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### **Education:**

**Ph.D.** School of Forest Resources and Conservation, University of Florida, 2016.

*Advisor:* Dr. Stephanie A. Bohlman

*Dissertation:* The frequency of catastrophic wind disturbance in the northwest Amazon, and their impact upon tree mortality and diversity

Tulane University – Department of Ecology and Evolutionary Biology. 2009 - 2012

*Advisor:* Dr. Jeffrey Q. Chambers (at Lawrence-Berkeley National Laboratory since 2009)

**M.S.**, Warnell School of Forestry and Natural Resources, University of Georgia, 2008.

**B.S.**, Earth and Environmental Science, University of California, Irvine, 2005.

### **Employment History:**

2017 - present Research Associate & Oxford Martin Fellow, Environmental Change Institute, School of Geography and the Environment, University of Oxford

2016 Postdoctoral researcher, School of Forest Resources and Conservation, University of Florida

2016 Teaching instructor, School of Forest Resources and Conservation, University of Florida

2013 - 2016 NASA Earth and Space Science graduate fellow, School of Forest Resources and Conservation, University of Florida

2012 - 2013 Graduate research assistant, School of Forest Resources and Conservation, University of Florida

2009 - 2012 Graduate research assistant, Department of Ecology and Evolutionary Biology, Tulane University

2006 - 2008 Graduate research assistant, Warnell School of Forestry and Natural Resources, University of Georgia

- 2005 – 2006 Field Assistant, Department of Earth System Science, University of California, Irvine
- 2004 - 2006 Research Assistant, Keck Carbon Cycle Accelerator Mass Spectrometry Laboratory, University of California, Irvine

**Publications:**

Núñez-Reguiro M.M., Fletcher R.J., Pienaar E.F., Branch L.C., Volante J., and S.W. Rifai. *in review*. Adding the temporal dimension to spatial patterns of Payment for Ecosystem Services enrollment. *Ecosystem Services*

Gvozdevaite A., Oliveras I., **Rifai S.W.**, Fauset S., Waites R., Peprah T., Boakye M., Afriyie L., Martini D., Miguel J., Moore S., Adu-Bredu S., and Y. Malhi. *submitted* Significance of leaf shape dynamics along light and temperature gradients in the tropics. *Oecologia*.

Aguirre Gutiérrez J., Oliveras I., **Rifai S.W.**, Gvozdevaite A., Fauset S., Ziemińska K., Lewis S.L., Feldpausch T.R., Phillips O., Hubau W., Moore S., Peprah T., Affum-Baffoe K., Swaine M.D., Adu-Bredu S., Enquist B., and Y. Malhi. *in review*. Drier tropical forests are more susceptible to functional changes after a long-term drought. *Ecology Letters*.

**Rifai, S.W.**, Girardin C.A.J., Berenguer E., Aguila-Pasquel J., Dahlsjö C.A.L., Doughty C.E., Jeffery K.J., Moore S., Oliveras I., Riutta T., Rowland L.M., Araujo Murakami A., Addo-Danso S.D., Brando P., Burton C., Evouna Ondo F., Duah-Gyamfi A., Farfán Amézquita F., Freitag R., Hanco Pacha F., Huaraca Huasco W., Ibrahim F., Mbou A.T., Mihindou Mihindou V., Peixoto K.S., Rocha W., Rossi L.C., Seixas M., Silva-Espejo J.E., Abernethy K.A., Adu-Bredu S., Barlow J., da Costa A.C.L., Gardner T., Marimon B.S., Marimon-Junior B.H., Meir P., Metcalfe D.B., Phillips O., White L.J.T., and Y. Malhi., *in press*. ENSO drives interannual variation of forest woody growth across the tropics through atmospheric and soil water droughts. *Philosophical Transactions of the Royal Society B: Biological Sciences*.

Burton C., **Rifai S.W.**, and Y. Malhi. *in press*. Inter-comparison and assessment of gridded climate products over tropical forests during the 2015-16 El Niño. *Philosophical Transactions of the Royal Society B: Biological Sciences*.

