

# *Curriculum Vitae*

## **PAUL M. TREITZ**

### **PERSONAL DATA:**

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Laboratory for Remote Sensing of Earth and Environmental Systems (LaRSEES)

website: <http://www.queensu.ca/geographyandplanning/larsees/>

Citizenship: Canadian

### **ACADEMIC BACKGROUND:**

Ph.D. Geography, University of Waterloo (1997)  
M.A. Geography, University of Waterloo (1986)  
B.Ed. Brock University (1986)  
B.Sc. (Hons.) Biology and Geography, Brock University (1983)

### **CAREER SUMMARY:**

<b>Position</b>	<b>Institution</b>	<b>Department / Faculty</b>	<b>Period</b>
Professor	Queen's University	Geography and Planning, Arts and Science	2009-
Visiting Researcher	Umeå University	Arctic Research Centre	2017
Interim Head	Queen's University	Geography and Planning, Arts and Science	2015-2016
Head	Queen's University	Geography and Planning, Arts and Science	2010-2015
Associate Head	Queen's University	Geography, Arts and Science	2008-2009
Acting Head	Queen's University	Geography, Arts and Science	2007-2008
Graduate Chair	Queen's University	Geography, Arts and Science	2002-2006
Associate Professor	Queen's University	Geography, Arts and Science	2002-2009
Visiting Scholar	Swedish University of Agricultural Sciences	Department of Forest Resource Management and Geomatics	2002
Assistant Professor	Queen's University	Geography, Arts and Science	1999-2002
Senior Fellow	York University	Environmental Studies	1999-2000
Assistant Professor	York University	Geography, Arts, Environmental Studies	1997 - 1999
Lecturer	York University	Geography, Arts, Environmental Studies	1995 - 1997
Research Scientist	Centre for Research in Earth and Space Technologies, University of Waterloo	Earth-Observations Laboratory, Department of Geography, Environmental Studies	1989 - 1995
Instructor	Sir Sandford Fleming College	Geographic Information Systems Technician Program, School of Natural Resources	1987 - 1989
Teacher	Fenelon Falls S.S.	Geography, English, Guidance Counsellor	1986 - 1987

**CAREER OVERVIEW:****Department of Geography and Planning, Queens University, Kingston, Ontario**

Since arriving at Queen's in 1999, I have served the Department in a variety of administrative roles: most recently as the Head of the Department of Geography (GPHY) (2010-2015) and Interim Head of the Department of Geography and Planning (GPPL) (2015-2016). In 2014-2015, I was the primary architect of a new Constitution for GPPL. While 2014-2015 represented the vision of the new unit as conceived by the Task Force responsible for the merger, 2015-2016 was the year of implementation as the new unit came into being on July 1, 2015. As Interim Head of GPPL, I implemented the new budget model under the new unit's structure. This merger has resulted in a broader and more robust Department with enhanced undergraduate and graduate research and professional programming.

During my career as an instructor, I have developed a remote sensing stream in the Department that supports the physical geography/earth system science (ESS) program. As a result, I developed and delivered a suite of courses in remote sensing and digital image processing. I also spearheaded the Geographic Information Science (GISc) Certificate Program in Geography and Planning: an interdisciplinary program that is open to students across campus. The GISc Certificate has become a popular program and recruitment tool in GPPL. At the undergraduate level, I have been one of the primary developers and instructors of our large first year course in ESS. I continue to supervise graduate students and have supported 32 Masters and PhD candidates to date.

Initially, my research focus was on the examination of boreal forests using hyperspectral and light detection and ranging (LiDAR) data to characterize forest stand structure and estimate biophysical and physiological variables. This remains an important part of my research, given my most recent involvement in an NSERC Collaborated Research Development (CRD) grant entitled – Assessment of Wood Attributes using Remote sEnsing (AWARE). However, given the focus of northern research in the Department, my biophysical remote sensing research has expanded to the Canadian Arctic using satellite spectral data to estimate biomass, percent vegetation cover and fraction of absorbed photosynthetically active radiation using spectral indices. This work is now the focus of my NSERC Discovery Grant as well as NCE ArcticNet. The goal of my Arctic research is to link seasonal carbon dioxide flux with plant community type, in order to determine carbon budgets at landscape and regional scales using remote sensing data, all within the context of environmental change. In addition, my research group is also examining the utility of RADARSAT synthetic aperture radar (SAR) data to model soil moisture, permafrost degradation and subsidence across a range of watersheds across the High Arctic. This research requires substantial field campaigns that have been made possible through collaborations within and outside the Department. To support my research program and my graduate students, I have established the Laboratory for Remote Sensing of Earth and Environmental System (LaRSEES).

**York University, Toronto, Ontario (1995 to 1999)**

As an Assistant Professor, I was cross-appointed between the Department of Geography, Faculty of Arts, and the Faculty of Environmental Studies. Here, I developed and presented courses in remote sensing, image processing and geographic information systems (GIS) and was instrumental in developing a "Certificate in Geomatics", a certificate program involving three academic units: Geography, Environmental Studies and Earth and Atmospheric Sciences. While at York, I was involved in international work in Sulawesi, Indonesia through a Canadian International Development Agency (CIDA) grant to the Faculties of Environmental Studies at York University and the University of Waterloo. My activities as project scientist involved project design and implementation, faculty exchanges and graduate student supervision.

**University of Waterloo, Waterloo, Ontario (1989 to 1995)**

*Research Scientist*, Earth-Observations Laboratory, Centre for Research in Earth and Space Technologies (CRESTech) (Ontario Centre of Excellence (OCE))

*Adjunct Lecturer*, Department of Geography, Faculty of Environmental Studies

**Trent University, Peterborough, Ontario (1989)**

*Adjunct Lecturer, Department of Geography*

**Sir Sandford Fleming College (SSFC), Lindsay, Ontario (1987 to 1989)**

*Instructor and Systems Manager*

Responsible for the instruction of remote sensing and digital remote sensing techniques in the “Geographic Information Systems Technician” Program.

Manager of the “Centre for Advanced Resource Measurement and Assessment” (CARMA).

**Fenelon Falls Secondary School, Fenelon Falls, Ontario (1986-1987)**

*Teacher*

Taught courses for grades 9 through 12 in Geography and English. Also served as a counsellor for the Guidance Department.

