Patrick Alexander

Associate Research Scientist
Lamont Doherty Earth Observatory
Palisades, NY 10964
pma2107@ldeo.columbia.edu (646)-701-4622

EDUCATION

PhD, Graduate Center of the City University of New York 2015
Committee: M. Tedesco (Chair), Z. Luo, A. Frei, X. Fettweis
Dissertation: Assessing Greenland ice sheet albedo and mass balance variability using in-situ data, spaceborne observations and regional model outputs.

M.S., Columbia University, New York 2010
Advisor: G. Gong
Thesis: Modeled surface air temperature response to snow depth variability

B.S., Columbia University, New York 2009
Major: Environmental Engineering

RESEARCH INTERESTS

I am a cryospheric scientist and modeler focusing on interactions between ice and climate. I incorporate remote sensing and in situ measurements with global climate models, regional climate models and ice dynamics models to study ice-climate interactions, particularly interactions between climate and polar ice sheets, with the goal of understanding the future impact of climate change on sea level rise. I am also more broadly interested in surface-atmosphere interactions, and feedbacks and effects of changing atmospheric circulation on local climate and societal impacts.

EMPLOYMENT HISTORY

Associate Research Scientist, Lamont Doherty Earth Observatory	June 2020 -
Postdoctoral Research Scientist, Lamont Doherty Earth Observatory	2017 – 2020
Postdoctoral Fellow, NASA Goddard Institute for Space Studies	2015 – 2017
Research Assistant, City College of New York	2010 – 2015
Adjunct Lecturer, City College of New York	2010 – 2015
Research Assistant, Columbia University	2009 – 2010
Intern, Lamont Doherty Earth Observatory	2007 – 2008

HONORS AND AWARDS

2015 – 2017	NASA Postdoctoral Program Fellowship (2-3 years, $69,290)
Fall 2010, Spring 2011	CUNY Science Fellowship, Fall 2010 + Spring 2011
Fall 2010	CUNY University Fellowship
Summer 2007	NSF REU Intern, Lamont Doherty Earth Observatory

PEER REVIEWED PUBLICATIONS

2021: Boghosian, A. L., Pitcher, L. H., Smith, L. C., Kosh, E., **Alexander, P. M.**, Tedesco, M., and Bell, R. E. Development of ice-shelf estuaries promotes fractures and calving, *Nature Geoscience*, 14, 889-905, 10.1038/s41561-021-00837-7.

2021: Payne, A. J., Nowicki, S., Abe-Ouchi, A., Agosta, C., **Alexander, P.**, et al. (2021) Future sea level change under coupled model intercomparison project phase 5 and phase 6 scenarios from the Greenland and Antarctic ice sheets, *Geophysical Research Letters*, 48, e2020GL091741, doi: 10.1029/2020GL091741.

2021: Edwards, T. L., Nowicki, S., Goelzer, H., Seroussi, H., Marzeion, B., Smith, C. J., Jourdain, N. C., Slater, D., McKenna, C. M., Simon, E., Abe Ouchi, A., Gregory, J. M., Hock, R., Larour, E., Lipscomb, W. H., Payne, A. J., Shepherd, A., Agosta, C., **Alexander, P.,** et al. (2021) Projected land ice contributions to twenty-first-century sea level rise. *Nature*, 593, 74-82, doi: 10.1038/s41586-021-03302-y.

2021: Wang, S., **Alexander, P.**, Wu, Q., Tedesco, M., and Shu, S. (2021) Characterization of ice shelf fracture features using ICESat-2 – A case study over the Amery ice shelf, *Remote Sensing of Environment*, 255, 11266, doi: 10.1016/j.rse.2020.112266.

2020: Goelzer, H., Nowicki, S., Payne, A., Larour, E., Seroussi, H., Lipscomb, W. H., Gregory, J., Abe-Ouchi, A., Shepherd, A., Simon, E., Agosta, C., **Alexander, P.** et al. (2020) The future sea level contribution of the Greenland ice sheet: a multi-model ensemble study of ISMIP6, *The Cryosphere*, 14, 3071-3096, doi: 10.5194/tc-14-3071-2020.

2020: Wang, S., Tedesco, M., **Alexander, P.**, Xu, M., and Fettweis, X. (2020) Quantifying spatiotemporal variability of glacier algal blooms and the impact on surface albedo in southwest Greenland, *The Cryosphere*, 14, 2687-2713, doi: 10.5194/tc-14-2687-2020.

