ALEXANDER SHENKIN, PH.D.

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RELEVANT EXPERIENCE

Assistant Research Professor, **Northern Arizona University**, Flagstaff, AZ   2021 – Present
School of Informatics, Computing, and Cyber Systems - Ecological and
Environmental Informatics cluster

Consultant, **The Nature Conservancy**, Arlington, VA   2021 – Present
Modeling pan-Amazonian impacts of silvicultural interventions

Post-Doctoral Research Scientist, **University of Oxford**, Oxford, UK   2017 – 2021
Adviser: Yadvinder Malhi
Leading pan-tropical studies of tree architecture derived from Terrestrial LiDAR
Scanning.

Post-Doctoral Research Scientist, **University of Oxford**, Oxford, UK   2013 – 2016
Adviser: Yadvinder Malhi
Investigated the roles of forest structure and light environments on the ecology and
productivity of forests across altitudinal gradient spanning the Andes to the
Amazon in Peru.

Researcher, **PRORENA / Smithsonian Tropical Research Institute**, Panama   2005 – 2007
Advisers: Mark Ashton, Omar Lopez
Investigated soil factors affecting tree growth across reforestation sites in Panama.

Consultant, **Birdlife International / Government of Turkey**, Ankara, Turkey   April 2004 – April 2005
Conceptual design of the Turkey Biodiversity Database.

Consultant, **Conservation International**, Washington, DC   Nov. 2002 – January 2005
Developed knowledge management systems and biodiversity databases.

Consultant, **Environmental Literacy Council,** Washington, DC   Oct. 2002 – August 2004
Authored cellular phone life cycle teaching module. World Parks Congress
correspondent.

Consultant, **The Nature Conservancy,** Washington, DC   Jun. 2003 – Sept. 2003
Developed a Visual Basic-based spreadsheet tool for international Protected Areas
conservation finance. Presented at World Parks Congress in Durban, 2003.

Developer, **eWingz Systems Inc.,** San Francisco, CA   Nov. 2001 – Jul. 2002
Perl coding for SMS gateway.

Field and Research Volunteer, **Orangutan Foundation International,** Borneo, Indonesia   Jul. – Aug. 2000
Conducted orangutan research, investigated illegal logging, maintained camp.

Consulting Hardware & Software Engineer, **Microsoft, Stanford University, Lockheed Martin Western Development Labs**, **Others,** San Francisco Bay Area, California   Aug. 1997 – Jun. 2003
Hardware: design and test of RF circuits. Software: Programming procedural and
object-oriented languages (e.g. PERL, PHP, JavaScript, C, VB) for back-end web
applications; administering Unix/Linux/PC servers, systems, networks, and
databases (e.g. Oracle, MySQL).

Senior Design Engineer, **Precision Microwave Components, Inc.,** San Jose, California   Sept. 1997 – Apr. 1999
    Circuit design, implementation and testing of commercial communications modules

Research & Development Engineer, **Lockheed Martin Western Development Labs,** San   Apr. 1995 – Feb. 1998
Jose, California
    Circuit design, implementation and testing of high-speed R&D satellite
    communication sub-modules

POSITIONS
    Management Committee Member, **3D Forest Ecosystem Monitoring** <u>**COST Action**</u>, 2021 - 2022
    Member, **Tropical Managed Forest Observatory**, 2012 – present
    Fellow, **Smithsonian Tropical Research Institute**, 2011 – 2016

EDUCATION

University of Florida, Gainesville, Florida   2014
    PhD, Interdisciplinary Ecology
    Adviser: Francis E. "Jack" Putz
    Dissertation: <u>Fates of Trees and Forests in Bolivia Subjected to Selective Logging,</u>
    <u>Fire, and Climate Change</u>

Yale University, New Haven, Connecticut   2006
    Master of Environmental Science

University of Colorado at Boulder, Boulder, Colorado   2001
    Master of Engineering (Electrical)

Stanford University, Palo Alto, California   1995 – 1996
    NDO Industry Program

University of California at San Diego, La Jolla, California   1994
    Bachelor of Science, Engineering Physics, Solid State Electronics

Lund Institute of Technology, University of Lund, Lund, Sweden   1991 – 1992
    Education Abroad Program, University of California at San Diego

TEACHING EXPERIENCE

Lecturer, **Thermal Remote Sensing for Environmental Monitoring**, Flagstaff, AZ   2023
    Invited lecture for seminar course at Northern Arizona University.

Lecturer, **From Tree Architecture to Functional Ecology: Towards a Whole-Plant**   2022
Approach to Forest Structure and Function, Flagstaff, AZ
    Invited lecture for seminar course at Northern Arizona University.

