

# ALEK PETTY - CURRICULUM VITAE

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DATE CREATED: August 2020.

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## RESEARCH SUMMARY

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RESEARCH INTERESTS: Polar sea ice; atmosphere-ice-ocean interactions; climate variability.

RESEARCH APPROACH: Remote sensing (satellite and airborne) and direct (*in-situ*) observations; geospatial/statistical analysis; developing, adapting and analyzing climate models of varying complexity; numerical simulations.

## PROFESSIONAL APPOINTMENTS

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2020-Now	ASSOCIATE RESEARCH SCIENTIST NASA Goddard Space Flight Center, Greenbelt, MD, USA Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA
2017-2020	ASSISTANT RESEARCH SCIENTIST NASA Goddard Space Flight Center, Greenbelt, MD, USA Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA
2015-2017	POSTDOCTORAL ASSOCIATE NASA Goddard Space Flight Center, Greenbelt, MD, USA Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA
2014-2015	POSTDOCTORAL ASSOCIATE NOAA Laboratory for Satellite Altimetry, College Park, MD, USA Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA

## EDUCATION & QUALIFICATIONS

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2010-2014	PH.D, CLIMATE SCIENCE Centre for Polar Observation & Modelling, University College London, London, UK Thesis Title: Sea ice and the ocean mixed layer over the Antarctic continental shelf Supervisors: Daniel L. Feltham & Paul R. Holland
2006-2010	MSCI, PHYSICS (1ST CLASS HONOURS) University of Bristol, Bristol, UK

## GRANTS AND FELLOWSHIPS (FUNDED)

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NASA A.36 Studies with ICESat-2 NNH19ZDA001N-ICESAT2 (5/1/20-4/31/22), Advancing understanding sea ice topography across scales and seasons, total budget: \$600,000 (my budget: \$80,240), PI: Rachel Tilling, Co-Is: Alejandro Egido, Alek Petty, Role: Co-I. (successful)

International Arctic Science Council cross-cutting funding (June 2019), CoAST: Coastal Arctic Science Teams, total budget: \$8,000, PI: Alice Bradley, Co-Is: Alek Petty, Role: Co-I (**successful**)

NASA A.16 Cryospheric Science NNH17ZDA001N-CRYO (1/1/19-12/31/21), A Coupled Antarctic Cryosphere System: Linking Ice Sheet Surface Mass Balance Processes and Ocean Surface Variability Across Coastal Antarctica, total budget: \$425,000 (my budget: \$49,969) PI: Luke Trusel, Co-Is: Jan Lenaerts, Alek Petty, Role: Co-I (**successful**)

International Arctic Science Council cross-cutting funding (June 2018), Improving our understanding of extreme events in the Arctic using a cross-disciplinary approach - a discussion group at POLAR 2018, Total budget: \$6,000, PI: Alek Petty, Co-Is: Thomas Armitage, Manisha Ganeshan, Role: PI (**successful**)

NASA Summer Internship (July-August 2018), Improving sea ice predictions using novel machine learning tools, Total budget: summer student stipend, PI: Alek Petty, Summer Student: Akira Sewnath, Role: PI

(successful)

International Arctic Science Committee (IASC) Fellow for the Cryosphere Working Group, 2016–2019 (travel award to support attendance at international planning meetings).

UK National Environment Research Council postgraduate award. Awarded to University College London, 2010–2014.

## INTERNAL FUNDING

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NASA's ICESat-2 Project Science Office, (since 1/1/18, renewed annually), Project Lead: Nathan Kurtz, Personal Budget: 0.3 FTE/year.

PolarMERRA, (10/1/20–09/30/2021, pending renewal), NASA Earth Science funding, Project Lead: Thorsten Markus, Personal Budget: 0.3 FTE/year.

NASA's Operation IceBridge Project Science Office, (since 10/1/15–09/30/2021), Project Lead: Joe MacGregor, Personal Budget: 0.33–1.0 FTE/year.

NASA-ESA Snow On Sea Ice (NESOSI), (10/1/17–09/31/2019), NASA Earth Science funding, Project Lead: Thorsten Markus, Personal Budget: 0.33 FTE/year.

