

Israel Silber

Atmospheric Sciences & Global Change Division
Pacific Northwest National Laboratory
Richland, WA, 99352

israel.silber@pnnl.gov
israel0silber.wixsite.com/isilber
www.researchgate.net/profile/Israel_Silber
www.linkedin.com/in/israel-silber
<https://github.com/isilber>

Education:

- 2010-2016:** **Ph.D.**, Tel-Aviv University, Israel
Department of Geosciences (Geophysics and Planetary Sciences)
Dissertation title: "Short and long term changes in the upper atmosphere"
Advisor: Prof. Colin Price
- 2015:** **B.Ed** (Math teaching diploma), Tel-Aviv University, Israel
- 2007-2010:** **B.Sc** (Magna Cum Laude), Tel-Aviv University, Israel
Department of Geophysics and Planetary Sciences

Research Experience:

- 2023-Present:** Earth Scientist, Atmospheric Sciences and Global Change Division, Pacific Northwest National Laboratory
Richland, WA, USA.
Research topics: Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) user facility data analysis and analytics.
- 2021-2023:** Assistant Research Professor, Department of Meteorology and Atmospheric Science, Pennsylvania State University, University Park, PA, USA.
Research topics: Stratiform cloud microphysical processes and feedbacks using the synergistic utilization of observations and models; evaluation of polar and mid-latitude stratiform cloud and aerosol representation in large-scale models; development of model evaluation tools.
- 2018-2021:** Research Scientist (affiliated with Penn State via a sub-contract), NASA Goddard Institute for Space Studies, New York, NY, USA.
PI: Dr. Ann Fridlind.
Research topics: Evaluation and improvement of polar stratiform cloud and aerosol representation in NASA's ModelE3 climate model; polar cloud microphysical processes and feedbacks using observations and an LES model.
- 2016-2018:** Post-Doctoral Fellow, Department of Meteorology and Atmospheric Science, Pennsylvania State University, University Park, PA, USA.
Advisor: Prof. Johannes Verlinde.
Research topics: Antarctic cloud layering, surface radiative forcing, microphysics, dynamics, and liquid water partitioning; development of retrieval methods for determining cloud properties.
- 2010-2012:** Research Assistant, ILAN Team, Department of Nature Sciences, Open University, Israel.
Principle investigator: Prof. Yoav Yair.
Research topic: Study of red sprites and other transient luminous events.
- 2009-2011:** Research Assistant, Department of Geophysics and Planetary Sciences, Tel-Aviv University, Israel.
Principle investigators: Dr. Karin Ardon-Dryer and Prof. Zev Levin.
Research topic: Concentration and efficiency of ice nuclei in clean and polluted air, and their effects on clouds and precipitation.

Teaching Experience:

- 2019:** Guest speaker, Department of Meteorology and Atmospheric Science, Pennsylvania State University.
Course name: Frank Talks.
- 2013:** Guest lecturer, Department of Geophysical, Atmospheric and Planetary Sciences, Tel-Aviv University.
Course name: Atmospheric electricity.
- 2011-2014:** Teaching assistant and tutor, Department of Geophysical, Atmospheric and Planetary Sciences, Tel-Aviv University.
Course name: Introduction to Atmospheric Sciences.

Research Grants:

- 2021-2024:** United States Department of Energy (DOE),
“Combining long-term observations and Lagrangian case studies to evaluate stratiform cloud precipitation processes in climate models”, PI: A. Fridlind (NASA GISS), Co-PI: L. Russell (UCSD), Co-I: **I. Silber (PSU)**, \$849,615, of that \$68,593 to Silber.
- 2020-2023:** United States Department of Energy (DOE),
“Early Stages in the Lifecycle of Polar Liquid-Bearing Clouds”, PI: **I. Silber (PSU)**, Co-I: G. Cesana (Columbia U.), \$440,299, of that \$304,160 to Silber.
- 2020-2023:** United States Department of Energy (DOE),
“Application of aerosol-ice nucleating particle closure to establish the leading parameters governing ice crystal number concentration under commonly observed mixed-phase cloud conditions”, PI: D. Knopf (SBU), Co-Is: N. Riemer (U. Illinois), **I. Silber (PSU)**, \$710,909, of that \$100,051 to Silber.

