

CURRICULUM VITAE

Natalie T. Boelman

EDUCATION

Ph.D., Earth and Environmental Sciences 2004
Columbia University, New York, NY USA

M.A., Earth and Environmental Sciences 2001
Columbia University, New York, NY USA

B.Sc., Physical Geography 1999
McGill University, Montreal, QC Canada

PROFESSIONAL APPOINTMENTS

Lamont Associate Research Professor July 2015 to present
Lamont-Doherty Earth Observatory, Columbia University

Adjunct Faculty Sep 2014 to present
*Ecosystems Center, Marine Biological Laboratory (MBL)
Woods Hole, MA USA*

Affiliated Faculty Oct 2012 to present
Dept. of Ecology, Evolution & Environmental Biology, Columbia University

Adjunct Assistant Professor Sep 2013 to 2018
Dept. of Earth and Environmental Sciences, Columbia University

¹Lamont Assistant Research Professor July 2010 to June 2015
Lamont-Doherty Earth Observatory, Columbia University

Storke Doherty Lecturer July 2008 to 2013
*Dept. of Earth and Environmental Sciences &
Lamont-Doherty Earth Observatory, Columbia University*

¹Doherty Associate Research Scientist July 2006 to 2010
Lamont-Doherty Earth Observatory, Columbia University

Postdoctoral Fellow Jan 2005 to July 2006
*Department of Global Ecology, Carnegie Institution
Stanford, CA, USA*

MAJOR RESEARCH INTERESTS

I use of traditional field surveys of plants and animals, near/remote sensing, bioacoustics and GPS animal tracking to study the:

- Effects of changing environmental conditions, wildfire, and anthropogenic activity on animal behavior
- Role of animals in influencing carbon biogeochemistry
- Changing composition, physical structure, phenology of vegetation, and consequences for carbon dynamics
- Socio-ecologic consequences of changing snow- and ice-scapes

PUBLICATIONS

Please note that a * denotes that a graduate student in my lab group is lead author. In addition, I have been following the growing custom in the field of ecology, which is for the PI (myself) to place their name in the last authorship position on advisee led studies, indicating that the study was produced and led by their lab group.

In advanced stage of preparation (to be submitted Fall 2019):

*Jensen, J., **Boelman**, N.T., Griffin, K.L., Oelkers, R., Maguire, A., D'Arrigo, R., Menge, D., Vierling, L.A., Eitel, J.U.H. (in prep) Lidar-derived forest demography reveals eminent regeneration failure at the Alaskan Forest tundra ecotone, to be submitted in October to *Ecological Applications*

Mahoney, P., K. Joly, B.L. Borg, M.S. Sorum, H. Golden, T. Rinaldi, D. Saalfeld, A.D. M. Latham, A. Kelly, B. Mangipane, C. Koizumi, M. Hebblewhite, N.T. **Boelman**, Laura Prugh (in prep.), Wolf denning phenology and reproductive success in response to climate signals, to be submitted to in October to *Global Change Biology*

*Min, E., Wilcots, E., **Boelman**, N.T., Gough, L. McLaren, J., Rowe, R., Rastetter, E., Boelman, N.T., Griffin, K.G. (in prep) Herbivore exclusion may decrease the carbon sink capacity of the Alaskan dry heath tundra, to be submitted in October to *Oecologia*

Davidson, S.C., Bohrer, G., Gurarie, E., Jennewein, J.S., LaPoint, S.D., Mahoney, P.J., **Boelman**, N.T., Eitel, J., Hebblewhite, M., Prugh, L.R., Vierling, L., Grier, E., Meddens, A., Oliver, R.Y., Kays, R. & Wikelski, M. (in prep.), An archive of Arctic animal movement data, to be submitted in November to *Scientific Data: Nature*

Submitted journal articles:

Gurarie, E., Hebblewhite, M., Joly, K., Kelly, A., Adamczewski, J., Davidson, S., Davison, T., Gunn, A., Suitor, M., Fagan, W., **Boelman**, N.T. (in review), Tactical departures and strategic arrivals: Divergent effects of climate and weather on caribou spring migrations, *Ecosphere*, submitted August 2019

Eitel, J.U.H., Griffin, K.L, **Boelman**, N.T., Meddens, A., Jensen, J., Vierling, L., Maguire, A., Schmiege, S., Jennewein, J., Foliar remote sensing tracks radial tree growth dynamics (in review), *Global Change Biology*, submitted August 2019

*Oliver, R.Y. *, Mahoney, P.J., Gurarie E, Krikun, N., Weeks, B.C., Hebblewhite, M., Liston, G. **Boelman**, N.T., Behavioral responses to migration conditions are a mechanism for shifting avian phenology (in review), *Science Advances*, submitted July 2019

In revision:

*Oliver R.Y., Blair, M., Sanin, C., Sterling, E., Zhang, W., **Boelman**, N.T. (in revision) *Climate induced declines in suitable Arctic-boreal habitat for two species of migratory songbirds, Diversity and Distributions.*

Published and accepted journal articles:

Boelman, N.T., Liston, G.E., Gurarie, E., Meddens, A.J.H., Mahoney, P.J., Kirchner, P.B., Bohrer, G., Brinkman, T.J., Cosgrove, C.L., Eitel, J.U.H., Hebblewhite, M., Kimball, J.S., Nolin, A.W., LaPoint, S.D., Pedersen, S.H., Prugh, L.R., Reinking, A.K., Vierling, L.A. (2019) Integrating snow science and wildlife ecology in Arctic-boreal North America, *Environmental Research Letters*, 14(1), DOI: 10.1088/1748-9326/aaec1

Eitel, JUH, Maguire, AJ, **Boelman**, N, Vierling, LA, Griffin, KL, Jensen, J, Magney, TS, Mahoney, PJ, Meddens, AJH, Silva, C, Sonnentag, O. (2019) Proximal remote sensing of tree physiology at northern treeline: Do late-season changes in the photochemical reflectance index (PRI) respond to climate or photoperiod? *Remote Sensing of Environment*, 221: 340-350.

