Tommaso **Trotto, MSc**

Vancouver, British Columbia, Canada

604 968 9743 tommaso.trotto.97@gmail.com 009-0001-0307-7076 Website LinkedIn

About me

Remote sensing specialist and PhD Candidate in forestry and remote sensing with over five years of experience conducting and managing scientific studies, designing scalable geospatial pipelines for optical and lidar remote sensing data, applying state-of-the-art statistical and machine learning to environmental monitoring, and collaborating effectively with university and industry partners to achieve unified goals. Currently finalizing my PhD focused on forest ecosystem monitoring utilizing large-scale lidar and dense Landsat time series observations across the Canadian boreal forests, resulting in three peer-review publications and one under review in peer-reviewed journals. Proficient in Python, R, and Rust and developer of *rusterize*, a high-performance Rust library designed for extremely fast geometry rasterization useful for forest inventory purposes. My current interests include remote sensing data engineering at scale, from lidar to satellite imagery, and the investigation of machine learning model explainability and underlying uncertainties. I excel in building strong working relationships that deliver high-quality, client-ready results and I am committed to achieving project objectives in a timely manner. I am looking forward to collaborating with a multidisciplinary team in diverse projects and offer my expertise from project inception to completion.

Expertise

Remote Sensing Leadership	Designing and managing remote sensing projects (lidar, satellite, drone).
Computing & Data Science	Rust, Python, R, Google Earth Engine, Cloud Computing (SLURM), GIS, ENVI, eCognition. CloudCompare, GDAL, LAStools, PDAL, PCL, shallow learning, deep learning, unsupervised learning, and statistical analyses for big structured and unstructured geospatial data.
Technical Innovation	Developing Rust tools for modern forest inventory management and scalable data exploration.
Machine Learning	Building robust pipelines for ingesting large volumes of data for training gradient-boosting and ensemble models.
Ecosystem Management	Integrating ecosystem monitoring with remote sensing and statistical/machine learning.
Scientific Communication	Producing client-ready reports for public, industry, and academia.

Core Experience

SILVA21 High Quality Personnel - PhD Candidate

FACULTY OF FOREST RESOURCES MANAGEMENTS – UNIVERSITY OF BRITISH COLUMBIA

Characterizing and quantifying the effect of disturbances on boreal forest resilience:

- Publishing scientific literature on the role of insect infestations on the structural changes in the boreal forests of Quebec, Canada;
- Exploring a variety of supervised and unsupervised machine learning techniques to characterize the presence of infestations at the stand and landscape level from lidar point clouds and satellite imagery;
- Interfacing with cloud computing platforms (Digital Research Alliance of Canada, SLURM) to process large volumes of data at scale, improving project efficiency;
- Producing modern software solutions in Rust for very fast geometry rasterization useful for forest inventory purposes;
- Translating scientific results into potential management strategies at a tactical level;
- Collaborating and facilitating consultation with partner universities and industries as part of the SILVA21 research program (www.silva21.com);
- Actively communicating complex scientific outcomes to a diverse audience of project partners to ensure clarity;
- Developing and leading workshops on the use of machine learning techniques for remote sensing data, producing educational resources. For example, I developed and co-lead a workshop on advancing equity in forestry with a focus on cloud computing and deep learning;
- Mentoring a diverse groups of graduate researchers to cultivate their skills and promoting their success, underlining leadership and educational prowess.

Education

PhD Candidate in Forestry and Remote Sensing

2022 – current

Integrated Remote Sensing Studio, The University of British Columbia, Canada

Supervisor: Dr. Nicholas Coops

Master of Forestry

2020 – 2021

The University of British Columbia, Canada

Transatlantic Forestry Master. GPA: 4.0

Theses titles (supervisor: Dr. Nicholas Coops):

- *"Individual tree crown delineation under dense Douglas Fir regeneration"*
- *"Spectroscopic assessment of foliar traits in a dense Douglas Fir forest"*

Master in Forest Science

2019 – 2020

University of Padova, Italy

Graduated with Honors (110/110 *summa cum laude*)

Bachelor in Forestry and Environmental Technologies

2016 – 2019

University of Padova, Italy

Graduated with Honors (110/110 *summa cum laude*)
Thesis title (supervisor: Dr. Emanuele Lingua):

- *"Age-independent growth curves for mixedwood forests in central Ontario"*

Awards & Career Highlights

PhD Candidate funding CAD 30,000 Annual since January 2022

Funded as part of the Canada-wide Silva21 research program to study forest resilience to natural disturbances using forest inventory and remote sensing data (project code AD-2). NSERC Alliance project Silva21 NSERC ALLRP 556265-20. Grantee Dr. Alexis Achim.

International Tuition Award CAD 4,650 Annual since January 2022

Award assigned in recognition of high academic achievements.

ESRI Canada Scholarship CAD 2,000 March 2022

Evaluation of multi-temporal tree height growth using lidar data. The submission's goal was to map tree height variations over time to understand forest response to natural disturbances.

Transatlantic Forestry Master double-degree program September 2019 – August 2021

Qualification for the Transatlantic Forestry Master double-degree program between the University of Padova, Italy, and The University of British Columbia, Canada. The program offers highly qualified students the opportunity to earn two Master's Degrees in Forestry in Europe and Canada.

Academic exchange nomination January 2019 – August 2019

Qualification for an exchange program sponsored by the University of Padova, Italy with the Sir Sandford Fleming College, Ontario, Canada.