Honors and Awards:

- 2017:** International Union of Radio Science (URSI) Young Scientist Award.
- 2015:** International Association of Geomagnetism and Aeronomy (IAGA) Young Scientist Award.
- 2014:** Israeli Ministry of Science and Technology Travel Scholarship for an international scientific conference.
- 2013:** Department of Geophysical, Atmospheric, and Planetary Sciences Ph.D. Excellence Award.
- 2012:** Israeli Ministry of Science and Technology Ph.D. Fellowship (250,000 NIS), in memory of Col. Ilan Ramon.
- 2010, 2011:** Tel-Aviv University Dean's Excellence Award.

Publications:

- 2023:** Stanford M. K., A. M. Fridlind, **I. Silber**, A. S. Ackerman, G. V. Cesana, J. Mülmenstädt, A. Protat, S. P. Alexander, and A. J. McDonald, Observed Process-level Constraints of Cloud and Precipitation Properties over the Southern Ocean for Earth System Model Evaluation, *Atm. Chem. Phys. Discuss.*, doi: [10.5194/egusphere-2023-170](https://doi.org/10.5194/egusphere-2023-170), accepted.
- Lubin, D., M. L. Ghiz, S. Castillo, R. C. Scott, S. E. LeBlanc, and **I. Silber**, The Siple Dome Challenge: Can Your Climate Model Match a Unique West Antarctic Surface Radiation Balance Data Set?, *J. Clim.*, accepted.
- Desai, N., M. Diao, Y. Shi, X. Liu, and **I. Silber** (2023), Cloud Phase Observations over the Southern Ocean and Comparison with E3SM results, *J. Geophys. Res.: Atmos.*, doi: [10.1029/2023JD038581](https://doi.org/10.1029/2023JD038581).