Instructor, **Tree Architecture and Terrestrial Laser Scanning**, Mato Grosso, Brazil   2019
    Designed and taught field course to Brazilian students on tree architecture and novel
    methods of investigation.

Co-organizer, **Conservation and Development Seminar Series**, Oxford, UK   2015 – present

Leader, **Ecology Book Club**, Oxford, UK   2015 - 2017

Teaching Assistant, **Field Methods Course**, Gainesville, FL 2012
> Forest Conservation Field Methods

Teaching Assistant, **Field Methods Course**, Suriname 2011
> Forest Research Methods

Instructor and Co-planner, **Bolivia Forest Policy: REDD's Challenges and** August 2008
Opportunities, Pando & Santa Cruz, Bolivia
> Designed and coordinated two-week field course which hosted both Bolivian and
> US students. In conjunction with the Working Forests in the Tropics NSF IGERT
> at the University of Florida.

Teaching Assistant, **University of Florida**, Gainesville, Florida 2006
> Landscape Ecology course

Research Assistant/Fellow, **Space Grant Consortium, University of Colorado at** Aug. 1999 – May 2000
Boulder, Boulder, CO
> Mentored undergraduate students in the development of antenna systems and solar
> power systems for the Citizen Explorer satellite.

CAPSTONE COURSES MENTORED
> Project Glasswing, Autonomous Understory UAV, Computer Science, NAU Fall/Spring 2022
> Project Glasswing, Autonomous Understory UAV, Electrical Engineering, NAU Spring/Fall 2023
> Project SmartFan, Smart Passive Residential Temp Control System, Electrical Engineering, NAU Spring/Fall 2023
> Project SilvaFlux, NBS Carbon Market UI, Computer Science, NAU Spring/Fall 2023
> Project 3D Forest, Functional 3D Forests with Gaming Engines, Computer Science, ASU Fall 2023

STUDENTS & POSTDOCS SUPERVISED (**), CO-SUPERVISED (*) AND MENTORED
> Scott LaRocca** (PhD, Northern Arizona University)
> Pooja Rathore** (Postdoc, Northern Arizona University)
> Isaiah Shipley (MSc, Northern Arizona University)
> Honglu Xin* (PhD, Peking University)
> Jens van der Zee* (MSc, Wageningen University)
> Yuanzhao Ding** (MSc, Oxford University)
> Nicolas Raab* (PhD, Oxford University)
> Tobias Jackson* (PhD, Oxford University)
> Alvaro Lau* (MsC*, PhD, Wageningen University)
> Lucio Trujillo (BS Universidad Nacional San Antonio Abad del Cusco, MsC PPGBIO/UNIFAP-
> Amapá-Brazil)
> Kieran Walker* (MsC, Imperial College London)
> Nils Rutjes* (MsC, Wageningen University)

PUBLICATIONS

PEER-REVIEWED ARTICLES

Shenkin, A., Patrick Bentley, L., Oliveras, I., Salinas, N., Adu-Bredu, S., Marimon, B. H., . . . Malhi, Y.
> (2020). The Influence of Ecosystem and Phylogeny on Tropical Tree Crown Size and Shape.
> Frontiers in Forests and Global Change 3, 109pp. doi:10.3389/ffgc.2020.501757

Shenkin, A., Chandler, C., Boyd, D., Jackson, T., Jami, J. b., Disney, M., . . . Malhi, Y. (2019). The world's
> tallest tropical tree in three dimensions. Frontiers in Forests and Global Change.
> doi:10.3389/ffgc.2019.00032

Shenkin, A., Bolker, B., Peña-Claros, M., Licona, J. C., Ascarrunz, N., & Putz, F. E. (2018). Interactive effects of tree size, crown exposure and logging on drought-induced mortality. Philosophical Transactions of the Royal Society B: Biological Sciences, 373(1760). doi:10.1098/rstb.2018.0189

Shenkin, A., Bolker, B., Peña-Claros, M., Licona, J. C., & Putz, F. E. (2015). Fates of trees damaged by logging in Amazonian Bolivia. Forest Ecology and Management, 357, 50-59. doi:10.1016/j.foreco.2015.08.009

Jucker, T., …, **Shenkin. A.**, …, Zavala, M. (2022). Tallo: A global tree allometry and crown architecture database. Global Change Biology 28, 5254–5268.

