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Founder and Director of SpecNet

<http://specnet.info>

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SHORT BIOGRAPHY

In my research, I study the "breathing of the planet" - the exchanges of carbon and water vapour between the biosphere and the atmosphere that affect ecosystem productivity and help regulate our atmosphere and climate. Of particular interest are the effects of disturbance (fires, succession, weather events and climate change) on these basic processes. Additional research involves the detection of plant physiology, ecosystem function, species composition, and biodiversity using non-contact sampling methods. Much of this work is done with optical monitoring (remote sensing and automated field methods), and entails the development of new monitoring methods and related informatics tools. To facilitate optical monitoring of photosynthesis, I pioneered the use of the relationship between leaf xanthophyll cycle pigment content and spectral reflectance, and developed new optical sampling instruments. To encourage wider usage of these methods, I co-founded SpecNet, (Spectral Network), a network of collaborating sites and investigators using optical sampling methods to study ecological questions. As an active researcher overseeing several field projects, my field sites have covered a range of ecosystems from the Arctic to the Tropics.

UNIVERSITY AND POST-DOCTORAL EDUCATION

<u>Degree</u>	<u>Institution</u>	<u>Year</u>
Post-Doctoral, Remote Sensing & Ecophysiology	Carnegie Institution, Stanford, CA Advisor: Dr. Christopher Field	1989-1991
Ph.D., Botany	University of California, Davis, CA Advisor: Dr. Robert Pearcy	1989
M.S., Botany	University of California, Davis, CA Advisor: Dr. Robert Pearcy	1986
B.S., Biology	Yale University, New Haven, CT	1979

FACULTY APPOINTMENTS:

2016 – present	Professor, University of Nebraska, School of Natural Resources, Lincoln, NE
2013 – 2016	Adjunct Professor, School of Natural Resources, Univ. of Nebraska, Lincoln, NE
2008 – present	Professor, Departments of Earth & Atmospheric Sciences & Biological Sciences, University of Alberta, Edmonton, Canada. (currently on leave)
2006 – 2007	iCORE Visiting Professor, Department of Earth & Atmospheric Sciences, University of Alberta, Edmonton, Alberta, Canada. (summer 2006 & summer 2007, with a focus on “EcoInformatics”).
2001 – 2008	Professor, Department of Biological Sciences, California State University, Los Angeles, California.
June – Aug 2005	Letter of Appointment, Division of Earth and Ecosystem Sciences, Desert Research Institute, Reno Nevada.
2000 – 2002	Adjunct Associate Professor, Biological Sciences Center, Desert Research Institute, Reno, Nevada.
1996 – 2001	Associate Professor, Department of Biological Sciences California State University, Los Angeles, California.
1991 – 1996	Assistant Professor, Department of Biological Sciences California State University, Los Angeles, California.

RESEARCH ACTIVITIES & PROFESSIONAL LEADERSHIP

Ecosystem metabolism - I have been applying my training as a plant ecophysiologicalist to the study of whole ecosystem responses to disturbance (both anthropogenic and natural), with a particular emphasis on the metabolic processes that comprise the “breathing of the planet” (photosynthesis, respiration, and evapotranspiration). My research group has been developing optical remote sensing methods and automated monitoring techniques for real-time monitoring of these fundamental ecosystem processes. Key activities have been the development of robotic carts (“tram system”) for ecosystem optical sampling, the installation of *in situ* sensor networks for ecosystem monitoring, and the application of novel remote sensing approaches using hyperspectral (narrow band) spectrometry. We have applied these methods in the southwestern US (where drought, fire, and human disturbance have a large impact on ecosystem processes), and in northern Alaskan and Canadian ecosystems (where the climate is rapidly warming, and altering ecosystem-atmosphere gas exchange). We have also applied these methods to the dry tropical forests of Latin America. Through international networks (e.g. SpecNet, EuroSpec), I encourage collaborative applications of these methods for cross-ecosystem analyses.