- 2022:** Tridon, F., **I. Silber**, A. Battaglia, S. Kneifel, A. M. Fridlind, P. Kalogeris, and R. Dhillon (2022), Highly supercooled riming and unusual triple-frequency radar signatures over McMurdo station, Antarctica, *Atmos. Chem. Phys.*, doi: [10.5194/acp-22-12467-2022](https://doi.org/10.5194/acp-22-12467-2022).
- Silber, I.**, and M. D. Shupe (2022), Insights on Sources and Formation Mechanisms of Liquid-Bearing Clouds over MOSAiC Examined from a Lagrangian Framework, *Elem. Sci. Anth.*, doi: [10.1525/elementa.2021.000071](https://doi.org/10.1525/elementa.2021.000071).
- Silber, I.**, R. Jackson, A. M. Fridlind, A. S. Ackerman, S. Collis, J. Verlinde, and J. Ding (2022). The Earth Model Column Collaboratory (EMC²) v1.1: An Open-Source Ground-Based Lidar and Radar Instrument Simulator and Sub-Column Generator for Large-Scale Models, *Geosci. Model Dev.*, doi: [10.5194/gmd-15-901-2022](https://doi.org/10.5194/gmd-15-901-2022).
- 2021:** Hines, K., D. H. Bromwich, **I. Silber**, L. M. Russell, and L. S. Bai (2021), Predicting Frigid Mixed-Phase Clouds for Pristine Coastal Antarctica, *J. Geophys. Res.: Atmos.*, doi: [10.1029/2021JD035112](https://doi.org/10.1029/2021JD035112).
- Cesana, G. V., A. S. Ackerman, A. M. Fridlind, **I. Silber**, and M. Kelley (2021), Snow reconciles observed and simulated phase partitioning and increases cloud feedback, *Geophys. Res. Lett.*, doi: [10.1029/2021GL094876](https://doi.org/10.1029/2021GL094876).
- Yip, J., M. Diao, T. Barone, **I. Silber**, and A. Gettelman (2021), Evaluation of the CAM6 Climate Model Using Cloud Observations at McMurdo Station, Antarctica, *J. Geophys. Res.: Atmos.*, doi: [10.1029/2021JD034653](https://doi.org/10.1029/2021JD034653).
- Kremser, S., M. Harvey, P. Kuma, S. Hartery, A. Saint-Macary, J. McGregor, A. Schuddeboom, M. von Hobe, A. Geddes, R. Querel, A. J. McDonald, M. Peltola, K. Sellegri, S. T. Lennartz, **I. Silber**, C. Law, C. J. Flynn, A. Marriner, G. Brailsford, G. Plank, and G. Graham (2021), Southern Ocean Cloud and Aerosol data: a compilation of measurements from the 2018 Southern Ocean Ross Sea Marine Ecosystems and Environment voyage, *Earth Sys. Sci. Data*, doi: [10.5194/essd-13-3115-2021](https://doi.org/10.5194/essd-13-3115-2021).
- Silber, I.**, P. S. McGlynn, J. Y. Harrington, and J. Verlinde (2021), Habit-Dependent Vapor Growth Modulates Arctic Supercooled Water Occurrence, *Geophys. Res. Lett.*, doi: [10.1029/2021GL092767](https://doi.org/10.1029/2021GL092767).
- Cadeddu, M. P., D. Cimini, V. Ghate, D. Lubin, A. M. Vogelmann, and **I. Silber** (2021), Investigation of Humidity and Ice Supersaturation Profiles Over West Antarctica Using Ground-Based G-Band Radiometer Retrievals, *IEEE Trans. Geosci. Remote Sens.*, doi: [10.1109/TGRS.2021.3077088](https://doi.org/10.1109/TGRS.2021.3077088).
- Silber, I.**, A. M. Fridlind, J. Verlinde, A. S. Ackerman, G. V. Cesana, and D. A. Knopf (2021), The Prevalence of Precipitation from Polar Supercooled Clouds, *Atmos. Chem. Phys.*, doi: [10.5194/acp-21-3949-2021](https://doi.org/10.5194/acp-21-3949-2021).
- Kuma, P., A. J. McDonald, O. Morgenstern, R. Querel, **I. Silber**, and C. J. Flynn (2021), Ground-based lidar processing and simulator framework for comparing models and observations (ALCF 1.0), *Geosci. Model Dev.*, doi: [10.5194/gmd-14-43-2021](https://doi.org/10.5194/gmd-14-43-2021).
- McErlich, C., A. J. McDonald, A. J. Schuddeboom, and **I. Silber** (2021), Comparing satellite and ground-based observations of cloud occurrence over high southern latitudes, *J. Geophys. Res.: Atmos.*, doi: [10.1029/2020JD033607](https://doi.org/10.1029/2020JD033607).
- 2020:** **Silber I.**, A. M. Fridlind, J. Verlinde, L. M. Russell, and A. S. Ackerman (2020), Nonturbulent Liquid-Bearing Polar Clouds: Observed Frequency of Occurrence and Simulated Sensitivity to Gravity Waves, *Geophys. Res. Lett.*, doi: [10.1029/2020GL087099](https://doi.org/10.1029/2020GL087099).
- Lubin, D., D. Zhang, **I. Silber**, R. C. Scott, P. Kalogeris, A. Battaglia, D. H. Bromwich, M. Cadeddu, E. W. Eloranta, A. M. Fridlind, A. Frossard, K. Hines, S. Kneifel, W. R. Leitch, W. Lin, J. P. Nicolas, H. Powers, P. K. Quinn, P. Rowe, L. M. Russell, S. Sharma, J. Verlinde, and A. M. Vogelmann (2020), AWARE: The

Atmospheric Radiation Measurement (ARM) West Antarctic Radiation Experiment, *Bull. Amer. Meteor. Soc.*, [doi: 10.1175/BAMS-D-18-0278.1](https://doi.org/10.1175/BAMS-D-18-0278.1).

Silber, I., J. Verlinde, G. Wen, and E. W. Eloranta (2020), Can embedded liquid cloud layer volumes be classified in polar clouds using a single-frequency zenith-pointing radar?, *IEEE Geosci. Remote Sens. Lett.*, [doi: 10.1109/LGRS.2019.2918727](https://doi.org/10.1109/LGRS.2019.2918727).