Doughty, C., Gaillard, C., Abraham, A., Burns, P., Keany, J., Aguirre-Gutierrez, J., Malhi, Y., Jantz, P., Koch, G., **Shenkin, A.**, & Tang, H. (2022). Unstratified forests dominate the tropics especially in regions with lower fertility or higher temperatures. https://ecoevorxiv.org/repository/view/4656/

Aguirre-Gutiérrez, J., Berenguer, E., Oliveras Menor, I., …, **Shenkin, A.**, et al. Functional susceptibility of tropical forests to climate change. Nat Ecol Evol (2022). https://doi.org/10.1038/s41559-022-01747-6

Wieczynski, D.J., Díaz, S., Durán, S.M., Fyllas, N.M., Salinas, N., Martin, R.E., **Shenkin, A.**, Silman, M.R., Asner, G.P., Bentley, L.P., Malhi, Y., Enquist, B.J. and Savage, V.M. (2022), Improving landscape-scale productivity estimates by integrating trait-based models and remotely-sensed foliar-trait and canopy-structural data. Ecography e06078. https://doi.org/10.1111/ecog.06078

Shiwen, L., Steel, L., Dahlsjö, C. A., Peirson, S., **Shenkin, A.**, Morimoto, T., . . . Spitschan, M. (2021). Hyperspectral characterisation of natural illumination in woodland and forest environments (Vol. 11815): SPIE. doi: 10.1117/12.2595301

Wilkes, P., **Shenkin, A.**, Disney, M., Malhi, Y., Bentley, L. P., & Vicari, M. B. Terrestrial laser scanning to reconstruct branch architecture from harvested branches. Methods in Ecology and Evolution, 12, 2487– 2500. doi:10.1111/2041-210X.13709

Xin, H., Lin, Yi., Jackson, T., Cao, Y., Zhang, H., & **Shenkin, A.** (2021). Forest trees spatial pattern analysis based on vectorial mark. Journal of Forestry Research.

Xin, H., Malhi, Y., Coomes, D. A., Lin, Y., Liu, B., Yang, Q., & **Shenkin, A.** (2021). Individual tree detection and crown segmentation based on metabolic theory from airborne laser scanning data. Journal of Applied Remote Sensing, 15(3), 034504. doi:10.1117/1.JRS.15.034504

van der Zee, J., Lau, A., & **Shenkin, A.** (2021). Understanding crown shyness from a 3D perspective. Ann Bot. doi:10.1093/aob/mcab035

Aguirre-Gutiérrez, J., Rifai, S., **Shenkin, A.**, Oliveras, I., Bentley, L. P., Svátek, M., . . . Malhi, Y. (2021). Pantropical modelling of canopy functional traits using Sentinel-2 remote sensing data. Remote Sensing of Environment, 252, 112122. doi:10.1016/j.rse.2020.112122

Jackson, T., **Shenkin, A.**, Majalap, N., Bin Jami, J., Bin Sailim, A., Reynolds, G., . . . Malhi, Y. (2020). The mechanical stability of the world's tallest broadleaf trees. Biotropica. doi:10.1111/btp.12850 [**Wiley top cited article, 2022**]

Elsherif, A., Gaulton, R., **Shenkin, A.**, Malhi, Y., & Mills, J. (2019). Three dimensional mapping of forest canopy equivalent water thickness using dual-wavelength terrestrial laser scanning. Agricultural and Forest Meteorology, 276, 107627.

Jackson, T., **Shenkin, A.**, Kalyan, B., Zionts, J., Calders, K., Origo, N., . . . Malhi, Y. (2019). A New Architectural Perspective on Wind Damage in a Natural Forest. Frontiers in Forests and Global Change, 1(13). doi:10.3389/ffgc.2018.00013

Jackson, T., **Shenkin, A.**, Wellpott, A., Calders, K., Origo, N., Disney, M., . . . Malhi, Y. (2019). Finite element analysis of trees in the wind based on terrestrial laser scanning data. Agricultural and Forest Meteorology, 265, 137-144. doi:https://doi.org/10.1016/j.agrformet.2018.11.014

Perz, S. G., **Shenkin, A.**, Rondon, X., & Qiu, Y. (2013). Infrastructure upgrades and rural–urban connectivity: distance disparities in a tri-national frontier in the Amazon. The Professional Geographer, 65(1), 103-115.