**DISTINCTIONS, AWARDS, CREDENTIALS**

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|-----------------|---|
| 2004/9 - 2005/4 | Julian Szeicz Excellence in Teaching Award, Queen's University<br>Student-selected award for Excellence in Teaching   |
| 2001/1 – 2001/1 | Boeing Autometric Award<br>American Society for Photogrammetry and Remote Sensing<br>The purpose of the Boeing Autometric Award for Best Paper in Image Analysis and Interpretation is to stimulate development and recognize achievement in image interpretation and analysis through special acknowledgment of superior publications in the field.  |
| 1992/1 – 1993/1 | John I Davidson President's Award for Practical Papers<br>American Society for Photogrammetry and Remote Sensing<br>The purpose of the Award is to encourage and commend those who publish papers of practical or applied value in PE&RS, the official journal of ASPRS. Factors considered by the committee in making its selection are the value of the achievement to the United States of America and its practical or applied value in advancing the state of the art. |

**PROFESSIONAL MEMBERSHIPS**

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|---|------------------|
| Canadian Remote Sensing Society                       | [1983 - present] |
| Canadian Association of Geographers                   | [1983 - present] |
| American Society of Photogrammetry and Remote Sensing | [1983 - present] |
| Remote Sensing Society (UK)                           | [1989 - present] |
| Canadian Institute of Forestry                        | [1999 - present] |
| Arctic Institute of North America                     | [2004 - present] |

**RESEARCH:****Research Contributions*****ENVIRONMENTAL MONITORING OF ARCTIC ENVIRONMENTS***

Since 2001, my research team has conducted field experiments and analysed remote sensing data to determine the potential for (i) high spatial resolution optical data for characterizing arctic vegetation community types; (ii) examined the utility of high spatial resolution remote sensing data for detecting and characterizing permafrost disturbances; and (iii) determined the potential for synthetic aperture radar (SAR) data for characterizing surface moisture. This research has substantial potential for monitoring the vegetation response and moisture regimes of arctic environments in a warming climate. We are currently examining the relationships between seasonal carbon exchange and vegetation type and amount using remote sensing in combination with tower and chamber (auto and static) flux data.

***LIDAR FOR FORESTRY***

As a result of my leadership, significant progress has been made in the application of light detection and ranging (LiDAR) for forestry in Canada. My research team has developed methods for estimating forest mensuration (e.g., tree/canopy height, volume, biomass; stem diameter distributions) and related biophysical variables (e.g., chlorophyll concentration, fPAR, LAI) from LiDAR data. Our efforts have made significant advances in quantifying the effects of various data acquisition parameters and sensor characteristics on the accuracy and precision of forest height metrics for estimating forest biophysical variables. These scientific and technical advances have been recognized internationally. I have served on the scientific committee and/or been a speaker at the annual international Silvilaser conference on LiDAR applications for forestry in Canada (2001, 2012), Sweden (2003), USA (2005, 2009), Japan (2006), Scotland (2008), Germany (2010), Australia (2011) and France (2015). Dr. Benoit St-Onge (UQAM), Dr. Mike Wulder (Canadian Forest Service) and I sponsored the first of this series of international conferences in Vancouver in 2001 as a result of our NCE GEOIDE project.

***REMOTE SENSING DATA FOR ESTIMATING FOREST ECOSYSTEM STRUCTURE AND CHANGE***

Through my analysis of Compact Airborne Spectrographic Imager (CASI) data, I demonstrated that the relationship between forest ecosystem/stand parameters and remote sensing spatial resolution is a function of specific and measurable target and system variables. Based on analyses of high spatial resolution airborne reflectance data it was determined that an optimal size of support (i.e. spatial resolution) for characterizing forest ecosystems, as estimated by the mean ranges of a series of experimental semivariograms, differed based on (i) wavelength; (ii) forest ecosystem class (and at low altitude as a function of mean maximum canopy diameter (MMCD)); and (iii) altitude of the remote sensing system. My efforts earned me an invitation to be senior author on a monograph entitled “Hyperspectral Remote Sensing for Forestry” for the American Society for Photogrammetry and Remote Sensing. My co-authors included leading scientists from the USA (Gong, Thomas), UK (Curran) and Spain (Zarco-Tejada).

***DATA INTEGRATION FOR CHARACTERIZING ECOSYSTEM STRUCTURE***

Data integration for landscape description of forest ecosystem classes has demonstrated the importance of suitable image processing techniques in conjunction with appropriate and contrasting datasets for mapping and modeling natural environments. The addition of textural and geomorphometric variables to high-resolution CASI reflectance data in a low-relief boreal environment can improve discrimination of forest ecosystem classes, thereby defining *a priori* relationships and parameters necessary to initiate ecosystem modelling at landscape scales. In 2001, this research was awarded the **Boeing Autometric Award** by the American Society for Photogrammetry and Remote Sensing (ASPRS).

## **Current Research Projects**

### **Remote Sensing of Biophysical Variables at Multiple Spatial Scales along a Latitudinal Gradient in the Canadian Arctic** NSERC Discovery Grant [PI: Treitz (Queen's)]

The focus of my NSERC Discovery Grant is on modeling biophysical variables at multiple scales across a latitudinal gradient (~63°-75°N) for the Canadian Arctic; serving as a temperature gradient of approximately 10°C for mean-July temperatures. This research is being conducted at Sabine Peninsula (77°N) and Cape Bounty (75°N), Melville Island; Boothia Peninsula (71°N); and Apex River, Baffin Island (63°N), Nunavut. Although there have been studies examining biophysical variables at these latitudes, they have largely been limited to broad spatial scales (i.e., 1-8 km<sup>2</sup>). There has been very little research conducted in Canada's North on relating biophysical variables to high spatial resolution remote sensing data (<10 m); nor how these variables are linked to ecosystem processes (i.e., carbon flux/net ecosystem exchange). My research: (i) quantifies the relationships between biophysical variables and spectral reflectance/indices at high spatial resolutions; (ii) models the relationships between biophysical variables and ecosystem processes; and (iii) models biophysical variables, including carbon exchange, at multiple scales in order to project changes in these variables over space and time.

### **Assessment of Wood Attributes from Remote Sensing (AWARE)**

NSERC Collaborative Research Development (CRD) Grant [PI: Coops (UBC), Co-Is: Fournier (Sherbrooke), Treitz (Queen's), St-Onge (UQAM) and seven others]

This project addresses a suite of 25 research questions described through a series of four themes. At each scale of observation each theme will develop relationships and approaches linking remotely sensed variables with stand, tree, and wood attributes. With the increasing availability of LiDAR and high spatial resolution optical data, forest managers have seen increasing opportunities for using these data to meet a wider range of forest inventory information needs (Nelson et al., 2003). To date however, the number of attributes derived has been limited. My research falls under Theme 2 – Improving Stand Structural, Volume and Species Information at Local and Regional Scales for an Enhanced Forest Inventory. More specifically, my research questions address the development of new structural metrics from the LiDAR point cloud as well as to identify the optimal suite/range of metrics that best characterize stand timber characteristics and wood properties.