2020: Nowicki, S., Payne, A. J., Goelzer, H., Seroussi, H., Lipscomb, W., Abe-Ouchi, A., Agosta, C., **Alexander, P.**, et al. (2020) Experimental protocol for sea level projections from ISMIP6 standalone ice sheet models, *The Cryosphere*, 14, 2331-2368, doi: 10.5194/tc-2019-322.

2019: Nusbaumer, J. N., **Alexander, P. M.,** LeGrande, A. N., and Tedesco, M. (2019) Spatial shift of moisture sources over Greenland related to enhanced Arctic warming, *Geophysical Research Letters,* 46, doi: 10.1029/2019GL084633

2019: **Alexander, P. M.,** M. Tedesco, L. Koenig, and X. Fettweis. (2019) Evaluating a regional climate model simulation of Greenland ice sheet snow and firn density for improved surface mass balance estimates, *Geophysical Research Letters*, 46. doi: 10.1029/2019GL084101

2019: **Alexander, P. M.,** A. N. LeGrande, E. Fischer, M. Tedesco, X. Fettweis, M. Kelley, S. Nowicki, and G. A. Schmidt (2019) Simulated Greenland Surface Mass Balance in the GISS ModelE2 GCM: Role of the ice sheet surface, *Journal of Geophysical Research*, 124. doi: 10.1029/2018JF004772.

2018: Montgomery, L., L. Koenig, and **P. Alexander** (2018) The SUMup dataset: compiled measurements of surface mass balance components over ice sheets and sea ice with analysis over Greenland, *Earth Syst. Sci. Data*, 10, 1959-1985, doi: 10.5194/essd-10-1959-2018.

2018: Wang, S., M. Tedesco, M. Xu, and **P. M. Alexander** (2018) Mapping ice algal blooms in southwest Greenland from space, *Geophys. Res. Lett.*, 45, 11,779-11,788, doi: 10.1029/2018GL080455.

2018: Navari, M., S. A. Margulis, M. Tedesco, X. Fettweis, and **P. M. Alexander** (2018) Improving Greenland surface mass balance estimates through the assimilation of MODIS albedo: A case study along the K-Transect, *Geophys. Res. Lett.*, 45, doi: 10.1029/2018GL078448.

2016: Navari, M., S. A. Margulis, S. M. Bateni, M. Tedesco, X. Fettweis, and **P. Alexander** (2016) Feasibility of improving a priori regional climate model estimates of Greenland ice sheet surface mass loss through assimilation of measured ice surface temperatures, *The Cryosphere*, 10, 103-120, doi: 10.5194/tc-10-103-2016.

2016: **Alexander, P. M.,** M. Tedesco, N.-J. Schlegel, S. B. Luthcke, X. Fettweis, and E. Larour (2016) Greenland Ice Sheet seasonal and spatial mass variability from model simulations and GRACE (2003-2012), *The Cryosphere*, 10, 1259-1277, doi: 10.5194/tc-10-1259-2016.

2016: Koenig, L. S., A. Ivanoff, **P. M. Alexander**, J. A. MacGregor, X. Fettweis, B. Panzer, J. D. Paden, R. R. Forster, I. Das, J. R. McConnell, M. Tedesco, C. Leuschen, and P. Gogineni (2016) Annual Greenland accumulation rates (2009-2012) from airborne snow radar, *The Cryosphere,* 1739-1752, doi: 10.5194/tc-10-1739-2016.

2016: Tedesco, M., S. Doherty, X. Fettweis, **P. Alexander**, J. Jeyaratnam, and J. Stroeve (2016) The darkening of the Greenland ice sheet: trends, drivers, and projections (1981-2100), *The Cryosphere*, 10, 477-496, doi: 10.5194/tc-10-477-2016.

2014: **Alexander, P.M.**, M. Tedesco, X. Fettweis, R. S. W. van de Wal, C. J. P. P. Smeets, and M. R. van den Broeke (2014) Assessing spatio-temporal variability and trends in modeled and measured Greenland Ice Sheet albedo (2000-2013), *The Cryosphere*, 8, 2293-2312, doi: 10.5194/tc-8-2293-2014.

