David A. Lilien

Postdoctoral Researcher

Physics of Ice, Climate, and Earth, Niels Bohr Institute, University of Copenhagen

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Education:

University of Washington, Seattle, WA. 2013- 2019. PhD in Earth and Space Sciences. Supervisor: Ian Joughin.

Yale University, New Haven, CT. 2009-2013. B.S. Physics (Intensive) and Mathematics.

Appointments:

2019—present: Postdoctoral researcher, Physics of Ice, Climate, and Earth, Niels Bohr Institute, University of Copenhagen

Fellowships:

NASA Earth and Space Sciences Fellow: 2015-2018   (3 years stipend, portion of tuition)

University of Washington Program on Climate Change Fellow: 2013   (9 months stipend)

Publications:

9. Rathmann, NM, CS Hvidberg, A Grindsted , **DA Lilien**, and D Dahl-Jensen (2021). Effect of a nonlinear grain rheology on polycrystalline directional enhancement factors. *Journal of Glaciology*. (doi:10.1017/jog.2020.117).

8. **Lilien, DA**, B Hills, J Driscol, R Jacobel, and K Christianson (2020). ImpDAR: An open-source impulse radar processor. *Annals of Glaciology*. **81**(61), 114-123 (doi:10.1017/aog.2020.44).

7. Fudge, TJ, **DA Lilien**, M Koutnik, H Conway, CM Stevens, ED Waddington, EJ Steig, AJ Schauer, and N Holschuh (2020). Advection and non-climate impacts on the South Pole Ice Core. *Climate of the Past*. **8**, 819-832, (doi:10.5194/cp-16-819-2020).

6. **Lilien, DA,** I Joughin, B Smith, and N Gourmelen (2019). Melt at grounding line controls observed and future retreat of Smith, Pope, and Kohler Glaciers, *The Cryosphere*. **13**, 2817–2834 (doi:10.5194/tc-13-2817-2019).

5. Holschuh, N, **DA Lilien**, and K Christianson (2019). Thermal Weakening, Convergent Flow, and Vertical Heat Transport in the Northeast Greenland Ice Stream Shear Margins. *Geophysical Research Letters.* **46**(14), (doi:10.1029/2019GL083436).

4. **Lilien, DA**, TJ Fudge, MR Koutnik, H Conway, EC Osterberg, DG Ferris, ED Waddington, and CM Stevens (2018). Holocene Ice-Flow Speedup in the Vicinity of the South Pole. *Geophysical Research Letters*. **45**(13), 6557–6565 (doi:10.1029/2018GL078253).

3. **Lilien, DA**, I Joughin, B Smith, and DE Shean (2018). Changes in flow of Crosson and Dotson ice shelves, West Antarctica, in response to elevated melt. *The Cryosphere*. **12**, 1415–1431 (doi:10.5194/tc-12-1415-2018).

2. Poinar, K, I Joughin, **D Lilien**, L Brucker, L Kehrl, and S Nowicki, (2017). Drainage of Southeast Greenland firn aquifer water through crevasses to the bed. *Frontiers in Earth Science,* **5**(5), (doi:10.3389/feart.2017.00005).

1. Wasik, BR, SF Liew, **DA Lilien**, A Dinwiddie, H Noh, H Cao, & A Monteiro (2014). Artificial selection for structural color on butterfly wings and comparison with natural evolution. *PNAS*, 1402770111 (doi:10.1073/pnas.1402770111).

Manuscripts in press, submitted and in preparation:

- **Lilien, DA**, D Steinhage, D Taylor, F Parrenin, C Ritz, R Mulvaney, C Martín, JB Yan, C O'Neill, M Frezzotti, H Miller, P Gogineni, D Dahl-Jensen, and O Eisen. New radar constraints support presence of ice older than 1.5 Ma at Little Dome C. *The Cryosphere Discussions.* In review (doi:10.5194/tc-2020-345).

- **Lilien, DA**, NM Rathmann, CS Hvidberg, and D Dahl-Jensen. Potential utility of ice-crystal fabric as a proxy for ice-stream stability. In review at *JGR: Earth Surface*.

- Stevens, CM, M Koutnik, H Conway, TJ Fudge, **DA Lilien**, B Horlings, ED Waddington. Deriving a firn compaction model for South Pole based on strain measurements. In prep.

- Rathmann, NM, A Grindsted, SH Faria, CS Hvidberg, **DA Lilien**, D Dahl-Jensen. Spectral microstructure model coupling grain orientation, grain volume, and strain-energy distribution functions. In prep.