### **Assessing Forest Biomass as a Bioenergy Feedstock: the Availability and Recovery of Biomass in Uneven-Aged Forests** ecoEnergy Innovative Initiative R&D Contribution Program, Natural Resources Canada [PI: Casperson (Toronto); Co-Is: Treitz (Queen's) and Hu (Toronto)]

The objective of this project is to assess the potential for using forest biomass as feedstock for the production of bioenergy. Forest biomass is considered a promising feedstock by all of our partners, which include: 1) forestry and utility companies seeking to harvest or secure a supply of feedstock for the production of heat and power; 2) provincial agencies and crown corporations responsible for the inventory and allocation of wood from crown forests; and 3) researchers working at universities, government labs, and private research institutes. Growing collaboration among the researchers has led to the development of this project, which draws upon our two areas of expertise – *forest inventory* and *biomass harvesting*. We will combine these two approaches to estimate both the *availability* and *recovery* of biomass in uneven-aged forests of the Great Lakes-St. Lawrence region.

### **Water Security and Quality in a Changing Arctic**

(Government of Canada Program - ArcticNet) [Co-PIs: Lamoureux and Lafrenière, Co-I: Treitz and 9 others]

Water is crucial to Northerners and plays a vital role in the stability of landscapes and ecosystems. Projected climate changes are anticipated to substantially impact aquatic and terrestrial ecosystems, and this project uses an integrated watershed approach to identify how climate and permafrost change drive freshwater quality and availability. This comprehensive research program is focused on understanding changing water systems through climate and permafrost change, and integrating this with the terrestrial ecosystem. Research is conducted primarily at the Cape Bounty Arctic Watershed Observatory (CBAWO) to provide key insights into drivers of water quality and quantity changes that are relevant for Northerners. This knowledge is also being transferred to build sustainable research capacity with stakeholders through a collaborative research program in the Apex River near Iqaluit, NU. This research is especially motivated by concerns about changes to river flow and water quality by local decision makers and residents.

**Research Funds – External/Internal (since 2008)**

<u>Period of Funding</u>	<u>Role</u>	<u>Principal Applicant</u>	<u>Funding Organization</u>	<u>Title</u>	<u>Amount (CAN\$)</u>
2017/4 - 2020/3	Co- Investigator	Danby R.	NWT Cumulative Impact Monitoring Program (NWT CIMP)	Vegetation Productivity and Phenology across the Bathurst Caribou Range	\$111,000
2015/4 - 2020/3	Co- Investigator	Coops, N.	NSERC Collaborative Research and Development Grant (NSERC - CRD)	Assessment of Wood Attributes using Remote Sensing (AWARE)	2,086,000
2014/4 - 2019/3	Principal Investigator	Treitz, P.	Natural Sciences and Engineering Research Council of Canada – Discovery Grant (NSERC)	Remote Sensing of Biophysical Variables at Multiple Spatial Scales along a Latitudinal Gradient in the Canadian Arctic	185,000
2013/4 - 2016/3	Co- Investigator	Casperson, J.	Natural Resources Canada - ecoEnergy Innovation Initiative Grant (NRCan)	Assessing Forest Biomass as a Bioenergy Feedstock: the Availability and Recovery of Biomass in Uneven-aged Forests	300,000
2011/4 - 2015/3	Co- Investigator	Lamoureux, S. and Lafreniere, M.	ArcticNet (NCE)	High Arctic Hydrological, Landscape and Ecosystem Responses to Climate Change	424,770
2008 - 2014	Principal Investigator	Treitz, P.	Aboriginal Affairs and Northern Development Canada - Northern Science and Technology Program (AANDC - NSTP)	Arctic Vegetation and Soil Moisture Modelling using Remote Sensing	28,000
2013/4 - 2015/3	Principal Investigator	Treitz, P.	Canadian Space Agency – Science and Operational Applications Research (CSA – SOAR)	Differential-InSAR and Hazard Susceptibility Mapping for Assessing Permafrost Degradation	~40,000 Radarsat 2 SAR data
2009/4 - 2014/3	Principal Investigator	Treitz, P.	Natural Sciences and Engineering Research Council of Canada – Discovery Grant (NSERC)	Remote Sensing of Environmental Change across Northern Terrestrial Ecosystems	115,000

2009/4 - 2013/12	Co- Investigator	Lafreniere, M., Lamoureux, S.	Natural Sciences and Engineering Research Council of Canada – Strategic Grant (NSERC)	Modelling High Arctic Permafrost Landscape Stability and Water Quality for Changing Climate and Resource Development	599,075
2011/6 - 2013/5	Principal Investigator	Treitz, P.	National Centre of Excellence – GEOIDE Phase IV: Strategic Investment Initiative (NCE – GEOIDE SII)	Precision Planning Inventory Tools for Forest Value Enhancement	160,000
2009/4 - 2011/3	Principal Investigator	Treitz, P.	Canadian Space Agency – Science and Operational Applications Research (CSA – SOAR)	Soil Moisture Modelling of Arctic Tundra Soils using Radarsat-2 SAR	40,000
2006/4 - 2010/3	Co- Investigator	Lamoureux, S.	Natural Sciences and Engineering Research Council of Canada – International Polar Year (NSERC - IPY)	Climate Change and Permafrost Impacts on High Arctic Watershed Fluxes: Cape Bounty, Melville Island Experimental Watershed Observatory	670,000
2007/4 - 2010/12	Principal Investigator	Treitz, P.	Ontario Centres of Excellence – Earth and Environmental Technologies (OCE - EET)	Evaluation and Development of LiDAR Data Acquisition Standards for Forest Inventory Applications and Predictive Forest Ecosite Classification	140,000
2005/4 - 2008/3	Principal Investigator	Treitz, P.	Centre for Research in Earth and Space Technologies (CRESTech)	Three-Dimensional Analysis of forest Structure and Terrain using LiDAR Technology	130,000
2003/4 - 2008/3	Principal Investigator	Treitz, P.	Premier’s Research Excellence Award (PREA)	Modelling Forest Ecosystem Structure using Light Detection and Ranging (LiDAR)	100,000
2003/4 - 2008/3	Principal Investigator	Treitz, P.	Natural Sciences and Engineering Research Council – Discovery Grant (OCE - EET)	Spectral/Spatial/Temporal Analysis of Remote Sensing Data for Estimating Biophysical Variables of Arctic and Boreal Ecosystems Ecosite Classification	113,000

**Refereed Journal Publications (career)**

We publish our research in **international journals** that focus on remote sensing, forest and Arctic research. **Authorship order** is determined carefully and reflects the overall contributions of ideas, field work, methods, analysis, writing and editing. Students are mentored to publish their research and assume lead authorship whenever possible. **Authors in bold** are graduate students or postdoctoral fellows supervised (or co-supervised) by me. Students are encouraged (and supported) to present their research at national and international conferences.