Maguire, AJ, Eitel, JUH, Vierling, LA, Johnson, DM, Griffin, KL, **Boelman**, NT, Jensen, JE, Greaves, HE, Arjan JH Meddens (2019) Terrestrial lidar scanning reveals fine-scale linkages between microstructure and photosynthetic functioning of small-stature spruce trees at the forest-tundra ecotone. *Agricultural and Forest Meteorology*, 269-270.

*Oliver, R.Y., Ellis, D.P.W., Chmura, H.E., Krause, J.S., Pérez, J.H., Sweet, S.K., Gough, L., Wingfield, J.C., **Boelman**, N.T. (2018) Eavesdropping on the Arctic: Automated bioacoustic reveal dynamics in songbird breeding phenology, *Science Advances*, 4(6), DOI: 10.1126/sciadv.aaq1084

Mahoney PJ, Liston GE, LaPoint S, Gurarie E, Mangipane B, Wells AG, Brinkman TJ, Eitel JUH, Hebblewhite M, Nolin AW, **Boelman** N, Prugh LR (2018) Navigating snowscapes: scale-dependent responses of mountain sheep to snowpack properties, *Ecological Applications*, 28(7) 1715-1729. DOI: 10.1002/eap.1773

Chmura, H.E., Krause, J.S., Pérez, J., Asmus, A., Sweet, S.K., Hunt, K.E., Meddle, S.L., McElreath, R., **Boelman**, N.T., Gough, L., and Wingfield, J.C. (2018) Late-season snowfall is associated with decreased offspring survival in two migratory arctic-breeding songbird species, *Journal of Avian Biology*, 49 (9), e01712

Asmus, A., Chmura, H.E., Toke T. Høy⁴, Krause, J.S., Sweet, S.K., Pérez, J., **Boelman**, N.T., Wingfield, J.C and Gough, L. (2018) Shrub shading moderates the effects of weather on arthropod activity in arctic tundra, *Ecological Entomology*, 43 (5), 647-655.

Boelman, N.T., Krause, J.S., Sweet, S.K., Chmura, H.E., Perez, J.H., Gough, L., and Wingfield, J.C. (2017) Extreme spring conditions in the Arctic delay spring phenology of long-distance migratory songbirds, *Oecologia*, 185(1): 69-80, 10.1007/s00442-017-3907-3

*Prager, C.M., Naeem, S., **Boelman**, N.T., Eitel, J.U.H., Greaves, H.E., Heskell M.A., Magney, T.S., Menge, D.N.L., Vierling, L.A., Griffin, K.L. (2017) A gradient of nutrient enrichment reveals nonlinear impacts of fertilization on Arctic plant diversity and ecosystem function, *Ecology and Evolution*, 7(7): 2449-2460, 10.1002/ece3.2863

Magney, T.S., Logan, B.A, Griffin, K.L., Eitel, J.U.H., **Boelman**, N.T., Reblin, J., Abatzoglou, J.T., Greaves, H., Prager, C.M., L., Fortin, Oliver, R.Y., Shen, C., and Vierling, L.A (2017) Xanthophyll cycle activity in two prominent Arctic shrub species, *Arctic, Antarctic, and Alpine Research*, 49(2): 277-289, 10.1657/AAAR0016-044

Greaves, H.E., Vierling, L.A., Eitel, J.U.H., **Boelman**, N.T., Magney, T.S., Prager, C.M., and B.A, Griffin, K.L. (2017) Applying terrestrial lidar for evaluation and calibration of airborne

lidar-derived shrub biomass estimates in Arctic tundra, *Remote Sensing Letters*, 8(2): 175-184, 10.1080/2150704X.2016.1246770

Gersony, J.T., Prager, C.M., **Boelman**, N.T., Eitel, J.U.H., Gough, L., Greaves, H.E., Griffin, K.L., Magney, T.S., Sweet, S.K., Vierling, L.A., Naeem, S. (2016) Scaling thermal properties from the leaf to the canopy in the Alaskan arctic tundra, *Arctic, Antarctic and Alpine Research*, 48(4): 739-754, 10.1657/AAAR0016-013

Krause, J.S., Perez, J.H., Chmura, H.E., Asmus, A., Sweet, S.K., Meddle, S.L., Hunt, K.E., Gough, L., **Boelman**, N.T., and Wingfield, J.C. (2016) The effect of extreme spring weather on body condition and stress physiology in Lapland longspurs and white-crowned sparrows breeding in the Arctic, *General and Comparative Endocrinology*, 237:10-18, 10.1016/j.ygcen.2016.07.015

Krause J.S., Pérez J.H., Chmura H.E., Meddle S.L., Hunt K.E., Gough L., **Boelman** N.T. and Wingfield J.C. (2016) The stress response is attenuated during inclement weather in parental, but not in pre-parental, Lapland longspurs (*Calcarius lapponicus*) breeding in the Low Arctic, *Hormones and Behavior*, 83:68-74, DOI: 10.1016/j.yhbeh.2016.05.018

Boelman, N.T., Holbrook, J., Krause, J.S., Greaves, H.E., Chmura, H.E., Perez, J.H., Magney, T.S., Eitel, J.U.H., Wingfield, J.C., Gough, L., Vierling, K.T. and Vierling, L.A. (2016) Airborne laser scanning and spectral remote sensing give a bird's eye perspective on arctic tundra breeding habitat at multiple spatial scales, *Remote Sensing of Environment*, 184:337-349, DOI: 10.1016/j.rse.2016.07.012

