2010	Canadian Meteorological and Oceanographic Society, Toronto Student Chapter
2009 – 2010	Engineers Without Borders, Fundraising Lead – Toronto Professional Chapter
2007 – 2009	Graduate Student Union Representative, University of Toronto
2003 – 2004	Graduate Student Council Representative, Caltech

## **I. PROFESSIONAL ASSOCIATIONS**

2008 – present	American Geophysical Union
2009 – present	Canadian Meteorological and Oceanographic Society
2009 – present	American Meteorological Society
2010 – present	European Geosciences Union