**Outstanding Points in Career:**

Fall 2013 to present (Date samples only)

2008 – 2013

2008 – 2013

2009 – 2013

2011 – 2012

**Awards, Scholarships, Fellowships**

**Presentations**

1. **Allchin, M.** and Déry, S. (2018) A spatial analysis of Northern Hemisphere seasonal snow replenishment trends, 1971-2014*GEWEX Open Conference:* Canmore, AB, 6-11 May. 2018
2. **Allchin, M.** and Déry, S. (2017) A spatio-temporal analysis of trends in N. Hemisphere snow-covered area and duration, 1971-2014 *International Glaciological Society / International Association for Cryospheric Sciences / World Climate Research Programme - Climate and Cryosphere - International Symposium on The Cryosphere in a Changing Climate:* Wellington, New Zealand, 12-17 Feb. 2017
3. **Allchin, M.** and Déry, S. (2017) A biome-based analysis of trends in N. Hemisphere snow-covered area and duration, 1971-2016 *International Glaciological Society / International Association for Cryospheric Sciences / World Climate Research Programme - Climate and Cryosphere - International Symposium on The Cryosphere in a Changing Climate:* Wellington, New Zealand, 12-17 Feb. 2017
4. **Allchin, M.** and Déry, S. (2016) The Ecology of snow: a biome-based analysis of trends in Northern Hemisphere snow-covered area and duration, 1971-2014 *American Geophysical Union Fall Meeting:* San Francisco, USA, 12-16 Dec. 2016
5. **Allchin, M.** and Déry, S. (2016) Spatio-temporal patterns in trends of Northern Hemisphere snow extent and duration, 1971-2014 *Joint Congress of the Canadian Meteorological and Oceanographic Society / Canadian Geophysical Union:* Fredericton, NB, 29 May-2 Jun. 2016

* UNBC Doctoral Dissertation Completion Award (2019)
* ESRI Canada GIS Scholarship (2015)
* UNBC Graduate Entry Scholarship, Graduate Entry Research Award (2013)
* Sessional Lecturer, Thompson Rivers University (2019, 2020)
* Manager, Quesnel River Research Centre, UNBC (2016-)
* Research Assistant, Foothills Research Institute (2012-2013)
* Data Manager, Centre for Hydrology, University of Saskatchewan   
  (2009-2012)
* Independent geoinformatics consultant (1995-2014)
* Higher Scientific Officer, UK Centre for Ecology and Hydrology   
  (1993-1995)
* Assistant Consultant, Andersen Consulting (1991-1993)
* Lieutenant, British Army (1987-1991)

1. **Allchin, M.** and Déry, S. The climatological context of trends in the onset of Northern Hemisphere seasonal snow-cover, 1972-2017 *In review:*  *submitted to Journal of Geophysical Research – Atmospheres*
2. Hamilton, A., **Allchin, M.**, and 13 others Impacts of the 2014 Mount Polley mine tailings dam breach on the physical limnology of Quesnel Lake, British Columbia, Canada: baseline to three years post-spill *In review:* *submitted to Water Resources Research*
3. **Allchin, M.** and Déry, S. (2019) Shifting spatial and temporal patterns in the onset of seasonally snow-dominated conditions in the Northern Hemisphere, 1972 – 2017 *Journal of Climate* **32** pp. 4981-5001 DOI: 10.1175/JCLI-D-18-0686.1
4. **Allchin, M.** and Déry S. (2017) A spatio-temporal analysis of trends in Northern Hemisphere snow-dominated area and duration, 1971-2014 *Annals of Glaciology* **58**(75pt1) pp. 21-35  
   DOI: 10.1017/aog.2017.47

**Publications:**

**PEER REVIEWED**



**Dissertation Abstract**

Seasonal snow-cover (SSC) substantially alters surface physical properties over the Northern Hemisphere (NH). It modulates processes within the energy and water cycles, thereby influencing climatology, hydrology, geomorphology and ecology. In spring and summer, snowmelt provides an essential resource for humankind. The identification, quantification and explanation of changing spatial and temporal distributions of SSC helps to predict future impacts on natural and human environments, and informs development of mitigation and adaptation strategies. Because SSC is spatially and temporally heterogeneous, meaningful estimation of trends in its distribution and duration is dependent on long records of remotely-sensed imagery. The Rutgers University Global Snow Laboratory and the United States’ National Oceanic and Atmospheric Administration provide the longest such archive (NOAA-Rutgers Snow Archive, NRSA), dating from 1966. However, several studies have raised questions about the credibility of the signs and magnitudes of trends derived from the NRSA, suggesting that they may be artifacts of technological improvements introduced in 1999. This dissertation improves the spatial resolution at which NH SSC extent and duration trends during the NRSA’s longest continuous section (since 1971) are reported, building on previous hemispheric and continental studies. It demonstrates that the magnitudes of area-related trends are sensitive to assumptions adopted when estimating SSC extent from the NRSA, and that these sensitivities vary spatially. The study assesses whether temporal trajectories of SSC-onset trends imply abrupt changes in 1999, particularly over more complex terrain, and finds no evidence of this. It also explores the broader climatological contexts of these trends, together with estimated departures from mean conditions. Evidence is presented at monthly intervals for causative chains linking advection of mid-tropospheric warming from lower to higher latitudes, consequent inception of climatologically novel airflows, and the incidence of significant SSC-onset trends of both signs. Earlier onset of snow-dominated conditions is found to be driven by augmented moisture advected from lower latitudes (in eastern Eurasia) or zonally from oceanic sources (in North America) over regional monthly mean 0°C isotherms. Delayed onset is associated with drier or warmer airflows. These findings support the interpretation that the NRSA-based trends are plausible within their spatial and temporal contexts.

**DISSERTATION TITLE:**

A Spatio-Temporal Analysis of Trends in   
Northern Hemisphere Seasonal Snow-cover, 1971-2017

***24 April 2020***

**Doctor of Philosophy**

**Natural Resources and Environmental Studies**

**Degrees**

MSc, Geographical Information Science;   
University of Southampton, Southampton, United Kingdom (2013)

BSc (Hons) Geology;  
University of Bristol, Bristol, United Kingdom (1986)

**Examining Committee:**

Chair:  Dr. Neil HANLON, Professor

Geography, University of Northern British Columbia

Supervisor: Dr. Stephen DÉRY, Professor

Environmental Science, University of Northern British Columbia

Committee Member: Dr.  Dezene HUBER, Professor

Ecosystem Science and Management, University of Northern British Columbia

Committee Member:  Dr. Richard KELLY, Professor

Geography & Environmental Management, University of Waterloo

Committee Member:  Dr. Brian MENOUNOS, Professor

Geography, University of Northern British Columbia

Committee Member:  Dr. Roger WHEATE, Associate Professor

Geography, University of Northern British Columbia

External Examiner:  Dr. David ROBINSON, Distinguished Professor

Geography, Rutgers University

**Welcome to the PhD Oral Defence for**

**Michael Allchin**