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EDUCATION

- 2011-12 Fellow in Sustainability Science, Kennedy School of Government, Harvard University, Cambridge, MA, USA. Advisor: Dr. Holbrook.
- 2006-12 Ph.D. in Biology, Stanford University, Stanford, CA, USA. Co-advisors: Dr. Field and Dr. Asner. Committee: Dr. Dirzo and Dr. Vitousek. DOE GCEP Mentor: Dr. Davidson. Dissertation: *Forest dynamics across temporal and spatial scales*.
- 2002-05 M.S. in Forest Resources and Conservation, University of Florida, Gainesville, FL, USA., Specialization in tropical forestry. Advisor: Dr. Zarin. Committee: Dr. Binford and Dr. Putz. Thesis: *Assessment of temporal and spatial dynamics of forest disturbances resulting from selective logging in lowland Bolivia through sub-pixel analysis of multi-temporal remotely sensed imagery*.
- 1996-00 B.A. in Botany, University of Vermont, Burlington, VT, USA. Specialization in tropical botany. Advisor: Dr. Barrington. Minor in English, specialization in publication and design. Thesis: *Congenera niche partitioning between two Ericaceous epiphytes within the phorophyte tree Conostegia oerstediana in a cloudforest in Monteverde, Costa Rica*.
- 1998-99 Tropical Ecology and Conservation semester, Monteverde Biological Institute, Council on International Educational Exchange, Costa Rica. Advisors: Drs. Masters.
- 1996 Hazen Union High School, Hardwick, VT, USA.

RESEARCH INTERESTS

Tropical forest ecology, including selective logging and restoration - Remote sensing, including hyperspectral imaging and LiDAR, from satellites, aircraft and unmanned aerial vehicles (UAV) - Conservation biology, focused on human-wildlife interactions - Ecosystem ecology – Geospatial analyses, including forest fragmentation and connectivity, Landscape simulation models, and land use and land cover change – New geospatial technology, including soundscapes and camera traps.

AFFILIATIONS

- 2016 + Assistant Professor of Forest Ecology and Geomatics, Spatial Ecology and Conservation Lab, School of Forest Resources and Conservation, University of Florida, Gainesville, FL, USA. www.speclab.org
- 2016 + Co-director, GatorEye Unmanned Flying Laboratory (GE-UFL), University of Florida, Gainesville, FL, USA. www.gatoreye.org

- 2016 + Affiliate Faculty, Tropical Conservation and Development Program, University of Florida, Gainesville, FL, USA.
- 2016 + Informatics Committee Faculty, Organization for Tropical Studies (OTS), Costa Rica.
- 2016 + Affiliate Faculty, Water Institute, University of Florida, Gainesville, FL, USA.
- 2016 + Affiliate Faculty, Land Use and Environmental Change Institute (LUECI), University of Florida, Gainesville, FL, USA.
- 2016 + Affiliate Faculty, Center for Remote Sensing, University of Florida, Gainesville, FL, USA.
- 2014 + Adjunct Faculty, Department of Biology, University of Alabama, Tuscaloosa, AL, USA. biology.ua.edu
- 2014 + Faculty affiliate, Center for Freshwater Studies, University of Alabama, Tuscaloosa, AL, USA. cfs.as.ua.edu
- 2014 + Affiliated Researcher, Stanford Woods Institute for the Environment, Stanford University, CA, USA. inogo.stanford.edu / inogo.info
- 2011 + Co-director, Amazonico. www.amazonico.org
- 2014-16 Assistant Professor, Department of Geography, University of Alabama, Tuscaloosa, AL, USA.
- 2012-14 Postdoctoral Fellow, Stanford Woods Institute for the Environment, Stanford University. *Institutional Analysis and Livelihood Security Threat Assessment in the Osa-Golfito Region of Costa Rica.* inogo.stanford.edu / inogo.info
- 2013-14 Postdoctoral Fellow, Smithsonian Conservation Biology Institute. Anderson-Teixeira Lab. *Integrating global deforestation and fragmentation metrics with the Smithsonian ForestGEO global plot network.* www.forestgeo.si.edu/group/Ecosystems+and+Climate
- 2012-13 Postdoctoral Fellow, Smithsonian Conservation Biology Institute, affiliated with Harvard Forest. Thompson Forest Landscape Ecology Lab. *Simulating future landscapes and their ecosystem services through coupled forest – land use models.* harvardforest.fas.harvard.edu/other-tags/future-scenarios
- 2011-12 Doctoral/Postdoctoral Fellow, Sustainability Science Program, Kennedy School of Government, Harvard University, Cambridge, MA, USA.
- 2006-12 Doctoral Student, Department of Biology, Stanford University, Stanford, CA, USA.
- 2011 Consultant Forest Ecologist. Mangrove and peat forest biomass in Cancun, Mexico and Papua, Indonesia. United States Forest Service (USFS).
- 2009 Consultant Research Ecologist. Malinowsky Corridor Initiative (MCI). Amazon Conservation Association, Washington DC.
- 2006-08 Co-Developer and Teaching Assistant: Undergraduate Field Ecology Course, “Bees, herbivory, woody encroachment and climate change: understanding feedbacks and