- Rudy, A.C.A.**, S.F. Lamoureux, P. Treitz, N. Short, B. Brisco, 2018. Seasonal and multi-year surface displacements measured by DInSAR in a High Arctic permafrost environment. *International Journal of Applied Earth Observation and Geoinformation*, 64: 51-61.
- Edwards, R.**, P.M. Treitz, 2017. Vegetation greening trends at two sites in the Canadian Arctic: 1984-2015, *Arctic, Antarctic and Alpine Research*, (accepted August 10, 2017).
- Zhang, X.**, P.M. Treitz, D. Chen, C. Quan, L. Shi, X. Li, 2017. Mapping mangrove forests using multi-tidal remotely-sensed data and a decision-tree-based procedure, *International Journal of Applied Earth Observation and Geoinformation*, 62: 201-214.
- Holloway, J.E., **A.C.A. Rudy**, S.F. Lamoureux, P.M. Treitz, 2017. Determining the terrain characteristics related to the surface expression of subsurface water pressurization in permafrost landscapes using susceptibility modelling, *The Cryosphere*, 11:1403-1415.
- Liu, N.**, P. Budkewitsch, P. Treitz, 2017. Examining spectral reflectance features related to Arctic percent vegetation cover: Implications for hyperspectral remote sensing of Arctic tundra. *Remote Sensing of Environment*, 192:58-72.
- Shang, C.**, P. Treitz, J. Casperson, T. Jones, 2017. Estimating stem diameter distributions in a management context for a tolerant hardwood forest using ALS height and intensity data. *Canadian Journal of Remote Sensing*, 43(1):79-94.
- Rudy, A.C.A.**, S.F. Lamoureux, P. Treitz, **K. Van Ewijk**, P.P. Bonnaventure, P. Budkewitsch, 2017. Terrain controls and landscape-scale modelling of active-layer detachments, Sabine Peninsula, Melville Island, Nunavut. *Permafrost and Periglacial Processes*, 28:79-91.
- Liu, N.**, P. Treitz, 2016. Modelling high arctic percent vegetation cover using field digital images and high resolution satellite data, *International Journal of Applied Earth Observation and Geoinformation*, 52:445-456.
- Rudy, A.C.A.**, S.F. Lamoureux, P. Treitz, **K. Van Ewijk**, 2016. Transferability of regional permafrost disturbance susceptibility modelling using generalized linear and generalized additive models. *Geomorphology*, 264:95-108.
- Gökkaya, K., V. Thomas, T. Noland, J.H. McCaughey, I. Morrison, P. Treitz, 2015. Mapping continuous forest type variation by means of correlating remotely-sensed metrics to canopy N:P ratio in a boreal mixedwood forest. *Applied Vegetation Science*, 18(1):143-157.
- Gökkaya, K., V. Thomas, T. Noland, J.H. McCaughey, P. Treitz, I. Morrison, 2015. Prediction of Macronutrients at the Canopy Level Using Spaceborne Imaging Spectroscopy and Lidar Data in a Mixedwood Boreal Forest. *Remote Sensing*, 7:9045-9069.
- Collingwood, A.**, P. Treitz, F. Charbonneau, 2014. Surface roughness estimation from RADARSAT-2 data in a High Arctic environment. *International Journal of Applied Earth Observation and Geoinformation*, 27: 70-80.
- Collingwood, A.**, P. Treitz, F. Charbonneau, D.M. Atkinson, 2014. Artificial neural network modeling of high arctic phytomass using synthetic aperture radar and multispectral data. *Remote Sensing*, 6: 2134-2153.
- Tamminga, A.**, N.A. Scott, P.M. Treitz, M. Woods, 2014. A biogeochemical examination of Ontario's boreal forest ecosite classification system. *Forests*, 5: 325-346.