2019: **Silber, I.**, A. M. Fridlind, J. Verlinde, A. S. Ackerman, Y. S. Chen, D. H. Bromwich, S.-H. Wang, M. Cadeddu, and E. W. Eloranta (2019), Persistent supercooled drizzle at temperatures below -25°C observed at McMurdo Station, Antarctica, *J. Geophys. Res.: Atmos.*, [doi: 10.1029/2019JD030882](https://doi.org/10.1029/2019JD030882).

Silber, I., J. Verlinde, S.-H. Wang, D. H. Bromwich, A. M. Fridlind, M. P. Cadeddu, E. W. Eloranta, and C. J. Flynn (2019), Cloud influence on ERA5 and AMPS surface downwelling longwave radiation biases in West Antarctica, *J. Clim.*, [doi: 10.1175/JCLI-D-19-0149.1](https://doi.org/10.1175/JCLI-D-19-0149.1).

Hines, K., D. Bromwich, S. H. Wang, **I. Silber**, J. Verlinde, and D. Lubin (2019), Microphysics of summer clouds in central West Antarctica simulated by Polar WRF and AMPS, *Atmos. Chem. Phys.*, [doi: 10.5194/acp-2018-1251](https://doi.org/10.5194/acp-2018-1251).

Silber, I., J. Verlinde, M. Cadeddu, C. J. Flynn, A. M. Vogelmann, and E. W. Eloranta (2019), Antarctic cloud macrophysical, thermodynamic phase, and atmospheric inversion coupling properties at McMurdo Station. Part II: radiative impact during different synoptic regimes, *J. Geophys. Res.: Atmos.*, [doi: 10.1029/2018JD029471](https://doi.org/10.1029/2018JD029471).

2018: **Silber, I.**, J. Verlinde, E. W. Eloranta, and M. Cadeddu (2018), Antarctic cloud macrophysical, thermodynamic phase, and atmospheric inversion coupling properties at McMurdo Station Part I: principal data processing and climatology, *J. Geophys. Res.: Atmos.*, [doi: 10.1029/2018JD028279](https://doi.org/10.1029/2018JD028279).

Silber, I., J. Verlinde, E. W. Eloranta, C. J. Flynn, and D. M. Flynn (2018), Polar liquid cloud base detection algorithms for high spectral resolution or micropulse lidar data, *J. Geophys. Res.: Atmos.*, [doi: 10.1029/2017JD027840](https://doi.org/10.1029/2017JD027840).

Katz, S., Y. Yair, C. Price, R. Yaniv, **I. Silber**, B. Lynn, and B. Ziv (2018), Electrical properties of the 8-12th September, 2015 massive dust outbreak over the Levant, *Atmos. Res.*, 201, 218-225, [doi: 10.1016/j.atmosres.2017.11.00](https://doi.org/10.1016/j.atmosres.2017.11.00).

2017: Wüst, S., C. Schmidt, M. Bittner, **I. Silber**, C. Price, J. H. Yee, M. Mlynczak, and J. Russell III (2017), First ground-based observations of mesopause temperatures above the Eastern-Mediterranean Part II: OH*-climatology and gravity wave activity, *J. Atmos. Sol. Terr. Phys.*, 155, 104-111, [doi: 10.1016/j.jastp.2017.01.003](https://doi.org/10.1016/j.jastp.2017.01.003).

Silber, I., C. Price, C. Schmidt, S. Wüst, M. Bittner, and E. Pecora (2017), First ground-based observations of mesopause temperatures above the Eastern-Mediterranean Part I: Multi-day oscillations and tides, *J. Atmos. Sol. Terr. Phys.*, 155, 95-103, [doi: 10.1016/j.jastp.2016.08.014](https://doi.org/10.1016/j.jastp.2016.08.014).

Silber, I., and C. Price (2017), On the use of VLF narrowband measurements to study the lower ionosphere and the mesosphere-lower-thermosphere, *Surv. Geophys.*, 38, 407-441, [doi: 10.1007/s10712-016-9396-9](https://doi.org/10.1007/s10712-016-9396-9).

