WALTER N. MEIER

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Summary of Professional Experience

Dr. Walter Meier is currently a senior research scientist at the National Snow and Ice Data Center (NSIDC), University of Colorado, where he is the lead scientist for the NASA Snow and Ice Distributed Active Archive Center (DAAC) at NSIDC. Previously, he worked in the Cryospheric Sciences Lab at the NASA Goddard Space Flight Center from 2013 to 2017. From 2003-2013, he was a research scientist at the NSIDC where he was the science and product team lead for passive microwave and sea ice products. He has been a principal investigator on a NOAA-funded development of a sea ice concentration climate data record (CDR) and the NASA-funded GCOM-W AMSR2 science team for sea ice products. He was a lead writer for the sea ice chapter of the Snow, Water, Ice, Permafrost in the Arctic (SWIPA) Assessment Report, published in 2011, and the SWIPA follow-on report, published in 2017. Dr. Meier has served on numerous committees and panels related to sea ice remote sensing and Arctic climate.

Education

Ph.D., 1998	Aerospace Engineering Sciences, Program in Atmospheric and Oceanic Sciences, University of Colorado, Boulder, CO
M.S., 1992	Aerospace Engineering Sciences, University of Colorado, Boulder, CO
B.S., 1991	Aerospace Engineering, University of Michigan, Ann Arbor, MI

Appointments

Senior Research Scientist, National Snow and Ice Data Center (Jul 2017 – present)
Research Scientist, NASA Goddard Space Flight Center (Aug 2013 – Jul 2017)
Research Scientist III, National Snow and Ice Data Center (Aug 2009 – Aug 2013)
Research Scientist II, National Snow and Ice Data Center (Aug 2003 – Aug 2009)
Adjunct Assistant Professor, U.S. Naval Academy (Aug 2001 – Aug 2003)
UCAR Visiting Scientist, U.S. National Ice Center (Sep 1999 – Aug 2001)
UCAR Post-Doctoral Fellow, University of Colorado (Feb 1999 – Aug 1999)
Graduate Research Assistant, University of Colorado (Jun 1991 – Dec 1998)

Peer-Reviewed Lead Author Publications

Meier, W.N., and J.S. Stewart, 2020. Assessment of the stability of passive microwave brightness temperatures for NASA Team sea ice concentration retrievals, *Rem. Sens.*, 12(14), 2197, doi:10.3390/rs12142197.

Meier, W.N., and J.S. Stewart, 2020. Assessing the potential of enhanced resolution gridded passive microwave brightness temperatures for retrieval of sea ice parameters, *Rem. Sens.*, 12(16), 2552, doi:10.3390/rs12162552.

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Meier, W.N., S. Kern, M. Holland, and T. Tamura, 2017. Changes in Arctic sea ice extent, concentration and thickness, *in* "Snow, Water, Ice, and Permafrost in the Arctic (SWIPA) 2017", pp. 105-111, Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.

Meier, W.N., F. Fetterer, J. Scott Stewart, and S. Helfrich, 2015. How do sea ice concentrations from operational data compare with passive microwave estimates? Implications for improved model evaluations and forecasting, *Ann. Glaciol.*, vol. 56(69), 332-340, doi:10.3189/2015AoG69A694.

Meier, W.N., G. Peng, D.J. Scott, M.H. Savoie, 2014. Verification of a new NOAA/NSIDC passive microwave sea-ice concentration climate record, *Polar Research*, 33, doi:/10.3402/polar.v33.21004.

Meier, W.N., G. Hovelsrud, B. van Oort, J. Key, K. Kovacs, C. Michel, M. Granskog, S. Gerland, D. Perovich, A.P. Makshtas, and J. Reist, 2014. Arctic sea ice in transformation: A review of recent observed changes and impacts on biology and human activity, *Rev. Geophys.*, 41, doi:10.1002/2013RG000431.

Meier, W.N., D. Gallaher, and G.G. Campbell, 2013. New estimates of Arctic and Antarctic sea ice extent from recovered Nimbus I satellite imagery, *The Cryosphere*, 7, 699-705, doi:10.5194/tc-7-699-2013.

Meier, W.N., J. Stroeve, A. Barrett, and F. Fetterer, 2012. A simple approach to providing a more consistent Arctic sea ice extent timeseries from the 1950s to present, *The Cryosphere*, 6, 1359-1368, doi:10.5194/tc-6-1359-2012.