- interactions at Jasper Ridge Reserve”, Department of Biology, Stanford University, Stanford, CA.
- 2004-06 Research Ecologist, Asnerlab, Dept. of Global Ecology, Carnegie Institution at Stanford University, Stanford, CA. PI: Gregory Asner (Carnegie).
- 2002-05 Masters Student, School of Forest Resources and Conservation, University of Florida, Gainesville, FL, USA.
- 2002-04 Research Assistant, Tropical Forestry, University of Florida, Gainesville, FL. PI: Daniel Zarin (UFL).
- 2004 Teaching Assistant, Tropical Forestry, University of Florida, Gainesville, FL. PI: Daniel Zarin (UFL).
- 2002 Tropical Botany / Forestry Internship, Instituto Boliviano de Investigación Forestal, Santa Cruz, Bolivia. PIs: Daniel Zarin (UFL), Marielos Peña-Claros, Todd Fredericksen, and Marisol Toledo (BOLFOR).
- 2001-02 Biodiversity Mapping Specialist, Hudsonia Ltd, Bard College, NY. PIs: Gretchen Stevens and Erik Kiviat (Hudsonia).
- 2000 Student Action Coordinator, EarthAction environmental non-profit, Amherst, MA.
- 1996-00 Undergraduate Student, Department of Botany, University of Vermont, Burlington, VT, USA.
- 2000 Herbarium Technician, Pringle Herbarium, University of Vermont, Burlington, VT. PIs: David Barrington (UVM).
- 2000 Editor-in-Chief, *The Catalyst*, University Environmental Publication, University of Vermont, Burlington, VT.
- 1998-99 Student / Teaching Assistant, Tropical Ecology Program, Monteverde Biological Institute, CIEE, Costa Rica.
- 1999 Botanist, “Woody stem diversity of a cloud forest in Monteverde, Costa Rica”, Pringle Herbarium, University of Vermont. PIs: David Barrington (UVM), Bill Haber and Willow Zuchowski (Missouri Botanical Gardens).
- 1999 Teaching Assistant: Tropical Botany and Ecology, Tropical Ecology Course, CIEE, Monteverde, Costa Rica. PIs: Alan and Karen Masters (CIEE).
- 1997-99 Natural Areas Assistant Manager, University of Vermont, Burlington, VT. PI: Rick Paradis (UVM).
- 1996-97 Research Assistant, “Root cap degradation of snapbeans (*Phaseolus vulgaris* L.) undergoing Aluminum toxicity”, Department of Botany, University of Vermont. PIs: Gary P. Olivetti (UVM).

PUBLICATIONS ([Total citations = 1709](#))

<http://speclab.org/publications.html>

1. Thompson JR, Fallon KL, Foster DR, **Broadbent EN**, Blumstein M, Almeyda Zambrano AM, Fan Y. *In press*. Scenarios, Services, and Society: A case study of stakeholder-defined land use scenarios and their consequences in Massachusetts, USA. *Ecosphere*.
2. Quispe Gil CA, Piana R, **Broadbent EN**, Almeyda Zambrano AM, Almeyda Zambrano SL. *In Press*. Possible Symbiosis Between the Ground Cuckoo (*Neomorphus Geoffroyi*) And The Collard Peccary (*Pecari Tajuca*) in Southeastern Peru.