Greaves, H., Vierling, L.A., Eitel, J.U.H., **Boelman**, N.T., Magney, T.S., Prager, C.M., and Griffin, K.L. (2016) High-resolution mapping of aboveground shrub biomass in Arctic tundra using airborne lidar and imagery, *Remote Sensing Environment*, 184:361-373, DOI: 10.1016/j.rse.2016.07.026

Boelman, N.T., Magney, T.S., Logan, B.A., Griffin, K.L., Eitel, J.U.H., Greaves, H., Prager, C.M. and Vierling, L.A. (2016) Spectral determination of concentrations of functionally diverse pigments in increasingly complex arctic tundra canopies, *Oecologia*, 182:85-97, DOI: 10.1007/s00442-016-3646-x

Perez, J.H., Krause, J.S., Chmura, H.E., Bowman, S., McGuigan, M., Asmus, A., Meddle, A.L., Hunt, K.E., Gough, L., **Boelman**, N.T., Wingfield, J.C. (2016) Nestling growth rates in relation to food abundance and weather in the Arctic, *The Auk*, 133(2): 261-272, DOI: 10.1642/AUK-15-111.1

Krause J.S., Chmura H.E., Pérez J.H., Asmus A., Word K.R., Németh Z., Meddle S.L., Quach L.N., McGuigan M.A., Gough L., **Boelman**, N.T., and Wingfield J.C. (2016) Breeding on the leading edge of a northward range expansion: differences in morphology and the stress response in the arctic Gambel's white-crowned sparrow, *Oecologia*, 180(1):33-44, DOI: 10.1007/s00442-015-3447-7

Magney, T.S., Eitel, J.U.H., Griffin, K.L., **Boelman**, N.T., Greaves, H., Prager, C.M., Logan, B.A., Zheng, G., Ma, L., Fortin, E.A., Oliver, R.Y. and Vierling, L.A. (2016) LiDAR canopy radiation model reveals patterns of photosynthetic partitioning in an arctic shrub, *Agricultural and Forest Meteorology*, 22:78-93, DOI:10.1016/j.agrformet.2016.02.007

Greaves, H., Vierling, L.A., Eitel, J.U.H., Magney, T.S., **Boelman**, N.T., Prager, C., and Griffin, K.L. (2015) Estimating aboveground biomass of low-stature Arctic shrubs with terrestrial LiDAR, *Remote Sensing Environment*, 164, 26-35, DOI:10.1016/j.rse.2015.02.023

- *Sweet, S., Griffin, K.L., Steltzer, H., Gough, L., and **Boelman**, N.T. (2015b) Greater deciduous shrub abundance extends the annual period of maximum tundra greenness and increases modeled net CO₂ uptake, *Global Change Biology*, 21(6), DOI: 10.1111/gcb.12852
- Boelman**, N.T., Gough, L., Wingfield, J.C., Goetz, S., Asmus, A., Chmura, H.E., Krause, J.S., Perez, J.H., Sweet, S.K. and Guay, K.C. (2015) Greater shrub dominance alters breeding habitat and food resources for migratory songbirds in Alaskan arctic tundra, *Global Change Biology*, 21(4), 1508-1520, DOI: 10.1111/gcb.12761
- *Sweet, S., Asmus, A., Rich, M.E., Gough, L., and **Boelman**, N.T. (2015a) NDVI as a predictor of canopy arthropod biomass in the Alaskan arctic tundra, *Ecological Applications*, 25(3), 779-790.
- *Sweet, S., Gough, L., Griffin, K.L., and **Boelman**, N.T. (2014) Tall deciduous shrubs offset delayed start of growing season through rapid leaf development in Alaskan arctic tundra, *Arctic, Antarctic and Alpine Research*, 46(3):682-697, DOI: 10.1657/1938-4246-46.3.682
- Rich, M.E., Gough, L., and **Boelman**, N.T. (2013) Arctic arthropod assemblages in habitats of differing shrub dominance, *Ecography*, 36, DOI: 10.1111/j.1600-0587.2012.00078.x
- Griffin, K.L., Epstein, D.J., and **Boelman**, N.T. (2013) Hill Slope Variations in Chlorophyll Fluorescence Indices and Leaf Traits in a Small Arctic Watershed, *Arctic, Antarctic and Alpine Research*, 45(1): 39-49, doi: <http://dx.doi.org/10.1657/1938-4246-45.1.39>
- Searle, S.Y., Turnbull, M. H., **Boelman**, N.T., Schuster, W.S.F., Yakir, D. and Griffin, K.L. (2012) Urban heat island effect in New York City promotes growth in Northern red oak seedlings, *Tree Physiology*, 32(4): 389-400, doi: 10.1093/treephys/tps027
- Boelman**, N.T., Rocha, A.V. and Shaver, G.R. (2011b) Understanding burn severity sensing in Arctic tundra: Exploring vegetation indices, sub-optimal assessment timing and the impact of increasing pixel size, *International Journal of Remote Sensing*, 32(22): 7033-7056
- Boelman**, N.T., Gough, L., McLaren, J.R. and Greaves, H. (2011a) Does NDVI reflect variation in the structural attributes associated with increasing shrub dominance in arctic tundra? *Environmental Research Letters*, 6, doi:10.1088/1748-9326/6/3/035501
- Boelman**, N.T., Asner, G.P., Hart, P.J., and Martin, R.E. (2007) Multi-trophic invasion resistance in Hawai'i: Bioacoustics, Field Surveys, and Airborne Remote Sensing, *Ecological Applications*, 17(8): 2137-2144, doi: <https://doi.org/10.1890/07-0004.1>
- Whitehead D., **Boelman**, N.T., Turnbull, M.T., Griffin, K.L., Tissue, D.T., Barbour, M.M., Hunt, J.E., Richardson, S.J., and Peltzer, D.A. (2005) Photosynthesis and reflectance indices for rainforest species in ecosystems undergoing progression and retrogression along a soil fertility chronosequence in New Zealand, *Oecologia*, 144: 233-244
- Boelman**, N.T., Stieglitz, M., Griffin, K.L., and Shaver, G.R. (2005) Inter-annual variability of NDVI in response to long-term warming and fertilization in wet sedge and tussock tundra, *Oecologia*, 143: 588-597
- Boelman**, N.T., Stieglitz, M., Rueth, Sommerkorn, H. M., Griffin, K.L., Shaver, G.R., and Gamon, J.A. (2003) Response of NDVI, Biomass, and Ecosystem Gas Exchange to Long-Term Warming and Fertilization in Wet Sedge Tundra, *Oecologia*, 135:414-421