Tuition Award EUR 2,000 Annual 2016 – 2021

Qualified for a full tuition compensation at the University of Padova, Italy for 5 consecutive years for outstanding academic achievements.

Applied Skills

Remote Sensing Satellite/drone imagery, lidar point clouds, and vector data processing in local and cloud computing platforms (Digital Research Alliance of Canada).

Programming Frequently used software/libraries:

- QGIS, Google Earth Engine, GDAL, WhiteBoxTools, CloudCompare, PDAL, LAStools
- Python: dask, earthpy, geopandas, jax, laspy, numpy, polars, pyogrio, rasterio, ray, rioxarray, scipy, shapely, sklearn, stacpy, torchgeo, xarray, xgboost, zarr

- R: lasR, lidR, sf, terra, tidyterra
- Rust: geo, ndarray, numpy, polars, pyo3, rayon

Ecosystem Management	Interpreting forest inventories, conducting scientific statistical and machine learning analyses on ecological attributes.
Scientific Writing	Experienced in writing peer-reviewed publications.
Communication	Public speaker and mentor to audiences of varying backgrounds with strong graphical data communication skills.

Soft Skills

Personal	Diligent, confident, accountable, adaptable, enthusiastic, respectful, friendly, positive.
Social	Team-oriented, equitable, emotionally and culturally intelligent
Methodological	Pragmatic, analytical, problem-solver, self-motivated, organized
Languages	English, Italian, Spanish (basic)

Peer-Reviewed Publications

1. **Trotto, T.**, Coops, N. C., Achim, A., & Gergel, S. E., Roeser, D. (In review). Uncovering forest characteristics supporting resilience to spruce budworm infestations over Quebec, Canada using Landsat time series. ISPRS Journal of Photogrammetry and Remote Sensing.

2. **Trotto, T.**, Coops, N. C., Achim, A., & Gergel, S. E. (2025). Spectral remote sensing reveals forest structural characteristics resilient to spruce budworm infestations. *Ecological Indicators*, 181, 114382. https://doi.org/10.1016/j.ecolind.2025.114382

3. **Trotto, T.**, Coops, N.C., Achim, A., Gergel S. E., Roeser, D. (2025). Characterizing landscape configuration effects on eastern spruce budworm infestation dynamics. *Landscape Ecology*, 40, 183. https://doi.org/10.1007/s10980-025-02203-z.

4. **Trotto, T.**, Coops, N. C., Achim, A., Gergel, S. E., Roeser, D. (2024). Characterizing forest structural changes in response to non-stand replacing disturbances using bitemporal airborne laser scanning data. *Science of Remote Sensing*, 10, 100160. https://doi.org/10.1016/j.srs.2024.100160.

Software

1. **Trotto, T. (2024).** *rusterize:* High performance rasterization tool for Python built in Rust.

Certificates

1. **Trotto, T. (2024).** Pilot Certificate – Basic operations for Small Remotely Piloted Aircraft (VLOS). Issued by Transport Canada

Code Development & Review

Code Development	Self-motivated development of software solution outside of my current academic position.
Code Maintenance & Quality Assurance	Creating high-quality codebases and associated documentation for reproducibility and maintenance through continuous updates.
Code Review	Reviewed software in Rust, C++, Python, and R for academic and production purposes.
Collaborative Development	Effective Git user to build collaborative codebases.

Conferences

Living Data (Bogotá, Columbia) 2025
Mapping and monitoring landscape configuration effects on natural disturbances from space

Silva21 – Annual General Meeting (Sherbrooke, Canada) 2025
Characterizing landscape configuration effects on spruce budworm infestations

Silva21 – Annual General Meeting (Ottawa, Canada) 2024
Data fusion of lidar and Landsat reveals landscape-level structural patterns of spruce budworm infestations

Silvilaser (London, UK) 2023
Characterizing fine-scale forest structural changes due to non-stand replacing disturbances with bitemporal airborne laser scanning data

Silva21 – Annual General Meeting (Halifax, Canada) 2023
Fine-scale structural characterization of non-stand replacing disturbances using bitemporal aerial laser scanning data

Silva21 – Annual General Meeting (Quesnel, Canada) 2022
Learning from the past: lidar-derived products to link resistance and resilience to non-stand replacing disturbances

Teaching & Instructional Workshop Experience

Advancing Equity in Forestry: Digital Research Infrastructure and Deep Learning for All 2025
Machine learning in forest modeling

TA – Master of Geomatics for Environmental Monitoring 500 Annual since 2022
Landscape Ecology and Management

TA – Forestry 443 Annual since 2023
Remote Sensing for Ecosystem Management

TA – Master of Geomatics for Environmental Monitoring 530 2024 – 2025
Geospatial Data Analysis

TA – Natural Resource Conservation 430 2023
Introduction to GIS for Forestry and Conservation

TA – Forestry 544 2022
Technical Communication Skills I

International Journals

Reviewer Journal of Remote Sensing in Ecology and Conservation

Reviewer Journal of Environmental Management

Reviewer Current Forestry Reports

Reviewer Landscape Ecology

Personal Hobbies

Code development

- Enthusiastic coder developing packages that facilitate my work.

Language

- I enjoy multicultural environments and language is a first interface to new cultures. Currently learning Mandarin.

Sports

- Experienced tennis player (15+ years), once playing ranked tournaments.
- Intermediate climber.