

Christopher B. Anderson

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Education History

- 2016-Current **Stanford University**
PhD Student, Department of Biology
- 2004-2008 **University of California, Santa Cruz**
B.S., Ecology and Evolutionary Biology

Work History

- 2009-2016 Carnegie Institution for Science
Carnegie Airborne Observatory Imaging Spectrometer Technical and Science Lead
Carnegie Spectranomics Project Laboratory Manager
- 2008-2009 North Bay Industries
Environmental Survey Lead
- 2007-2008 University of California, Santa Cruz
Restoration Scientist in conjunction with the Santa Cruz Municipal Water District

Peer-Reviewed Publication History

- Asner, G. P., Martin, R. E., Knapp, D. E., Tupayachi, R., **Anderson, C. B.**, Sinca, F., Vaughn, N. R., & Llactayo, W. (2017). Airborne laser-guided imaging spectroscopy to map forest trait diversity and guide conservation. *Science*, 355(6323), 385-389. [[Link](#)]
- Asner, G. P., Knapp, D. E., **Anderson, C. B.**, Martin, R. E., Vaughn, N. (2016). Large-scale climatic and geophysical controls on the leaf economics spectrum. *Proceedings of the National Academy of Sciences*. 201604863. [[Link](#)]
- Asner, G. P., Martin, R. E., **Anderson, C. B.**, Kryston, K., Vaughn, N., Knapp, D. E., Bentley, L. P., Shenkin, A., Salinas, N., Sinca, F., Tupayachi, R., Quispe Huaypar, K., Montoya Pillco, M., Ccori Álvarez, F. D., Díaz, S., Enquist, B. and Malhi, Y. (2016), Scale dependence of canopy trait distributions along a tropical forest elevation gradient. *New Phytologist*. [[Link](#)]
- Graves, S. J., Asner, G. P., Martin, R. E., **Anderson, C. B.**, Colgan, M. S., Kalantari, L., & Bohlman, S. A. (2016). Tree Species Abundance Predictions in a Tropical Agricultural Landscape with a Supervised Classification Model and Imbalanced Data. *Remote Sensing*, 8(2), 161. [[Link](#)]
- Barbosa, J. M., Sebastián-González, E., Asner, G. P., Knapp, D. E., **Anderson, C.**, Martin, R. E., & Dirzo, R. (2016). Hemiparasite–host plant interactions in a fragmented landscape assessed via imaging spectroscopy and LiDAR. *Ecological Applications*, 26(1), 55-66. [[Link](#)]