Biodiversity and Functional Types - Another emphasis of my research has been the application of optical remote sensing to assess biodiversity and detect distinct “functional types” of vegetation. The basic hypothesis is that functionally different vegetation types (species or functional types) express those differences in their structure, physiology, and phenology in ways that can be detected by sensitive optical remote sensing methods. My lab group has been applying novel remote sensing tools (e.g. hyperspectral methods) to detect subtle structural and physiological signals that were previously inaccessible by remote sensing, providing new methods to assess species diversity and functional diversity using remote sensing.

Ecoinformatics & Cyberinfrastructure - An emerging focus of my research involves the systems for collecting, transmitting, and ultimately storing, retrieving, analyzing, and visualizing large, complex ecological datasets. In collaboration with the National Center for Ecological Analysis and Synthesis (NCEAS), SpecNet, EuroSpec and other groups, I have worked to establish “intelligent” databases that integrate spectral data with image data, flux tower data, and ecological field data. We also had collaborations with HPWREN, an NSF-funded center applying wireless technology to ecosystem sampling (see <http://hpwren.ucsd.edu/news/051012.html> for an example). A remaining goal is to develop web-based visualization tools for real-time monitoring of remote ecosystems in teaching and research.

SpecNet (Spectral Network) – One of my primary collaborative research efforts in the past several years has been to improve the use of remote sensing and optical sampling tools for ecological questions. To this end, I founded SpecNet (Spectral Network, <http://specnet.info>), an international network of collaborating investigators that apply multi-scale optical sampling methods (spectral reflectance), mostly at flux tower sites (FLUXNET sites) around the world. Starting in 2003, with initial funding from the National Center for Ecological Analysis & Synthesis (NCEAS), I have organized several SpecNet workshops and working group meetings, which have encouraged similar regional efforts (e.g. EuroSpec and a similar working group at the Australian Centre for Ecological Analysis & Synthesis). A primary SpecNet goal is to improve our understanding of the controls on ecosystem-atmosphere carbon fluxes (the “breathing of the planet”). A key objective has been to test the hypothesis of complementary controls on carbon fluxes across ecosystems. SpecNet promotes standardized protocols and informatics approaches needed to facilitate cross-ecosystem comparisons – a notoriously difficult informatics challenge. SpecNet also develops methods for integrating optical (e.g. spectral reflectance and remote sensing) data with ecosystem gas flux and other ecological data. These efforts are now facilitating cross-ecosystem analysis of carbon flux and satellite validation, and are spurring new approaches to assessing functional diversity. Since its inception in 2003, SpecNet has grown into a network of over 40 sites around the world where the tools of remote sensing and spectral reflectance are being applied as proxies for a variety of ecological variables, including carbon fluxes, water vapor fluxes, and measures of vegetation cover, species composition & biodiversity. In 2006, we produced a special issue of *Remote Sensing of Environment*, and have since facilitated the development of similar regional networks (e.g. EuroSpec) in other parts of the

world. SpecNet is now a non-profit corporation in California (I am the current CEO). Recent activities have included a call for proposals, jointly sponsored with Decagon Inc. (Pullman, Washington) to develop a global network of standardized optical sensors (NDVI and PRI sensors) for monitoring carbon uptake and validate satellite signals at flux tower sites. This call received approximately 90 applications from around the world, and we are now implementing this network at selected sites representing contrasting biomes in 2015. Additionally, with NASA support (via a subcontract from the University of Wisconsin), SpecNet has an active role in developing “spectral data systems” for handling the large volumes of optical data now being collected from collaborating sites around the world. To support this informatics effort, SpecNet now offers travel and research stipends to investigators interested in contributing code and data to this effort. SpecNet holds periodic open scientific meetings, with an annual board meeting at the Fall AGU meeting (San Francisco). For further information on SpecNet, please visit <http://specnet.info>.

NorthSTAR – With several colleagues, I have developed a network of arctic sites (NorthSTAR) where optical sampling is used in conjunction with studies of surface-atmosphere feedbacks (trace gas fluxes and energy balance). NorthSTAR provides technical tests of new automated sensors in harsh environments, and network data is delivered to an online database via satellite links. This study is starting to reveal new interpretations of optical signals that contradict some of the assumptions about arctic responses to climate change. For example, we have found that standing water often confounds satellite NDVI signals, and that surface drying may be leading to a “false greening” signal, at least for some coastal arctic sites. My goal is to continue developing this collaborative network with the addition of new Canadian arctic sites planned for 2015.