- Ewijk, K.Y., van, C.F. Randin, P.M. Treitz, N.A. Scott, 2014.** Predicting fine-scale tree species abundance patterns using biotic variables derived from LiDAR and high spatial resolution imagery. *Remote Sensing of Environment*, 150: 120-131.
- Gökkaya, K., V. Thomas, T. Noland, J.H. McCaughey, P. Treitz, 2014. Testing the robustness of predictive models for chlorophyll generated from spaceborne imaging spectroscopy data for a mixedwood boreal forest canopy. *International Journal of Remote Sensing*, 35(1): 218-233.
- Pope, G., P. Treitz, 2013.** Leaf area index (LAI) estimation in boreal mixedwood forest of Ontario, Canada using light detection and ranging (LiDAR) and WorldView-2 imagery. *Remote Sensing*, 5(10): 5040-5063.
- Atkinson, D., P. Treitz, 2013.** Modelling biophysical variables across an arctic latitudinal gradient using high spatial resolution remote sensing data. *Arctic, Antarctic and Alpine Research*, 45(2): 161-178.
- Rudy, A., S. Lamoureux, P. Treitz, A. Collingwood, 2013.** Identifying permafrost slope disturbance using multi-temporal optical satellite images and change detection techniques. *Cold Regions Science and Technology*, 88: 37-49.
- Southee, F.M., P. Treitz, N. Scott, 2012.** Application of LIDAR terrain surfaces for soil moisture modeling. *Photogrammetric Engineering & Remote Sensing*, 78(12):1241-1251.
- Middleton, M., P. Närhi, H. Arkimaa, E. Hyvönen, V. Kuosmanen, P. Treitz, R. Sutinen, 2012.** Ordination and hyperspectral remote sensing approach to classify peatland biotopes along soil moisture and fertility gradients, *Remote Sensing of Environment*, 124: 596-609.
- Treitz, P., K. Lim, M. Woods, D. Pitt, D. Nesbitt, D. Etheridge, 2012. LiDAR Sampling Intensity for Forest Resource Inventories in Ontario, Canada, *Remote Sensing*, 4(4):830-848.
- Maher, A., P. Treitz, M. Ferguson, 2012.** Can Landsat data detect variations in snow cover within habitats of arctic ungulates? *Wildlife Biology*, 18:1-13. DOI: 10.2981/11-055
- Woods, M., D. Pitt, K. Lim, D. Nesbitt, D. Etheridge, M. Penner, P. Treitz, 2011. Operational implementation of a LiDAR inventory in Boreal Ontario, *Forestry Chronicle*, 87(4):512-528.
- Thomas, V., T. Noland, P. Treitz, H. McCaughey, 2011. Leaf area and clumping indices for a boreal mixedwood forest: lidar, hyperspectral, and Landsat models, *International Journal of Remote Sensing*, 32 (23): 8271–8297.
- Ewijk, K.Y., van, P.M. Treitz, N.A. Scott, 2011.** Characterizing Forest Succession in Central Ontario using LiDAR derived Indices, *Photogrammetric Engineering and Remote Sensing*, 77 (3): 261-269.
- Wall, J., A. Collingwood, P. Treitz, 2010.** Monitoring surface moisture state in the Canadian High Arctic using synthetic aperture radar (SAR), *Canadian Journal of Remote Sensing*, Vol. 36, Supplement 1: S124-S134.
- Treitz, P., V. Thomas, P. Zarco-Tejada, P. Gong, and P. Curran, 2010. *Hyperspectral Remote Sensing for Forestry*, Monograph Series, American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, 107 p.
- Thomas, V., J.H. McCaughey, P. Treitz, D.A. Finch, T. Noland, L. Rich, 2009.** Spatial modelling of photosynthesis for a boreal mixedwood forest by integrating micrometeorological, lidar and hyperspectral remote sensing data. *Agricultural and Forest Meteorology*, 149: 639-654.
- Chasmer, L., A. Barr, A. Black, H. McCaughey, A. Shashkov, P. Treitz, T. Zha, 2009.** Scaling and assessment of GPP from MODIS using a combination of airborne lidar and eddy covariance measurements over jack pine forests. *Remote Sensing of Environment*. 113:82-93.
- Lim, K., C. Hopkinson, P. Treitz, 2008.** Examining the effects of sampling point densities on laser canopy height and density metrics for forest studies at the plot level, *Forestry Chronicle*, 84(6): 876-885.
- Chasmer, L., C. Hopkinson, P. Treitz, H. McCaughey, A. Barr, A. Black, 2008.** A lidar-based hierarchical approach to assessing MODIS fPAR. *Remote Sensing of Environment*. 112: 4344-4357.
- Chasmer, L., N. Kljun, A. Barr, A. Black, C. Hopkinson, H. McCaughey, P. Treitz, 2008.** Vegetation structural and elevation influences on CO<sub>2</sub> uptake within a mature jack pine forest in Saskatchewan, Canada. *Canadian Journal of Forest Research*, 38: 2746-2761.

- Woods, M., **K. Lim**, P. Treitz, 2008. Predicting forest stand variables from LiDAR data in the Great Lakes St. Lawrence Forest of Ontario, *Forestry Chronicle*, 84(6): 827-839.
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- Laidler, G.**, P. Treitz, **D. Atkinson**, 2008. Estimating percent-vegetation cover in the Canadian Arctic: The utility of multi-resolution remote sensing data and vegetation indices, *Arctic*, 61(1):1-13.
- Thomas, V.**, P. Treitz, J.H. McCaughey, T. Noland, L. Rich, 2008. Canopy chlorophyll concentration estimation using hyperspectral and lidar data for a boreal mixedwood forest in northern Ontario, Canada. *International Journal of Remote Sensing*, 29(4):1029-1052.
- Thomas, V.**, D. Finch, J.H. McCaughey, T. Noland, L. Rich, P. Treitz, 2006. Spatial modelling of the fraction of photosynthetically active radiation absorbed by a boreal mixedwood forest using a lidar-hyperspectral approach, *Agriculture and Forest Meteorology*, 140:287-307.
- Lamoureux, S.F., D.M. McDonald, J.M.H. Cockburn, M. Lafrenière, **D. Atkinson**, P. Treitz 2006. An incidence of multi-year sediment storage on channel snowpack in the Canadian High Arctic, *Arctic*, 59(4):381-390.
- Chasmer, L.**, **C. Hopkinson**, B. Smith, P. Treitz, 2006. Examining the influence of changing laser pulse repetition frequencies on conifer forest canopy returns, *Photogrammetric Engineering and Remote Sensing*, 72(12): 1359-1367.
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- Chasmer, L.**, **C. Hopkinson**, P. Treitz, 2006. Investigating laser pulse penetration through a conifer canopy by integrating airborne and terrestrial lidar, *Canadian Journal of Remote Sensing*, 32(2):116-125.
- Prenzel, B.**, P. Treitz, 2006. Spectral and spatial filtering for enhanced thematic change analysis of remotely sensed data, *International Journal of Remote Sensing*, 27(5):835-854.
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### **Research Presentations (since 2010)**

- Freemantle, V.**, P. Treitz, D. Atkinson, F. Gregory, (2017). How Have Different High Arctic Vegetation Communities Changed at Cape Bounty? A Time-Series Analysis of High Spatial Resolution Imagery (2003-2016), Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
- Treitz, P.M.**, R. Edwards, D. Atkinson, N. Scott, (2017). Remote Sensing of Environmental Change in the Canadian High Arctic, Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
- Van Ewijk, K.**, E. Lindberg, P. Treitz, M. Woods, (2017). Species-Specific Diameter Distribution Modeling using a Hybrid ABA-ITC Approach in a Complex Forest Ecosystem, Canadian Association