3. Dobbins M, **Broadbent EN**, Steinberg M, Ryan S. *In press*. Habitat use, activity patterns, and human interactions with jaguars in southern Belize. *Oryx*
4. Chazdon RL., **Broadbent EN**, Rozendaal DMA, et al. 2016. Carbon mitigation potential of Neotropical forest. *Science Advances*.
5. Poorter L, Bongers F, Aide M, Almeyda Zambrano AM, Balvanera P, Becknell J, Boukili V, **Broadbent EN**, Chazdon R, et al. 2016. Biomass Resilience in the Tropics. *Nature*.
6. Chazdon RL, Rozendaal D, Poorter L, **Broadbent EN**, Bongers F. 2015. Resilience of biomass recovery in regenerating Neotropical forests following agricultural land use. *XIV World Forestry Congress*.
7. Anderson-Teixeira K, ... **Broadbent EN**, et al. 2014. CTFS-ForestGEO: A worldwide network monitoring forests in an era of global change. *Global Change Biology*.
8. Chavez AB, **Broadbent EN**, Almeyda Zambrano AM. 2014. Smallholder policy adoption and land cover change in the southeastern Peruvian Amazon: A twenty-year perspective. *Applied Geography 53*: 223-233
9. **Broadbent EN**, Almeyda Zambrano AM, Asner GP, Field CB, Kennedy-Bowdoin T, Knapp D, Rosenheim B, Burke D, Giardina C, Cordell S. 2014. Linking rainforest microclimate and ecophysiology through fusion of airborne waveform LiDAR and hyperspectral imagery. *Ecosphere 5*(5): 1-37
10. **Broadbent EN**, Almeyda Zambrano AM, Asner GP, Soriano M, Ramos de Souza H, Field CB, Peña-Claros M, Adams R, Giles L. 2014. Integrating stand and soil properties to understand foliar nutrient dynamics during forest succession following slash-and-burn agriculture in the Bolivian Amazon. *PLOS ONE 9*:e86042
11. Moll-Rochek J., Gilbert GE, **Broadbent EN**. 2014. Brazil nut (*Bertholletia excelsa*, Lecythidaceae) regeneration in logging gaps in the Peruvian Amazon: implications for the sustainability of multiple use forests. *International Journal of Forestry Research*. 420764:1-8.
12. Barbosa JM, **Broadbent EN**, Bitencourt MD. 2014. Aboveground biomass estimation by remote sensing: a review of the implications for forest regrowth studies in tropical forests. *International Journal of Forestry Research 715796*:1-14.
13. **Broadbent EN**, Almeyda Zambrano AM, Dirzo R, Durham WH, Driscoll L, Gallagher P, Salters R, Schultz J, Colmenares A. 2012. The effect of land use change and ecotourism on biodiversity: a study of Manuel Antonio, Costa Rica, from 1985-2008. *Landscape Ecology 27*:731-744.
14. Almeyda Zambrano AM, **Broadbent EN**, Durham WH. 2010. Social and environmental effects of ecotourism in the Osa Peninsula of Costa Rica: the Lapa Rios case. *Journal of Ecotourism 9*:62-83.
15. Pringle EG, Adams RI, **Broadbent EN**, Busby PE, Donatti CI, Kurten EL, Renton K. 2010. Distinct leaf-trait syndromes of evergreen and deciduous trees in a seasonally dry tropical forest. *Biotropica 34*:299-308.
16. Almeyda Zambrano AM, **Broadbent EN**, Wyman MS, Durham WH. 2010. Ecotourism Impacts in the Nicoya Peninsula, Costa Rica. *International Journal of Tourism Research*, 12:803-819.
17. Almeyda Zambrano AM, **Broadbent EN**, Schmink M, Perz SG, Asner GP. 2010. Deforestation drivers in Southwest Amazonia: comparing smallholder farmers in Iñapari, Peru, and Assis Brasil, Brazil. *Conservation and Society 8*:157-170.

18. **Broadbent EN**, Asner GP, Keller M, Knapp D, Oliveira P, Silva N. 2008. Forest fragmentation from deforestation and selective logging in the Brazilian Amazon. *Biological Conservation* 141:1745-1757.
19. **Broadbent EN**, Asner GP, Soriano M, Palace M, Peña-Claros M. 2008. Spatial distribution of biomass and diversity in lowland Bolivian forest: linking field and remote sensing measurements. *Forest Ecology and Management* 255:2602-2616.
20. **Broadbent EN**, Zarin D, Asner GP, Peña-Claros M, Cooper A, Littell R. 2006. Recovery of forest spectral and structural properties following selective logging in Lowland Bolivia. *Ecological Applications* 16:1148-1163 - Featured photograph in ESA bulletin July, 2006.
21. Asner GP, **Broadbent EN**, Oliveira P, Keller M, Knapp D, Silva D. 2006: Cover, Condition and fate of logged forests in the Brazilian Amazon. *Proceedings of the National Academy of Sciences* (PNAS) 103:12947-12950.
22. Asner GP, Knapp D, **Broadbent EN**, Oliveira P, Keller M, Silva M. 2005. Selective logging in the Brazilian Amazon. *Science* 310:480-482.

PUBLICATIONS MISC

1. **Broadbent EN**, Almeyda Zambrano AM, Jimenez A, Vinicio M, Campos C, Betancourt, LQ. 2015. Uso y cobertura de la tierra en el Humedal Nacional Térrapa-Sierpe: Una comparación entre el 2012 y el 2015. Affiliated with the Spatial Ecology and Conservation (SPEC) Lab, the NGO Osa Conservation, and the Stanford Woods Institute for the Environment.
2. **Broadbent EN**, Almeyda Zambrano AM, Dirzo RD, Quispe Gil CA, Almeyda Zambrano SL, Villalobos M, Hunt C, Menke C. 2015. INOGO Mapas 2012: a high resolution map of land cover in the Osa Peninsula and Golfito region of Costa Rica. Affiliated with the Spatial Ecology and Conservation (SPEC) Lab, the NGO Osa Conservation, and the Stanford Woods Institute for the Environment.
3. Almeyda Zambrano AM, **Broadbent EN**, Gaffiken L, Quispe Gil CA, Almeyda Zambrano SL. 2015. An analysis of social and environmental problems, solutions and interventions in the Osa and Golfito regions of Costa Rica: comparative findings from INOGO phase 1 reports. Stanford Woods Institute for the Environment. Report. Pgs. 104.
4. **Broadbent EN**, Almeyda Zambrano AM. 2014. CTFS-ForestGEO: A worldwide network monitoring forests in an era of global change - R scripts for spatial analyses. <http://dx.doi.org/10.7910/DVN/26155>, Harvard Dataverse Network. <http://thedata.harvard.edu/dvn/dv/EbenBroadbent>
5. Asner GP, Knapp DE, **Broadbent EN**, Oliveira PJC, Keller MM, Silva JNM. 2013. LBA-ECO LC-21 Brazilian Amazon Fractional Land Cover Images: 1999-2002. Data set. Available on-line (<http://daac.ornl.gov>) from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. <http://dx.doi.org/10.3334/ORNLDAAAC/1152>
6. Duchelle A, Almeyda Zambrano AM, Hoyos N, Marsik M, **Broadbent EN**, Kainer KA. 2010. Conservation in an Amazonian tri-national frontier: patterns and drivers of land cover change in community-managed forests. CIFOR
7. **Broadbent EN**. 2003. *Introduction to conducting biodiversity assessments using GIS and stereoscopic analysis of aerial photographs*. Training manual. Hudsonia. 65pgs.
8. Stevens G, **Broadbent EN**. 2002. *Significant habitats of the town of East Fishkill, Dutchess County, New York*. Report to East Fishkill Town Board and Marilyn Milton Simpson Charitable Trusts. 57 pgs.