Biospheric Carbon Network – one goal of these optical sampling networks has been to develop the technology for near-real-time monitoring of carbon flux using a combination of satellite sensors, surface optical sensors, and flux measurements. To this end, I started the Biospheric Carbon Network (<http://biosphericcarbonnetwork.org/>) with the goal of developing a unified metric relating ecosystem carbon fluxes and stocks (the Biospheric Carbon Index) using inputs from multiple data sources. This effort aligns closely with other similar efforts (e.g. FLUXNET), and is likely to be an expanded effort for the next several years.

TROPI-DRY is a network of investigators and sites in the dry tropical forests of Latin America, funded by the Inter-American Institute (PI: Dr. Arturo Sanchez). The goal of the network is to spur research in the dry tropical forests, an area of high biodiversity, high human impact, and high conservation need. The program applies ecological remote sensing, and social science approaches to gain an integrated understanding of these critical ecosystems. From 2005 to 2010, I was an active participant in this international research effort, both as a member of the Science Steering Committee, and as a Co-Investigator in the Ecology and Remote Sensing teams within TROPI-DRY. (For further information on TROPI-DRY, please visit <http://tropi-dry.eas.ualberta.ca>.)

Sustainability - Increasingly, my attention is turning toward applying scientific knowledge to improved public policy, with a primary focus on ecological sustainability. My research group’s work in this area has included ecosystem monitoring, restoration, and integration of ecological information with social science and economics. In Los Angeles, I have worked closely with public agencies (e.g. US National Park Service) and local grassroots organizations (e.g. North East Trees, Arroyo Seco Foundation, etc.) to assist in managing public resources in the Los Angeles area, and to incorporate more science into management decisions. Currently, I am working with stakeholders in Alberta, including ranchers and the agricultural insurance industry, to address land-use impacts on crop yield and carbon sequestration.

GRANT ACTIVITIES:

GRANTS AWARDED TO OTHERS:

“SpecNet-Decagon Optical Sensor Network” – via SpecNet, and in collaboration with Decagon Inc (Pullman WA), I coordinated a call for proposals for an optical sensor network. We reviewed approximately 90 applications and awarded 9 applications with optical sensors (SRS, Decagon Inc.) for monitoring vegetation optical properties at flux tower sites.

“SpecNet Fellowships” – currently, SpecNet is offering fellowships to successful applicants for deliver of data and software tools related to SpecNet science objectives.

CURRENT GRANT AWARDS:

“Evaluating growing season length and productivity across the ABoVE Domain using novel satellite indices and a ground sensor network. NASA ABoVE Program, (Terrestrial Ecology), \$676,471 (managed via U Nebraska, Lincoln).

“The functional significance of plant optical diversity: a multi-scale analysis” NSERC Discovery Grant \$105,000 (2015-2020).

“Quantifying the carbon balance of Mattheis Ranch” Rangeland Research Institute (University of Alberta). \$40,000 (2015-2017).

"Environmental Monitoring for Canadian Ecosystems" - funding to develop and implement environmental monitoring capacity for Canadian ecosystems, Alberta Innovates Technology Futures \$150,000 (2014-2016)

“Linking remotely sensed optical diversity to genetic, phylogenetic, and functional diversity to predict ecosystem processes.” Dimensions Program: US National Science Foundation (NSF), and US National Aeronautics and Space Administration (NASA) \$2,000,000 (2014-2019) – PI: J. Cavender-Bares (U. Minnesota). (My involvement via U. Nebraska – Lincoln).

“Ecological Spectral Information System (EcoSIS): Integration of Spectral Data with Measurements of Vegetation Functional Traits” US National Aeronautics and Space Administration (NASA Terrestrial Ecology) (\$75,000, 2013-2016 – PI: P. Townsend (U. Wisconsin). (My involvement via SpecNet).