- Rathmann, NM, and **DA Lilien**. Inferred basal friction and mass flux affected by crystal-orientation fabric. In prep.

Teaching Experience:

Teaching assistant   UW ESS 451: *Principles of glaciology*   (Fall 2015)

Responsible for grading all homework and a portion of each exam. Led class field trip to Easton Glacier on Mt. Baker. Led weekly discussion/homework sections.

Mentor for undergraduates

Helped advise Ian Lee (2015) working on Nivlisen Ice Shelf and for Joshua Driscol (2018-2019) working on automatic radar picking.

Tutor   Yale Quantitative Reasoning Center   (Winter 2012 to Spring 2013)

Tutored students struggling in physics and math courses. Tutored introductory physics, multi-variable calculus, advanced classical mechanics, and quantum mechanics.

Course Grader   Yale University Mathematics Department   (Spring 2011 and Fall 2012)

Was responsible for grading all homework assignments in Math 262b, Wavelet Analysis, during second semester 2011 and for Math 222a, Linear Algebra, first semester 2012.

Field Experience:

Little Dome C, Antarctica (Austral summer 2019/20)

Part of 3-person team conducting final site survey to select the location of the Beyond EPICA Oldest Ice core. Responsible for processing of data, assisted in data collection.

South Pole, Antarctica (Austral summer 2016/17, 2017/18, and 2018/19)

Worked on an NSF-sponsored project to characterize ice upstream of the South Pole Ice Core, working at South Pole Station and in the deep field. Led extensive high frequency radar survey. Co-led distributed shallow core and GPS survey. Assisted in shallow drilling operations and firn densification instrument installation.

Mt. Baker and Mt. Rainier, WA (2015-2018)

Assisted with various 1-2 day surveys using Lidar, ground-based inteferometric radar, and GPS on Easton, Coleman, and Nisqually glaciers.

Service:

Reviewer for *The Cryosphere, Nature Geoscience, JGR: Earth Surface, Journal of Glaciology,* and for German polar airtime applications

Graduate student representative on first-year PhD exam committees (2017 and 2018)

Graduate student representative on student awards committee (2018)

Outreach:

Organizer, glaciology display, Polar Science Weekend (2015 to 2018)

Volunteer, University of Washington Rockin' Out (2013-2019)
Participated in K-12 outreach activities at science nights, visiting in classrooms, and with students on campus visits.

Selected Presentations:

"Modeling ice-crystal fabric as a proxy for ice-stream stability." AGU Fall meeting. Online poster. December, 2020.

"Modeling ice-crystal fabric as a proxy for ice-stream stability." University of Tubingen/Alfred Wegner Institute structural geology seminar. November, 2020. Invited.

"Melt at grounding line controls observed and future retreat of Smith, Pope, and Kohler Glaciers." EGU Meeting. Moved online. May 2020. Highlight talk.

"Using ice-flow models to understand and contextualize modern ice-stream retreat." *University of Wisconsin Weeks lecture*. February 6, 2020. Invited.

"ImpDAR: An Open-Source Impulse Radar Processor in Python." Poster. *Five decades of radioglaciology (IGS meeting).* Stanford, CA. July 2019. *Presented by UW undergraduate advisee Joshua Driscol

 "Modeled temperature and basal shear stress of NEGIS and implications for surge mechanics of Storstrømmen." Talk. *EastGRIP Steering Committee Meeting*. Copenhagen, DK. November 2018.

"Elevated melt causes varied response of Crosson and Dotson Ice Shelves." Talk. *West Antarctic Ice Sheet Workshop*. Camp Casey, WA. October 2017.

"Acceleration of Crosson and Dotson Ice Shelves controlled by melt and rifting." Talk. *Meeting of Northwest Glaciologists.* October 2016.

"Modeling the influence of melt and buttressing on the recent speedup of Smith Glacier." Talk. *International Symposium on the Interaction of Glaciers and Ice Sheets with the Ocean.* 74A2011. La Jolla, CA. July 2016.

"Quantifying uncertainty in inferred viscosity and basal shear stress over ice streams." Poster. *AGU Fall Meeting*. C51C-0730. San Francisco, CA. December 2015.

"Modeling ocean-forced changes in Smith Glacier, West Antarctica." Poster. *AGU Fall Meeting*. C23C-0417. San Francisco, CA. December 2014.

Computer Skills:

Proficient: Python, Git, Bash, Elmer/Ice, Fortran, Matlab
Familiar: C, Slurm, Torque

Professional Affiliations:

International Glaciological Society
American Geophysical Union
European Geosciences Union