CURRENT PROJECTS (status)

Writing

- Dirzo R, **Broadbent EN**, Almeyda Zambrano AM, Picado A, Acuña R, Moraga M, García D. (Writing). Floral and faunal biodiversity in African Oil Palm Plantations (*Elais guineensis*) in the Osa-Golfito Region, Costa Rica.
- Broadbent EN**, Almeyda Zambrano AM, Asner GP, Sereceda M. (Data analysis). Social and edaphic factors influencing swidden agricultural decisions in the Peruvian Amazon.
- Broadbent EN**, Araujo E, Daily G, Montero J. (Data analysis/Writing). Forest disturbance alteration of *Nymphalid* butterfly vertical niche partitioning in the Osa Peninsula, Costa Rica.
- Almeyda Zambrano AM, **Broadbent EN**, Asner GP, Knapp D, Durham WH. (Manuscript revisions). Road infrastructure development and deforestation in Southwest Amazonia: A tri-national frontier study.
- Almeyda Zambrano AM, **Broadbent EN**, Duchelle AE, Asner GP, Knapp D, Babigumira R, Wunder S, Durham WH. (Manuscript revisions). Household land cover and land use in a dynamic frontier: integrating landscape and landholding scales.
- Almeyda Zambrano AM, **Broadbent EN**, Duchelle AE, Asner GP, Knapp D, Babigumira R, Wunder S, Durham WH. (Manuscript revisions). Livelihood trajectories and deforestation among smallholders in Southwest Amazonia.
- Almeyda Zambrano SL, Catenazzi A, Almeyda Zambrano AM, **Broadbent EN**, Quispe Gil CA. (Manuscript revisions). Survival, condition and fungal reinfection of the Andean frog *Psychophrynella usurpator* following temperature change.
- Broadbent EN**, Almeyda Zambrano AM, Dirzo RD, Morales Barquero L, Almeyda Zambrano SL, Quispe Gil CA. (Manuscript revisions) Conservation priorities and threats to the Osa Peninsula and Golfito region of Costa Rica: integrating participatory mapping, surveys and spatial analysis.

Data analysis

- Almeyda Zambrano AM, Gaffikin L, **Broadbent EN** (Data analysis) Spatial and temporal congruence among social and environmental problems and solutions in the Osa and Golfito region of Costa Rica. Affiliated with the Spatial Ecology and Conservation (SPEC) Lab and the Stanford Woods Institute for the Environment.
- Broadbent EN**, Almeyda Zambrano AM, Forrester T, Cruz Díaz JC, Quispe Gil CA, Almeyda Zambrano SL. (Data analysis) Monitoring biodiversity of the Osa and Golfito region through citizen scientist based camera trapping: a case study at the Lapa Rios nature reserve. Affiliated with the Spatial Ecology and Conservation (SPEC) Lab, the NGO Osa Conservation, and the Smithsonian Conservation Biology Institution.
- Almeyda Zambrano AM, **Broadbent EN**, Quispe Gil CA, Almeyda Zambrano SL, Villalobos M. (Data analysis) Effects of watershed land use and land cover on water quality in the Osa and Golfito regions of Costa Rica. Affiliated with the Spatial Ecology and Conservation (SPEC) Lab and the NGO Osa Conservation.

POPULAR MEDIA

- 2016 – BBC, Huffington Post, Tuscaloosa News, Grist, Mongabay, Folha de Sao Paulo, etc... related to our Nature article on Biomass Resilience in the Neotropics and Carbon sequestration potential.
- 2015 - ABC TV News – Birds and Climate Change – 3 minute TV segment – September, 25, 2015
- 2015 - WVUA TV News – All about the Birds – 1 minute TV segment – September, 22, 2015

2015 - Featured on www.ua.edu, research.ua.edu, and emergingscholars.ua.edu webpages, September, 2015 to Present