RECENT GRANT AWARDS (2006 – 2014)

“ENVIRO-NET: Sensing our Changing Environment” Canadian Foundation for Innovation. (\$250,000 per year, 2009-2013) – PI: A. Sanchez/ Co-PI: J. Gamon

“A scaleable optical sensor network for ecosystem health” Canadian Foundation for Innovation (\$250,158, 2010-2014)

“Baseline carbon monitoring for rangeland carbon sequestration” Rangeland Research Institute, University of Alberta (\$20,000, 2012-2013)

“Observing Functional Change in Canadian Arctic Ecosystems” Churchill Northern Studies Centre Northern Research Fund (approx. \$700 per year in in-kind support, 2010 - 2013).

“Imaging Spectrometry & Cyberinfrastructure for Biospheric Carbon Monitoring” iCORE Scholar Program (\$450,000, 2010-2013)

- “Observing Functional Change in Canadian Arctic & Boreal Ecosystems” NSERC/Discovery Award, Canada (\$150,000, 2019-2014)
- “Estimating Pasture Productivity in the Mixedgrass Prairie Combining Intensive Physical and Optical Ground Sampling with NDVI from Satellite Imagery.” Agricultural Financial Services Corporation/Satellite Insurance Programme, Canada (\$45,460)
- “Ecoinformatics for Biospheric Carbon Sequestration” Canada-California Strategic Innovation Partnership (\$100,000)
- “A Network Enabled Platform for Earth Observation Scientists.” Netera/Cybera Network Enabled Platforms, Canada (PIs Drs. G. Arturo Sanchez-Azofeifa and Rob Simmonds) (\$1,300,000)
- “Estimating Pasture Productivity in the Mixedgrass Prairie Combining Intensive Physical and Optical Ground Sampling with NDVI from SPOT5 Imagery.” Agricultural Financial Services Corporation/Satellite Insurance Programme, Canada (\$28,598)
- “Biocomplexity Associated with the Response of Tundra Carbon Balance to Warming and Drying across Multiple Spatial and Temporal Scales” subcontract from Dr. Walt Oechel, San Diego State University - NSF Biocomplexity Program, USA (\$100,000)
- “SpecNet: Proposal for an NCEAS Working Group” - National Center for Ecological Analysis & Synthesis, USA (\$60,150)
- “TROPI-DRY” Co-Investigator (PI: Dr. G. Arturo Sanchez). (\$1,000,000 from the Inter-American Institute, with \$1,500,000 in matching funds from the University of Alberta, Canada, and other countries).

RECENT GRANT PANEL SERVICE:

SpecNet – Organized reviews for SpecNet-Decagon call for proposals: “An optical sensor network for photosynthetic assessment.” Sponsored by SpecNet and Decagon Inc.
National Science Foundation (NSF) – several review panels
NASA – several review panels (Terrestrial Ecology focus)

INVENTIONS:

Leaf Reflectometer – I developed the first "leaf reflectometer," (Gamon and Surfus, 1997) which was the basis for a commercial version (UniSpecSC) now sold by PP Systems (Amesbury, MA, USA). Other companies, including Analytical Spectral Devices and Ocean Optics have incorporated elements of this design, which allows rapid field sampling of leaf reflectance spectra.

Dual-detector spectrometer - I worked closely with PP Systems (Amesbury MA) to develop a dual-detector spectrometer (UniSpec, DC, PP Systems, Amesbury MA) for automated monitoring of ecosystem optical properties using towers or robotic platforms (“tram system” – Gamon et al., 2006b). Dual-detector spectrometers offer the benefit of correcting for sky conditions, facilitating accurate optical monitoring in parts of the world (e.g. the Arctic and Tropics) where frequent cloud cover precludes accurate remote sensing. Similar instruments have now been used at several SpecNet sites around the world for monitoring ecosystem metabolism and phenology.

Tram system – My research group has developed a “tram system” (Gamon et al., 2006b) consisting of a robotic cart on a track for monitoring whole-ecosystem surface properties (e.g. spectral reflectance, surface temperature related to biosphere-atmosphere gas fluxes).

