

Jonathan Ryan

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Education

Centre for Glaciology, Aberystwyth University (2013 – 2017), Ph.D

- Thesis title: Processes of Greenland Ice Sheet mass loss using unmanned aerial systems
- Advisor: Prof Alun Hubbard and Dr Neal Snooke
- Funded by the Aberystwyth University Department of Geography and Earth Sciences Doctoral Career Development Scheme (DCDS).

Scott Polar Research Institute, University of Cambridge (2012 – 2013), MPhil

- Thesis title: Submarine Geomorphology of the Continental Shelves of Southeast and Southwest Greenland from Olex Data
- Advisor: Prof. Julian Dowdeswell

University of Nottingham (2009 – 2012), BSc (Geography)

Employment

Department of Geography, UCLA (2017 – present), Postdoctoral Scholar and Institute for Environment and Society, Brown University (2017 – present), Visiting Scholar

- Mapping and dynamics and processes of meltwater formation and runoff on the surface of the Greenland Ice Sheet using a combination of aerial and satellite remote sensing.
- Advisor: Prof. Laurence Smith

Publications

Journal articles:

Ryan, J. C., Hubbard, A., Irvine-Fynn, T. D., Doyle, S. H., Cook, J. M., Stibal, M., and Box, J. E., (2017). How robust are in-situ observations for validating satellite-derived albedo over the dark zone of the Greenland Ice Sheet? *Geophysical Research Letters*, doi: 10.1002/2017GL073661.

Ryan, J.C., Hubbard, A., Box, J.E., Brough, S., Cameron, K., Cook, J.M., Cooper, M., Doyle, S.H., Edwards, A., Holt, T. and Irvine-Fynn, T., et al., (2017). Derivation of High Spatial Resolution Albedo from UAV Digital Imagery: Application over the Greenland Ice Sheet. *Frontiers in Earth Science*, 5, doi:10.3389/feart.2017.00040.

Ryan, J. C., Hubbard, A., Stibal, M., Box, J. E., and team, T. D. S. P., (2016) Attribution of Greenland's ablating ice surfaces on ice sheet albedo using unmanned aerial systems, *The Cryosphere Discuss.*, doi:10.5194/tc-2016-204.

Ryan, J. C., Hubbard, A. L., Box, J. E., Todd, J., Christoffersen, P., Carr, J. R., Holt, T. O., and Snooke, N., (2015). UAV photogrammetry and structure from motion to assess calving dynamics at Store Glacier, a large outlet draining the Greenland ice sheet, *The Cryosphere*, 9, 1-11, doi:10.5194/tc-9-1-2015.

Book Chapters:

Ryan, J.C., Dowdeswell, J. A., and Hogan, K. A.: Three cross-shelf troughs on the continental shelf of Southwest Greenland from Olex data, *Atlas of Submarine Glacial Landforms: Modern, Quaternary and Ancient*, Geological Society of London. In Press.

Expedition/fieldwork experience and competencies

- Safe and effective management, logistics and leadership of teams in remote polar environments
- 30 weeks camping in Greenland including 3 weeks on the ice sheet ablation area (2013 – 2016)
- 10 weeks crewing on research vessel Gambo (June – August 2013)
- Construction and maintenance of electric and petrol-powered unmanned aerial systems
- Development of UAV telemetric and sensor packages including multi-spectral camera, broadband radiometers and kinematic GPS
- Operation of unmanned aerial vehicles including over 200 UAS surveys in Greenland
- Collection of oceanographic and bathymetric data using single-beam echo-sounder, side-scan sonar, CTD and ADCP instruments
- Installation and management of remote networks of geodetic GPS and automatic weather stations
- Trained in powerboat handling, firearms and bear-awareness, VHF radio and Iridium communications

Conference presentations since 2015 (selected)

Toberg, N., **Ryan, J. C.**, Christoffersen, P., Snooke, N., Todd, J., and Hubbard, A. L.: Estimating ice-melange properties with repeat UAV surveys over Store Glacier, West Greenland, EGU General Assembly Conference Abstracts, 2016.

Hubbard, A. L., **Ryan, J. C. (primary contributor)**, Box, J. E., and Snooke, N. : Albedo and its relationship with seasonal surface roughness using repeat UAV survey across the Kangerlussuaq sector of the Greenland Ice Sheet, AGU Fall Meeting Abstracts, 2015.

Smith, L. C., Yang, K., Pitcher, L. H., Overstreet, B. T., Rennermalm, A. K., Chu, V. W., **Ryan, J. C.**, Hubbard, A. L., Cooper, M. G., Tedesco, M., Mote, T. L., Young, K., and Behar, A. : Efficient removal of meltwater runoff through supraglacial streams and rivers on the southwestern Greenland Ice Sheet, AGU Fall Meeting Abstracts, 2015.

Awards, scholarships and funding

- Awarded Aberystwyth University Doctoral Career Development Scholarship which covered university tuition fees (£12,156) and provided a maintenance allowance of £43,089 over three years to pursue my PhD.
- Received Aberystwyth University Research Fund (£4,500) to cover travel, accommodation and living costs in Greenland 2015.
- Contributed to a Dark Snow Project (<http://www.darksnow.org/>) proposal which was awarded £77,412 from the Leonardo DiCaprio Foundation. The grant funded an ambitious UAV data acquisition program in Greenland between June to August 2015.□

- Contributed to the “Resolving subglacial properties, hydrological networks and dynamic evolution of ice flow on the Greenland Ice Sheet” (RESPONDER) project, a European Research Council
- Consolidator Grant of £2,100,000 (2016-2021) of which £12,000 are set aside for UAV surveys.

Research skills

I work predominantly with open-source software. Data processing, analysis and presentation is centered around the Python programming language in a Linux (Ubuntu) environment. My research has taught me to automate the download, extraction and storage of large datasets including tens of thousands of aerial images, weather station time-series data and the MODIS and Landsat archives. I have experience of working with a broad range of datatypes (e.g. time series, spatial and numerical) stored in a variety of formats. My approach to data analysis involves the compiling of comprehensive datasets and extraction of patterns using statistics and machine learning. To do this I exploit the computer vision, geospatial, machine learning, data manipulation libraries in Python. These include OpenCV and scikit-image for image processing, scikit-learn for classification, regression and clustering, GDAL and OGR for raster and vector data manipulation and analysis. I use QGIS to visualise the results of data analysis and Inkscape for map and figure production. Finally, I communicate the research in a concise and intelligible manner with Latex

Supervision

I am currently co-supervising a first-year PhD student at Aberystwyth University in the use of UAVs and have co-supervised two Aberystwyth University Masters students.

Public outreach and media coverage (selected)

- Store Glacier UAV Project [Online] Available from: <https://www.youtube.com/watch?v=y8kauAVAfE>
- Davenport C, Haner J, Buchanan L and Watkins D (2015). Greenland is melting away. New York Times. Available at: http://www.nytimes.com/interactive/2015/2010/2027/world/greenland-is-melting-away.html?_2013
- Yulsman, T.(2014) Getting Droned on Greenland’s Ice Sheet. Discover Magazine [Online] 30th August. Available from: <http://blogs.discovermagazine.com/imageo/2014/08/30/getting-droned-greenlands-ice-sheet/#.VDfMWPldV14>

References

Prof. Alun Hubbard • abh@aber.ac.uk • +44 (0)1970 622591

Prof. Poul Christoffersen • pc350@cam.ac.uk

Prof. Jason Box • jbox.greenland@gmail.com