Perz, S. G., **Shenkin, A.**, Barnes, G., Cabrera, L., Carvalho, L. A., & Castillo, J. (2012). Connectivity and resilience: a multidimensional analysis of infrastructure impacts in the Southwestern Amazon. Social indicators research, 106(2), 259-285.

van der Sande, M. T., Bush, M. B., Urrego, D. H., Silman, M., Farfan-Rios, W., García Cabrera, K., **Shenkin, A.**, . . . Gosling, W. (2021). Modern pollen rain predicts shifts in plant trait composition but not plant diversity along the Andes–Amazon elevational gradient. 32(1), e12925. doi: 10.1111/jvs.12925

Doughty, C. E., Cheesman, A. W., Ruitta, T., Thomson, E., **Shenkin, A.**, Huasco, W. H., . . . Meir, P. (2020). Predicting tropical tree mortality with leaf spectroscopy. Biotropica, 53(2), 581-595. doi: 10.1111/btp.12901.

Oliveras, I, Bentley, L., Fyllas, N. M., Gvozdevaite, A., **Shenkin, A.**, Prepah, T., . . . Malhi, Y. (2020). The influence of taxonomy and environment on leaf trait variation along tropical abiotic gradients. Frontiers in Forests and Global Change.

Martin, R. E., Asner, G. P., Bentley, L. P., **Shenkin, A.**, Salinas, N., Huaypar, K. Q., . . . Malhi, Y. (2020). Covariance of Sun and Shade Leaf Traits Along a Tropical Forest Elevation Gradient. Frontiers in plant science, 10(1810). doi:10.3389/fpls.2019.01810

Jucker, T., Jackson, T. D., Zellweger, F., Swinfield, T., Gregory, N., Williamson, J., . . . **Shenkin, A.**, . . ., Coomes, D. A. (2020). A Research Agenda for Microclimate Ecology in Human-Modified Tropical Forests. Frontiers in Forests and Global Change, 2(92). doi:10.3389/ffgc.2019.00092

Durán, S. M., Martin, R. E., Díaz, S., Maitner, B. S., Malhi, Y., Salinas, N., **Shenkin, A.**, . . . Enquist, B. J. (2019). Informing trait-based ecology by assessing remotely sensed functional diversity across a broad tropical temperature gradient. Science Advances, 5(12), eaaw8114. doi:10.1126/sciadv.aaw8114

Verbeeck, H., Bauters, M., Jackson, T., **Shenkin, A.**, Disney, M., & Calders, K. (2019). Time for a Plant Structural Economics Spectrum. Frontiers in Forests and Global Change, 2(43). doi:10.3389/ffgc.2019.00043

Piponiot, C., Rödig, E., Putz, F. E., Rutishauser, E., Sist, P., Ascarrunz, N., . . ., **Shenkin, A.**, . . ., Hérault, B. (2019). Can timber provision from Amazonian production forests be sustainable? Environmental Research Letters, 14(6), 064014. doi:10.1088/1748-9326/ab195e

Lau, A., Martius, C., Bartholomeus, H., **Shenkin, A.**, Jackson, T., Malhi, Y., . . . Bentley, L. P. (2019). Estimating architecture-based metabolic scaling exponents of tropical trees using terrestrial LiDAR and 3D modelling. Forest Ecology and Management, 439, 132-145. doi:10.1016/j.foreco.2019.02.019

Fauset, S., Gloor, M., Fyllas, N. M., Phillips, O. L., Asner, G. P., Baker, T. R., . . ., **Shenkin, A.**, . . ., Malhi, Y. (2019). Individual-Based Modeling of Amazon Forests Suggests That Climate Controls Productivity While Traits Control Demography. Frontiers in Earth Science, 7(83). doi:10.3389/feart.2019.00083

Doughty, C., Santos-Andrade, P.E., **Shenkin, A.**, Goldsmith, G., Bentley, L. P., Blonder, B. Diaz, S., Salinas, N., Enquist, B., Martin, R. E., Asner, G. P., Malhi, Y. (2018). Tropical forest leaves may darken in response to climate change. Nature Ecology & Evolution (accepted).

Blonder, B., Salinas, N., Bentley, L. P., **Shenkin, A.**, Chambi Porroa, P. O., Valdez Tejeira, Y., . . . Malhi, Y. (2018). Structural and defensive roles of angiosperm leaf venation network reticulation across an Andes–Amazon elevation gradient. Journal of Ecology, 106(4), 1683-1699. doi:doi:10.1111/1365-2745.12945

Lau, A., Bentley, L. P., Martius, C., **Shenkin, A.**, Bartholomeus, H., Raumonen, P., . . . Herold, M. (2018). Quantifying branch architecture of tropical trees using terrestrial LiDAR and 3D modelling. Trees, 32(5), 1219-1231. doi:10.1007/s00468-018-1704-1

Malhi, Y., Jackson, T., Bentley, L. P., Lau, A., **Shenkin, A.**, Herold, M., . . . Disney, M. (2018). New perspectives on the ecology of tree structure and tree communities through terrestrial laser scanning. Interface Focus. doi:10.1098/rsfs.2017.0052

Fauset, S., M. G., Fyllas, N., Phillips, O. L., Asner, G. P., Baker, T., Bentley, L., . . ., **Shenkin, A.**, …, Malhi, Y. S. (2019). Individual-based modelling of Amazon forests suggests that climate controls productivity while traits control demography. Frontiers in Earth Science (Accepted).