Meier, W.N., and others, 2011. Sea Ice *in* Snow, Water, Ice and Permafrost in the Arctic (SWIPA): Climate Change and the Cryosphere, AMAP, Oslo, Norway, 87 pp.

Meier, W.N., S.J.S. Khalsa, and M.H. Savoie, 2011. Intersensor calibration between F-13 SSM/I and F-17 SSMIS near-real-time sea ice estimates, *IEEE Trans. Geosci. Rem. Sens.*, 49(9), 3343-3349.

Meier W.N., and J. Stroeve, 2008. Comparison of sea-ice extent and ice-edge location estimates from passive microwave and enhanced-resolution scatterometer data, *Ann. Glaciol.*, 48, 65-70.

Meier, W.N., J. Stroeve, and F. Fetterer, 2007. Whither Arctic sea ice? A clear signal of decline regionally, seasonally and extending beyond the satellite record, *Ann. Glaciol.*, 46, 428-434.

Meier, W.N., J. Stroeve, and S. Gearheard, 2006. Bridging perspectives from remote sensing and Inuit communities on changes in the sea ice cover in the Baffin Bay region, *Ann. Glaciol.*, 44, 433-438.

Meier, W.N., and M. Dai, 2006. High-resolution sea-ice motions from AMSR-E imagery, *Ann. Glaciol.*, 44, 352-356.

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Meier, W.N., M. Marquis, M. Kaminski, and R. Weaver, 2004. NASA EOS sensors demonstrate potential for multiparameter studies of Arctic sea ice, *Eos Trans.*, AGU, 85(46) 481-489.

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Meier, W.N., and J.A. Maslanik, 2001. Synoptic-scale ice motion case studies using assimilated motion fields, *Ann. Glaciol.*, 33, 145-150.

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Meier, W.N., M.L. Van Woert, and C. Bertoia, 2001. Evaluation of operational SSM/I ice-concentration algorithms, *Ann. Glaciol.*, 33, 102-108.

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Other Peer-Reviewed Publications

Vannan, S., R.R. Downs, W.N. Meier, B.E. Wilson, and I.V. Gerasimov, submitted. Are dataset citation metrics creating the desired impacts?, *Eos Trans. Amer. Geophys. Union*.

Lee, S.-M., W.N. Meier, B.-J. Sohn, H. Shi, and A.J. Gaskiewski, 2020. Estimation of Arctic basin-scale sea ice thickness from passive microwave measurements, *IEEE Trans. Geosci. Rem. Sens.*, doi:10.1109/TGRS.2020.3026949.

Perovich, D., W. Meier, M. Tschudi, K. Wood, S. Farrell, S. Hendricks, S. Gerland, L. Kaleschke, R. Ricker, X. Tian-Kunze, and M. Webster, 2019. Sea ice cover [in "State of the Climate in 2019"]. *Bull. Amer. Meteor. Soc.*, 101 (8), S251–S256, doi:10.1175 /BAMS-D-20-0086.1.

Tschudi, M.A., W.N. Meier, and J.S. Stewart, 2020. An enhancement to sea ice motion and age products at the National Snow and Ice Data Center (NSIDC), *The Cryosphere*, 14, 1519-1536, doi:10.5194/tc-14-1519-2020.

Liu, Y., S. Helfrich, W. Meier, and R. Dworak, 2020. Assessment of AMSR2 ice extent and ice edge in the Arctic using IMS, *Rem. Sens.*, 12(10), 1582, doi:10.3390/rs12101582.

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Peng, G., M. Steele, A.C. Bliss, W.N. Meier, and S. Dickinson, 2018. Temporal means and variability of Arctic sea ice melt and freeze season climate indicators using a satellite climate data record, *Rem. Sens.*, 10, 1328, doi:10.3390/rs10091328.

Perovich, D., W. Meier, M. Tschudi, S. Farrell, S. Hendricks, S. Gerland, C. Haas, T. Krumpen, C. Polashenski, R. Ricker, M. Webster, 2018. Sea ice [in Arctic Report Card 2018], https://www.arctic.noaa.gov/Report-Card.

Stanitski, D.M., J.M. Intrieri, M.L. Druckenmiller, F. Fetterer, M.D. Gerst, M.A. Kenney, W.N. Meier; J. Overland, J. Stroeve, and S.F. Trainor, 2018. "Indicators for a Changing Arctic", submitted to *Climatic Change*.