2013: Tedesco, M., **P. Alexander**, J. E. Box, J. Cappelen, N. T. Knudsen, T. Mote, K. Steffen, R. S. W. van de Wal, J. Wahr, and B. Wouters (2013) "Greenland Ice Sheet" in: [State of the Climate in 2012, eds. J. Blunden and S. Arndt, *Bull. Amer. Meteorol. Soc.*, 94, S1-S258]

2013: Tedesco, M., I. Willis, M. Hoffman, A. Banwell, **P. Alexander** and N. Arnold (2013) Ice dynamic response to two modes of supraglacial lake drainage on the Greenland Ice Sheet, *Environ Res. Lett.,* 034007, doi: 10.1088/1748-9326/8/3/034007

2013: Tedesco, M., X. Fettweis, T. Mote, J. Wahr, **P. Alexander**, J. E. Box, and B. Wouters (2013) Evidence and analysis of 2012 Greenland records from spaceborne observations, a regional climate model and reanalysis data, *The Cryosphere,* 7, 615-630, doi:10.5194/tc-7-615-2013.

2011: **Alexander, P.** and G. Gong (2011) Modeled surface air temperature response to snow depth variability, *J. Geophys. Res., 116,* D14105, doi: 10.1029/2010JD014908

2009: Loose, B., M. Stute, **P. Alexander**, and W. M. Smethie. (2009) Design and deployment of a portable membrane equilibrator for sampling of acqueous dissolved gases, *Water Resources Research,* 45, W00D34, doi: 10.1029/2008WR006969

PUBLICATIONS IN NON-REFEREED JOURNALS

2015: Tedesco, M., S. Doherty, S. Warren, M. Tranter, J. Stroeve, X. Fettweis, and **P. Alexander** (2015) What darkens the Greenland Ice Sheet?, *EOS*, 96, doi: 10.1029/2015EOo35773. Published 17 September, 2015.

PUBLICATIONS IN REVIEW

2021: Zheng, C., Ting, M., Wu, Y., Kurtz, N., Orbe, C., **Alexander, P.**, Seager, R., and Tedesco, M. Turbulent heat flux, downward longwave radiation, and large-scale atmospheric circulation associated with the Wintertime Barents-Kara Sea extreme sea ice loss events, *Journal of Climate*, in review, 2021.

2021: Wang, S., Liu, H., Jezek, K., Alley, R. B., Wang, L., **Alexander, P.,** and Huang, Y. Controls on Larsen C Ice Shelf retreat from a 60-year satellite data record, *Journal of Geophysical Research*, in review, 2021.

2021: Smith, B., Medley, B., Fettweis, X., Sutterly, T., **Alexander, P.,** Porter, D., and Tedesco, M. Evaluating Greenland Surface-Mass-Balance and Firn-Densification Data Using ICESat-2 Altimetry, *The Cryosphere*, submitted, 2021.

PUBLICATIONS IN PREPARATION

2021: **Alexander, P. M.,** M. Tedesco, S. Wang, A. N. LeGrande, M. Kelley, X. Fettweis, and G. A. Schmidt (2021) Evaluation and improvement of Greenland ice sheet bare ice extent and albedo variability in the NASA GISS ModelE GCM, *in preparation.*

2021: **Alexander, P. M.,** M. Tedesco, R. Antwerpen, M. Flanner, and X. Fettweis (2021) Offline evaluation of a physically-based hyperspectral snow albedo scheme for regional and global climate models, *in preparation.*

2021: Porter, D. F., **P. M. Alexander**, M. Tedesco and X. Fettweis (2021) Greenland firn evolution response to changing atmospheric conditions in the MAR surface models, *in preparation.*

PROFESSIONAL PRESENTATIONS

Invited Talks

Alexander, P. Greenland surface mass balance in a global climate model: the role of surface albedo, *NASA GISS Sea Level Rise Seminar,* NASA Goddard Institute for Space Studies, New York, NY (virtual), March 24, 2020.

Alexander, P. Greenland ice sheet mass balance in a general circulation model: Role of the ice sheet surface, *Marine Geology and Geophysics Seminar,* Lamont Doherty Earth Observatory, Palisades, NY, November 28, 2018.

Alexander, P. Simulating the Greenland ice sheet in the NASA GISS ModelE2 GCM, *NASA Goddard Space Flight Center*, Greenbelt, MD, May 17, 2018.

Alexander, P. Improving models of ice sheet change: old and new questions, Lamont Doherty Earth Observatory, Palisades, NY, January 17, 2017.

Alexander, P. The Greenland Ice Sheet: The Science of Change, *GEOS Seminar Series,* The Graduate Center, CUNY, New York, NY, October 8, 2015.

Alexander, P. Examining spatial and temporal variations in Greenland ice sheet albedo and mass balance, *NASA Goddard Institute for Space Studies,* New York, NY, December 12, 2014.

Alexander, P. Greenland Ice sheet albedo trends and variability (2000-2012): Insights from a regional climate model and remote sensing data, *NASA Jet Propulsion Laboratory,* Pasadena, CA, August 21, 2013.