## PEER REVIEWED PUBLICATIONS

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- [27] Kwok, R., **A. Petty**, M. Bagnardi, N. T. Kurtz, G. F. Cunningham, A. Ivanoff (2020, in review), Refining the sea surface identification approach for determining freeboard in the ICESat-2 sea ice products. The Cryosphere Discuss, doi:10.5194/tc-2020-174.
- [26] Zhou, L., J. Stroeve, S. Xu, **A. Petty**, R. Tilling, et al., (2020, in review), Inter-comparison of snow depth over sea ice from multiple methods, The Cryosphere Discuss., doi:10.5194/tc-2020-65.
- [25] Kwok, R., G. F. Cunningham, S. Kacimi, M. A. Webster, N. T. Kurtz, **A. A. Petty** (2020), Decay of the snow cover over Arctic sea ice from ICESat-2 acquisitions during summer melt in 2019. *Geophys. Res. Lett.*, 47, e2020GL088209. doi: 10.1029/2020GL088209.
- [24] Horvat, C., E. Blanchard-Wigglesworth, **A. Petty** (2020), Observing waves in sea ice with ICESat-2. *Geophys. Res. Lett.*, 47, e2020GL087629. doi: 10.1029/2020GL087629.
- [23] Notz, D., J. Dorr, D. A. Bailey, E. Blockley, M. Bushuk, J. B. Debernard, et al. (inc. **A. A. Petty**) (2020), Arctic Sea Ice in CMIP6. *Geophys. Res. Lett.*, 47, e2019GL086749. doi:10.1029/2019GL086749.
- [22] Landy, J., **A. A. Petty**, M. C. Tsamados, J. Stroeve, Sea ice roughness overlooked as a key source of uncertainty in Cryosat-2 ice freeboard retrievals *J. Geophys. Res. Oceans*, 125, e2019JC015820, doi:10.1029/2019JC015820.
- [21] **Petty, A. A.**, N. T. Kurtz, R. Kwok, T. Markus, T. Neumann, Sea ice thickness of the Arctic Ocean from ICESat-2, *J. Geophys. Res. Oceans*, 125, e2019JC015764. doi:10.1029/2019JC015764.
- [20] Kwok, R., S. Kacimi, M. A. Webster, N. T. Kurtz, **A. A. Petty** (2020). Arctic snow depth and sea ice thickness from ICESat-2 and CryoSat-2 freeboards: A first examination. *Journal of Geophysical Research: Oceans*, 125, e2019JC016008. doi: 10.1029/2019JC016008.
- [19] Armitage, T. W. K, G. E. Manucharyan and **A. A. Petty**, R. Kwok, A. F. Thompson, Critical role of sea ice and ocean eddies in the freshwater and energy balance of the Beaufort Gyre *submitted to Nature Communications*, 11. doi:10.1038/s41467-020-14449-z.
- [18] Cabaj, A., P. Kushner, C. Fletcher, S. Howell, **A. A. Petty**, Encouraging agreement between CloudSat and reanalysis snowfall over the Arctic Ocean *Geophys. Res. Lett.*, 47, doi:10.1029/2019GL08642.
- [17] Kwok, R., T. Markus, N. T. Kurtz, **A. A. Petty**, T. A. Neumann, S. L. Farrell, et al (2019). Surface height and sea ice freeboard of the Arctic Ocean from ICESat-2: Characteristics and early results. *J. Geophys. Res: Oceans*, 124. doi:10.1029/2019JC015486.
- [16] Frew, R., D. L. Feltham, P. R. Holland, **A. A. Petty**, (2019), Sea Ice - Ocean Feedbacks in the Antarctic Shelf Seas, *J. Phys. Oceanogr.*, doi:10.1175/JPO-D-18-0229.1.
- [15] **Petty, A. A.**, M. Webster, L. N. Boisvert, T. Markus (2018), The NASA Eulerian Snow on Sea Ice Model (NESOSIM) v1.0: Initial model development and analysis, *Geosci. Model Dev.*, doi:10.5194/gmd-11-4577-2018.
- [14] **Petty, A. A.**, M. M. Holland, D. A. Bailey, N. T. Kurtz, (2018), Warm Arctic, increased winter sea-ice growth?, *Geophys. Res. Lett.*, 45, doi:10.1029/2018GL079223.