Published reports:

Epstein, H.E., Bhatt, U.S., Reynolds, M.K., Walker, D.A., Bieniek, P.A., Tucker, C.J., Pinzon, J., Myers-Smith, I.H., Forbes, B.C., Macias-Fauria, M., Boelman, N.T., Sweet, S.K. (2015) Tundra Greenness [in *Arctic Report Card 2015*], <http://www.arctic.noaa.gov/reportcard>.

Kasischke, E.S., Hayes, D.J., Billings, S., **Boelman**, N.T., plus 21 more (2014) A Concise Experimental Plan for the Arctic-Boreal Vulnerability Experiment, <http://above.nasa.gov/acep.html>

Published datasets:

Vierling, L.A., Eitel, J.U.H., **Boelman**, N.T., Griffin, K.L., Greaves, H., Magney, T.S., Prager, C., Ajayi, M., and Gibson, R. (2013a) Bare earth LiDAR dataset for Toolik Field Station, AK, and nearby field sites along Dalton Highway. doi: 10.7923/G4057CV5

Vierling, L.A., Eitel, J.U.H., **Boelman**, N.T., Griffin, K.L., Greaves, H., Magney, T.S., Prager, C., Ajayi, M., and Gibson, R. (2013b.) Four-band, 5cm resolution orthophotographs of Toolik Field Station, AK, and nearby field sites along Dalton Highway. doi: 10.7923/G4VD6WCW.

POPULAR PRESS

Audubon Magazine: Multi-page article *Out of Sync* Sept-Oct 2013
written by Amanda Mascarelli
(<http://www.audubonmagazine.org/articles/climate/arctic-researchers-race-uncover-effects-global-warming-songbirds?>)

CNN Opinion piece: *Next global warming worry: Thawing tundra* Sept 25 2012
(<http://www.cnn.com/2012/09/25/opinion/boelman-arctic-tundra/index.html>)

Metro International: Quoted in the newspaper on the topic of climate change and Arctic breeding songbirds Fall 2012

Wired UK, quoted in magazine on the topic of ‘*Pop Up Ecosystems*’ Fall 2012

New York Times ‘*Scientist at work*’ May 26-June 8 2011
Research blog from the North Slope of Alaska
(<http://scientistatwork.blogs.nytimes.com/author/natalie-boelman/>)

RESEARCH GRANTS AWARDED

(3 years) NASA – Terrestrial Ecology, ABoVE Phase 2 2019 - 2022
A data-model fusion approach to quantifying socio-ecologic and -economic consequences of changing snow- and ice-scapes on natural resources and transportation networks in ABoVE
PIs: **Boelman**, N.T. (lead), T. Brinkman, L. Prugh, G. Liston, A. Reinking

(5 years) NSF – Polar Programs, Arctic Social Sciences 2018 - 2023
Collaborative Research: Navigating the New Arctic (NNA): Soundscape ecology to assess environmental and anthropogenic controls on wildlife behavior
PIs: **Boelman**, N.T. (lead), T. Brinkman, M. Mandel, G. Liston, A. Reinking

- RISE Grant, Columbia University 2018 - 2020
Evolution in the Arctic: Genomic reconstruction of microbial, plant and animal communities during the Holocene
 PIs: Shaman, J. (lead), J. Nichols, N.T. **Boelman**, D. Peteet, S. Anthony
- Climate Center, Lamont-Doherty Earth Observatory 2017 - 2019
Birds of a feather: Isotopic analysis to complement GPS tracking of American robins to understand migratory routes and habitat usage
 PIs: Oliver, R.Y. (lead), N.T. **Boelman**
- Catalyst Grant, Columbia University 2017 - present
Reducing the catastrophic effects of Oak Wilt disease through early detection and ecologically sound decision making
 PIs: Griffin, K.L. (lead), N.T. **Boelman**, W. Schuster
- (5 years) NSF - Polar Programs, Arctic Natural Sciences 2016 - 2021
Collaborative Research: Adding animals to the equation: assessing herbivore impacts on carbon cycling in northern Alaska
 PIs: **Boelman**, N.T. (lead), L. Gough, K.L. Griffin, J. McLaren, E. Rastetter, R. Rowe
- (4 years) NASA - Terrestrial Ecology, ABoVE Phase 1 2015 - 2019
Animals on the move: Remotely based determination of key drivers influencing movements and habitat selection of highly mobile fauna throughout the ABoVE study domain
 PIs: **Boelman**, N.T. (lead), G. Bohrer, J. Eitel, M. Hebblewhite, L. Prugh, L. Vierling
- (4 years) NASA - Terrestrial Ecology 2015 - 2019
LiDAR, passive spectral, and ecophysiological approaches to link Forest Tundra Ecotone structure and function
 PIs: Eitel, J. (lead), N. **Boelman**, L. Vierling, K. Griffin
- (2 years) ROADS Grant Provost Ignition Funding Program, Columbia University 2015-2017
Listening to the Arctic Fauna
 Co-PIs: N. **Boelman** and D. Ellis from the Dept. of Electrical Engineering, Columbia University
- (3 years + NCE) NASA - Terrestrial Ecology Program 2013 - 2016
Quantifying thresholds in arctic tundra vegetation structure and ecosystem function using LiDAR and multispectral remote sensing
 PIs: Vierling, L. (lead), N.T. **Boelman**, K.L. Griffin, J. Eitel
- Climate Center, Lamont-Doherty Earth Observatory 2013-2014
Understanding drivers of changing arthropod communities on the tundra as Arctic warming facilitates woody deciduous shrub expansion,
 PI: **Boelman**, N.T.
- Climate Center of Lamont-Doherty Earth Observatory 2011-2012
Using ancient DNA to explore co-variation between migratory songbirds, climate and shrub abundance in Arctic tundra ecosystems from LGM to present
 PIs: **Boelman**, N.T., D. Peteet
- (5 years) NSF-Office of Polar Programs, Arctic Natural Sciences 2010-2014
Collaborative Research: Effects of warming-induced increases in shrub abundance and changing seasonality on migratory songbirds in Alaskan arctic tundra
 PIs: **Boelman**, N.T. (lead), L. Gough, J.C. Wingfield