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- Rudy, A.C.A.**, S.L. Lamoureux, P.M. Treitz, N. Short, B. Brisco (2017). Using DINSAR to Interpret Seasonal Surface Displacements in a Continuous Permafrost High Arctic Environment, Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
- Bonney, M.**, P.M. Treitz, R.K. Danby (2017). Landscape Variability of Vegetation Change across the Forest to Tundra Transition of Northern Canada, Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
- Marczak, P.**, N. Scott, P. Treitz, (2017). Improving Predictions of Aboveground Forest Carbon Accumulation Rates in Southeastern Ontario Forests, Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
- Wasson, R.**, P. Treitz (2017). Identifying Songbird Habitat from Forest Structure using LiDAR, Canadian Association of Geographers – Ontario Division Meeting, Queen’s University, Kingston, Ontario, Canada, October 20-21, 2017.
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- Scott, N.A., **A. Blaser, E. Buckley**, E. Humphreys, P. Treitz (2015). Variation in factors regulating net greenhouse gas exchange across different vegetation types at Cape Bounty, Melville Island, Nunavut, *American Geophysical Union*, Fall Meeting 2015, San Francisco, #B33G-05
- Ewijk, K.Y. van**, P.M. Treitz, N.A. Scott (2015). LiDAR-based Characterization of Understory Trees in a Complex Temperate Forest in Ontario, Canada. Silvilaser 2015 – ISPRS Geospatial Week, La Grande Motte, France, September 28-30, 2015.
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- Buckley, E., N.A. Scott, P.M. Treitz (2013). Spatial and Temporal Patterns of Net Carbon Exchange in Polar-Semi-desert Communities at the Cape Bounty Arctic Watershed Observatory, Melville Island, Nunavut. ArcticNet Annual Scientific Meeting 2013, Halifax, Canada.
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- Rudy, A.**, S.F. Lamoureux, P.M. Treitz (2012). Satellite Change Detection Techniques and Object-Based Analysis to Identify Permafrost Slope Disturbances at Cape Bounty, Melville Island, Nunavut. 2012 ArcticNet Annual Scientific Meeting (ASM 2012), Vancouver, Canada.
- Gregory, F.**, P.M. Treitz, N.A. Scott (2012). Using IKONOS-derived NDVI to study vegetation dynamics in the Canadian High Arctic. 33rd Canadian Symposium on Remote Sensing, Ottawa, Canada.

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- Middleton, M.**, P. Närhi, H. Arkimaa, E. Hyvönen, V. Kuosmanen, P. Treitz, R. Sutinen (2012). Hyperspectral Imaging of Boreal Peatland Biotopes along Soil Moisture and Fertility Gradients. 12<sup>th</sup> International Circumpolar Remote Sensing Symposium, Levi, Finland.
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- Rudy, A.**, S. Lamoureux, P. Treitz (2012). Mapping High Arctic Permafrost Disturbances using Multitemporal Aerial Photographs and Satellite Imagery, Melville Island, Nunavut. 2012 International Polar Year (IPY) Conference, Montreal, Canada.
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- Collingwood, A.**, P. Treitz, F. Charbonneau (2012). Soil Moisture Modelling in the Canadian High Arctic with RADARSAT-2. 2012 International Polar Year (IPY) Conference, Montreal, Canada.
- Cassidy, A.**, L. Bosquet, S. Lamoureux, P. Treitz, G. Henry (2012). Tundra Vegetation and Physical Environmental Responses to Recent and Historical Permafrost Disturbance. 2012 International Polar Year (IPY) Conference, Montreal, Canada.
- Lamoureux, S., M. Lafrenière, P. Treitz, N. Scott (2012). The Cape Bounty Arctic Watershed Observatory (CBAWO): Integrated Arctic System Science in the Canadian High Arctic. Arctic Day, Queen's University, Kingston, Canada.
- Treitz, P., F. Gregory, N. Scott (2012). Fine-scale Remote Sensing of Vegetation in the Canadian High Arctic. Arctic Day, Queen's University, Kingston, Canada.
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- Rudy, A.**, S. Lamoureux, P. Treitz (2012). Identification of Permafrost Slope Disturbances using Multitemporal Imagery and Change Detection Techniques, Cape Bounty, Melville Island, Nunavut. 42nd International Arctic Workshop, Winter Park, United States.
- Lim, K., M. Woods, P. Treitz (2011). Enhancing Forest Inventories Using LiDAR: Experience from Ontario, Canada. Society of American Foresters 2011 National Convention, Honolulu, United States
- Treitz, P. (2011). Forest Resource Inventory in Ontario, Canada: Modeling Forest Structure using Airborne Laser Scanning. Invited Lecture, Umea, Sweden.
- Pope, G.**, M. Woods, D. Nesbitt, P. Treitz (2011). Comparing LiDAR and Stereophoto Digital Elevation Models in a Managed Boreal Forest Environment. Oral Presentation. GEOIDE Project Meeting, Hearst, Canada.
- Collingwood, A.**, P. Treitz, F. Charbonneau (2011). Environmental Monitoring in the Canadian High Arctic with RADARSAT-2. 32nd Canadian Symposium on Remote Sensing, Sherbrooke, Canada.
- Treitz, P., M. Woods, D. Pitt, M. Penner, K. Lim, D. Nesbitt, D. Etheridge (2011). Operational Implementation of a LiDAR Inventory in Boreal Ontario. 32nd Canadian Symposium on Remote Sensing, Sherbrooke, Canada.