Oral Presentations

2019: **Alexander, P.*,** M. Tedesco, A. N. LeGrande, E. Fischer, S. Wang, D. Porter, X. Fettweis, M. Flanner, and G. Schmidt, Constraining and quantifying the effects of ice sheet surface albedo in a global climate model simulation, *Lamont Postdoctoral Symposium*, Lamont Doherty Earth Observatory, Palisades, NY, September 11, 2019.

2018: **Alexander, P.*,** A. N. LeGrande, E. Fischer, M. Tedesco, X. Fettweis, M. Kelley, S. Nowicki, and G. Schmidt, Greenland ice sheet surface mass balance simulated by the NASA GISS ModelE2 GCM, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 23, 2018.

2017: Tedesco, M., **P. M. Alexander*,** R. Datta, M. Linares, J. Jeyaratnam, and D. Porter (2017) MAR at the Cryosphere Processes Laboratory: a perspective on 10 years of results and achievements, *2nd MAR workshop,* Grenoble, France, September 13-15, 2017.

2017: **Alexander, P. M. *,** A. N. LeGrande, E. Fischer, M. Tedesco, M. Kelley, X. Fettweis, and S. E. Moustafa (2017) Improving simulations of ice-sheet albedo and surface mass balance in the GISS ModelE Global Climate Model, *Proceedings of the Wellington International Symposium on The Cryosphere in a Changing Climate*, Wellington, NZ, February 12-17, 2017.

2014: **Alexander, P.*,** M. Tedesco, N. Schlegel, E. Larour, S. Luthcke, X. Fettweis (2011) Evaluating the spatiotemporal variability of modeled and measured Greenland mass balance (2000-2013), *Program for Arctic Regional Climate Assessment (PARCA) meeting,* NASA Goddard Space Flight Center, Greenbelt, MD, January 28, 2014.

2011: **Alexander, P.*,** M. Tedesco, N. Steiner, H-P Marshall, S.B. Luthcke, and X. Fettweis (2011) Identification of accumulation, density and grain size bias in the regional climate model MAR over the Greenland ice sheet using in-situ and remotely sensed data, *Fall 2011 American Geophysical Union Meeting,* C22B-06

*Presenting Author

Selected Conference Presentations

***** Oral Presentation

2021: **Alexander, P. M.,** A. LeGrande, M. Tedesco, C. Kittel, C. Amory, C. Agosta, and X. Fettweis (2021) Evaluating simulated Antarctic ice sheet mass balance in the NASA GISS GCM, *Fall 2021 American Geophysical Union Meeting*, New Orleans, LA and online, 13-17 December.

2021: Antwerpen, R., M. Tedesco, X. Fettweis, P. Alexander, and W. J. van de Berg (2021) Assessing bare ice albedo simulated by MAR on the Greenland ice sheet (2000-2020) and implications for meltwater production estimates, *Fall 2021 American Geophysical Union Meeting,* New Orleans, LA and online, 13-17 December.

2021: Zheng, C., M. Ting, Y. Wu, N. Kurtz, C. Orbe, **P. Alexander**, R. Seager, and M. Tedesco (2021) Turbulent heat flux, downward longwave radiation, and large-scale atmospheric circulation associated with wintertime Barents-Kara Sea extreme sea ice loss events, *Fall 2021 American Geophysical Union Meeting,* New Orleans, LA and online, 13-17 December.

2021: Wang, S., R. Alley, L. Yang, P. Alexander, and S. Anandakrishnan (2021) Fracture evolution of Thwaites Glacier tongue from time-series ICESat-2 observations, *Fall 2021 American Geophysical Union Meeting,* New Orleans, LA and online, 13-17 December.

2020: **Alexander, P. M.,** M. Tedesco, X. Fettweis, S. Wang, R. Antwerpen, M. Flanner, A. N. LeGrande, and G. Schmidt (2020) Implementing a physically-based hyperspectral snow albedo scheme in regional and global climate models for improved ice sheet mass balance estimates, *Fall 2020 American Geophysical Union Meeting*, online, 1-17 December.

2020: Smith, B. E., T. C. Sutterley, **P. M. Alexander,** M. Tedesco, B. Medley, and X. Fettweis (2020) Evaluating Greenland surface mass balance and firn density models with ICESat-2 altimetry differences, *Fall 2020 American Geophysical Union Meeting*, online, 1-17 December.