- [13] Boisvert, L. N., M. A. Webster, **A. A. Petty**, T. Markus, D. H. Bromwich, R. I. Cullather (2018), Intercomparison of precipitation estimates over the Arctic Ocean and its peripheral seas from reanalyses, *J. Climate*, 31(20), 8441–8462, doi:10.1175/JCLI-D-18-0125.1.
- [12] **Petty, A. A.**, J. C. Stroeve, P. R. Holland, L. N. Boisvert, A. C. Bliss, N. Kimura, W. N. Meier (2018), The Arctic sea ice cover of 2016: A year of record-low highs and higher-than-expected lows, *The Cryosphere*, 12, 433–452, doi:10.5194/tc-12-433-2018.
- [11] Cole, S. T., J. M. Toole, R. Lele, M.-L. Timmermans, S. G. Gallagher, T. P. Stanton, W. J. Shaw, B. Hwang, T. Maksym, J. P. Wilkinson, M. Ortiz, H. Graber, L. Rainville, **A. A. Petty**, S. L. Farrell, J. A. Richter-Menge, and C. Haas (2017), Ice and ocean velocity in the Arctic marginal ice zone, Ice roughness and momentum transfer, *Elem Sci Anth*, 5: 55, doi:10.1525/elementa.241.
- [10] **Petty, A. A.**, M. C. Tsamados, N. T. Kurtz, Atmospheric form drag over Arctic sea ice using remotely sensed ice topography observations, *J. Geophys. Res. Earth's Surf*, 122, doi:10.1002/2017JF004209.
- [9] Armitage, T. W. K., S. Bacon, A. L. Ridout, **A. A. Petty**, S. Wolbach, M. C. Tsamados (2017), Arctic Ocean geostrophic circulation 2003–2014, *The Cryosphere*, doi:10.5194/tc-2017-22.
- [8] Graham, R. M., L. Cohen, **A. A. Petty**, L. N. Boisvert, M. A. Granskog, A. Rinke, S. R. Hudson, M. Nicolaus, Increasing frequency and duration of Arctic winter warming events, *Geophys. Res. Lett.* doi: 10.1002/2017GL073395
- [7] **Petty, A. A.**, D. Schroder, J. C. Stroeve, T. Markus, J. Miller, N. T. Kurtz, D. L. Feltham, D. Flocco, Skillful spring forecasts of September Arctic sea-ice extent using passive microwave sea ice observations, *Earth's Future*, 5, doi:10.1002/2016EF000495.
- [6] Boisvert, L. N., **A. A. Petty**, J. C. Stroeve (2016), The extreme winter 2015/2016 Arctic cyclone and its impact on the Barents-Kara seas, *Mon. Wea. Rev.*, 144, 4279–4287, doi:10.1175/MWR-D-16-0234.1.
- [5] **Petty, A. A.**, M. C. Tsamados, N. T. Kurtz, S. L. Farrell, T. Newman, J. Harbeck, D. L. Feltham, J. A. Richter-Menge (2016), Characterizing Arctic sea ice topography using high-resolution IceBridge data, *The Cryosphere*, 10(3), 1161–1179, doi:10.5194/tc-10-1161-2016.
- [4] **Petty, A. A.**, J. K. Hutchings, J. A. Richter-Menge, M. A. Tschudi (2016), Sea ice circulation around the Beaufort Gyre: The changing role of wind forcing and the sea ice state, *J. Geophys. Res. Oceans*, 121(5), 3278–3296, doi:10.1002/2015JC010903.
- [3] Tsamados, M. C., D. L. Feltham, **A.A. Petty**, D. Schroder, D. Flocco (2015), Processes controlling surface, bottom and lateral melt of Arctic sea ice in a state of the art sea ice model, *Phil. Trans. Roy. Soc., Lond A*, 373, doi:10.1098/rsta.2014.0167
- [2] **Petty, A. A.**, D. L. Feltham, and P. R. Holland (2014), Sea ice and the ocean mixed layer over the Antarctic shelf seas, *The Cryosphere*, 8(2), 761–783, doi:10.5194/tc-8-761-2014.
- [1] **Petty, A. A.**, D. L. Feltham, and P. R. Holland (2013), Impact of atmospheric forcing on Antarctic continental shelf water masses, *J. Phys. Oceanogr*, 43(5), 920–940, doi:10.1175/JPO-D-12-0172.1.

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## INVITED PERSPECTIVES AND COMMENTARIES

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- Petty, A. A.** (2018), A possible link between winter Arctic sea ice decline and a collapse of the Beaufort High?, *Geophys. Res. Lett.*, doi:10.1002/2018GL077704 (invited commentary).
- Petty, A. A.**, T. Markus, N. Kurtz (2017), Improving our understanding of Antarctic sea ice with NASA's Operation IceBridge and the upcoming ICESat-2 mission, *US CLIVAR Variations*, 15, 3 (invited perspective).

## OTHER PUBLICATIONS

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- 2016 Sea Ice Prediction Network, Sea Ice Outlook post-season report, (co-author/action team member).
- 2015 Sea Ice Prediction Network, Sea Ice Outlook post-season report, (co-author/action team member).
- Petty, A. A.** (2013), Impact of Atmospheric Forcing on Antarctic Continental Shelf Water Masses, PhD Thesis, University College London, UK.