(3 years) NSF-Office of Polar Programs <i>Fire In the Arctic Landscape: Impacts, Interactions And Links to Global and Regional Environmental Change</i> PIs: Shaver, G.R. <i>plus</i> N.T. Boelman , M.S. Bret-Harte, W.B. Bowden, L.A. Deegan, A.E. Giblin, C.R. Johnson, G.W. Kling, M.C. Mack, E.B. Rastetter, A.V. Rocha	2009-2012
Black Rock Forest Small Grant Consortium Small Grants Program <i>Effects of urbanization on tree physiology using remote sensing</i> PI: Boelman , N.T.	2008
Earth Institute of Columbia University <i>ADVANCE Program Transition Support Grant</i> PI: Boelman , N.T.	2008
Climate Center of the Earth Institute of Columbia University Four separate seed funding awards prior to 2011 PI: Boelman , N.T.	2001, 2003, 2006, 2008

AWARDS

LDEO Excellence in Mentoring Award	Sep 2015
LDEO Excellence in Mentoring Award, Honorable Mention	May 2014
Carnegie Science Department of Global Ecology Postdoctoral Fellow	2005-2006

TEACHING

Course Instructor: Earth's Environmental Systems: The Life System (EESC V2300) <i>Department of Earth and Environmental Science, Columbia University</i>	Spring 2012 Spring 2015 Spring 2016 Spring 2017 Spring 2018
Seminar Instructor: Treeline Structure and Function (EESC G9500) <i>Department of Earth and Environmental Science, Columbia University</i>	Spring 2016
Instructor: Undergraduate student tutorial (EESC W3000)	Fall 2014
Course Instructor: Senior Research Seminar (EESC W3901) <i>Department of Earth and Environmental Science, Columbia University</i>	Spring/Fall 2012 Spring/Fall 2013 Spring 2014
Seminar Instructor: Plant Physiology & Ecology (EESC G9500) <i>Department of Earth and Environmental Science, Columbia University</i>	Fall 2012 Fall/Spring 2013
Seminar Instructor: Arctic Tundra & Climate Change (EESC G9500) <i>Department of Earth and Environmental Science, Columbia University</i>	Fall 2011

POSTDOCTORAL & STUDENT ADVISING

Postdoctoral Scientists:

Scott LaPoint	Fall 2016 – Fall 2018
Shannan Sweet	Fall 2015

Graduate Students:

Dept. of Earth and Environmental Science, Columbia University

Doctoral Thesis Committee Member: Rose Oelkers 2018 - present
Co-advisor for Doctoral Thesis: Elizabeth Min 2017 - present
Primary Doctoral Thesis Advisor: Ruth Oliver 2013 - 2018
Doctoral Thesis Committee Member: Angelica Patterson 2012 - 2018
Primary Doctoral Thesis Advisor: Shannan Sweet 2010 - 2015

Dept. of Ecology, Evolution & Environmental Biology, Columbia University

Doctoral Thesis Committee Member: Shailee Shah Fall 2016 - present
Co-advisor for Doctoral Thesis: Johanna Jensen Fall 2016 - present
Doctoral Thesis Committee Member: Case Prager 2012 - 2017

Department of Forest, Rangeland, and Fire Sciences, University of Idaho

Doctoral Thesis Committee Member: Heather Greaves 2014 - 2017

Undergraduate Students:

Dept. of Earth and Environmental Science, Columbia University

Senior Undergraduate Thesis Advisor: Adam Formica 2012 - 2013
Senior Undergraduate Thesis Advisor: Victoria Diaz-Bonilla 2010 - 2011

Dept. of Ecology, Evolution & Environmental Biology, Columbia University

Senior Undergraduate Thesis Advisor: Megan Wilcots 2017- 2018
Senior Undergraduate Thesis Advisor: Elizabeth Hiers 2017
Senior Undergraduate Thesis Advisor: Jess Gersony 2013 - 2014
Senior Undergraduate Thesis Advisor: Rebecca Gibson 2013
Senior Undergraduate Thesis Advisor: Moyo Ajayi 2013
Senior Undergraduate Thesis Advisor: Lacey Harris-Coble 2012

Dept. of Environmental Science, Barnard College

Senior Undergraduate Thesis Advisor: Irina Mateescu Spring 2019
Senior Undergraduate Thesis Advisor: Elizabeth Tupper 2007 - 2008

LDEO AND COLUMBIA SERVICE

Promotions and Careers Committee 2017 – present
Lamont-Doherty Earth Observatory

Graduate Student Admissions Committee 2017 – 2018
Department of Earth and Environmental Sciences, Columbia University

LDEO representative 2016 - present
Arctic Research Consortium of the United States (ARCUS)