Fauset, S., Gloor, M. U., Aidar, M. P. M., Freitas, H. C., Fyllas, N. M., Marabesi, M. A., Rochelle, A.L.C., **Shenkin, A.**, Vieira, S.A., & Joly, C. A. (2017). Tropical forest light regimes in a human-modified landscape. Ecosphere, 8(11), e02002-n/a. doi:10.1002/ecs2.2002

Doughty, C. E., Santos-Andrade, P. E., Goldsmith, G. R., Blonder, B., **Shenkin, A.**, Bentley, L. P., . . . Malhi, Y. (2017). Can leaf spectroscopy predict leaf and forest traits along a Peruvian tropical forest elevation gradient? Journal of Geophysical Research: Biogeosciences, 122(11), 13. doi:10.1002/2017JG003883

Enquist, B. J., Bentley, L. P., **Shenkin, A.**, Maitner, B., Savage, V., Michaletz, S., . . . Malhi, Y. (2017). Assessing trait-based scaling theory in tropical forests spanning a broad temperature gradient. Global Ecology and Biogeography. doi:10.1111/geb.12645

Fyllas, N. M., Bentley, L. P., **Shenkin, A.**, Asner, G. P., Atkin, O. K., Díaz, S., . . . Swenson, D. N. (2017). Solar radiation and functional traits explain the decline of forest primary productivity along a tropical elevation gradient. Ecology Letters. doi:10.1111/ele.12771

Wu, M. S., Feakins, S. J., Martin, R. E., **Shenkin, A.**, Bentley, L. P., Blonder, B., . . . Malhi, Y. (2017). Altitude effect on leaf wax carbon isotopic composition in humid tropical forests. Geochimica Et Cosmochimica Acta, 206, 1-17. doi:10.1016/j.gca.2017.02.022

Blonder, B., Salinas, N., Patrick Bentley, L., **Shenkin, A.**, Chambi Porroa, P. O., Valdez Tejeira, Y., . . . Malhi, Y. (2017). Predicting trait-environment relationships for venation networks along an Andes-Amazon elevation gradient. Ecology, 98(5), 1239-1255. doi:10.1002/ecy.1747

Piponiot-Laroche, C., Sist, P., Mazzei, L., Peña-Claros, M., Putz, F. E., Rutishauser, E., **Shenkin, A.**, . . . Hérault, B. (2016). Carbon recovery dynamics following disturbance by selective logging in Amazonian forests. [archive]. eLife, 5, e21394 (21319 p.). doi:10.7554/eLife.21394

Feakins, S. J., Peters, T., Wu, M. S., **Shenkin, A.**, Salinas, N., Girardin, C. A. J., . . . Malhi, Y. (2016). Production of leaf wax n-alkanes across a tropical forest elevation transect. Organic Geochemistry, 100, 89-100. doi:http://dx.doi.org/10.1016/j.orggeochem.2016.07.004

Goldsmith, G. R., Bentley, L. P., **Shenkin, A.**, Salinas, N., Blonder, B., Martin, R. E., . . . Malhi, Y. (2016). Variation in leaf wettability traits along a tropical montane elevation gradient. New Phytol. doi: 10.1111/nph.14121

Neyret, M., Bentley, L. P., Oliveras, I., Marimon, B. S., Marimon-Junior, B. H., Almeida de Oliveira, E., … **Shenkin A.,** .. . . Malhi, Y. (2016). Examining variation in the leaf mass per area of dominant species across two contrasting tropical gradients in light of community assembly. Ecology and Evolution. doi: 10.1002/ece3.2281

Asner, G. P., Martin, R. E., Anderson, C. B., Kryston, K., Vaughn, N., Knapp, D. E., . . . **Shenkin A.,** . . . Malhi, Y. (2016). Scale dependence of canopy trait distributions along a tropical forest elevation gradient. New Phytologist. doi: 10.1111/nph.14068

Feakins, S. J., Bentley, L. P., Salinas, N., **Shenkin, A.**, Blonder, B., Goldsmith, G. R., . . . Malhi, Y. (2016). Plant leaf wax biomarkers capture gradients in hydrogen isotopes of precipitation from the Andes and Amazon. Geochimica Et Cosmochimica Acta, 182, 155-172. doi: http://dx.doi.org/10.1016/j.gca.2016.03.018

Sist, P., Rutishauser, E., Peña-Claros, M., **Shenkin, A.**, Hérault, B., Blanc, L., . . . Silva, K. E. (2015). The Tropical managed Forests Observatory: a research network addressing the future of tropical logged forests. Applied Vegetation Science, 18(1), 171-174.