Visakorpi, K., Gripenberg, S., Malhi, Y., Bolas, C., Oliveras, I., Harris, N., **Rifai, S.** and Riutta, T. 2018., Small-scale indirect plant responses to insect herbivory could have major impacts on canopy photosynthesis and isoprene emission. *New Phytologist*. doi:10.1111/nph.15338

Negrón-Juarez, R.I., Chambers, J.Q., Marra, D.M., Holm, J.A., **Rifai, S.W.**, Riley, W.J., McGroddy, M.E., Koven, C.D., Knox, R.G., Urquiza-Muñoz, J.D., Tello-Espinoza, R.,

Alegria-Muñoz, W.A., Ribeiro, G.H.P.M, and N. Higuchi. 2018. Vulnerability of Amazon forests to storm-driven tree mortality. *Environmental Research Letters* 13:5

Magnabosco Marra, D., Trumbore, S., Higuchi N., Ribeiro, G., Negron-Juarez, R., Holzwarth, F., **Rifai, S.W.**, Santos, J., Lima, A., Kinupp, V., Chambers, J., and Wirth, C. *In press*. Windthrows control biomass patterns and functional composition of Amazon forests. *Global Change Biology*

Wilson, C.H., Caughlin, T.T., **Rifai, S.W.**, Boughton, E.H., Mack, M.M., and S.L. Flory. 2017. Multi-decadal time series of remotely sensed vegetation improves prediction of soil carbon in a subtropical grassland. *Ecological Applications* 27: 1646-1656.

Tucker, J.M., Vittor, A., **Rifai, S.W.**, and D. Valle. 2017. Does deforestation promote or inhibit malaria transmission in the Amazon? A systematic literature review and critical appraisal of the effect of deforestation on malaria. *Philosophical Transactions of the Royal Society B: Biological Sciences*. (372)

Caughlin, T.T., **Rifai, S.W.**, Graves, S.J., Asner, G.P., and S.A. Bohlman. 2016. Landsat-LiDAR integration reveals widespread reforestation in a tropical agricultural landscape. *Remote Sensing in Ecology and Conservation*.

**Rifai, S.W.**, J.D. Urquiza Muñoz , R.I. Negrón-Juarez , F. Ramirez Arevalo , R. Tello, M. Vanderwel , J. Lichstein , J.Q. Chambers , and S.A. Bohlman. 2016. Landscape-scale consequences of differential tree mortality from catastrophic wind disturbance in the Amazon. *Ecological Applications*.

**Rifai, S.W.**, West, T.A.P, and F.E. Putz. 2015. “Carbon Cowboys” could inflate REDD+ payments through positive measurement bias. *Carbon Management*. (6): 151-158.

Graves, S.J., **Rifai, S.W.**, and Putz, F.E. 2014. Outer bark thickness decreases more with height on stems of fire-resistant than fire-sensitive Floridian oaks. *American Journal of Botany*. (101): 2183-2188.

Cho, A. H., S. A. Johnson, C. E. Schuman, J. M. Adler, O. Gonzalez, S. J. Graves, J. R. Huebner, D.B. Marchant, **S.W. Rifai**, I Skinner, and E. M. Bruna. 2014. Women are underrepresented on editorial boards in environmental biology and natural resource management. *PeerJ*: 2:e542

Negón-Juárez, R.I., Chambers, J.Q., Marra, D.M., Ribeiro, G.H.P.M, **Rifai, S.W.**, Higuchi, N. and D. Roberts. (2011) Detection of subpixel treefall gaps with Landsat imagery in Central Amazon forests. *Remote Sensing of Environment* (115): 3322-3328.

**Rifai, S.W.**, D. Markewitz, and B.E. Borders. (2010) Twenty years of intensive fertilization and competing vegetation suppression in loblolly pine plantations: Impacts on soil C, N, and microbial biomass. *Soil Biology and Biochemistry* (42): 713-723.

Santos , G.M., M. Mazon, J. Southon, **S. Rifai** and R.B. Moore (2007b) Evaluation of iron and cobalt powder brands as suitable catalysts for  $^{14}\text{C}$ -AMS target preparation, *Nuclear Instruments and Methods in Physics Research B* (259): 308-315.