2016: **Silber, I.**, C. Price, and C. J. Rodger (2016), Semi-annual oscillation (SAO) of the nighttime ionospheric D-region as detected through ground-based VLF receivers, *Atmos. Chem. Phys.*, 16(5), 3279–3288, [doi: 10.5194/acp-16-3279-2016](https://doi.org/10.5194/acp-16-3279-2016).

2015: **Silber, I.**, C. Price, E. Galanti, and A. Shuval (2015), Anomalously strong vertical magnetic fields from distant ELF/VLF sources, *J. Geophys. Res.: Space. Phys.*, 120, 6036-6044, [doi: 10.1002/2015JA021141](https://doi.org/10.1002/2015JA021141).

- 2013:** **Silber, I.**, C. Price, C. J. Rodger, and C. Haldoupis (2013), Links between mesopause temperatures and ground-based VLF narrowband radio signals, *J. Geophys. Res.: Atmos.*, 118, 1-12, [doi: 10.1002/jgrd.50379](https://doi.org/10.1002/jgrd.50379).

Datasets:

- 2022:** **Silber, I.** (2022), Liquid-bearing clouds 5-day back-trajectories, [doi: 10.5439/1840519](https://doi.org/10.5439/1840519).
- 2021:** **Silber, I.**, J. Verlinde, E. W. Eloranta (2021), HSRL Liquid cloud base height (MOSAiC), [doi: 10.5439/1764692](https://doi.org/10.5439/1764692).
- 2019:** **Silber, I.**, J. Verlinde, E. W. Eloranta (2019), HSRL Liquid cloud base height (nsaC1), [doi: 10.5439/1532341](https://doi.org/10.5439/1532341).
- 2018:** **Silber, I.**, J. Verlinde, E. W. Eloranta, C. J. Flynn, and D. M. Flynn (2018), HSRL Liquid cloud base height / MPL Liquid cloud base height, [doi: 10.5439/1438194](https://doi.org/10.5439/1438194).
- Silber, I.**, J. Verlinde, E. W. Eloranta, C. J. Flynn, and D. M. Flynn (2018), Reprocessed MPL data sets, [doi: 10.5439/1468777](https://doi.org/10.5439/1468777).

Conference Proceedings:

- 2017:** **Silber, I.**, and C. Price (2017), Short-term variability of the lower ionosphere from VLF narrowband radio observations, *2017 XXXIIInd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS)*, [doi: 10.23919/URSIGASS.2017.8105361](https://doi.org/10.23919/URSIGASS.2017.8105361).

Submitted Manuscripts:

- 2023:** **Silber, I.**, Arctic Cloud-Base Ice Precipitation Properties Retrieved Using Bayesian Inference, *J. Geophys. Res.: Atmos.*, in revision.
- Knopf, D. A., **I. Silber**, N. Riemer, A. M. Fridlind, and A. S. Ackerman, A 1D Model for Nucleation of Ice from Aerosol Particles: An Application to a Mixed-Phase Arctic Stratus Cloud Layer, *JAMES*, in revision.
- Cesana, G. V., A. S. Ackerman, A. M. Fridlind, **I. Silber**, A. Del Genio, M. Zelinka, and H. Chepfer, Observational constraint on a feedback from supercooled clouds reduces projected warming uncertainty, *Sci. Adv.*, in revision.

Manuscripts in Preparation:

- 2023:** **Silber, I.**, et al., Evaluation of Polar Cloud Base Precipitation Rates in Multiple CMIP6 Member Models, *In prep.*
- Cesana, G. V., and **I. Silber**, PHAse Cloud Type (PHACT): a New CALIPSO Dataset for an Unambiguous Evaluation of Cloud Occurrence in Earth System Models, *in prep.*

Invited Talks:

- Jan 2022:** “Insights on Sources and Formation Mechanisms of Central Arctic Supercooled Clouds”
14th Symposium on Aerosol - Cloud - Climate Interactions, AMS 102nd Annual Meeting (remote).
- Aug 2021:** “On the Use of Ground-Based and In-Situ Observations to Elucidate Polar Mixed-Phase Cloud Processes”
School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY, USA.
- Nov 2020:** “Insights on Processes in Polar Supercooled Cloud Lifecycles from Observations and Large Eddy Simulations”
Department of Earth and Planetary Sciences, Weizmann Institute of Science, Rehovot, Israel (remote).