GRANTS AND FELLOWSHIPS

- In prep: Geospatial socio-ecological sustainability in the Osa and Golfito region of Costa Rica: A case study scalable prioritization approach. NCEAS SNAP Co-PI \$200,000
- Pending: Improved monitoring of carbon dynamics in tropical landscape mosaics using multi-sensor multi-platform fusion. NASA ROSES CMS. PI \$820,700
- Pending: Citizen spatial science to monitor social and ecological health in the Terraba-Sierpe Wetlands of Costa Rica. Private foundation. Co-PI \$40,000
- Pending: Integrating Multi-Platform/Multi-Sensor Remote Sensing and Biogeochemical Characterizations to Determine Quantity, Sources and Quality of Inorganic and Organic Nutrients Exported from Agricultural Watersheds. USGS-NIWR. Co-PI \$ 501,062
- Pending: River response and management after the historic tornado outbreak of 2011. NSF Dynamics of Coupled Natural and Human Systems. Co-PI \$ 499,024
- 2015 Alabama Water Resources Research Institute: Integrating remote sensing and biogeochemical characterizations at high resolutions to determine source and amount of inorganic and organic nutrients exported from agricultural watersheds. Co-PI \$44,000
- 2015 Research Grant Committee: Linking remote sensing of land use and land cover with water quality and human health in the Osa Peninsula and Golfito region of Costa Rica. PI \$5,000\$
- 2015 Stanford Woods Institute for the Environment: Developing high resolution maps of the Osa and Golfito region in Costa Rica using RapidEye satellite imagery and segmentation approaches. PI \$17,000
- 2014 Osa Conservation (5000\$) – Costa Rica
- 2014 College Academy for Research, Scholarship and Creative Activity (4350\$) - Tanglewood
- 2014 Stanford Woods Institute for the Environment (2 months' summer salary) – Costa Rica
- 2014 Stanford Woods Institute for the Environment (7500\$) – Costa Rica
- 2014 Stanford Woods Institute for the Environment (2800\$) – Costa Rica
- 2011-12 Harvard University, Sustainability Science Pre/Post-Doctoral Fellowship
- 2009 NSF Dissertation Improvement Grant (\$15000) – Hawaii
- 2009 Stanford University, CESD Research Grant (\$3000) – Costa Rica
- 2009 Stanford University, Biology Research Grant (\$1000) – Hawaii
- 2008 Carnegie Institution for Science (Field lab) research grant (\$750) – Hawaii
- 2008 Carnegie Institution for Science (Asner lab) research grant (\$3800) – Hawaii
- 2008 DOE GREF GCEP Fellowship (3 years graduate funding + \$1200/yr research grant) – Hawaii
- 2008 NASA Graduate Fellowship (3 years funding), awarded but declined
- 2007 Stanford University Morrison Institute of Population and Environmental Studies (\$3500) – Peru
- 2007 Stanford University, Biology excellence in teaching award (Dept. of Biology)
- 2007 Stanford University, Latin American Studies Field Research Grant (\$7000) – Costa Rica
- 2006 Stanford University, Latin American Studies Field Research Grant (\$6000) – Costa Rica

- 2006 Stanford University, Department of Biology PhD Fellowship
- 2005 Carnegie Institution for Science (Asner lab) research grant (\$4000) – Bolivia
- 2005 NSF Graduate Research Fellowship Honorable Mention
- 2004 UFL LUECI & Geolab software grant (\$1000)
- 2004 University of Florida, Dept. of Geography Research Assistantship
- 2004 Woods Hole Summer Field Research Grant – Brazil
- 2004 BOLFOR summer research grant (\$5000) – Bolivia
- 2004 NSF IGERT Doctoral Fellowship (4 years funding), awarded but declined
- 2004 NASA grant for ASTER satellite imagery acquisitions – Bolivia
- 2003 University of Florida Map and Imagery Library Image Grant (\$1200) – MS research
- 2002 Enhancing Graduate Enrollment Scholarship, SFRC, UFL – Gainesville

PRESENTATIONS / POSTERS / WORKSHOPS

- 2016 Characterizing tropical forest dynamics using satellite and airborne sensors and geospatial modelling. NASA Jet Propulsion Laboratory (JPL). Invited presenter.
- 2016 Dobbins M, Steinberg M, **Broadbent EN**, Ryan SJ. (Poster) Habitat use, activity patterns, and human interactions with jaguars in southern Belize. AAG, 2016.
- 2016 Taylor C, **Broadbent EN**, Almeyda A, Caylor M. (Poster) Spatial and temporal variability of bat composition in the Talladega National Forest, Alabama. AAG, 2016.
- 2016 Almeyda Zambrano SL, **Broadbent EN**, Shanee, S, et al. (Poster) Habitat Use and Preference in the Yellow-Tailed Woolly Monkey (*Lagothrix Flavicauda*) At Yambrasbamba, Peru. AAG, 2016.
- 2016 Forest dynamics and biology across spatial and temporal scales. University of Tennessee, Knoxville. Invited presenter.
- 2016 Conservation priorities and threats to the terrestrial ecosystems of the Osa and Golfito region. Osa Conservation, Costa Rica. Invited presenter.
- 2016 Drones for carbon monitoring demonstration. Invited presenter. Osa Conservation, Piro Station, Osa Peninsula, Costa Rica.
- 2016 (2x) Pinkerton A, **Broadbent EN**, Almeyda Zambrano A. (Poster) Automated tree-crown delineation using photogrammetric analyses for assessment of pine plantation health in the southeast. UA Undergraduate Research Conference and Computer Based Honors Program Conference.
- 2016 (2x) Shay K, **Broadbent EN**, Almeyda Zambrano A. (Poster) Development of methodology for soundscape monitoring of avian composition and abundance. Women in Science, 2016 and Undergraduate Research Conference.
- 2016 (2x) Ols C, **Broadbent EN**, Almeyda Zambrano A. (Poster) Trail and forest animal diversity and composition in a biological reserve with active ecotourism on the Osa Peninsula of Costa Rica. University of Alabama System Honors Research Conference, Women in Science, 2016 and Undergraduate Research Conference
- 2015 **Broadbent EN**, Almeyda Zambrano A. (Workshop) Integrating drones into environmental monitoring and enforcement by MINAE SETENA in Costa Rica, San Jose, Costa Rica, December, 2015.
- 2015 Davis K, Almeyda Zambrano A, **Broadbent EN**, Quispe Gill CA, Almeyda Zambrano S. (Poster) Linking remote sensing of land use and land cover with water quality and human health in the Osa Peninsula and Golfito region of Costa Rica. Alabama Water Resources Conference, September, 2015.