## TEACHING EXPERIENCE

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2019–2020	Tutor and hackweek instructor at the ‘University of Washington’s ICESat-2 hackweek’ providing support to the sea ice participants regarding data retrieval and analysis, University of Washington, June 2019 and June 2020.
2019	Guest lecture on ‘Polar sea ice and global climate’ for the Environmental Sciences, American University, Feb., 2019.
2018	Guest lecture on ‘Polar sea ice and the global climate system’ for the Department of Atmospheric and Oceanic Science, University of Maryland, Apr., 2018.
2017	Guest teacher on ‘Polar Science at NASA’ for K7 and K12 students, Sitka Alaska, Oct., 2017.
2015–2017	MADE CLEAR climate change scientific expert - providing advice to K-12 teachers in Maryland/Delaware. Contributed to the new Climate Change Learning Progression draft, 2015-2017.
2016	Python for Cryospheric Sciences monthly meet-up organizer, NASA Goddard Space Flight Center.
2013	ASPIRE after school course, The Melting Planet, City & Islington College, London, UK on climate change and the polar regions (6 weekly lessons).
2011–2013	UCL Earth Sciences GEOL 3039 course ‘Physics of Oceans, Ice Sheets & Climate’, teaching assistant.
2011–2013	UCL Earth Sciences GEOL 1006 course ‘Foundations of Physical Geoscience’, teaching assistant.
2011–2013	UCL Earth Sciences undergraduate mathematics tutor.

## SUPERVISING EXPERIENCE

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### Support Scientists

Dr. Marco Bagnardi, NASA Goddard Space Flight Center (co-supervisor, since 2019).  
Assessing ICESat-2 sea ice data (primary supervisor: Dr. Nathan Kurtz).

### PhD Students

Joshua McCurry, University of Maryland (co-supervisor, pending funding support).  
Project TBD (Primary supervisor: Dr. Jonathan Poterjoy).

Rebecca Frew, University of Reading (co-supervisor, since 2015).  
Sea ice and climate feedbacks in the Southern Ocean (primary supervisor: Dr. Daniel L. Feltham).

Steven Wolbach, University of Maryland (co-supervisor, 2016, did not finish).  
Beaufort Gyre ice-ocean dynamics (primary supervisor: Dr. James L. Carton).

### Masters Students

Ryan Klasky, University of Maryland (primary supervisor, 2016-2017).  
Antarctic sea ice forecasting .

Colton Byers, United States Naval Academy (co-supervisor, 2016).  
Arctic sea ice mapping using low-cost aerial drones (primary supervisor: Dr. Joseph P. Smith).

### Visiting Students

Alex Cabaj, University of Toronto (co-supervisor, spring 2019)  
Constraining snow on Arctic sea ice (primary supervisor: Dr. Paul Kushnar).

### Summer Students

Nicole Keeney, NASA Goddard Space Flight Center (primary supervisor, summer 2020)  
New estimates of winter Arctic sea ice growth from ICESat-2.

Akira Sewnath, NASA Goddard Space Flight Center (primary supervisor, summer 2018)  
Arctic sea ice forecasting using novel machine learning tools.

## SELECTED PRESENTATIONS (AS PRESENTING AUTHOR)

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\* indicates an invited talk