Baraloto, C., Alverga, P., Quispe, S. B., Barnes, G., Chura, N. B., da Silva, I. B., …, **Shenkin, A.**, …, Perz, S. (2015). Effects of road infrastructure on forest value across a tri-national Amazonian frontier. Biological Conservation, 191, 674-681. doi: http://dx.doi.org/10.1016/j.biocon.2015.08.024

Perz, S. G., Xia, Y., & **Shenkin, A.** (2014). Global Integration and Local Connectivity: Trans-boundary Highway Paving and Rural-Urban Ties in the Southwestern Amazon. Journal of Latin American Geography, 13(3), 205-239.

Perz, S., Barnes, G., **Shenkin, A.**, Rojas, D., & Vaca, C. (2014). Private and communal lands? The ramifications of tenure ambiguity and regional integration for tenure formalization and its consequences in northern Bolivia. International Journal of the Commons, 8(1), 179-206.

Perz, S., Chavez, A. B., Cossio, R., Hoelle, J., Leite, F. L., Rocha, K., Rojas, R.O., **Shenkin, A.**, Araujo Carvalho, L, Castillo, J. (2014). Trans-boundary infrastructure, access connectivity, and household land use in a tri-national frontier in the Southwestern Amazon. Journal of Land Use Science, 1-27.

Baraloto, C., Alverga, P., Baéz Quispe, S., Barnes, G., Bejar Chura, N., Brasil da Silva, I., . . . **Shenkin A.,** . . . Perz, S. (2014). Trade-offs among forest value components in community forests of southwestern Amazonia. Ecology and Society, 19(4). doi: 10.5751/ES-06911-190456

Romero, L.C., Biedenweg, K., Camacho, I.R., Céspedes, D.R., **Shenkin, A.**, Elliott, D. & Perz, S., (2009). Perspectivas socioeconómicas de los proyectos de infraestructura: Las comunidades campesinas y la pavimentación de carreteras en Pando, Bolivia Bolivian Studies Journal 8(1), 18pp.

BOOK CHAPTERS, DATABASES, AND SOFTWARE

Shenkin, A., Berenger, E., Bennett, A. (2019). World Economic Forum Transformation Map, Innovation for Nature. https://intelligence.weforum.org/topics/a1G0X0000062jZ3UAI?tab=publications

Shenkin, A. (2019). treestruct: R package for analysis and manipulation of tree structure models. R package version 0.30.0. https://github.com/ashenkin/treestruct

Meir, P., **Shenkin, A.**, Disney, M., Rowland, L., Malhi, Y., Herold, M., & Costa, A. C. L. d. (2017). Plant Structure-Function Relationships and Woody Tissue Respiration: Upscaling to Forests from Laser-

Derived Measurements. In G. Tcherkez & J. Ghashghaie (Eds.), Plant Respiration: Metabolic Fluxes and Carbon Balance (Vol. 43): Springer International Publishing AG.

Shenkin, A., Bentley, L. P., Girardin, C., Blonder, B., Boyle, B., Doughty, C. E., . . . Malhi, Y. (2017). GEMTraits: A database and R package for accessing and analyzing plant functional traits from the Global Ecosystems Monitoring Network. doi:10.5287/bodleian:v0BD04N7o

ARTICLES IN PREPARATION

Shenkin, A., et al, A New Tree Surface Area Allometry. In preparation for Ecology Letters, 80% complete.

Shenkin, A., Asner. G.P., Bentley, L., Salinas, N., Olivieras, I., Enquist, B., Malhi, Y. Leaf chemical traits explain carbon cycle allocation: setting a foundation for understanding carbon cycles at landscape scales. Ecology Letters, in preparation, 40% complete.

Shenkin, A., Bentley, L., Salinas, N., Asner. G.P., Enquist, B., Malhi, Y. Vertical light variability affects forest productivity across a tropical elevation gradient. In preparation, 40% complete.