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- Atkinson, D., P.** Treitz (2011). Estimation of Arctic Tundra Biophysical Variables from IKONOS Multispectral Data. Canadian Association of Geographers Annual General Meeting, Calgary, Canada
- Pope, G., M.** Woods, D. Nesbitt, P. Treitz (2011). Comparing LiDAR and Stereophoto Digital Elevation Models in a Managed Boreal Forest Environment. GEOIDE Annual General Meeting, Toronto, Canada.
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- Ewijk, K., van, P.** Treitz, N. Scott (2011). LiDAR Derived Indices for Characterizing Forest Succession and Ecosite Prediction in Central Ontario. FRP/CIF Workshop: Taking Stock: Inventory options for today and tomorrow, Kapuskasing, Canada.
- Collingwood, A., P.** Treitz, F. Charbonneau (2010). Surface Roughness Modeling with SAR Data in a High Arctic Environment. 7th ArcticNet Annual Scientific Meeting (ASM2010), Ottawa, Canada.
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- Wagner, I., A. Beamish, **A. Cassidy**, P. Treitz, N. Scott (2010). Relationships Among Phenology, NDVI and CO<sub>2</sub> Exchange in Three High Arctic Plant Community Types. 7th ArcticNet Annual Scientific Meeting (ASM2010), Ottawa, Canada.
- Pilger, N., P.** Treitz, B. St-Onge (2010). Coupling LiDAR and High Resolution Digital Imagery for Biomass Estimation in Mixedwood Forest Environments. Canadian Association of Geographers - Ontario Division (CAGONT) Annual Meeting, Toronto, Canada.
- Treitz, P., K. Lim, M. Woods, D. Pitt, D. Nesbitt, D. Etheridge (2010). LiDAR Data Acquisition and Processing Protocols for Forest Resource Inventories in Ontario, Canada. Silvilaser 2010, Freiburg, Germany.
- Ewijk, K., van, P.** Treitz, N. Scott (2010). Characterizing Central Ontario's Forest Ecosystems by Fusing Airborne LiDAR and High Resolution Digital Imagery. The Prairie Summit (CAG, CCA, CGRG and CRSS), Regina, Canada.
- Lim, K., P. Treitz, M. Woods, D. Nesbitt, D. Etheridge (2010). LiDAR Remote Sensing for Forest Management: Modelling Forest Inventory Variables. The Prairie Summit (CAG, CCA, CGRG and CRSS), Regina, Canada.
- Thomas, V., M. Khomik, J.H. McCaughey, A. Arain, P. Treitz (2010). Leaf and Canopy Physiology: Synergistic Use of Field Measurements, Radiative Transfer Modeling and LiDAR-Hyperspectral Remote Sensing. The Prairie Summit (CAG, CCA, CGRG and CRSS), Regina, Canada.
- McQuat, G., R.** Harrap, P. Treitz (2010). Methodologies for Effective Analysis of Mobile-Terrestrial LiDAR Data in Complex Urban Environments. OCE Discovery 2010, Toronto, Canada
- Ewijk, K., van, P.** Treitz, N. Scott (2010). Characterizing Forest Succession in Central Ontario using LiDAR derived Indices. OCE Discovery 2010, Toronto, Canada.
- Southee, M., P.** Treitz, N. Scott (2010). Using LiDAR Derived Terrain Attributes for Forest Ecosite Prediction in the Romeo Malette Forest, Ontario. OCE Discovery 2010, Toronto, Canada.
- Lim, K., P. Treitz, M. Woods, D. Etheridge, D. Nesbitt (2010). Operationalizing the Use of LiDAR in Forest Resource Inventories: What is the Optimal, Point Density? ASPRS 2010 Annual Conference, Opportunities for Emerging Geospatial Technologies, San Diego, United States.
- Treitz, P. (2010). New Technologies for Enhanced Forest Resource Inventory (eFRI). The Golden Age of Geo-Positioning: Constructing Business Solutions, Niagara College, Niagara-on-the-Lake, Canada.

- Woods, M., K. Lim, P. Treitz, D. Etheridge (2010). Investigating Airborne LiDAR Acquisition Intensity Requirements in the Enhancement of Forest Resource Inventories. GEOTEC 2010 – Increasing Productivity, Potential and Profits, Toronto, Canada.
- Ewijk, K., van, P. Treitz, N. Scott** (2010). Characterizing Forest Succession in Central Ontario using LiDAR Derived Indices. Workshop on Multi-Cohort Stand Structural Classification using LiDAR, Faculty of Forestry, University of Toronto, Toronto, Canada.
- Pollard, A., P. Treitz, A. Duncan, D. Matovic, N. Scott, S. Carson (2010). Optimizing Ontario based Wood Pellet Production for Co-firing and Market Development and Penetration. Final Project Presentation for the Ontario Centre of Excellence - Atikokan Bioenergy Research Centre, Atikokan, Canada.
- McQuat, G., R. Harrap, P. Treitz** (2010). Object-Oriented Classification of Mobile-Terrestrial LiDAR Data. Proceedings of the International Lidar Mapping Forum '10, Denver, United States.
- Treitz, P. (2010). Remote Sensing for Forest Management: Modelling Forest Structure (using LiDAR/ALS). Presentation to the Department of Geography and Environmental Studies, Carlton University, Ottawa, Canada.
- Treitz, P., K. Lim, M. Woods, D. Nesbitt, D. Etheridge (2010). LiDAR Data Acquisition and Processing Protocols for Forest Resource Inventories in Ontario, Canada. Proceedings of the SilviLaser Conference 2010. The 10th International Conference on LiDAR Applications for Assessing Forest Ecosystems, Freiburg, Germany, 2010-09-16, pp. 450-459.

### **Graduate and Postdoctoral Supervision**

- |                                  |  |
|----------------------------------|--|
| 2017/9 -<br>Co-Supervisor        | Jacqueline Hung, PhD Thesis (In Progress), Queen's University<br>TBD   |
| 2017/9 -<br>Supervisor           | Rachel Wasson, Master's Thesis (In Progress), Queen's University<br>Identifying Avian Nest Site Habitat Using Landscape and Canopy Variables<br>Derived from LiDAR data                                      |
| 2016/9 -<br>Supervisor           | Valerie Freemantle, Master's Thesis (In Progress), Queen's University<br>High Spatial Resolution Time Series Analysis of Environmental Change at<br>the Cape Bounty Arctic Watershed Observatory (2003-2017) |
| 2016/9 -<br>Co-Supervisor        | Paulina Marczak, Master's Thesis (In Progress), Queen's University<br>Songbird Habitat Modelling using Airborne Laser Scanning Data – A Case<br>Study at the Queen's University Biology Station              |
| 2015/9 -<br>Supervisor           | Karin van Ewijk, Postdoctoral Fellow (In Progress), Queen's University<br>Assessment of Wood Attributes from Remote Sensing (AWARE)  |
| 2015/9 – 2017/9<br>Co-Supervisor | Mitchell Bonney, Master's Thesis (Completed), Queen's University<br>Landscape Variability of Vegetation Change across the Forest to Tundra<br>Transition of Central Canada                                   |
| 2014/9 - 2016/6<br>Supervisor    | Rebecca Edwards, Master's Thesis (Completed), Queen's University<br>Time Series Analysis of Vegetation Change in the Canadian High Arctic  |
| 2013/9 -<br>Supervisor           | Chen Shang, Doctorate (In Progress), Queen's University<br>Modelling Forest Biomass in Uneven-Aged Stands using LiDAR Remote<br>Sensing  |