TA Policies Committee 2014 - 2017
Department of Earth and Environmental Sciences, Columbia University

Member of Panel Discussion: Fieldwork on Every Continent, Every Ocean Oct 2012
LDEO Open House Event

Gave public lecture as part of Spring Public Lecture Series April 2011
Spring Public Lecture Series of LDEO

Gave public lecture 2010, 2011, 2014, 2017, 2018
LDEO Open House Event

Hosted exhibit 2007, 2016
LDEO Open House Event

PROFESSIONAL ACTIVITIES

Co-convened AGU conference sessions Dec 2017, 2018, 2019
 ‘The Resilience and Vulnerability of Arctic and Boreal Ecosystems to Climate Change’
American Geophysical Union (AGU) Annual Meeting (Sessions I-VI)

Guest Editor of Special Journal Issue 2017 - present
 ‘Resiliency and Vulnerability of Arctic and Boreal Ecosystems to Environmental Change:
 Advances and Outcomes of ABoVE (the Arctic Boreal Vulnerability Experiment)’
Environmental Research Letters

Working Group lead (appointed) Fall 2015 - present
NASA - Terrestrial Ecology’s Arctic Boreal Vulnerability Experiment (ABoVE)

Science Team member (competitive selection) 2015 - present
NASA - Terrestrial Ecology’s Arctic Boreal Vulnerability Experiment (ABoVE)

Science Definition Team (SDT) member (competitive selection) Feb 2013 - June 2014
NASA - Terrestrial Ecology’s Arctic Boreal Vulnerability Experiment (ABoVE)

Led public presentation and panel discussion Nov 2012
 ‘The Arctic’s response to climate warming: Ecosystems, people and
 impacts on the rest of the planet’
LDEO and Earth Institute of Columbia University & Québec Government Office in New York

Co-convened conference session Dec 2011
 ‘Multi-trophic Level Response to Climate Change in the Arctic Tundra’ (B55)
 Co-convener: Eric Post, Pennsylvania State University
American Geophysical Union (AGU) Annual Meeting

Review journal articles in: *Remote Sensing Environment, Ecology, Global Ecology and
 Conservation, Global Change Biology, Animal Migration, Environmental Research Letters,
 Trends in Ecology and Evolution, Oecologia, Science of the Total Environment, Canadian
 Journal of Remote Sensing, Frontiers in Ecology and Evolution, Polar Biology, Global Ecology
 and Conservation, Animal Migration, Nature Climate Change*

TALKS

1st Town Hall meeting (invited) Jun 2019
*Earth Institute
 Columbia University*

Departmental Seminar (invited) Jan 2018
*Dept. of Ecology, Evolution & Environmental Biology
 Columbia University*

Speaker (invited) Arctic Matters Audience: congressional/federal agencies, NGOs, think tanks, educational institutions, media outlets <i>Polar Research Board, National Academy of Sciences, Washington DC</i>	Jan 2016
Speaker (invited) Wildlife and Ecosystem Services Working Group presentation <i>NASA Terrestrial Ecology's Annual ABoVE Science Team Meeting</i>	2015, 2016, 2017, 2018, 2019
Speaker (invited) Unlocking the Mysteries of the Physical World with Data Science: A Natural Sciences and Data Sciences Interface Workshop <i>Data Science Institute, Columbia University</i>	Sep 2015
Speaker (invited) Ignite Session: Ecology in Earth System Models: What's missing and why is it important? <i>Ecological Society of America (ESA) Annual Meeting</i>	Aug 2015
Colloquium (invited) <i>LDEO</i>	Oct 2014
Seminar (invited) <i>The Cary Institute for Ecosystem Studies, Millbrook, NY</i>	May 2014
Seminar <i>Division of Biology and Paleo Environment, LDEO</i>	Mar 2014
Arctic Long-term Ecological Research (LTER) Station (invited) Annual Meeting <i>Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA</i>	2012, 2013, 2014, 2018
'Topics in 3D - 'Recycle, Rethink, Rebuild' (invited) <i>Parsons The New School for Design, New York, NY</i>	Sep 2012
Departmental Seminar (invited) <i>Dept. of Biological and Environmental Sciences University of Tennessee Chattanooga, Chattanooga, TN</i>	Nov 2011
Workshop on Arctic Issues: Current and future perspectives on research, advocacy and collaboration (invited) <i>Québec Government Office in New York, NY</i>	Apr 2011
Departmental Seminar (invited) <i>Dept. of Ecology, Evolution & Environmental Biology Columbia University</i>	Feb 2010
Panel on Biodiversity and Ecosystem Services in the Arctic (invited) <i>Earth Institute of Columbia University</i>	Dec 2009
Departmental Seminar (invited) <i>Dept. of Ecology, Evolution & Environmental Biology Columbia University</i>	Feb 2007
Departmental Seminar (invited) <i>Dept. of Geography Concordia University, Montreal, QC, Canada</i>	Feb 2006

Departmental Seminar (invited) Mar 2006
Dept. of Geography
York University, Toronto, ON, Canada

Seminar (invited) Jan 2004
Institute for Forest, Snow and Landscape Research (WSL), Zurich, Switzerland

PUBLISHED MEETING ABSTRACTS

Please note that a * denotes that a graduate student in my lab group is lead author.

Black Rock Forest Highlands Research Symposium Jun 2019
Talk title: Vertical gradients in light environment alter carbon balance in White Spruce (*Picea glauca*) at its southernmost and northernmost range extremes
Authors: *Schmiege, S., Griffin, K. **Boelman**, N., Vierling, L., Eitel, J.