SELECTED PRESENTATIONS

Shenkin, A., Ladenburg, A. (2019). **Invited Talk:** Forests of Gestalt. Digital | Visual | Cultural III, Oxford, UK.

Shenkin, A., Herold, M., Gonzalez de Tanago, J., Disney, M., Meir, P., Lau Sarmiento, A., Malhi, Y. (2017). Tree architecture influences stem respiration: 3D models to better understand forest productivity. Association of Tropical Biology and Conservation, Fall Meeting 2017, Merida, Mexico.

Shenkin, A. (2017). Does Forest Structure Matter for Forest Productivity? Presentation to the Oxford Centre for Tropical Forests, University of Oxford, Oxford, UK. http://www.tropicalforests.ox.ac.uk/event/octf-seminar-dr-alexander-shenkin/

Bentley, L.P., **Shenkin, A.** (2017). **Symposium organizers**: New Views of Structural Complexity and Tropical Ecosystem Function. Association of Tropical Biology and Conservation, Fall Meeting 2017, Merida, Mexico.

Shenkin, A., Hallé, F., Malhi, Y. (2016). **Symposium organizers**: Tropical tree structure and function: directions and gaps four decades after Hallé. Association of Tropical Biology and Conservation, Fall Meeting 2016, Montpellier, France.

Shenkin, A. (2016). The shapes of trees across the tropics: environmental and evolutionary roles in crown metabolic scaling. Association of Tropical Biology and Conservation, Fall Meeting 2016, Montpellier, France.

Shenkin, A., Asner, G.P., Malhi, Y. (2015). Sensing Carbon Cycles from the Andes to the Amazon: First steps towards scaling to the landscape. Association of Tropical Biology and Conservation, Fall Meeting 2015, Honolulu, Hawaii.

Bentley, L.P., **Shenkin, A.** (2015). GEM-Traits: A new global database linking tropical tree diversity to ecosystem function via functional traits. Association of Tropical Biology and Conservation, Fall Meeting 2015, Honolulu, Hawaii.

Shenkin, A. (2015). Lasers in the Jungle, SEED, Oxford University. https://www.youtube.com/watch?v=d0q4vO-SrLQ

Goldsmith, G., Doughty, C., Bentley, L., **Shenkin, A**., Castro-Ccoscco, R., Salinas, N., & Malhi, Y. (2014). Intra-and inter-community variation in leaf water repellency along a 4000 m elevation transect in the Peruvian Andes. AGU Fall Meeting Abstracts, 1, 04.

Bentley, L., **Shenkin, A.**, Enquist, B., & Malhi, Y. (2014). Using empirical measurements of tree branching architecture to scale whole-tree metabolism along a 4000 m elevation transect in the Peruvian Andes and Amazon. AGU Fall Meeting Abstracts, 1, 0103.

Shenkin, A., Bentley, L., Asner, G., & Malhi, Y. (2014). Light in Tropical Forest Models: What Detail Matters? AGU Fall Meeting Abstracts, 1, 0123.

Shenkin, A., Lopez, O., Ashton, P.M. (2007). Microbiotic Soil Community Effects on Tree Growth Across Two Sites in Panama (poster). American Museum of Natural History Spring Symposium, Small Matters: Microbes and Their Role in Conservation.

Shenkin, A. (2004). Turkey's Biodiversity Information Monitoring System: Adapting Birdlife's World Bird Database For Use in Turkey. Biodiversity Information Monitoring System Meeting. Ankara, Turkey.

GRANTS AND AWARDS

2023	Northern Arizona University, Faculty Research and Creative Activity Support Grant, "Autonomous UAV navigation in tropical forest understory environments to advance forest ecology research." **$20,000** Role: PI
2022	Arizona Board of Regents, "Arizona Tree Stress Explorer and Alert System." **$1,260,000** Role: PI
2021	1st Place, Oxford Climate Tech & Sustainability Innovation Challenge. "A new climate service provided by forests." **£12,000** Role: PI
2021	John Fell Fund, "Spatio-temporal variation of oak-caterpillar phenological synchrony in Wytham Woods, UK." **£5000** Role: PI
2020-2021	John Fell Fund, "The visual ecosystem of Wytham Woods: A big data approach to measurement and modelling." **£18,000**. Role: Co-I/Researcher.
2019	New Phytologist Large Symposium award. "The Shape of Trees: Advances in understanding tree architecture, forest structure, and ecosystem function." **£60,000**. Role: PI
2016 – 2017	John Fell Fund, "Building a virtual 3D forest: a new partnership between ecological research and commercial software engineering." **£60,000**. Role: PI
2016	DigitalGlobe Foundation Imagery Grant. **£2000**. Role: PI
2010-2012	World Wildlife Foundation Fuller Fellow. **$20,000**. Role: PI
2007	Working Forests in the Tropics NSF IGERT, University of Florida, Gainesville, Florida, USA. **$3000**. Role: PI
2006 – 2010	Alumni Fellow, University of Florida, Gainesville, Florida, USA. **$100,000**. Role: PI
2005	Tropical Research Institute Fellow, Yale University. **$1500**. Role: PI
2005	101 Conservation Scholarship Recipient, Pinchot Institute for Conservation. **$3000**. Role: PI