**Manuscripts in Preparation:**

**Rifai, S.W.**, Anderson, L.O., and S.A. Bohlman. *In prep.* Climatic teleconnections drive the forest disturbance regime of the northwestern Amazon.

**Rifai, S.W.**, Chambers, J.Q., Urquiza-Muñoz, J.D., Negrón-Juarez, R.I., Ramirez-Arévalo, F.F., Tello-Espinoza, R.T., Marra, D.M., and S.A. Bohlman. *In prep.* Sustained reduction of species richness in northwestern Amazonian trees following catastrophic wind disturbances.

**Presentations:**

**Rifai, S.W.**, Malhi, Y. "How much of the global spatiotemporal variation in tropical woody net primary productivity is attributable to meteorological conditions?", Kuching, Malaysia, July 2018. Annual Meeting of the Association for Tropical Biology and Conservation.

**Rifai, S.W.**, Fyllas, N., Rowland, L., da Costa, A.C.L., Ferreira L., Fauset, S., Johnson, M., Gloor, E., Meir, P., Malhi, Y. "Amazonian forest responses to extreme drought from rapid hydraulic failure in a trait-based model", Mérida, Mexico, July 2017. Annual Meeting of the Association for Tropical Biology and Conservation.

**Rifai, S.W.**, Anderson, L.O., and S.A. Bohlman. "Spatiotemporal variability of blowdowns and the changing climate of the northwestern Amazon". Fall meeting of the American Geophysical Union, San Francisco, CA, December 2015.

**Rifai, S.W.**, Bohlman, S.A., Urquiza J.D., Ramirez, F.F., Negrón-Juarez, R.I, and J.Q. Chambers. "Changes in local to landscape tree species diversity from large catastrophic wind disturbance events in the Northwestern Amazon". Annual meeting of the Ecological Society of America, Baltimore, MD August 2015.

**Rifai, S.W.**, Urquiza J.D., Bohlman, S.A., and J.Q. Chambers. "How does non-random mortality change landscape estimation of biomass lost from catastrophic wind disturbances in the Peruvian Amazon?". Annual meeting of the Ecological Society of America, Sacramento, CA August 2014.

**Rifai, S.W.** "Catastrophic wind disturbance causes selective tree mortality in the Peruvian Amazon". Annual conference of the Association of Tropical Biology and Conservation. San José, Costa Rica, 2013.

**Rifai, S.W.** “Forest Structural Responses to Wind Disturbance in the Peruvian Amazon.” Department Seminar, School of Forest Resources and Conservation, University of Florida. November 2012.

**Rifai, S.W.,** Chambers J.Q., Negron-Juarez, R.I., Tello, R., Ramirez, F., and W. Alegria. “Wind Disturbance Produced Changes in Tree Species Assemblage in the Peruvian Amazon”. Poster Presentation, American Geophysical Union - Annual Meeting, San Francisco, CA. 2010.

**Rifai, S.W.** “Simulating Post-Disturbance Community Dynamics of Species Richness.” Poster-Presentation, School of Science and Engineering Research Day, Tulane University. New Orleans, LA. March 2012.

Markewitz, D., **Rifai, S.W.** and Borders, B. “Twenty years of intensive fertilization and competing vegetation suppression in loblolly pine plantations: Impacts on soil C, N, and microbial biomass.” Poster Presentation, Soil Science Society of America 2010 International Annual Meeting. Long Beach, CA. 2010.

**Rifai, S.W.,** Chambers J.Q., Negron-Juarez, R.I., Tello, R., Ramirez, F., and W. Alegria. “Sampling tropical forest tree species community assemblage along wind disturbance gradients in the Peruvian Amazon – Current Progress”. Poster Presentation, NASA Biodiversity and Ecological Forecasting Team Meeting, Washington D.C. 2010.

**Rifai, S.W.** and Markewitz, D. 2007 “Impacts of Competing Vegetation Suppression and Nutrient Fertilization Upon Soil Microbial Functional Groups in Loblolly Pine (*Pinus taeda*) Stands.” Poster Presentation, Soil Science Society of America 2007 Annual Meeting, New Orleans, LA, 2007.