NASA Terrestrial Ecology's ABoVE Science Team Meeting May 2019
Poster title: Quantifying socioecological consequences of changing snow and icescapes: A data-model fusion approach (ABoVE Phase 2)
Authors: **Boelman**, N., T. Brinkman, G. Liston, L. Prugh, A. Reinking, P. Mahoney

American Geophysical Union (AGU) Dec 2018
Talk title: Environmental and ecological drivers of American robin (*Turdus migratorius*) migration and habitat selection
Authors: *Oliver, R., P. Mahoney, E. Gurarie, N. Krikun, B. Weeks, M. Hebblewhite, G. Liston, N. **Boelman**

American Geophysical Union (AGU) Dec 2018
Talk title: Large-Scale Synchrony and Climate Drivers of Barrenground Caribou Migration across North America
Authors: Gurarie, E., M. Hebblewhite, N. **Boelman**

American Geophysical Union (AGU) Dec 2018
Talk title: Wolf denning phenology and reproductive success in response to climate signals
Authors: Mahoney, P.J., K. Joly, B. Borg, M. Sorum, H. Golden, T. Rinaldi, D. Saalfeld, D. Latham, B. Mangipane, C. Koizumi, É. Bélanger, M. Hebblewhite, N. **Boelman**, L. Prugh

American Geophysical Union (AGU) Dec 2018
Poster title: Evaluating the potential of fall trends in photochemical reflectance index (PRI) time-series to improve understanding of climate change effects at northern treeline
Authors: Eitel, J., A. Maguire, N. **Boelman**, L. Vierling, K. Griffin, J. Jensen, T. Magney, P. Mahoney, A. Meddens, C. Silva, O. Sonnentag

American Geophysical Union (AGU) Dec 2018
Poster title: Assessing the sensitivity of chlorophyll fluorescence to complex canopy structure at the forest-tundra ecotone of North America: toward remotely sensing light use efficiency dynamics
Authors: Maguire, A., J. Eitel, K. Griffin, T. Magney, N. **Boelman**, L. Vierling, S. Schmiege, S. Bruner, J. Jensen and E. Hiers

- American Geophysical Union (AGU)* Dec 2018
 Poster title: Vertical gradients in physiological function and pigment allocation at the Forest Tundra Ecotone: Implications for scaling up leaf level carbon fluxes in white spruce stands
 Authors: *Schmiege, S., K. Griffin, N. **Boelman**, S. Bruner, J. Eitel
- NASA Terrestrial Ecology's ABoVE Science Team Meeting* Jan 2018
 Poster title: Assessing the Utility of a Temporally Dynamic Wind Index in Alaskan Moose Resource Selection
 Authors: Jennewein, J, P. Mahoney, M. Hebblewhite, A. Meddens, S. Gilbert, L. Vierling, N. **Boelman**, J. Eitel
- NASA Terrestrial Ecology's ABoVE Science Team Meeting* Jan 2018
 Poster title: New tools for environmental annotation of animal movement tracks at the ABoVE domain and beyond.
 Authors: Bohrer, G., S. Davidson, S. LaPoint, N. **Boelman**, M. Wikelski
- NASA Terrestrial Ecology's ABoVE Science Team Meeting* Jan 2018
 Poster title: Developing high-resolution canopy height and digital terrain models using WorldView-2 and ArcticDEM data
 Authors: Meddens, A., L. Vierling, J. Eitel, J. Jennewein, C. Silva, N. **Boelman**, J. White, M. Wulder
- Annual North American Moose Conference* May 2018
 Talk title: Assessing the utility of a spatio-temporally dynamic wind index in Alaskan moose resource selection under thermal stress
 Authors: Jennewein, J., P. Mahoney, A. Meddens, S. Gilbert, M. Hebblewhite, N. **Boelman**, S. Brainerd, K. Joly, K. Jones, T. Paragi, K. Seaton, G. Frye, L. Vierling, J. Eitel
- NASA Terrestrial Ecology's ABoVE Science Team Meeting* Jan 2018
 Poster Title: Arctic warming and Golden eagle migrations: potential for desynchrony between spring and eagle arrival dates
 Authors: LaPoint, S., G. Bohrer, S. Davidson, E. Gurarie, P. Mahoney, N. **Boelman**
- American Geophysical Union (AGU)* Dec 2017
 Authors: Jennewein, J., P. Mahoney, M. Hebblewhite, A. Meddens, S. Gilbert, L. Vierling, N. **Boelman**, J. Eitel
 Poster title: Assessing the Utility of Temporally Dynamic Terrain Indices in Alaskan Moose Resource Selection
- American Geophysical Union (AGU)* Dec 2017
 Talk title: Estimating vegetation height from WorldView-02 and ArcticDEM data for broad ecological applications
 Authors: A. Meddens, L. Vierling, J. Eitel, J. Jennewein, C. Silva, N. **Boelman**, J. White, M. Wulder
- American Geophysical Union (AGU)* Dec 2017
 Talk Title: Golden Eagle Migratory Behaviors in Response to Arctic Warming
 Authors: LaPoint, S., G. Bohrer, S. Davidson, E. Gurarie, P. Mahoney, N. **Boelman**