2020	<b>Petty, A. A.</b> , M. Bagnardi, E. Buckley, ICESat-2 sea ice data products, University of Washington’s ICESat-2 Hackweek 2020, 12th June 2020 (oral, virtual).
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- Petty, A. A.**, N. Kurtz, R. Kwok, A. Cabaj, P. Kushner, Freeboard, snow depth and ice thickness in the early winter 2018/2019 from ICESat-2 and NESOSIM, NASA-ESA Snow on Sea Ice Meeting, 28th January 2020 (oral).
- 2019 **\*Petty, A. A.**, N. Kurtz, T. Markus, R. Kwok, T. Neumann, A. Cabaj, P. Kushner, R. Tilling, M. Bagnardi, Sea ice thickness of the Arctic Ocean from ICESat-2, *American Geophysical Union Fall meeting 2019*, San Francisco, USA, 13th December 2019 (oral, invited).
- Petty, A. A.**, J. Landy, M. Tsamados, J. MacGregor, N. Kurtz, Sea ice topography from NASA's Operation IceBridge and ICESat-2, *American Geophysical Union Fall meeting 2019*, San Francisco, USA, 13th December 2019 (poster).
- \*Petty, A. A.**, M. Bagnardi, R. Tilling, N. Kurtz, T. Markus, R. Kwok, T. Neumann, Evaluating and profiling polar sea ice with NASA's ICESat-2 mission (activities of the PSO), *ICESat-2 Science Team Meeting*, 30th October 2019 (oral, invited).
- Petty, A. A.**, N. Kurtz, T. Markus, R. Kwok, Sea ice thickness with ICESat-2, *IGS International Symposium on Sea Ice at the Interface*, Winnipeg, Canada, 20th August 2019 (oral).
- Petty, A. A.**, Snow on sea ice in models, *2019 SIMIP workshop*, Winnipeg, Canada, 18th August 2019 (oral).
- \*Petty, A. A.**, N. Kurtz, T. Markus, R. Kwok: New estimates of Arctic sea ice thickness from NASA's ICESat-2 mission, *Alfred-Wegener-Institute Helmholtz-Center for Polar and Marine Research (AWI)*, Potsdam, Germany, 16th July 2019 (oral, invited).
- Petty, A. A.**, N. Kurtz, T. Markus, R. Kwok: A reconciled time series of Arctic sea ice thickness, *ESA Living Planet symposium*, Milan, Italy, 13th May 2019 (oral).
- Petty, A. A.**, N. Kurtz, J. MacGregor, L. Boisvert, R. Tilling, C. Haas: Leveraging recent and upcoming NASA-ESA Cal/Val efforts to improve and reconcile the sea ice thickness record, *ESA Living Planet symposium*, Milan, Italy, 14th May. 2019 (poster).
- \*Petty, A. A.**, Constraining recent variability and future projections of Arctic sea ice with new and improved remote sensing data, *Atmospheric and Oceanic Sciences, McGill University*, Montreal, 29th Apr. 2019 (oral, invited).
- \*Petty, A. A.**, Polar sea ice variability and impacts on global climate, *Department of Atmospheric and Oceanic Science, University of Maryland*, College Park, MD, 27th Mar. 2019 (oral, invited).
- \*Petty, A. A.**: Modeling and observing polar sea ice across scales, *Ocean worlds science, exploration and analogs (OSEAN) STG meeting*, NASA Goddard Space Flight Center, 7th Mar. 2019 (oral, invited).
- Petty, A. A.**: Polar sea ice and global climate, *American University Environmental Sciences undergraduate guest lecture*, American University, Washington DC, 18th Feb. 2019 (oral, invited).
- \*Petty, A. A.**: NESOSIM development, recent additions, and preparations for ICESat-2, *NASA-ESA Snow on Sea Ice meeting*, College Park, MD, 31st January 2019 (oral, invited).
- 2018 **Petty, A. A.**, N. Kurtz, M. Holland, D. Bailey, M. Webster, L. N. Boisvert, T. Markus: Current variability and future projections of winter Arctic sea ice thickness, *American Geophysical Union fall meeting*, 10th December 2018, Washington, DC, USA (poster) (oral).
- \*Petty, A. A.**: Deriving Sea Ice Thickness from ICESat-2: From Freeboard to Thickness via Snowfall, *NASA SED Director's Seminar Series*, NASA Goddard Space Flight Center, MD, USA, 7th September 2018 (oral, invited).
- \*Petty, A. A.**: Improving our understanding of polar sea ice with NASA's ICESat, Operation IceBridge, and the upcoming launch of ICESat-2, *Reading University polar science seminar series*, Reading, UK, 17th July 2018 (oral, invited).
- \*Petty, A. A.**: The Arctic sea ice cover of 2016: A year of record low highs and higher-than-expected lows, *NASA Goddard Space Flight Center half-year science review to centre directors*, 2nd July 2018 (oral, invited).
- Petty, A. A.**, M. Webster, L. N. Boisvert, T. Markus: A New Snow on Sea Ice Budget Model and Snow Depth Dataset over the Polar Oceans, *POLAR 2018*, Davos, Switzerland, 23rd June 2018 (oral).
- Graham, R., **Petty, A. A.**: Increasing frequency and duration of Arctic winter warming events, *POLAR 2018*, Davos, Switzerland, 22nd June 2018 (oral, on behalf of Rob Graham).
- Petty, A. A.**, T. Armitage, G. Manucharyan: Energetics of the Beaufort Gyre and its link to freshwater dynamics, *AGU Ocean Sciences*, Portland, OR, USA, 14th February 2018 (oral).
- \*Petty, A. A.**: The NASA Eulerian Snow on Sea Ice Model, *NASA-ESA Snow on Sea Ice Meeting*, NASA Goddard Space Flight Center, MD, USA, 23rd January 2018 (oral, invited).
- 2017 **Petty, A. A.**: Precipitation, accumulation and sea ice thickness over the Arctic Ocean, *NASA Goddard Climate and Radiation Lab seminar series*, NASA Goddard Space Flight Center, MD, USA, 17th January 2018 (oral).
- Petty, A. A.**, M. Webster, L. N. Boisvert, T. Markus, M. Holland, D. Bailey, J. Harbeck, N. Kurtz: Winter Arctic sea ice growth: Current variability and projections for the coming decades, *American Geophysical Union fall meeting*, New Orleans, LA, USA, 12th December 2017 (poster).