2020: Wang, S., **P. Alexander**, Q. Wu, M. Tedesco, and S. Shu (2020) Revealing ice shelf fracture morphology using ICESat-2 measurements, *Fall 2020 American Geophysical Union Meeting*, online, 1-17 December.

2020: **Alexander, P. M.,** M. Tedesco, A. N. LeGrande, S. Wang, E. Fischer, X. Fettweis, M. Flanner, M. Kelley, R. Antwerpen, S. M. J. Nowicki, and G. A. Schmidt (2020) Capturing Greenland ice sheet sub-grid-scale albedo variability in the NASA GISS ModelE GCM: Impact on simulated surface mass balance, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* NASA Goddard Space Flight Center, Greenbelt, MD, 20 February.

2020: Porter, D., **P. M. Alexander**, X. Fettweis, and M. Tedesco (2020) The new snow surface model MAR-L shows the firn evolution response to changing atmospheric conditions over Greenland, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* NASA Goddard Space Flight Center, Greenbelt, MD, 20 February.

2020: Wang, S., M. Tedesco, Q. Wu, S. Shu, and **P. Alexander** (2020) Automatic detection of ice surface depression features using ICESat-2 altimetry measurements, *Program for Arctic*

Regional Climate Assessment (PARCA) meeting, NASA Goddard Space Flight Center, Greenbelt, MD, 20 February.

2019: **Alexander, P. M.,** M. Tedesco, A. N. LeGrande, E. Fischer, S. Wang, X. Fettweis, M. Flanner, M. Kelley, S. Nowicki, and G. A. Schmidt (2019) Impact of varying bare ice extent and albedo on Greenland ice sheet SMB in the NASA GISS ModelE GCM, *Fall 2019 American Geophysical Union (AGU) Meeting,* San Francisco, CA, 9-13 December.

2019: Tedesco, M., T. A. Moon, **P. M. Alexander**, P. Colosio, X. Fettweis, J. A. Francis, and S. Wang (2019) The exceptional 2019 melting season over the Greenland ice sheet: drivers, implications and new records, *Fall 2019 American Geophysical Union (AGU) Meeting,* San Francisco, CA, 9-13 December.

2019: Wang, S., M. Tedesco, **P. M. Alexander**, and M. Xu (2019) Spatiotemporal variability of ice algal blooms in southwest Greenland and its impact on bare ice albedo based on MERIS and MODIS satellite observations, *Fall 2019 American Geophysical Union (AGU) Meeting,* San Francisco, CA, 9-13 December.

2019: Sutterly, T. C., B. Smith, M. R. van den Broeke, B. Noël, M. Tedesco, **P. M. Alexander**, and X. Fettweis (2019) Seasonal evaluation of surface mass balance and firn model outputs from satellite and airborne lidar mapping, *Fall 2019 American Geophysical Union (AGU) Meeting*, San Francisco, CA, 9-13 December.

2019: Zaima, L., M. Tedesco, M. Turrin, **P. M. Alexander**, and S. Wang (2019) PlastiX-Snow: A citizen science project to identify microplastics in snow, *Fall 2019 American Geophysical Union (AGU) Meeting,* San Francisco, CA, 9-13 December.

2019: Lyons, H., C. Mccarthy, N. Frearson, M. Tedesco, and **P. M. Alexander** (2019) Experimental analysis of microplastics as cryospheric nucleation sites for sea ice reformation and impactors of glacier viscous flow rates, *Fall 2019 American Geophysical Union (AGU) Meeting*, San Francisco, CA, 9-13 December.

2019: *Tedesco, M., **P. Alexander**, D. Porter, S. Wang, P. Colosio, L. Dong, X. Fettweis, G. Picard, B. Smith, A. Rennermalm, and R. Ranzi (2019) Surface melting and elevations changes over the Greenland ice sheet: trends, processes and new tools, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 31, 2019.

2019: **Alexander, P.,** L. Koenig, M. Tedesco, and X. Fettweis (2019) Controls on simulation of snow and firn density in the regional climate model MAR, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 31, 2019.