Perovich, D., W. Meier, M. Tschudi, S. Farrell, S. Hendricks, S. Gerland, C. Haas, T. Krumpen, C. Polashenski, R. Ricker, and M. Webster, 2018. Sea ice cover [in "State of the Climate in 2017"]. Bull. Amer. Meteor. Soc., 99 (8), S150–S152, doi:10.1175 /2018BAMSStateoftheClimate.1.

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Xian, Y., Z.I. Petrou, Y. Tian, and W.N. Meier, 2017. Super-resolved fine-scale sea ice motion tracking, *IEEE Trans. Geosci. Rem. Sens.*, 55(10), 5427-5439, doi:10.1109/TGRS.2017.2699081.

Barber D.G., W.N. Meier, S. Gerland, and C.J. Mundy, 2017. Arctic Sea Ice. *In:* Snow, Water, Ice, and Permafrost Assessment (SWIPA), Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway, ISBN-13 978-82-7971-101-8.

Bliss, A.C., J.A. Miller, and W.N. Meier, 2017. Comparison of passive microwave-derived early melt onset records on Arctic sea ice, *Remote Sensing*, 9, 199, doi:10.3390/rs9030199.

Hobbs, W.R., R. Massom, S. Stammerjohn, P. Reid, G. Williams, W. Meier, 2016. A review of recent changes in Southern Ocean sea ice, their drivers and forcings, *Global and Planetary Change*, 143, 228-250, doi:10.1016/j.gloplacha.2016.06.008.

Bracegirdle, T., N. Bertler, A. Carleton, Q. Ding, C. Fogwill, J. Fyfe, H. Hellmer, A. Karpechko, K. Kusahara, E. Larour, P. Mayewski, W. Meier, L. Polvani, J. Russell, S. Stevenson, J. Turner, J. van Wessem, W. van de Berg, and I. Wainer, 2016. A multi-disciplinary perspective on climate model evaluations for Antarctica, *Bull. Amer. Meteor. Soc.*, doi:10.1175/BAMS- D-15-00108.1.

Perovich, D., W. Meier, M. Tschudi, S. Farrell, S. Gerland, and S. Hendrick, 2015. Sea Ice *in* Arctic Report Card 2015, http://www.arctic.noaa.gov/reportcard.

Posey, P.G., E.J. Metzger, A.J. Wallcraft, D.A. Herbert, R.A. Allard, O.M. Smedstad, M.W. Phelps, F. Fetterer, J.S. Stewart, W.N. Meier, and S.R. Helfrich, 2015. Improving Arctic sea ice edge forecasts by assimilating high horizontal resolution sea ice concentration data into the US Navy's ice forecast systems, *The Cryosphere*, 9, 1735-1745, doi:10.5194/tc-9-1735-2015.

Gallaher, D., G.G. Campbell, W. Meier, J. Moses, and D. Wingo, 2015. The process of bringing dark data to light: The rescue of the early Nimbus satellite data, *Geo. Res. J.*, 6, 124-134.

Perovich, D., S. Gerland, S. Hendricks, W. Meier, M. Nicolaus, and M. Tschudi, 2014. Sea Ice [in *Arctic Report Card 2014*], http://www.arctic.noaa.gov/reportcard.

Bhatt, U.S., D.A. Walker, J.E. Walsh, E.C. Carmack, K.E. Frey, W.N. Meier, S.E. Moore, F-J.W. Parmentier, E. Post, V.E. Romanovsky, and W.R. Simpson, 2014. Implications of Arctic sea ice decline for the earth system, *Ann. Rev. Environ. Resour.*, 39, 5-89, doi:10.1146/annurev-environ-122012-094357.

Eisenman, I., W.N. Meier, and J.R. Norris, 2014. A spurious jump in the satellite record: has Antarctic sea ice expansion been overestimated?, *The Cryosphere*, 8, 1289-1296, doi:10.15194/tc-8-1289-2014.

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Walsh, 2011. SWIPA Synthesis: Implications of Findings *in* Snow, Water, Ice and Permafrost in the Arctic (SWIPA): Climate Change and the Cryosphere, AMAP, Oslo, Norway, 87 pp.

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Selected Reports, Book Chapters, and Other Publications

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Perovich, D., W. Meier, J. Maslanik, and J. Richter-Menge, 2010. Sea Ice *in* Arctic Report Card 2010, http://www.arctic.noaa.gov/reportcard.

NRC, 2009. Scientific value of Arctic sea ice imagery derived products, Polar Research Board, National Research Council of the National Academies, National Academies Press, Washington, DC, 34 pp.