- \***Petty, A. A.** L. N. Boisvert, T. Markus: Applied sea ice science at NASA, *NASA Goddard Applied Sciences seminar series*, NASA Goddard Space Flight Center, MD, USA, 18th December 2017 (oral, invited).
- \* **Petty, A. A.**: Rapid declines in Arctic sea ice, what does this mean for Alaska?, *Natural History Seminar series*, University of Alaska Southeast, Sitka, 26th October 2017 (oral, invited).
- \***Petty, A. A.**: Rapid declines in Arctic sea ice, what does this mean for Alaska?, *Alaskan National Park Service webinar*, 20th October 2017 (oral, invited).
- \***Petty, A. A.**: Improving our understanding of Antarctic sea ice with NASA's Operation IceBridge and the upcoming ICESat-2 mission, *US Clivar summit*, Baltimore, MD, USA, 8th August 2017 (oral, invited speaker).
- Petty, A. A.**: Skillful seasonal sea ice forecasts using satellite derived ice-ocean observations: Results for September Arctic sea ice and beyond, *US IARPC webinar*, 28th July 2017 (oral, remote).
- Kurtz, N., **Petty, A. A.**: Recent sea ice activities with NASA's Operation IceBridge, *Arctic Change workshop*, Boulder, CO, USA, 22nd June 2017 (oral).
- Petty, A.A.**: Skillful seasonal sea ice forecasts using satellite derived ice-ocean observations: Results for September Arctic sea ice and beyond, *Polar Prediction workshop*, Bremerhaven Germany, 27th–30th March 2017 (oral).
- 2016 **Petty, A.A.**, M.C. Tsamados, N. Kurtz: Atmospheric form drag over Arctic sea ice, 2009–2015, *American Geophysical Union Fall meeting*, San Francisco, CA, USA, 13th–18th December 2016 (oral).
- 2015 **Petty, A.A.**, M.C. Tsamados, N. Kurtz, S.L. Farrell, T. Newman, J. Harbeck, J.A. Richter-Menge, D.L. Feltham: Characterizing Arctic sea ice topography using high-resolution IceBridge data, *American Geophysical Union Fall meeting*, San Francisco, CA, USA, 14th–18th December 2015 (poster).
- Petty, A.A.**, M.C. Tsamados, N. Kurtz, S.L. Farrell, T. Newman, J. Harbeck, J.A. Richter-Menge, D.L. Feltham: Characterizing Arctic sea ice topography using high-resolution IceBridge data, *Arctic Observing Open Science Meeting*, Seattle, WA, USA, 17th–19th November 2015 (oral, travel award recipient).
- Petty, A.A.**, M.C. Tsamados, T. Newman, S.L. Farrell, N. Kurtz, J.A. Richter-Menge, D.L. Feltham: Characterizing sea ice surface morphology using high-resolution IceBridge data, *NASA Operation IceBridge sea ice meeting*, NASA Goddard Space Flight Center, MD, USA, 27th–28th January 2015 (oral).
- Petty, A.A.**, J.K. Hutchings, S.L. Farrell, J.A. Richter-Menge: Seasonal trends in sea ice circulation and wind forcing over the Beaufort Sea, *American Geophysical Union Fall meeting*, San Francisco, CA, USA, 15th–19th December 2014 (poster).
- 2014 **Petty, A.A.**, S.L. Farrell, T. Newman, N. Kurtz, J.A. Richter-Menge, M.C. Tsamados, D.L. Feltham: Characterizing Sea Ice Surface Morphology Using High-resolution IceBridge Data, *American Geophysical Union Fall meeting*, San Francisco, CA, USA, 15th–19th December 2014 (poster).
- Petty, A.A.**, J.K. Hutchings, S.L. Farrell, J.A. Richter-Menge: Seasonal trends in sea ice circulation and wind forcing over the Beaufort Sea, *CICS-MD Science Meeting*, College Park, MD, USA, 12th–13th November 2014 (poster).
- Petty, A.A.**, S.L. Farrell, J.K. Hutchings, J.A. Richter-Menge: Seasonal trends in sea ice circulation and wind forcing over the Beaufort Sea, *Forum for Arctic Ocean Modeling and Observational Synthesis* Woods Hole Oceanographic Institute, Falmouth, MA, USA, 21st–24th October 2014 (poster, travel award recipient).
- \***Petty, A.A.**, D.L. Feltham and P.R. Holland: Sea ice-ocean modelling of the Antarctic shelf seas, *Polar Oceans Seminar Series*, British Antarctic Survey, Cambridge, UK, 15th January 2014 (oral, invited).
- 2013 **Petty, A.A.**, P.R. Holland, and D.L. Feltham: Sea ice ocean modelling of the Antarctic shelf seas, *European Geophysical Union meeting*, Vienna, Austria, 7th–12th April 2013 (oral).
- 2012 **Petty, A.A.**, D.L. Feltham and P.R. Holland: Impact of atmospheric forcing on Antarctic shelf water masses, *Forum for Research into Ice Shelf Processes*, Uto, Sweden, 12th–14th June 2012 (oral).
- 2011 **Petty, A.A.**, P.R. Holland, and D.L. Feltham: Sea ice and the ocean mixed layer over the Antarctic shelf seas, *American Geophysical Union Fall meeting*, San Francisco, CA, USA, 5th–9th December 2011 (poster - winner of the Outstanding Student Paper Award (OSPA) in the cryosphere section).