2018: **Alexander, P. M.,** M. Tedesco, E. Fischer, A. N. LeGrande, X. Fettweis, M. Flanner, S. Nowicki, and G. A. Schmidt (2018) Effect of improved physically-based simulation of land ice albedo on Greenland ice sheet surface mass balance and arctic regional climate in the ModelE GCM, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: *Boghosian, A., B. M. Csatho, M. Tedesco, R. E. Bell, D. F. Porter, **P. M. Alexander**, and N. Schlegel (2018) Linking the atmosphere and ice dynamics in Greenland, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: Dong, L., D. F. Porter, M. Tedesco, and **P. Alexander** (2018) Developing a glacial surface model for Greenland to improve projections of surface runoff, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: Linares, M., M. Tedesco, S. A. Margulis, **P. Alexander**, X. Fettweis, and G. Cortés (2018) Modeling surface quantities over Himalaya using the Modèle Atmosphérique Régionale (MAR)

Model: multi-decadal simulations and assessement using satellites and in-situ data, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: Lyons, H., M. Tedesco, M. G. Cooper, **P. M. Alexander**, and N. Frearson (2018) Spatial and morphological analysis of cryoconite holes in Kangerlussuaq, Greenland using unmanned aerial vehicle imaging and automated software recognition, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: Nusbaumer, J. M., **P. M. Alexander**, A. N. LeGrande, and M. Tedesco (2018) Evaluating the moisture sources of water vapor and precipitation over Greenland in GISS ModelE2.1, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: Porter, D. F., **P. M. Alexander**, M. Tedesco, B. Smith, and L. Dong (2018) Greenland firn evolution response to changing atmospheric conditions in the MAR surface model, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: *Tedesco, M., **P. Alexander**, X. Fettweis, E. Hanna, T. L. Mote, D. F. Porter, A. K. Rennermalm, B. M. Csatho, R. E. Bell, A. Boghosian, and N. Schlegel (2018) Unprecedented (1851-2016) atmospheric conditions drive record surface and ice dynamic mass losses over the Greenland ice sheet, *Fall 2018 American Geophysical Union Meeting,* Washington, DC, 10-14 Dec.

2018: *Tedesco, M., M. Linares, S. Margulis, X. Fettweis, and **P. M. Alexander** (2018) Assessment of the Modèle Atmosphérique Régional (MAR) regional climate model over High Mountain Asia, *Asia Oceana Geosciences Society*, Honolulu, Hawaii, June 3-8, 2018.

2018: Linares, M., M. Tedesco, S. Margulis, J. Jeyaratnam, **P. Alexander**, and X. Fettweis (2018) Preliminary assessment of the Modèle Atmosphérique Régionale (MAR) regional climate model over High Mountain Asia, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 23, 2018.

2018: Smith, B., M. Tedesco, W. Ermold, X. Fettweis, and **P. Alexander** (2018) Calibrating and validating firn-densification and regional climate modeling using altimetry and radar data, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 23, 2018.

2018: Tedesco, M., A. Rennermalm, R. Hock, **P. Alexander**, G. Corti, F. Covi, C. Miège, A. Heilig, J. Kingslake, L. Koenig, S. Leidman, M. MacFerrin, S. Munsell, D. Porter, and B. Smith (2018) Understanding and quantifying spatio-temporal variability of refreezing in southwest Greenland through fieldwork, regional climate model outputs and remote sensing tools, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* Earth System Science Interdisciplinary Center, College Park, MD, January 23, 2018.

2017: **Alexander, P. M.,** A. N. LeGrande, E. Fischer, M. Tedesco, M. Kelley, G. Schmidt and X. Fettweis (2017) Impact of improved Greenland ice sheet surface representation in the NASA GISS ModelE2 GCM on simulated surface mass balance and regional climate, *Fall 2017 American Geophysical Union Meeting,* New Orleans, LA, 11-15 Dec.

2017: Tedesco, M., **P. Alexander**, Porter, D. F., Fettweis, X., Luthcke, S. B., Mote, T. L., Rennermalm, A., and Hanna, E. (2017) The Role of the North Atlantic Oscillation (NAO) on Recent Greenland Surface Mass Balance Loss and Partitioning, *Fall 2017 American Geophysical Union Meeting,* New Orleans, LA, 11-15 Dec.

2017: **Alexander, P. M.,** A. N. LeGrande, E. Fischer, M. Tedesco, M. Kelley, X. Fettweis, S. E. Moustafa, and G. Schmidt (2017) Impact of ice sheet surface processes on Greenland surface mass balance in the NASA GISS ModelE2 GCM, *Conference on Regional Sea Level Changes and Coastal Impacts*, New York, NY, 10-14 Jul.

2017: **Alexander, P. M.,** L. S. Koenig, M. Tedesco, P. Kuipers Munneke, X. Fettweis, S. R. M. Ligtenberg, B. Noël, M. R. van den Broeke, and C. Miège (2017) Evaluating and testing climate model simulations of Greenland ice sheet snow and firn densities, 47th Annual International Arctic Workshop, Buffalo, NY, 23-25 Mar.