#### **Grants and Awards:**

- 2013 NASA Earth and Space Science Fellowship 2013-2016
- 2011 IBM – Tulane Center for Computation Science 2011-2012 Fellowship
- 2010 NSF-OTS PASI scholarship to attend short course: “Expanding the Frontiers in Tropical Ecology through Embedded Sensors”
- 2010 Best Paper – Session (S7): Soil Nutrient Dynamics – 2010 Soil Science Society of America Meeting
- 2009 Tulane University - Stone Center Graduate Student Summer Field Research Grant
- 2008 Soil Science Society of Georgia – First Place – Student Poster Competition

#### **Student Leadership Activities:**

- 2015 Part of “Tropical Conservation and Development” organizing committee for conference “Envisioning a Sustainable Tropics”, March 25-28, Gainesville, Florida

#### **Teaching and Mentorship Experience:**

- 2007 Graduate Student Instructor: U. Georgia – Soils and Hydrology (FANR 3060)

2009 Graduate Student Instructor: Tulane University – Diversity of Life (EBIO 111)  
2013 Graduate Student Instructor: University of Florida – Forest Ecology (FOR 3153)  
2016 Lab Instructor: University of Florida - Forest Ecology (FOR 3153)

2017 Co-advised: M.S. student Chad Burton, Environmental Change Institute,  
University of Oxford

**Professional Societies:**

Association for Tropical Biology & Conservation  
Ecological Society of America  
American Geophysical Union

**Visiting Research:**

Summer 2014 – Lab group of Liana O. Anderson and Luiz Aragão at Instituto Nacional de Pesquisas Espaciais, São José dos Campos, Brazil.

**Relevant Skills:**

Programming Languages (skill level):

R (high); Java (high); JavaScript API for Google Earth Engine (high); Python & Numpy (high); Unix shell/Bash (intermediate); C, C++ (low)

Digital Image Analyses and Geospatial Methods:

Computer vision for image segmentation; Landcover classifications; Spectral mixture analysis; Vector operations  
Climate analyses: Temporal and spatial aggregation, anomaly calculation

Statistics:

Hierarchical/Multilevel Bayesian models; Non-linear models and parameter optimization; Multivariate methods for analysing diversity; Time series and spatial statistics; Machine learning algorithms (Random Forests, Gradient Boosting, Support Vector Machines)

Languages:

English (native language), Spanish (advanced), Portuguese (intermediate)

Technical field and lab skills:

- High resolution mapping of tropical forests with UAVs (drones)
- LI-COR 6400 infrared gas analyzer for the measurement of soil surface CO<sub>2</sub> efflux, and plant CO<sub>2</sub> assimilation
- Analysis of soil C, N and microbial biomass with Shimadzu TOC and Carlo Erba elemental analyzer
- Extraction and gas chromatography analysis PLFA's for the identification of soil microbial taxonomic groups
- Sample preparation for C-14 dating by accelerator mass spectrometry

Field experience:

- Southern California deserts and mountain ranges (2005-2006)
- Boreal forest in Manitoba, Canada (2005-2006)
- Pine forests across Georgia (2006-2008)
- Amazonian forests in Northeastern Peru, and Central Brazil (2009-2012)
- Barro Colorado Island, Panama (2016)

**Current research:**

With the larger Ecosystems Lab group at Oxford (PI: Yadvinder Malhi), I am currently leading modeling efforts of how tropical forests carbon fluxes and carbon allocation are affected by meteorological extremes from El Niño events. I am pursuing both a statistical and numerical process modeling approach. Using climate reanalyses and field data collected from the Global Ecosystem Monitoring network, I have constructed statistical models to examine how patterns of forest carbon allocation change with respect to meteorological variation. Using these findings and tree mortality data from the Caxiuanã long-term drought experiment in the eastern Amazon, I have implemented plant hydraulic dynamics, the Sperry (2016 PCE) stomatal conductance profit optimization model, and tree mortality routines in the Trait Based Forest Simulator (Fyllas et al., 2014, Geoscientific Model Development). Here, our statistical modeling from the GEM data informs the parameterization of the the simulation model. As this simulation model evolves, we will force it with large ensembles of probabilistic climate predictions over the Amazon basin to explore how meteorological extreme events will affect the functional composition and demography of Amazonian forests.

**Personal References:**

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