2013/9 - 2015/12 Co-Supervisor	Amy Blaser, Master's Thesis (Completed), Queen's University Variability of Seasonal NDVI and Carbon Fluxes in a Wet Sedge Community on Melville Island, NU
2012/9 - 2015/10 Co-Supervisor	Emma Buckley, Master's Thesis (Completed), Queen's University Variability of Seasonal NDVI and Carbon Fluxes in a Polar Semi-Desert Community on Melville Island, NU
2012/9 – 2017/4 Supervisor	Nanfeng Liu, Doctorate (Completed), Queen's University Remote Sensing of the Canadian Arctic: Modelling Biophysical Variables
2012/9 – 2016/12 Co-Supervisor	Ashley Rudy, Doctorate (Completed), Queen's University Remote Sensing of High Arctic Permafrost Disturbances
2010/9 - 2013/12 Supervisor	Sarah Allux, Master's Thesis (Withdrawn), Queen's University Hyperspectral and Broad-Band Indices for Characterizing High Arctic Vegetation
2010/9 - 2012/8 Supervisor	Graham Pope, Master's Thesis (Completed), Queen's University LiDAR and Worldview-2 Satellite Data for Leaf Area Index Estimation in the Boreal Forest
2010/3 - 2014/10 Co-Supervisor	Maarit Middleton, Doctorate (Completed), University of Helsinki Hyperspectral Remote Sensing of Mires in Finland
2009/9 - 2011/8 Co-Supervisor	Alison Cassidy, Master's Thesis (Completed), Queen's University The Effects of Recent and Relict Permafrost Disturbances on Tundra Vegetation, Cape Bounty, Melville Island, NU
2008/9 - 2010/8 Co-Supervisor	Florence Southee, Master's Thesis (Completed), Queen's University Ecological Land Classification and Soil Moisture Modelling in the Boreal Forest using LiDAR Remote Sensing
2008/9 - 2011/4 Co-Supervisor	Gregory McQuat, Master's Thesis (Completed), Queen's University Feature Extraction Workflows for Urban Mobile-Terrestrial LiDAR Data
2008/9 - 2013/12 Supervisor	Adam Collingwood, Doctorate (Completed), Queen's University Use of Multi-Polarized SAR for Environmental Monitoring in the Canadian High Arctic
2007/9 - 2011/4 Co-Supervisor	Fiona Gregory, Master's Thesis (Completed), Queen's University Biophysical Remote Sensing and Terrestrial CO <sub>2</sub> Exchange at Cape Bounty, Melville Island

2006/8 - 2008/9 Supervisor	Holly Shulman, Master's Thesis (Completed), Queen's University Estimating Evacuation Vulnerability of Urban Transportation Systems Using GIS
2005/9 - 2014/5 Co-Supervisor	*Karin van Ewijk, Doctorate (Completed), Queen's University Forest Ecosystem Modelling using LiDAR and Optical Remote Sensing Data
2004/9 - 2012/12 Supervisor	David Atkinson, Doctorate (Completed), Queen's University Modelling Biophysical Variables and Carbon Dioxide Exchange in Arctic Tundra Landscapes using High Spatial Resolution Remote Sensing Data
2004/9 - 2013/12 Co-Supervisor	Neal Pilger, Doctorate (Withdrawn), Queen's University Analysis of Forest Biomass and Carbon Stocks using LiDAR
2003/9 - 2008/4 Co-Supervisor	*Laura Chasmer, Doctorate (Completed), Queen's University Canopy Structural and Meteorological Influences on CO <sub>2</sub> Exchange for MODIS Product Validation in a Boreal Jack Pine Chronosequence
2002/9 - 2006/8 Co-Supervisor	*Valerie Thomas, Doctorate (Completed), Queen's University Spatially Explicit Modelling of Forest Structure and Function using Airborne Lidar and Hyperspectral Remote Sensing Data Combined with Micrometeorological Measurements
2002/9 - 2006/6 Supervisor	Kevin Lim, Doctorate (Completed), Queen's University Lidar Remote Sensing of Forest Canopy and Stand Structure
2003/9 - 2005/8 Co-Supervisor	Jake Wall, Master's Thesis (Completed), Queen's University Arctic Remote Sensing of Soil Moisture with Multitemporal SAR Imagery
2003/9 - 2005/8 Co-Supervisor	Andrew Maher, Master's Thesis (Completed), Queen's University Assessing Snow Cover and its Relationship to Distribution of Peary Caribou in the High Arctic
2003/9 - 2005/8 Co-Supervisor	Alexandra Taylor, Master's Thesis (Completed), Queen's University Inuit Qaujmajatuqangit about Population Changes and Ecology of Peary Caribou and Muskoxen on the High Arctic Islands of Nunavut
2003/9 - 2005/8 Co-Supervisor	Margot Hessing-Lewis, Master's Thesis (Completed), Queen's University Assessing the Potential for Eelgrass Restoration in the Squamish Estuary, British Columbia
2001/9 - 2003/4 Supervisor	Gita Laidler, Master's Thesis (Completed), Queen's University Multi-Resolution Remote Sensing Data for Characterizing Tundra Vegetation Communities on Boothia Peninsula
1999/9 - 2001/12 Supervisor	Valerie Thomas, Master's Thesis (Completed), Queen's University Hyperspectral Assessment of Acer Saccharum Forest Structure

1998/9 - 2000/12  
Supervisor Björn Prenzel, Master's Thesis (Completed), York University  
Remote Sensing and GIS for Thematic Land Surface Analysis and  
Monitoring: A Case Study of the Tondano Study Area, Sulawesi, Indonesia

1998/9 - 2000/8  
Supervisor Paul Sampson, Master's Thesis (Completed), York University  
Forest Condition Assessment: An Examination of Scale, Structure and  
Function using High Spatial Resolution Remote Sensing Data

\* Dr. Valerie Thomas (PhD 2006), Dr. Laura Chasmer (PhD 2008) and Dr. Karin Van Ewijk (PhD 2015) were each recipients of the Canadian Remote Sensing Society's National Best PhD Thesis Award, presented annually at the Society's annual general meeting and conference. Dr. Thomas was also awarded the Mathematics and Physical Sciences Outstanding Thesis Award by Queen's University for her PhD research.

**SERVICE AND ADMINISTRATION – INTERNAL/EXTERNAL (since 2008)**

- 2017 - 2018      Chair of the Queen's University Biology Station Advisory Committee
- 2015 - 2016      Interim Head of Department  
Geography and Planning, Arts and Science, Queen's University at Kingston
- 2013 - 2017      Queen's University Biology Station Advisory Committee
- 2013 - 2014      Member of the Dean's New Budget Model Advisory Committee
- 2010 - 2015      Head of Department  
Geography, Arts and Science, Queen's University at Kingston
- 2010              Member of the University's Advisory Committee for collective bargaining  
with the Public Service Alliance of Canada (PSAC)
- 2008 - 2009      Associate Head of Department  
Geography, Arts and Science, Queen's University at Kingston
- 2008 - 2009      Faculty of Arts and Science Curriculum Committee (Sub-Committee Chair)  
(2008-2009)
- 2007 - 2008      Acting Head of Department  
Geography, Arts and Science, Queen's University at Kingston