- Jan 2020:** "Observations of Highly Supercooled Drizzle Over Antarctica: A Unique Event or a Prevalent Phenomenon?"
Department of Physics, Michigan-Tech University, Houghton, MI, USA.
- Apr 2019:** "Do Measured and Modeled Antarctic Clouds "Radiate" the Same Personality? (Updated)"
NASA GISS, New York, NY, USA.
- Dec 2018:** "Do Measured and Modeled Antarctic Clouds "Radiate" the Same Personality?"
Institute of Earth Sciences, Hebrew University of Jerusalem, Jerusalem, Israel.
Department of Earth and Planetary Sciences, Weizmann Institute of Science, Rehovot, Israel.
- Sep 2018:** "Cloud and Surface Radiation Measurements at McMurdo Station, Antarctica"
Department of Meteorology and Atmospheric Science, Pennsylvania State University, University Park, PA, USA.
- Aug 2017:** "Short-term variability of the lower ionosphere from VLF narrowband radio observations"
32nd Internation Union of Radio Science (URSI) General Assembly and Scientific Symposium, Montreal, Canada.
- Jan 2016:** "On the use of VLF radio receivers to study the MLT and the lower ionosphere"
Leibniz-Institut of Atmospheric Physics Colloquium, Kühlungsborn, Germany.

Academic Presentations:

- Mar 2023:** "Statistical Evaluation of Arctic Cloud Base Precipitation Properties in Free-Running Climate Model Simulations", Talk, The "Batsheva de Rothschild Seminar" on Cloud-Climate Interactions Across Scales, Eilat, Israel.
- Jan 2023:** "Arctic Cloud-Base Ice Precipitation Properties for Constraining Models Retrieved Using a Bayesian Inference Method", Talk, 103rd AMS Annual Meeting, 103rd AMS Annual Meeting, Denver, CO, USA.
- Oct 2022:** "ESM Process-Oriented Evaluation with the Earth Model Column Collaboratory (EMC²)", Talk, 2022 Joint ARM User Facility and ASR PI Meeting, Rockville, MD, USA.
"Sources and Formation Mechanisms of Liquid-Bearing Clouds Over MOSAiC", Talk, 2022 ASR Joint ARM User Facility and ASR PI Meeting, Rockville, MD, USA.
"Analysis of Arctic Supercooled Cloud Properties and Sink Processes Using Remote Sensing Observations and Model Simulations", Poster, 2022 ASR Joint ARM User Facility and ASR PI Meeting, Rockville, MD, USA.
- May 2022:** "Using the Earth Model Column Collaboratory (EMC²) Open-Source Ground-Based Instrument Simulator and Subcolumn Generator to Facilitate Direct Comparisons Between Observations and Models", Online tutorial, ARM/ASR Open Science Workshop.
- Dec 2021:** "The Earth Model Column Collaboratory (EMC²) Ground-Based Lidar and Radar Instrument Simulator and Subcolumn Generator for Large-Scale Models", Online Poster, 2021 AGU Fall Meeting, hybrid meeting.
- Aug 2021:** "Crystal-Clear Evidence of Ice Crystal Habit Modulation of Arctic Supercooled Water Occurrence", Online Talk, International Conference on Clouds and Precipitation, remote meeting.
- Jun 2021:** "Sources of liquid-bearing clouds over MOSAiC examined from a Lagrangian framework", Online Poster, 2020 Joint ARM User Facility and ASR PI Meeting, remote meeting.
- Jan 2021:** "Nonturbulent Polar Liquid-Bearing Clouds: Observed Occurrence and Representation in Models", Online Talk, AMS 101st Annual Meeting, remote meeting.