RECENT SERVICE & OUTREACH:

- 2016 Joined editorial boards for *Remote Sensing of Environment* (Editorial Board Member), & *Frontiers in Plant Science* (Review Editor in Plant Abiotic Stress)
- 2014 “Featured Expert” for classroom Q&A session on the “Breathing of the Earth”, Live-streamed to nine classrooms in Nunavut, Ontario, Alberta and British Columbia, Canada. “Virtual Researcher on Call” program, sponsored by Partners in Research.
- 2008 - present Advisory Board Member, CyberShARE, University of Texas, El Paso
- 2008 - present Member, HypsIRI Science Study Group, NASA
- 2005 – 2008 Member of Board of Directors, North East Trees, a Non-profit community organization dedicated to urban forestry, restoration, and parkland construction in Los Angeles.
- 2005 & 2007 Provided a series of public lectures on Global Change as part of a public lecture series on science and religion, Neighborhood Church, Pasadena, CA.
- 2005 Participating Scientist in “Climate Science Education Day” (April 27, 2005), a science lobbying effort in Sacramento sponsored by the Union of Concerned Scientists, with the goal of encouraging lawmakers to sponsor greenhouse gas caps and other climate-change related initiatives.

SELECTED PRESENTATIONS (2006 - PRESENT):

Nov 2016	“Revealing photosynthetic phenology through pigment dynamics.” ISSI Workshop on “Exploring the Earth’s ecosystems on a global scale: requirements, capabilities and directions in space-borne imaging spectroscopy.” Bern , Switzerland
Aug 2016	“Integrated assessment of biodiversity and productivity using airborne imaging spectrometry.” Ecological Society of America (ESA) Meeting, Fort Lauderdale, FL
Dec 2015	“Integrating flux, satellite, and proximal optical data for an improved understanding of ecosystem carbon uptake.” American Geophysical Union (AGU) Meeting, San Francisco, CA
Oct 2015	“Assessing <i>Biodiversity</i> and <i>Productivity</i> with Imaging Spectrometry.” NASA HypsIRI Meeting, Pasadena, CA
July 2015	“Watching the Earth breathe: remote sensing of productivity and biodiversity.” Cedar Creek Ecosystem Science Reserve (University of Minnesota), Minnesota
June 2015	“Vegetation spectral measurements and field data collections in support of HypsIRI.” NASA HypsIRI Meeting, Goddard Space Flight Center, Greenbelt, Maryland
June 2015	“Remote sensing of ecosystem processes and functional diversity.” NASA-EcoSIS project meeting, Madison, WI
May 2015	“Watching the Earth breathe: remote sensing of photosynthesis & biodiversity.” University of Western Ontario, London, Ontario, Canada
April 2015	“Looking at grassland carbon storage: how can remote sensing help?” Grassland Carbon Workshop, Rangeland Research Institute, Edmonton, Alberta, Canada
April 2015	“Applications of point & imaging spectrometry to studies of plant functional diversity.”