## ACADEMIC SERVICE

### Project Teams and Memberships

NASA's ICESat-2 Project Science Office, 2018–present.

NASA's Operation IceBridge Project Science Office, 2015–present.

US delegate to the International Arctic Science Committee (IASC), 2018–present.

Cryosphere Working Group Early Career Fellow, International Arctic Science Committee (IASC), 2016–2019.

Sea Ice Outlook Action Team, Sea Ice Prediction Network, 2015–2017.

American Geophysical Union (AGU) member, 2011–present.

Association for Polar Early Career Scientists (APECS) member, 2011–present.

UK Polar Network member, 2011-2014.

### **Campus Committees**

ESSIC Appointment, Evaluation and Promotion (AEP) committee member, 2018 onwards.

Steven Fons, PhD prospectus defense (member of the specialty exam committee, University of Maryland, March 2019).

### **Session Convening**

Polar Atmospheric Processes and Their Interactions with Land, Ice, and Ocean at the AGU Fall Meeting 2018 (co-convenor).

### **Reviewer**

Geophysical Research Letters, Journal of Geophysical Research, Journal of Climate, The Cryosphere, Journal of Glaciology, IEEE, Journal of Physical Oceanography, Remote Sensing.

Snow, Water, Ice and Permafrost in the Arctic (SWIPA) follow-up assessment.

National Science Foundation, Division of Polar Programs.

### **Review Panels**

NASA Future Investigators in NASA Earth and Space Science and Technology (FINESST), 2018.

National Science Foundation, Division of Polar Programs, 2015.

### **Workshops (organizing)**

University of Washington's NASA ICESat-2 (virtual) hackweek, University of Washington, Seattle, 10th-24th June 2020 (tutor, funded).

University of Washington's NASA ICESat-2 hackweek, University of Washington, Seattle, 17th-21st June 2019 (tutor, funded).

Improving our understanding of extreme events in the Arctic using a cross-disciplinary approach, focus group discussion at POLAR 2018, Davos, Switzerland, 20th–23rd June 2018 (organizer, funded workshop).

### **Workshops (attendee)**

Arctic Change workshop, Boulder, CO, USA, 9th–12th April (invited, travel award).

Extreme Science and Engineering Discovery Experiment (XSEDE) 2016 Polar Hackathon, Sea Ice Team member, Miami, FL, USA, 16th–21st July 2016 (travel award).

Forum for Arctic Modeling & Observational Synthesis (FAMOS) workshop, Cape Cod, MA, USA, 3rd–6th November 2015 (travel award).

New Generation of Polar Researchers Leadership Symposium, Wrigley/Boone Center for Environmental Science and Leadership, CA, USA, 2nd–9th May, 2015 (invited, travel award recipient).

NERC 'Engaging the public with your research' workshop, NERC, Swindon, UK, 12th–13th December 2013.

ResClim 'Role of sea ice in climate system' summer school, UNIS, Longyearbyen, Svalbard, 27th June–8th July 2011.

NERC/NCAS Earth System Science Spring School (ES4), Cambridge, UK, 4th–15th April 2011.

## **AWARDS**

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NASA GSFC Robert H. Goddard Award, Science Team (Operation IceBridge), 2020.

NASA GSFC Hydrospheric and Biospheric Sciences Laboratory (HOBIS) Award for outstanding scientific achievement, 2019.

American Geophysical Union Fall meeting Outstanding Student Paper Award (OSPA) in the cryosphere section, 2011.

## **FIELD EXPERIENCE**

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NASA's Operation IceBridge Antarctic campaign, Nov. 2016, Role: Science advisor, outreach.