2017: **Alexander, P. M.,** L. S. Koenig, M. Tedesco, P. Kuipers Munneke, X. Fettweis, S. R. M. Ligtenberg, B. Noël, M. R. van den Broeke, and C. Miège (2017) Understanding sources of error in simulated Greenland ice sheet snow and firn densities, *Program for Arctic Regional Climate Assessment (PARCA) meeting,* NASA Goddard Space Flight Center, Greenbelt, MD, January

2016: **Alexander, P. M.,** L. S. Koenig, M. Tedesco, P. Kuipers Munneke, X. Fettweis, S. R. M. Ligtenberg, B. Noël, M. R. van den Broeke, and C. Miège (2016) The role of meltwater in modelled Greenland Ice Sheet densities, *Workshop on observing and modeling meltwater retention processes on ice sheets and glaciers*, Copenhagen, Denmark, 1-3 June.

2016: **Alexander, P. M.,** A. N. LeGrande, L. Koenig, M. Tedesco, A. Ivanoff, E. Fischer, and X. Fettweis (2016) Assessing modeled Greenland surface mass balance in the GISS Model E2 and it sensitivity to surface albedo, *Geophysical Research Abstracts*, 18, EGU2016-17978, EGU General Assembly 2016, Vienna, Austria, 17-22 Apr.

2015: **Alexander, P. M.,** Koenig, L.S., Datta, R., Tedesco, M., Kuipers Munneke, P., Ligtenberg, S. R. M., Fettweis, X. and van den Broeke, M. R. (2015) Snow and firn densities on the Greenland and Antarctic Ice Sheets from observations, the MAR regional climate model, and the RACMO firn model, *Fall 2015 American Geophysical Union Meeting,* San Francisco, California, 14-18 Dec.

2015: Koenig, L., Ivanoff, A., **Alexander, P. M.,** MacGregor, J. A., Cullather, R. I. and Nowicki, S. (2015) Annual Greenland accumulation derived from airborne radar and comparisons to modeled and in situ data, *Fall 2015 American Geophysical Union Meeting*, San Francisco, California, 14-18 Dec.

2015: **Alexander, P. M.,** L. S. Koenig, R. Datta, M. Tedesco, X. Fettweis, S. R. M. Ligtenberg, P. Kuipers Munneke, and M. R. van den Broeke (2015) Evaluation of climate-model simulated ice sheet snow density using in situ data, *2015 WAIS workshop, West Antarctic Ice Sheet Initiative,* Loveland Colorado, 16-19 Sept.

2014: **Alexander, P.,** L. S. Koenig, M. Tedesco, R. Datta, and X. Fettweis (2014) Assessment of regional climate model-simulated snow density over the Greenland and Antarctic Ice Sheets using in situ measurements, *Fall 2014 American Geophysical Union Meeting,* C51B-0260.

2013: **Alexander, P.,** M. Tedesco, S.B. Luthcke, N. Schlegel, E. Larour and X. Fettweis (2013) Evaluating surface mass balance spatiotemporal variability in a regional climate model over Greenland using an ice sheet model and GRACE, *Fall 2013 American Geophysical Union Meeting*, C21C-0638

2012: **Alexander, P.**, M. Tedesco, X. Fettweis, S.A. Margulis, M. Navari, J. Box, and C. Chen (2012) Assessment of modeled albedo and bare ice extent (2001-present) in the regional climate model MAR using satellite data, *Fall 2012 American Geophysical Union Meeting,* C13F-0687

2012: Tedesco, M., A. Quillet, **P. M. Alexander,** A. K. Rennermalm, J. C. Stroeve, X. Fettweis, E. J. Orantes, D. Tuia, and M. Parkan. (2012) The influence of sea ice extent variability on the Greenland surface mass balance and energy balance, *Fall 2012 American Geophysical Union Meeting,* C33F-004

DATASETS

Tedesco, M., and **P. M. Alexander** (2013) MODIS (MCD43A3) black sky albedo on the MAR RCM Grid (2000-2012). Arctic Data Center. doi:10.5056/D6P55KJZ.

Tedesco, M., X. Fettweis, and **P. M. Alexander** (2013) MAR v3.2 regional climate model data for Greenland (1958-2013). Arctic Data Center. doi:10.5056/D6JH3J7Z.