	EARSEL Meeting, Brussels, Luxembourg (poster)
Dec 2014	“Is the Arctic really greening?” American Geophysical Union (AGU) Meeting, San Francisco, CA
Dec 2014	“Can vegetation optical types help address plant-climate interactions?” AGU Meeting, San Francisco, CA
Nov 2014	“Distinguishing plant functional traits with mobile imaging spectrometry.” American Society of Agronomy, Long Beach, CA
Oct 2014	“Exploring biodiversity through optical diversity.” NASA HypSIRI Meeting, Pasadena, CA
July 2014	“Spectral data systems for field spectrometry.” Tutorial, IGARSS Meeting, Quebec City, Quebec, Canada
May 2014	“The Photochemical Reflectance Index (PRI).” Webinar, Decagon Inc., Pullman WA
May 2014	“A new look at northern photosynthesis: monitoring changing productivity in northern terrestrial biomes.” Campbell Lecture, Washington State University, Pullman, WA
Dec 2013	“Observing dynamic Arctic surface optical properties with an optical sensor network (NorthSTAR). American Geophysical Union, San Francisco, CA
NOV 2013	“SpecNet: Addressing small- and big-scale questions with a global optical network.” EuroSpec Meeting, Trento, Italy.
NOV 2013	“Monitoring changing arctic photosynthesis and productivity with optical remote sensing.” University of Zurich
Oct 2013	“Optical detection of season length & photosynthetic activity in evergreens.” NASA HypSIRI Meeting, Pasadena CA.
June 2013	“Hyperspectral applications: past, present and future.” Amethyst Meeting, U. Lethbridge, Alberta
April 2013	“Carbon Uptake at Mattheis Ranch” Duchess, Alberta
Dec 2012	“The Photochemical Reflectance Index (PRI) 20 years later: what have we learned? AGU Meeting, San Francisco, CA.
Dec 2012	“Remote sensing of carbon fluxes: what can bottom-up approaches provide?” AGU Meeting, San Francisco, CA.
Oct 2012	“Seasonal changes in evergreen leaf reflectance: implications for optical estimation of photosynthetic rate.” Leaf Optics Meeting, Eberburg, Germany.
Oct 2012	A Short History of PRI (<i>Photochemical Reflectance Index</i>). Univ. of Zurich, Switzerland.
Nov 2012	“Vegetation responses and feedbacks to climate change” University of Toronto
Sept 2012	“Sensing our multi-colored world: Plant pigments as functional indicators.” University of Nebraska, Lincoln, Nebraska
July 2012	“SpecNet: Linking Remote Sensing to Carbon Flux,” CREAM, Universitat Autònoma de Barcelona, Barcelona, Spain
June 2012	“SpecNet: Scope, Progress & Future Plans,” COST Meeting, Madrid, Spain
June 2012	“The SpecNet Perspective on BioOptical Data,” Australian Centre for Ecological Analysis & Synthesis, Brisbane, Australia
June 2012	“Linking Optical to Flux Data: Best Practices for Field Optical Sampling in the Context of Carbon Flux Measurements,” Canadian Society for Remote Sensing, Ottawa

Oct 2011	“Watching the Earth Breathe,” ATLAS Seminar Series, University of Alberta
June 2011	“SpecNet Overview,” FLUXNET meeting, Berkeley, California
Jan 2011	“SpecNet & Protocols for Optical Sampling COST Meeting, Hyytiala, Finland
Jan 2011	“Integrating Remote Sensing and Flux Measurements with Optical Sampling, COST Meeting, Hyytiala Finland
Aug 2010	“Integrating Remote Sensing with Optical Sampling,” Botanical Society of America, Providence, Rhode Island (Special session in honor of Graeme Berlyn)
Aug 2010	SpecNet: An Evolving Collaborative Network for Vegetation Spectral Analysis, Botanical Society of America, Providence, Rhode Island (Special session in honor of Graeme Berlyn)
Nov 2010	“NorthSTAR – a network for monitoring ecosystem carbon uptake and phenology in northern ecosystems.” Understanding Circumpolar Ecosystems in a Changing World, Edmonton, Alberta
Nov 2010	“Microtopographic effects on vegetation cover and productivity in arctic tundra,” Understanding Circumpolar Ecosystems in a Changing World, Edmonton, Alberta
Oct 2010	“Our Changing Arctic: Environmental & Social Impacts,” Polar Impact Conversation Series, University of Alberta Edmonton, Alberta
Dec 2009	“What’s Your Angle? Using Sun Angle & Look Angle to Improve Carbon Flux Estimates from Optical Remote Sensing. American Geophysical Union, San Francisco
Aug 2009	“Ecosystem Response to Disturbance” NASA HypsIRI Workshop, Pasadena, California
July 2009	“Estimating pasture production in the Mixedgrass Prairie combining intensive physical and optical ground sampling with NDVI from SPOT5 imagery” Satellite Insurance Industry Conference, Calgary, Alberta
June 2009	“SpecNet Workshop – Introduction” – Canadian Society of Remote Sensing, University of Lethbridge, Alberta
March 2009	“Estimating Yield with Optical Remote Sensing” Agricultural Financial Services Corporation, Lacombe, Alberta
Oct 2008	“Biogeochemical Cycles” NASA/HypsIRI Workshop, Monrovia, California
Sept 2008	“SAON & cyberinfrastructure” Sustaining Arctic Observation Networks Meeting, Edmonton, Alberta
July 2008	“SpecNet” – Toolik Lake, Alaska
Mar 2008	“Living on the Red Edge: Integrating Remote Sensing with Carbon through FLUXNET and SpecNet” Canadian Carbon Programme Meeting, Calgary, Alberta
Nov 2007	“Global Change” (Series of 3 lectures) – Neighborhood Church, Pasadena, California
Sept 2007	“The Earth’s Changing Carbon Cycle” University of Alberta, Edmonton, Alberta
Feb 2006	“Watching the Earth Breathe: Monitoring photosynthesis, respiration, and evapotranspiration with optical remote sensing” University of Alberta, Edmonton, Canada.
Mar 2006	“Watching the Earth Breathe” University of Lund, Sweden.
Mar 2006	“Watching the Earth Breathe: Multi-scale optical sampling for assessing carbon and water vapor flux” Umea, Sweden. (Keynote presentation, NECC Meeting).
Mar 2006	“SpecNet: Linking optical sampling to flux measurements” Umea, Sweden, NECC Meeting.