- 2015 Chazdon RL, Rozendaal D, Poorter L, **Broadbent E**, Bongers F. 2015. (Paper) Resilience of biomass recovery in regenerating Neotropical forests following agricultural land use. *XIV World Forestry Congress*.
- 2015 Shay K, **Broadbent EN**, Almeyda Zambrano A. (Poster) Development of methodology for soundscape monitoring of avian composition and abundance. University of Alabama System Honors Research Conference, April, 2015
- 2015 Ols C, **Broadbent EN**, Almeyda Zambrano A. (Poster) Trail and forest animal diversity and composition in a biological reserve with active ecotourism on the Osa Peninsula of Costa Rica. University of Alabama System Honors Research Conference, April, 2015.
- 2015 Pinkerton A, **Broadbent EN**, Almeyda Zambrano A. (Poster) Automated tree-crown delineation using photogrammetric analyses. University of Alabama System Honors Research Conference, April, 2015.
- 2015 Shay K, **Broadbent EN**, Almeyda Zambrano A. (Poster) Development of methodology for soundscape monitoring of avian composition and abundance. UA UCRA, April, 2015
- 2015 Ols C, **Broadbent EN**, Almeyda Zambrano A. (Poster) Trail and forest animal diversity and composition in a biological reserve with active ecotourism on the Osa Peninsula of Costa Rica. UA UCRA, April, 2015. - **2nd place** – International Focus Poster – Emerging Scholars – Science, Math and Engineering, April, 2015
- 2015 Pinkerton A, **Broadbent EN**, Almeyda Zambrano A. (Poster) Automated tree-crown delineation using photogrammetric analyses. UA UCRA, April, 2015.
- 2014 **Broadbent EN**. (Presentation) Geospatial analysis and remote sensing of forest insect disturbances. Orono, University of Maine, January 16th.
- 2013 **Broadbent EN**. (Presentation) Forest geography. Tuscaloosa, University of Alabama, November 16th.
- 2013 **Broadbent EN**. (Presentation) Forest dynamics across spatial and temporal scales. San Juan, Puerto Rico, October 11th.
- 2013 **Broadbent EN**, Almeyda Zambrano AM, Blumstein MJ, Strombom E, Foster D, Lambert KL, Thompson JR. (Presentation) Prescient thinking and the future of ecosystem services in New England. Ecological Society of America (ESA), Minneapolis, MN August 5th.
- 2013 **Broadbent EN**, Dirzo RD, Almeyda Zambrano AM, Barquero LM, Almeyda Zambrano SL, Quispe CA. (Presentation) The terrestrial ecosystem component of the Osa & Golfito Initiative (inogo.stanford.edu), Costa Rica: An integrative cross-disciplinary effort for sustainability. Association for Tropical Biology and Conservation (ATBC), San Jose, Costa Rica, June 24th.
- 2013 **Broadbent EN**. (Presentation) Modeling future ecosystem services of Massachusetts: 2005-2055. Harvard Forest, Harvard University, Petersham, MA, March 19th.
- 2013 **Broadbent EN**. (Poster) Stakeholder driven future scenarios and their ecosystem services: 2005-2055. InVEST, Stanford University, Stanford, CA, March 15th.
- 2012 Moll-Rocek J, Holbrook MN, Gilbert M, **Broadbent EN**, Bustamante Collado R, Guariguata M. (Poster) The effects of selective logging on Brazil Nut natural regeneration. 8th Annual Plant Biology Symposium: Plant Reproductive Biology: Genomics to Phenomics, Boston, Massachusetts, May 8th
- 2012 **Broadbent EN**. (Presentation) Terrestrial Ecosystems and Biodiversity in Costa Rica: cross discipline integration for conservation. Sustainability Science Seminar, Harvard University. Cambridge, MA, March 21st.
- 2011 **Broadbent EN**. (Presentation) Sensoramiento remoto de la Ecología y Degradación de los bosques.” Workshop on mangrove carbon assessments. Cancun, Mexico, August 8th