FUNDING

EXTERNALLY-FUNDED RESEARCH GRANTS

2020-2023
NOAA Grant# GNA20OAR4310379
Amount: $590,820
Anticipatory assessment: Future US Droughts under the influence of evolving modes of variability and long-term change
Role: Co-PI

2020-2023
NASA Grant# 80NSSC20K1254
Amount: $1,006,457
Assessing the Role of the Atmosphere in Extreme Arctic Sea Ice Melting Events from Daily to Centennial Time Scales
Role: Co-PI

TEACHING EXPERIENCE

Adjunct Lecturer, City College of New York

Perspectives on Global Warming Laboratory (EAS 104 Lab; three sections in Spring 2015)

Earth System Science Laboratory (6 semesters; EAS 106 Lab: Fall 2010, Fall 2011, Spring 2012, Fall 2013, Spring 2014; ENGR 10610 Lab, Fall 2014)

Earth System Science (EAS 106) Guest instructor for one session, Fall 2011

FIELD EXPERIENCE

2019 X-Snow project, Hunter, NY, January 4, 2019

2018 X-Snow project, Phoenicia, NY, February 4-5, 2018; March 9, 2018

2016 2nd Snow Science Winter School, Preda/Davos, Switzerland, February 14-20, 2016: Learned about snow processes and gained experience with measurement techniques: traditional density, grain measurements, snow micropenetrometry, X-ray tomography, albedo measurements, NIR photography

2011 Expedition to Greenland: 2.5 weeks camping on the Greenland ice sheet; GPS measurements of ice motion in response to supraglacial lake drainage; hyperspectral albedo measurements with ASD fieldSpec3 spectrometer; assisted with hydrological measurements and biological sampling

2011 GAPS Field Campaign, Idaho: assisted with snow density, grain size, NIR photography, microwave radiometer measurements during the 3-day campaign

SERVICES

Organizing Committee Member, Greenland Surface Mass Balance Workshop, Lamont-Doherty Earth Observatory, September 7-8, 2016

Admissions Committee Member, Department of Earth and Environmental Sciences, The Graduate Center, CUNY, 2013- 2015

Co-founder and organizer, GEOS seminar series, Department of Earth and Environmental Sciences, The Graduate Center, CUNY, 2010-2015

Reviewer

GIScience and Remote Sensing	2021
Climate of the Past	2020
The Cryosphere	2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021
Environmental Research Letters	2019, 2020
Frontiers in Earth Science	2016
Journal of Advances in Modeling Earth Systems	2020
Remote Sensing of Environment	2020
Nature Communications	2017, 2019
UK NERC proposal reviewer	2020
NASA program review panel	2015

OUTREACH

Presenter at Intrepid Kids' Week, New York, NY, February 2020

Presenter at Intrepid Kids' Week, New York, NY, February 2019

Organized and led workshop at the Wave Hill Environmental Center, Bronx, NY, January 2019

Presenter at AMNH Sun and Earth Day, American Museum of Natural History, March 2018.

Presenter at Girls in Science and Engineering Day, Intrepid Sea Air and Space Museum, March 2018.

Presenter at Lamont Doherty Earth Observatory Open House, Palisades, NY, Fall 2017, 2018, 2019

Spoke to students about current research at Iona College, April 2018; Marymount Manhattan College, 2016; New York University, 2015, 2016; City College of New York, Fall 2015

Mentor at STEM mentoring café, Intrepid Sea Air and Space Museum, November 2015

PROFESSIONAL ORGANIZATIONS

American Geophysical Union (AGU)
American Association of Geographers (AAG)

MEDIA

Associated Press, "Snow science: crystal clues to climate change, watersheds", March 16, 2018.

State of the Planet Blog, "'X-Snow' project needs your help to unlock the secrets of snow", February 27, 2018.

National Public Radio WNYC, "Snowmelt", project.wnyc.org/snowflakes/, February 27, 2018

PROFESSIONAL DEVELOPMENT

2021

2020 Participated in Ùa ice sheet model User Meeting, Online, 27-31 August, 2020.

2019 Participated in Arctic Data Center Training Workshop, Santa Barbara, CA, 14-18 January, 2019.
2017 Participated in the second MAR regional climate model workshop, Grenoble, France, 13-15 September, 2017.
2013 Spent six weeks at the NASA Jet Propulsion Laboratory, Pasadena, CA collaborating with the Ice Sheet System Model group, July-August, 2013
2012 Participated in Ice Sheet System Model (ISSM) workshop, December 2012

TECHNICAL SKILLS

Proficiency using the NASA GISS ModelE global climate model, Community Earth System Model (CESM), MAR regional climate model, Ice Sheet System Model (ISSM), MATLAB, Python, FORTRAN, bash, UNIX