- American Geophysical Union (AGU)* Dec 2017
 Talk Title: Eavesdropping on the Arctic: Automated Bioacoustics Promises to Untangle Climate-Induced Shifts in Songbird Migration
 Authors: *Oliver, R., D. Ellis, L. Gough, H. Chmura, S. Sweet, N. **Boelman**, J. Krause, J. Perez, J. Wingfield
- American Geophysical Union (AGU)* Dec 2017
 Poster Title: Assessing the Utility of Temporally Dynamic Terrain Indices in Alaskan Moose Resource Selection
 Authors: Jennewein, J., M. Hebblewhite, A. Meddens, S. Gilbert, L. Vierling, N. **Boelman**, J. Eitel
- American Geophysical Union (AGU)* Dec 2017
 Poster Title: Building an archive of Arctic-Boreal animal movements and links to remote sensing data
 Authors: Handler, M., S. Davidson, G. Bohrer, N. **Boelman**
- American Geophysical Union (AGU)* Dec 2017
 Poster Title: Towards lidar-based mapping of tree age at the Arctic forest tundra ecotone.
 Authors: Jensen, J., A. Maguire, R. Oelkers, L. Anreu-Hayles, N. **Boelman**, R. D'Arrigo, K. Griffin, J. Jennewein, E. Hiers, A. Meddens, M. Russell, L. Vierling, J. Eitel
- American Geophysical Union (AGU)* Dec 2017
 Poster Title: Relating structural growth environment to white spruce sapling establishment at the Forest-Tundra Ecotone
 Authors: Maguire, A., N. **Boelman**, K. Griffin, J. Jensen, E. Hiers, D. Johnson, L. Vierling, J. Eitel
- Ecological Society of America (ESA)* Aug 2015
 Talk Title: Adding animals to the equation: Trophic interactions mediate carbon cycling in arctic tundra
 Authors: **Boelman**, N.T., Gough, L., Griffin, K.L., McLaren, J.R., Rastetter, E., Rowe, R.J.
- Ecological Society of America (ESA)* Aug 2015
 Poster Title: Arctic breeding songbirds cope with variability in the timing of spring onset
 Authors: **Boelman**, N.T., Gough, L., Wingfield, J.C., Krause, J.S., Chmura, H.E., Perez, J.H., Asmus, A.L., and S. Sweet, S.
- Ecological Society of America (ESA)* Aug 2015
 Talk Title: Thermal ecology: The influence of tundra vegetation on local thermal environments and the fate of the arctic permafrost
 Authors: Naeem, S., **Boelman**, N.T., Eitel, J.U.H., Gersony, J., Greaves, H., Griffin, K.L., Magney, T.S., Prager, C.A., and L. Vierling
- Ecological Society of America (ESA)* Aug 2015
 Talk Title: Plant diversity effects on carbon cycling in the Arctic
 Authors: *Prager, C.A., **Boelman**, N.T., Greaves, H., Griffin, K.L., Eitel, J.U.H., Magney, T.S., Vierling, L.A., and S. Naeem
- American Geophysical Union (AGU)* Dec 2014
 Poster Title: Greater deciduous shrub abundance extends tundra peak season and increases modeled net CO₂ uptake
 Authors: *Sweet, S.K., Griffin, K.L., Steltzer, H., Gough, L., N. **Boelman**

- Society of Integrative and Comparative Biology's (SICB) Annual Meeting* Jan 2014
 Poster Title: Multi-trophic impacts of shrub dominance on arctic arthropod assemblages
 Authors: Asmus A.L., L. Gough, N.T., **Boelman**, J.C., Wingfield, S.K., Sweet, J.S., Krause, J.H., Perez, H.E., Chmura
- Society of Integrative and Comparative Biology's (SICB) Annual Meeting* Jan 2014
 Poster Title: Interannual variability in arctic phenology and reproductive success in the White-crowned sparrow (*Zonotrichia leucophrys gambelii*) and Lapland longspur (*Calcarius lapponicus*)
 Authors: Chmura, H.E., J.S., Krause, Perez, J.H., S.K., Sweet, A., Asmus, N.T., **Boelman**, L., Gough, J.C., Wingfield
- American Geophysical Union (AGU) Annual Meeting* Dec 2013
 Poster Title: Quantifying shrub encroachment in Alaska using LiDAR
 Authors: Magney, T., H., Greaves, L., Vierling, J., Eitel, J., N.T., **Boelman**, K.L., Griffin, C., Prager, M., Ajayi, R., Gibson
- Society of Integrative and Comparative Biology's (SICB) Annual Meeting* Jan 2013
 Poster Title: Adrenocortical Responses to Stress on the Leading Edge of a Northward Range Expansion in White-crowned Sparrows
 Authors: Krause, J., J., Perez, S., Sweet, A., Asmus, K., Word, M., Rich, J., Schas, L., Gough, N.T., **Boelman**, J.C. Wingfield
- Society for Integrative and Comparative Biology (SICB) Annual Meeting* Jan 2013
 Poster Title: Impacts of Changing Seasonality and Potential for Trophic Mismatches in the Arctic.
 Authors: Krause, J., J., Perez, S., Sweet, A., Asmus, K. Word, M., Rich, J., Schas, L., Gough, J.C., Wingfield, N.T. **Boelman**
- All Scientists Meeting of the LTER Network* Fall 2012
 Poster Title: Quantifying the physiology of structurally complex arctic vegetation and implications for ecosystem function in a shrubbier tundra.
 Authors: *Formica, A., K.L., Griffin, N.T., **Boelman**
- All Scientists Meeting of the LTER Network* Fall 2012
 Poster Title: Effects of increasing shrubs in arctic tundra on associated arthropods and migratory songbirds.
 Authors: Gough, L., N.T., **Boelman**, J.C., Wingfield, J., Krause, S., Sweet, M., Rich, A., Asmus
- American Geophysical Union (AGU) Annual Meeting* Dec 2011
 Talk Title: Trophic matches in Northern Alaska: Existing synchrony among climate, vegetation, arthropods and migratory songbirds
 Authors: **Boelman**, N.T., L., Gough, J.C., Wingfield

PH.D. ADVISORS

Marc Stieglitz (Lamont-Doherty Earth Observatory (now at Georgia Institute of Technology))

Kevin Griffin (Dept. of Earth & Environmental Sciences, Columbia University)

Christopher Small (Lamont-Doherty Earth Observatory, Columbia University)

POSTDOCTORAL ADVISORS

Gregory Asner (Dept. of Global Ecology, Carnegie Institution, now at Arizona State Univ.)

Christopher Field (Dept. of Global Ecology, Carnegie Institution, now at the Stanford Woods Institute, Stanford Univ.)