Sept 2006	“EcoInformatics - can it help us with the BIG questions in ecology?” University of Alberta, Edmonton, Canada.
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COLLABORATORS: Recent Collaborators and Co-Authors or Co-Editors

- Joseph Berry, Carnegie Inst., Stanford, CA
- Torben R. Christensen, Sweden
- Jennifer Dungan, NASA Ames, CA
- Lynn Fenstermaker, Desert Research Inst., NV
- Chris Field, Carnegie Institution, Stanford CA
- Vince Gutschick, New Mexico State U.
- Steven J. Hastings, CIBNOR, Mexico
- Alexander Held, CSIRO, Australia
- K. Fred Huemrich, NASA GSFC, MD
- Arturo Sanchez, U. Alberta, Canada
- Lee Vierling, University of Idaho, Moscow
- Craig E. Tweedie, Univ. of Texas, El Paso
- Susan Ustin, Univ. of California, Davis
- Gus Shaver, Woods Hole, Massachusetts
- Mario Tenuta, U. Manitoba
- Larry Flanagan, U. Lethbridge
- Barbara Bond, Oregon State Univ., Corvallis
- Walt Oechel, San Diego State Univ., CA
- Andrew Oliphant, San Francisco State U., CA
- Josep Peñuelas, UAB, Barcelona, Spain
- Hong-lie Qiu, Cal. State Univ., Los Angeles
- A. Faiz Rahman, Indiana University, Bloomington, IN
- Dan Sims, Ball State University, Muncie, IN
- Cesar A. Salinas-Zavala, CIBNOR, Mexico
- Lydia Serrano, Barcelona, Spain
- Nicholas Coops, University of British Columbia
- Joerg Sander, University of Alberta, Canada
- Crist Khachikian, Cal. State Univ., L.A.
- Kaoru Kitajima, Univ. of Florida, Gainesville
- Peter LaFleur, Trent University
- Elyn Humphreys, Carlton University
- David Hik, University of Alberta
- Mauricio Quesada, UNAM, Morelia
- Loris Vescovo, Fondazione Edmund Mach, Italy
- Phil Townsend, U. Wisconsin
- Art Zygielbaum, U. Nebraska
- Jeannine Cavender-Bares, U. Minnesota

THESIS ADVISOR AND POSTGRADUATE-SCHOLAR SPONSOR:

(Note that my previous campus, California State University LA, lacked a PhD program)

PRIMARY THESIS ADVISOR:

Former Master's Students (Cal State University, LA): Lidia Yoshida, Linda Flower, Miriam Schmidts, Eric Yi, Brian Zutta, Stan Houston, Andrew Moyes, Becky Harper, Dwight Beltz

Former Master's Students (University of Alberta): Donald Wehlage, Saulo Castro, Evan DeLancey, Chris Wong

Former Ph.D. Students (University of Alberta): Scott Williamson

Current Ph.D. Students (University of Alberta): Ran Wang

Current Master's Students (University of Alberta): Kyle Springer

Thesis Committee Member (University of Alberta):