Joint Ocean Ice Study (JOIS)/Beaufort Gyre Exploration Project (BGEF) Arctic research expedition, 20th Sep.–19th Oct. 2016, Role: On-ice lead scientist (ice cores, thickness transects), ship-based sea ice observations.

NASA's Operation IceBridge spring Arctic campaign, Apr. 2016, Role: Science advisor, outreach.

Joint Ocean Ice Study (JOIS)/Beaufort Gyre Exploration Project (BGEF) Arctic research expedition, 20th Sep.–16th Oct. 2014, Role: On-ice lead scientist (ice cores, thickness transects), ship-based sea ice observations.

## MEDIA AND PUBLIC OUTREACH

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NASA data visualization of our new ICESat-2 Arctic sea ice thickness data, used in the summer NASA Live Shots filming <https://svs.gsfc.nasa.gov/4734>, (lead scientist contributing to the production and providing the source data).

IASC news article <https://iasc.info/communications/news-archive/531-interdisciplinarity-in-iasc-extreme-events-in-the-arctic-a-polar2018-focus-group-discussion> on our extreme Arctic events discussion group.

NASA news story and press release of my paper ‘Warm Arctic, increased winter sea-ice growth?’:

<https://www.nasa.gov/feature/goddard/2018/wintertime-arctic-sea-ice-growth-slows-long-term-decline-nasa>, additional coverage in various

media outlets (quotes and draft assistance, Nov. 2018).

NASA news story and press release on low winter 2018 Arctic sea ice extent: <https://www.nasa.gov/feature/goddard/2018/arctic-wintertime-sea-ice-extent-is-among-lowest-on-record>, additional coverage in various media outlets (quotes and draft assistance, Mar. 2018).

NASA news story and press release on warm winter events in the Arctic: <https://climate.nasa.gov/news/2690/unusually-warm-winter-breaks-up-sea-ice-in-the-arctic/>,

additional coverage in various media outlets (quotes, Feb. 2018).

Yale 360 article on the Arctic Ocean’s Beaufort Gyre and what a release of its freshwater might mean for Europe: <https://e360.yale.edu/features/how-a-wayward-arctic-current-could-cool-the-climate-in-europe>

(quotes, Dec., 2017).

Public lecture on ‘Rapid declines in Arctic sea ice, what does this mean for Alaska?’, Sitka Natural History Seminar series, Alaska (Nov., 2017).

NASA news story on efforts to improve Arctic sea ice predictions: <https://www.nasa.gov/feature/goddard/2017/nasa-scientists-seek-to-improve-sea-ice-predictions>

(quotes, Aug., 2017).

Climate Feedback review of a Breitbart article on thick ice in a warming Arctic

<https://climatefeedback.org/sea-ice-can-still-thick-places-warming-arctic/> (contributed review, Jul., 2017).

NASA news story and press release on Arctic sea ice predictions: <https://www.nasa.gov/feature/goddard/2017/study-improves-forecasts-of-summer-arctic-sea-ice/>, ,

additional coverage in various media outlets (quotes, Jan. 2017).

NASA news story and press release on our extreme winter cyclone paper: <http://www.nasa.gov/feature/goddard/2016/extremely-warm-2015-16-winter-cyclone-weakened-arctic-sea-ice-pack>, additional

coverage in various media outlets (quotes, drafting and visualization assistance, Nov. 2016).

Guest blog for NASA’s Notes from the Field, The 2016 Beaufort Gyre Exploration Project, Searching for Sea Ice:

<https://earthobservatory.nasa.gov/blogs/fromthefield/category/beaufort-gyre-exploration/> (Sep.–Oct., 2016).

NASA Earth Observatory Image of the Day ‘A Polynya Seldom Seen’:

<https://earthobservatory.nasa.gov/images/88656/a-polynya-seldom-seen> (recommendation and quotes, Sep., 2016).

Guest article on the Arctic Sea Ice blog: ‘Sea ice circulation around the Beaufort Gyre’

<https://neven1.typepad.com/blog/beaufort-gyre/> (May., 2016).

Guest blog post on The Climate Lab Book blog series: ‘The sea ice orchestra’

<http://www.climate-lab-book.ac.uk/2015/the-sea-ice-orchestra/> (Sep., 2015).

Blog series on the University of Maryland ‘Scientists’ Soapbox’ based on my participation in the 2014 JOIS research expedition <http://essic.umd.edu/joom2/index.php/research/scientists-soapbox/1926-the-beaufort-gyre-exploration-project> (Sep., 2014).

Public lecture on Antarctic climate change on behalf of the Cambridge zero-carbon society, (Nov., 2013).