Meier, W., 2007. Sea ice *in* Integrated Global Observing Strategy Cryosphere Theme Report, J. Key, ed., WMO/TD-No. 1405, World Meteorological Organization, Geneva, Switzerland, 100 pp.

Selected Invited Presentations

7th Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Marine Operations, "Long-term Changes in the Ice Retreat and Open Water Season in the Arctic: Potential Implications for Operations in the Region", 18-20 July 2017, Washington, DC.

Gordon Research Conference on Polar Marine Science, "A Tale of Two Poles: Contrasting Satellite-Derived Time Series of Sea Ice Changes in the Arctic and Antarctic over the Past Four Decades", 26-31 March 2017, Ventura, CA

Forum for Arctic Modeling and Observational Synthesis (FAMOS) 4th Meeting, "New satellite-derived observational sea ice concentration and extent products for modeling", Hyannis, MA, 6 November 2015.

Citizen's Climate Lobby, "Global Warming: A Perspective from the Poles", Washington, DC, 2 April 2015.

Colorado Science and Engineering Fair Keynote Address, "New visions of the Earth: A revolution in how humans view their world", Fort Collins, CO, 11 April 2014.

AGU Fall 2013 Meeting, "Trends and variability in the distribution of Arctic sea ice extent and age in the Beaufort and Chukchi seas", San Francisco, CA, 9 December 2013.

Arctic in Rapid Transition Workshop, "The dynamics of Arctic sea ice decline and consequences for heat and carbon fluxes" (with Brent Else), Sopot, Poland, 23 October 2012.

Arctic Futures Symposium, "Arctic sea ice in summer 2012: An exclamation point on a long-term declining trend", Brussels, Belgium, 15 October 2012.

U.S.-Chile Satellites and Ice Workshop, "Passive microwave remote sensing of sea ice", Santiago, Chile, 24 July 2012.

University of Lanzhou, "Observations and implications of changes in the Arctic sea ice cover", Lanzhou, China, 19 July 2012.

National Science Teachers Association National Conference, "The Arctic: Global climate's canary in a coal mine", Indianapolis, IN, 31 March 2012.

AGU Fall 2011 Meeting, "A new sea ice concentration climate data record for tracking Arctic and Antarctic variability and change", C14A-03, San Francisco, CA, 5 December 2011.

UNFCCC SBSTA 34th Workshop, "Climate change in the cryosphere", Bonn, Germany, 2 June 2011.

U.S. Office of Science and Technology Policy, "Arctic sea ice: Climate change on the fast track", Washington, DC, 17 March 2011.

Selected Contributions to Online Materials

NASA Scientific Visualization Studio, several animations, e.g., https://svs.gsfc.nasa.gov/4510

NSIDC Arctic Sea Ice News and Analysis, http://nsidc.org/arcticseaicenews/

Climate Dialogue, http://www.climatedialogue.org/melting-of-the-arctic-sea-ice/

NSIDC IceLights, http://nsidc.org/icelights/

NSIDC All About Sea Ice, http://nsidc.org/cryosphere/seaice/

NSIDC State of the Cryosphere, http://nsidc.org/cryosphere/sotc/sea_ice.html

Earth Exploration Toolbook "Whither Arctic Sea Ice?", http://serc.carleton.edu/eet/seaice/

SEARCH Sea Ice Outlook, http://www.arcus.org/search/seaiceoutlook/

MyCarbonPledge, http://mycarbonpledge.com/Articles/Articles.aspx?CID=2

WattsUpWithThat, http://wattsupwiththat.com/?s=Walt+Meier (several guest posts, 2008-2012)

Published Data Sets

Meier, W. N., H. Wilcox, M. A. Hardman, and J. S. Stewart. 2019. *DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 5*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi:10.5067/QU2UYQ6T0B3P.

Tschudi, M., W.N. Meier, J.S. Stewart, C. Fowler, and J. Maslanik. 2019a. *Polar Pathfinder Daily 25 km EASE-Grid Sea Ice Motion Vectors, Version 4*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive. doi: https://doi.org/10.5067/INAWUWO7QH7B.

Tschudi, M., W.N. Meier, J.S. Stewart, C. Fowler, and J. Maslanik. 2019b. *EASE-Grid Sea Ice Age, Version 4*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive. doi: https://doi.org/10.5067/UTAV7490FEPB.