- 2011 **Broadbent EN.** (Presentation) Modeling microclimate and ecophysiology of a tropical rainforest using airborne waveform LiDAR and hyperspectral fusion. Hawaii Ecosystems Meeting, Hilo, Hawaii, June 29th – 30th
- 2010 Almeyda Zambrano AM, **Broadbent EN.** (Presentation) Smallholders in Southwest Amazonia: development policies, socioeconomic conditions and forest use. XXIII International Union of Forest Research Organizations (IUFRO) World Congress. Seoul, Korea, August, 23th – 28th
- 2009 **Broadbent EN.** (Presentation) Fusion of waveform LiDAR and hyperspectral remote sensing data for tropical forest productivity modeling along an elevation gradient in Hawaii. Hawaii Ecosystems Meeting. Hilo, Hawaii, June 22nd–23rd.
- 2009 **Broadbent EN.** (Presentation) Sensoramiento remoto de tala selectiva y degradación de los bosques. Latin American Seminar in Forest Policy & Management (LASFPM), USAID. Santa Cruz de la Sierra, Bolivia, June 13th–18th
- 2008 **Broadbent EN.** (Presentation) Distribución espacial de biomasa y diversidad de árboles en un bosque de tierras bajas de Bolivia: Combinando mediciones de campo con sensores remotos. IV Reunión Nacional de Investigación Forestal. Cobija, Bolivia, September 3th–5th
- 2008 **Broadbent EN.** (Presentation) Influence of rainforest architectural and biological diversity on C assimilation along an elevation gradient in Hawaii. Fellows conference, DOE GCEP. Washington, DC, August 17–20th
- 2007 Asner GP, Knapp D, **Broadbent EN,** Oliveira P, Keller M, Silva M. (Poster) Selective logging in the Brazilian Amazon. LBA meeting, Brazil, September.
- 2006 Almeyda Zambrano AM, **Broadbent EN,** Durham WH. (Presentation) Socioeconomic impacts of ecotourism: The Lapa Rios case study. Center for Latin American Studies, Stanford University. Stanford, CA, January 25th
- 2005 **Broadbent EN.** (Poster) Remote sensing of selective logging in lowland Bolivia. Working Forests in the Tropics Conference: Policy and Market Impacts on Conservation and Management. University of Florida, Gainesville, FL, US, February 14th–15th
- 2004 **Broadbent EN.** (Presentation) Remote sensing of logging activities in lowland Bolivia: present and future directions. Superintendencia Forestal de Bolivia. Santa Cruz, Bolivia.

STUDENTS (*MS, **PhD)

- 2016 Rhiannon Garrard (Univ. of Alabama)
- 2016 Scott Ford (Univ. of Alabama)
- 2016 Jordan Cissell (Univ. of Alabama)
- 2015-16 Bradford Bates (Univ. of Alabama)
- 2015-16 Dinuke Nanayakkara Munasinghe (Univ. of Alabama)
- 2015-16 Cindy Taylor (Univ. of Alabama, Advisor)*
- 2015-16 Kelsi Davis (Univ. of Alabama, Advisor)*
- 2015-16 Shawn Carter (Univ. Of Alabama)*
- 2015 Rebecca Haynes (Princeton)
- 2015-16 Philip Shimel (Univ. of Alabama, Honors College)
- 2015-16 Austin Pinkerton (Univ. of Alabama, Computer Based Honors Program, Advisor)
- 2015-16 Clare Ols (Univ. of Alabama, Emerging Scholar, Advisor)
- 2015-16 Katy Shay (Univ. of Alabama, Emerging Scholar, Advisor)
- 2014 Michael Dobbins (Univ. of Alabama)*
- 2014-16 Sandra Lucia Almeyda Zambrano (Univ. of Alabama, Advisor)*
- 2013 Julian Moll-Rochek (Harvard University)

2007 Marlene Soriano (IBIF, Bolivia)

ADVISING OF STUDENT ORGANIZATIONS

- 2014-Present Costa Solutions, Inc. (UAV design team for microclimate, Advisor) – 5-10 students, primarily mechanical and aerospace engineers.
- 2014-Present Tuska Unmanned Aerial Vehicle (UAV) design and fabrication (Advisor) – 18-25 students, primarily mechanical and aerospace engineers.

SERVICE ACTIVITIES

- 2016+ Organization for Tropical Studies (OTS) – Informatics Committee Member
- 2015+ Serving on UA committees: (1) Department of Geography PhD program, (2) Tanglewood Biological Station, (3) Geography Faculty Search, (4) Geography Costa Rica Semester Abroad
- 2015 + Faculty Advisor, www.academia.edu
- 2009-Present Mendeley Advisor (www.mendeley.com)
- 2013 Ecologist, Smithsonian E-Mammal project (emammal.si.edu)
- 2001-2002 Emergency Medical Technician (EMT / WFR), East Fishkill Rescue / Emergency Squad, East Fishkill, NY, USA
- 1998-1999 Emergency Medical Technician (EMT / WFR), Essex Rescue / Emergency Squad, Essex Junction, VT, USA
- 2001-2002 Americorps National Service Volunteer, Hudsonia, Ltd. Bard College, NY, USA
- 2000 Conservation Representative, Conference of Parties (COP) 6 – Kyoto Protocol, November, 2000, The Hague, Amsterdam. Greenpeace, Washington, DC, USA

REVIEWER

Review for the National Science Foundation (NSF) and NASA (proposals and panel)

Reviewer for 30+ journals (total reviews: 80+):