- Dec 2020:** "The Prevalence of Precipitation from Polar Supercooled Clouds in Observations and Models", Online Talk, 2020 AGU Fall Meeting, remote meeting.
- Jun 2020:** "The Earth Column Model Collaboratory (EMC²): A new open source community framework for comparing column outputs from large-scale models with ground-based remote-sensing measurements", Online Talk, 2020 Joint ARM User Facility and ASR PI Meeting, remote meeting.
- Jul 2019:** "Highly Supercooled Drizzling Stratus Over Antarctica: A Good Test for Climate Models?", Poster, Radiation and Climate Gordon Research Conference 2019, Lewiston, ME, USA.
- Jun 2019:** "Cloud and water vapor Influences on ERA5, AMPS, and ModelE3 Surface Downwelling Longwave Radiation Biases in West Antarctica", Talk + Poster, 2019 Joint ARM User Facility and ASR PI Meeting, Rockville, MD, USA.
"Highly Supercooled Drizzling Stratus Over Antarctica: A Good Test for Climate Models?", Talk + Poster, 2019 ASR Joint ARM User Facility and ASR PI Meeting, Rockville, MD, USA.
- Jul 2018:** "The prevalence of cloud layers and the surface radiative impact of their phase during different synoptic regimes at McMurdo Station, Antarctica", Talk, 15th Conference on Cloud Physics/15th Conference on Atmospheric Radiation, Vancouver, Canada.
- Mar 2018:** "Comparison Between Arctic and Antarctic Cloud Morphology, Thermodynamic Phase, and Inversion Coupling Properties", Talk + Poster, 2018 Joint ARM User Facility and ASR PI Meeting, Tysons, VA, USA.
- Jun 2015:** "Semi-annual oscillation (SAO) of the nighttime ionospheric D-region as detected through ground-based VLF receivers", Talk, 26th IUGG General Assembly 2015, Prague, Czech Republic.
- Dec 2014:** "Anomalously strong vertical magnetic fields from distant lightning", Poster, AGU Fall Meeting 2014, San-Francisco, CA, USA.
- Jan 2014:** "Links between mesopause temperatures and ground-based VLF narrowband radio signals", Talk, 6th VERSIM workshop 2014, Dunedin, New-Zealand.
- Jun 2013:** "Links between mesopause temperatures and ground-based VLF narrowband radio signals", Talk, ARISE Training School 2013, Observatoire de Haute Provence (OHP), France.
- May 2012:** "Links between mesopause temperature and the D-region reflection height", Talk, 5th NDMC Meeting German Aerospace Center (DLR), Oberpfaffenhofen, Germany.
- Mar 2012:** "Mesopause temperatures above Israel", Poster, Israeli Meteorological Society Meeting, Ra'anana, Israel.

Advising:

- 2021-2022:** Marley Majetic (graduate student at Penn State; co-advised): Relating Ice Crystal Observations from the ICE-Ball Campaign to Model Simulations Elucidate Cirrus Development.

Mentoring:

- 2020-2021:** McKenna Stanford (post-doctoral fellow at Columbia U./NASA GISS; co-mentored): ground-based and space-borne remote-sensing analysis of Southern Ocean clouds.
- 2019-2020:** Paul McGlynn (undergraduate student at Penn State; co-mentored): impact of ice habit growth on liquid-bearing cloud occurrence over the Arctic.

Professional Service:

- 2016-2023:** **Journal Reviewer:**

Journal of Geophysical Research: Atmospheres, Atmospheric Chemistry and Physics, Journal of the Atmospheric Sciences, Journal of Climate, Journal of Advances in Modeling Earth Systems, Atmospheric Measurement Techniques, Earth System Science Data, Advances in Space Research, Annales Geophysicae, and Journal of Geophysical Research: Space Physics.

2020: **Proposal Reviewer:**

U.S. DOE ARM research pre-proposals.

2022-2023: **Member of the Graduate Faculty:**

Pennsylvania State University

2020-2022: **Session Co-Chair:**

“Plans for Eastern Pacific Cloud Aerosol Precipitation Experiment (EPCAPE)”, 2022 Joint ARM User Facility and ASR PI Meeting.

“Coupled system research at MOSAiC”, 17th Conference on Polar Meteorology and Oceanography at the 2022 AMS Collective Madison Meeting.

“Eastern Pacific Cloud Aerosol Precipitation Experiment (EPCAPE)”, 2021 Joint ARM User Facility and ASR PI Meeting.

“Pairing SCM/LES and GCM/ESM for observation-guided model development”, 2020 Joint ARM User Facility and ASR PI Meeting.

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