Meier, W., D. Scott, M. Savoie, H. Wilcox, and F. Fetter, 2017. *Polar Stereographic Valid Ice Masks Derived from National Ice Center Monthly Sea Ice Climatologies, Version 3*. Boulder, Colorado USA: NSIDC. http://nsidc.org/data/nsidc-0622.

Tschudi, M., C. Fowler, J. Maslanik, J. S. Stewart, and W. Meier. 2016a. *Polar Pathfinder Daily 25 km EASE-Grid Sea Ice Motion Vectors, Version 3*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive. doi: https://doi.org/10.5067/O57VAIT2AYYY.

Tschudi, M., C. Fowler, J. Maslanik, J. S. Stewart, and W. Meier. 2016b. *EASE-Grid Sea Ice Age, Version 3*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive. doi: https://doi.org/10.5067/PFSVFZA9Y85G.

Meier, W., D. Scott, M. Savoie, H. Wilcox, and F. Fetter, 2015. *Polar Stereographic Valid Ice Masks Derived from National Ice Center Monthly Sea Ice Climatologies*. Boulder, Colorado USA: National Snow and Ice Data Center. http://nsidc.org/data/nsidc-0622.

Fetterer, F., J.S. Stewart, and W. Meier, 2015. *MASAM2: Daily 4 km Arctic Sea Ice Concentration, 2012-2014.* Boulder, Colorado USA: NSIDC. http://dx.doi.org/10.7265/N5ZS2TFT.

Meier, W., F. Fetterer, M. Savoie, S. Mallory, R. Duerr, and J. Stroeve, 2011. *NOAA/NSIDC Climate Data Record of Passive Microwave Sea Ice Concentration,* Boulder, Colorado USA: National Snow and Ice Data Center. Digital media. http://nsidc.org/data/g02202.html.

Fetterer, F., K. Knowles, W. Meier, and M. Savoie, 2002, updated daily. *Sea Ice Index*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.

Stroeve, J. and W. Meier. 2017. *Sea Ice Trends and Climatologies from SMMR and SSM/I-SSMIS, Version 2*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: http://dx.doi.org/10.5067/EYICLBOAAJOU.

Committee and Working Group Memberships and Editorial Responsibilities

National Academies of Sciences, Engineering, and Medicine Committtee on "Future Use of NASA Airborne Platforms to Advance Earth Science Priorities", May 2020 – February 2021

American Geophysical Union Cryosphere Section Executive Committee, 2018 –

International Glaciological Society Symposium on "Polar Ice, Polar Climate, Polar Change", Scientific Steering Committee member, 14-19 August 2017, Boulder, CO

Scientific Editor, Annals of Glaciology, Volume 76, 2017

Scientific Editor, Remote Sensing Special Issue on Sea Ice, 2015 – 2016

IARPC Collaboration Team member, 2013 – present

IARPC Sea Ice Collaboration Team co-chair, 2017 – 2017

WCRP Data Advisory Council member, 2012 – 2017

IASC Cryosphere Working Group member, 2011 – 2016

WCRP CliC Sea Ice Working Group member, 2010 – present

WMO Global Cryosphere Watch focal point, 2009 – present

AMAP Snow, Water, Ice and Permafrost in the Arctic report lead author, 2009 – 2012 & 2014 – 2017

JAXA GCOM-W1 AMSR2 Science Team member, 2008 – present

Graduate and Postdoctoral Advisors

Graduate Advisor: James Maslanik, Univ. of Colorado

Thesis Committee: James Maslanik (retired), Konrad Steffen (now at Swiss Federal Research Institute [ETH]), William Emery (retired), Lakshmi Kantha, Judith Curry, (now at Georgia Tech Univ.)

Postdoctoral Advisor: Michael Van Woert, U.S. National Ice Center, 1999 – 2001

Advising and sponsor activities

Doctoral Committee Member: Patricia DeRepentigny, Univ. Colorado, 2018 –

Post-Doctoral Fellow Advisor: Angela Bliss, 2015 – 2017

Sponsor: Abigail Ahlert, Univ. Maryland intern, NASA Goddard, 2014 – 2015

Sponsor: Emily Kreyenhagen, summer intern, U.S. Naval Academy, 2013

Sponsor: William Parker, summer intern, U.S. Naval Academy, 2012

Thesis Advisor: Lisa Ballagh, M.S. student, NSIDC, 2007 – 2008

Sponsor: Ming Rui Dai, UCAR visiting post-doc, NSIDC, 2004 – 2006