2000   Merit Scholarship, University of Colorado, Boulder, USA. **$20,000**.
                    Role: PI

Submitted and in process

In process   EPIC Games MegaGrant. "Functional virtual forests: bridging the gap between
                    ecosystem simulation and gaming engines." **$200,000**. (Funding for one year, with
                    the intention to submit **~$2M** bid thereafter).
                    Role: PI

FIELD EXPERIENCE

Indonesia – Central Kalimantan – 6 weeks – volunteer work in remote orangutan rehabilitation center.

Panama – Gamboa, BCI, Los Santos, Rio Hato – 2 months – soil collection and sterilization, conducted nursery experiment

Northern Bolivia – Pando – 4 months – conducted social surveys in rural communities on land tenure, livelihoods, and resource use and knowledge. Co-organized team of 5 local assistants.

Eastern Bolivia – Guarayos, Santa Cruz – 6 months – forest survey methods (censuses, lianas, canopy cover, regeneration). Organized team of 2 local assistants and 2 local students.

Suriname – Carolina Savanna and surrounding forest concessions – 2 weeks – teaching field methods and research course for local students and professionals.

USA – Gainesville, Florida – 2 weeks – teaching field methods.

Peru – eastern Andes to Amazon basin – 6 months – tree structure, forest structure and microenvironmental measurements; built and deployed vertical light profile measurement system; terrestrial laser scanning; oversaw team of 3 local research assistants.

UK – Wytham Woods, Oxford – 1 month, ongoing – woody respiration measurement

Ghana – 2 weeks – Implementing and training for vertical light profile and crown architecture measurements in savanna – forest transition gradient study.

Malaysian Borneo – SAFE project area, Maliau Basin, Danum Valley – 2 months – terrestrial laser scanning, branch felling, Huber value/LMA measurement, designed and operated drone-based multispectral surveys.   Principal leader; organized logistics and budget, ran campaign with 12 assistants and 2 researchers.

Australia – Northern Queensland – 2 months – terrestrial laser scanning, branch felling, Huber value/LMA measurement, designed and operated drone-based multispectral surveys.   Principal leader; organized logistics and ran campaign with 2 assistants and 2 researchers.

Brazil – Mato Grosso – 1 month – terrestrial laser scanning, branch architecture measurement, photogrammetry, and drone-based multispectral surveys. Principal leader; organized logistics and ran campaign with 10 assistants and 2 researchers. Taught concurrent field course.

South Africa – 2 weeks – terrestrial laser scanning, branch architecture measurement.

MEDIA COVERAGE AND OUTREACH

Article [**front cover**]: "Arizona will soon be using satellites to monitor stress in trees",   December 2022
    Daily Sun

Footage: "Judi Dench's Wild Borneo Adventure", ITV   July 2019

"The World's Tallest Tropical Tree Discovered in Malaysia", The Niche	September 2019
"UK Scientists discover world's tallest tropical tree", BBC	April 2019
"Climb confirms that the world's tallest tropical tree tops 100 meters", Mongabay	April 2019
"The World's Tallest Tropical Tree Is Longer Than a Football Field", Live Science	April 2019
"Meet Menara, the highest tropical tree in the world", VRT News	April 2019

SERVICE

Associate Editor, Frontiers in Forests and Global Change (Forest Ecophysiology)	2020 - present
Review Editor, Frontiers in Forests and Global Change (Forest Disturbance)	2018 - present

Reviewer for: New Phytologist, Ecology Letters, PLOS One, Human Ecology, Journal of Applied Ecology, Methods in Ecology and Evolution, Global Ecology and Biogeography, Journal of Theoretical Biology, Journal of Vegetation Science, Functional Ecology

PROFESSIONAL MEMBERSHIPS

British Ecological Society	2018 - present
Association of Tropical Biology and Conservation	2015 – present

LANGUAGES

Fluent in English and Spanish (resident in Panama for 5 years)