At the University of Alberta, I have served on the Supervisory Committees for six Ph.D. students

Visiting Ph.D. Students (Cal State LA): Iolanda Filella, Lydia Serrano, Cat Stylinski

Visiting Ph. D. Students (University of Alberta): Christine Laney, Emmanuelle Frechette, Karolina Sakowska, Enrica Nestola

Sponsored Postdoctoral Scholars:

Hamed Golizadeh (2006-present, co-supervised with A. Zygielbaum, U. Nebraska - Lincoln)
 Gabriel Hminina (2016-present, U. Nebraska - Lincoln)
 Rong Yu (2016-present, U. Nebraska - Lincoln)
 Scott Williamson (2016-2017, U. Alberta)
 Craig Emmerton (2015, U. Alberta)
 Gilberto Zonta Pastorello (2011-2013, U. Alberta)
 Baljeet Malhotra (2010, U. Alberta)
 Yufu Cheng (2003 – 2006, Cal State LA)
 Dan Sims (1998 – 2003, Cal State LA)
 Abdullah Rahman (1998-2000, Cal State LA)

UNDERGRADUATE STUDENT MENTORING:

In addition to the graduate students and post-doctoral scholars listed above, I have provided research experiences or research support for 54 undergraduate students in the USA since 1991, largely through EPA, NSF, and NASA grants, and 16 undergraduate students in Canada since 2008, through three research grants (NSERC, iCORE-AITF and AFSC). Four undergraduates have completed honors theses, and several have been authors or co-author on papers (see publications, below).

COURSES TAUGHT

CALIFORNIA STATE UNIVERSITY, LOS ANGELES

Intro. to Biology I (BIOL 100A)*
 Principles of Biology I (BIOL 102)
 Biometrics (BIOL 300)
 Ecology (BIOL 360)
 Global Change (BIOL 420)*
 Plant Physiology (BIOL 430)
 Methods & Instrument. Envir. Sci. (BIOL 454)*
 Plant Ecology (BIOL 462)
 Departmental Seminar (BIOL 510)
 Plant Ecophysiology (BIOL 538)*

UNIVERSITY OF NEBRASKA - LINCOLN

Field Techniques in Remote Sensing
 (NRES/GEOG 421/821) – Spring 2017

UNIVERSITY OF ALBERTA

Planet Earth (EAS 100)
 Principles of Ecology (BIOL 208)
 Biogeography (EAS250)
 Global Change & Ecosystems (BIOL 384)*
 Global Change (EAS 457)
 Remote Sensing (EAS 451/585)
 Topics in Earth Observation Sci (EAS 452)
 Graduate Reading Course (EAS 520)
 Ecosystem Physiology (BIOL 495/595)*

**Indicates new courses developed*

PUBLICATIONS:**Peer-Reviewed Publications** (*asterisks indicate student authors or co-authors)

- Gitelson A, Gamon JA, Solovchenko A (2017) Multiple drivers of seasonal change in PRI: Implications for photosynthesis. 1. Leaf level *Remote Sensing of Environment*. 191:110-116. <http://dx.doi.org/10.1016/j.rse.2016.12.014>
- Gitelson A, Gamon JA, Solovchenko A (2017) Multiple drivers of seasonal change in PRI: Implications for photosynthesis. 2. Stand level *Remote Sensing of Environment*. 190:198-206. <http://dx.doi.org/10.1016/j.rse.2016.12.015>
- *Williamson SN, Hik DS, Gamon JA, Jarosch AH, Anslow FS, Clarke G, Rupp, S (2017) Spring and summer monthly MODIS LST is inherently biased compared to air temperature in snow covered sub-Arctic mountains. *Remote Sensing of Environment*, 189 (2017) 14–24. <http://dx.doi.org/10.1016/j.rse.2016.11.009>.
- *Wehlage DC, Gamon JA, Thayer DR, Hildebrand D (2016) Interannual variability in dry mixed-grass prairie yield: a comparison of MODIS, SPOT, and field measurements. *Remote Sensing*. 8, 872; [doi:10.3390/rs8100872](https://doi.org/10.3390/rs8100872).
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