- African Journal of Agricultural Research (1)
- Applied Earth Observation and Geoinformation (1)
- Biological Conservation (12) – top 10% reviewer for 2012-14.
- CAB Reviews (1)
- Diversity (1)
- Ecography (1)
- Ecosphere (1)
- Egyptian Journal of Remote Sensing and Space Sciences (1)
- Environment, Development and Sustainability (1)
- Environmental Management (1)
- Estuarine, Coastal and Shelf Science (1)
- Forests (2)
- Forest Ecology and Management (18)
- Functional Ecology (1)
- Global Ecology and Biogeography (1)
- International Journal of Tourism Research (3)
- International Journal of Tropical Biology and Conservation (2)
- Journal of Applied Ecology (2)
- Journal of Arid Lands (2)
- Journal of Geophysical Research - Atmospheres (2)

- Journal of Geophysical Research – Biogeosciences (1)
- Journal of Tropical Forest Science (1)
- Land Degradation & Development (1)
- Landscape Ecology (1)
- PLOS one (2)
- Proceedings of the National Academy of Sciences (PNAS) (1)
- Remote Sensing (4)
- Remote Sensing of the Environment (11)
- Revista de Biología Tropical (1)
- Tourism Management (1)

ASSOCIATIONS

- American Association for the Advancement of Science (AAAS)
- American Geophysical Union (AGU)
- Association for Tropical Biology and Conservation (ATBC)
- Association of American Geographers (AAG)
- Ecological Society of America (ESA)
- FLUXNET Young Scientist Network (YSN)
- Organization for Tropical Studies (OTS)
- Stanford Alumni Association

RESEARCH METHODS

- Unmanned Aerial Vehicles (UAVS) – fixed-wing and copter style platforms. LiDAR, multi-spectral, visual sensors. Photogrammetric analyses. Flight planning and processing.
- Advanced tree canopy access and rescue methods, including climbing using single rope, double rope, split tail lanyards, Tyrolean traverses, etc... for canopy research;
- Butterfly collection and identification (fruit traps and nets), capture and release methods for small animals and birds (traps and mist-nets), pit traps and sweep techniques for insect collection;
- Camera trap deployment (Reconyx PC800), repair and image analysis (emammal.si.edu).
- Climate tower construction and setup;
- CR-Basic and Edlog for Campbell Scientific data loggers (CR200, CR3000, CR10x), HOBO dataloggers and sensors, programming for Vaisala weather stations;
- Fine resolution 3D georeferencing offset methods (combining Trupulse 360 and Leica Differential GPS units);
- Leaf and soil Kjeldahl N and P measurements, C:N and isotope preparation and measurements, general lab work (i.e., pH), basic PCR methods and molecular analysis;
- Leaf trait measurements – toughness, chemical and physical protection; bioassays (caterpillars);
- LiCOR 3100 leaf area machine, LiCOR 6400 Portable Photosynthesis Measurements – skilled in canopy measurements, LAI-2000, soil moisture probes, Field spectrometers, laser range finders (including Trupulse 360); Garmin and Leica differential GPS units and post-processing;
- Micro-meteorological sensor design, construction, calibration and setup (i.e., shade rings, radiation shields), including anemometers, PAR (LiCOR, Apogee, BF3), temp, rH, anemometers (hot-wire, cup, sonic), rainfall (bucket and droplet detection);
- Plant collection and preservation: shotguns for canopy leaves, portable drying ovens and alcohol preservation techniques;

- Socioeconomic survey and questionnaire development and application in English and Spanish;
- Soil collection and preservation: bulk density, pH, portable drying ovens, transportation;
- Transects and plots for vegetation (structure, diversity & density) analysis;

STATISTICS

Fragstats, IAN, ArcGIS geostatistical analyst, JMP, MS Excel, PC-ORD, SAS, Statview, SPSS, 2D and 3D Tablecurve, R language, Matlab

GIS AND REMOTE SENSING

ArcGIS – GIS, Avenue GIS development language – GIS program development, ENVI – Remote sensing, ENVI LiDAR, eCognition, ERDAS – Remote sensing, Fragstats – Spatial statistical analysis, IDRISI – Remote sensing and GIS, Interactive Development Language (IDL) programming – Remote Sensing program development, Surfer – Spatial statistics and GIS, Field truthing of space- and airborne LiDAR, hyperspectral and multi-spectral measurements – Photogrammetric analyses – Pix4Dmapper Pro

CODING LANGUAGES, MODELS AND COMPUTING

- Avenue, CR-Basic, CR-10x, IDL, Matlab, Python, R
- Landis-II, InVEST, CLAS, CLASlite, ProSAIL
- Amazon Elastic Compute Cluster (EC2), R parallel processing, RamDisk (I/O) enhanced approaches, RAID architecture

LANGUAGES

English native
Spanish advanced
French basic
Portuguese basic

CERTIFICATIONS (current and expired)

Basic Scuba, Boating safety, Chainsaw Safety, Cardio Pulmonary Resuscitation (CPR), Emergency Care Assistant (ECA), Emergency Medical Technician (EMT), Life Guard, Wilderness First Responder (WFR), CLASlite (01/10/2014).