- Asner, G. P., Brodrick, P. G., **Anderson, C. B.**, Vaughn, N., Knapp, D. E., & Martin, R. E. (2016). Progressive forest canopy water loss during the 2012–2015 California drought. *Proceedings of the National Academy of Sciences*, 113(2), E249-E255. [[Link](#)]
- Baldeck, C. A., Asner, G. P., Martin, R. E., **Anderson, C. B.**, Knapp, D. E., Kellner, J. R., & Wright, S. J. (2015). Operational tree species mapping in a diverse tropical forest with airborne imaging spectroscopy. *PloS one*, 10(7), e0118403. [[Link](#)]
- Asner, G. P., **Anderson, C. B.**, Martin, R. E., Tupayachi, R., Knapp, D. E., & Sinca, F. (2015). Landscape biogeochemistry reflected in shifting distributions of chemical traits in the Amazon forest canopy. *Nature Geoscience*, 8, 567-573. [[Link](#)]
- Somers, B., Asner, G. P., Martin, R. E., **Anderson, C. B.**, Knapp, D. E., Wright, S. J., & Van De Kerchove, R. (2015). Mesoscale assessment of changes in tropical tree species richness across a bioclimatic gradient in Panama using airborne imaging spectroscopy. *Remote Sensing of Environment*, 167, 111-120. [[Link](#)]
- Taylor, P., Asner, G., Dahlin, K., **Anderson, C. B.**, Knapp, D., Martin, R., Mascaro, J., Chazdon, R., Cole, R., Wanek, W., Hofhansl, F., Malavassi, E., Vilchez, B., & Townsend, A. (2015). Landscape-scale controls on aboveground forest carbon stocks on the Osa Peninsula, Costa Rica. *PloS one*, 10(6), e0126748. [[Link](#)]
- Higgins, M. A., Asner, G. P., **Anderson, C. B.**, Martin, R. E., Knapp, D. E., Tupayachi, R., Perez, E., Elespuru, N., & Alonso, A. (2015). Regional-scale drivers of forest structure and function in northwestern Amazonia. *PloS one*, 10(3), e0119887. [[Link](#)]
- Asner, G. P., Martin, R. E., **Anderson, C. B.**, & Knapp, D. E. (2015). Quantifying forest canopy traits: Imaging spectroscopy versus field survey. *Remote Sensing of Environment*, 158, 15-27. [[Link](#)]
- Asner, G. P., Knapp, D. E., Martin, R. E., Tupayachi, R., **Anderson, C. B.**, Mascaro, J., Sinca, F., Chadwick, K.D., Higgins, M.A., Farfan, W., Llactayo, W., & Silman, M. R. (2014). Targeted carbon conservation at national scales with high-resolution monitoring. *Proceedings of the National Academy of Sciences*, 111(47), E5016-E5022. [[Link](#)]
- Marvin, D. C., Asner, G. P., Knapp, D. E., **Anderson, C. B.**, Martin, R. E., Sinca, F., & Tupayachi, R. (2014). Amazonian landscapes and the bias in field studies of forest structure and biomass. *Proceedings of the National Academy of Sciences*, 111(48), E5224-E5232. [[Link](#)]
- Asner, G. P., Martin, R. E., Carranza-Jiménez, L., Sinca, F., Tupayachi, R., **Anderson, C. B.**, & Martinez, P. (2014). Functional and biological diversity of foliar spectra in tree canopies throughout the Andes to Amazon region. *New Phytologist*, 204(1), 127-139. [[Link](#)]
- Higgins, M. A., Asner, G. P., Martin, R. E., Knapp, D. E., **Anderson, C. B.**, Kennedy-Bowdoin, T., Saenz, R., Aguilar, A. & Wright, S. J. (2014). Linking imaging spectroscopy and LiDAR with floristic composition and forest structure in Panama. *Remote Sensing of Environment*, 154, 358-367. [[Link](#)]
- Asner, G. P., Martin, R. E., Tupayachi, R., **Anderson, C. B.**, Sinca, F., Carranza-Jiménez, L., & Martinez, P. (2014). Amazonian functional diversity from forest canopy chemical assembly. *Proceedings of the National Academy of Sciences*, 111(15), 5604-5609. [[Link](#)]
- Asner, G. P., **Anderson, C. B.**, Martin, R. E., Knapp, D. E., Tupayachi, R., Sinca, F., & Malhi, Y. (2014). Landscape-scale changes in forest structure and functional traits along an Andes-to-Amazon elevation gradient. *Biogeosciences*, 11(3), 843-856. [[Link](#)]

- Mascaro, J., Asner, G. P., Knapp, D. E., Kennedy-Bowdoin, T., Martin, R. E., **Anderson, C. B.**, Higgins, M., & Chadwick, K. D. (2014). A tale of two “forests”: Random Forest machine learning aids tropical forest carbon mapping.. *PLoS one*, 9(4), e85993. [[Link](#)]
- Asner, G. P., Kellner, J. R., Kennedy-Bowdoin, T., Knapp, D. E., **Anderson, C. B.**, & Martin, R. E. (2013). Forest canopy gap distributions in the southern Peruvian Amazon. *PloS one*, 8(4), e60875. [[Link](#)]
- Asner, G. P., Mascaro, J., **Anderson, C. B.**, Knapp, D. E., Martin, R. E., Kennedy-Bowdoin, T., van Breugel, M., Davies, S., Hall, J.S., Muller-Landau, H.C., Potvin, C., Souza, W., Wright, S.J. & Bermingham, E. (2013). High-fidelity national carbon mapping for resource management and REDD+. *Carbon balance and management*, 8(7). [[Link](#)]
- Asner, G. P., Knapp, D. E., Boardman, J., Green, R. O., Kennedy-Bowdoin, T., Eastwood, M., Martin, R.E., **Anderson, C. B.**, & Field, C. B. (2012). Carnegie Airborne Observatory-2: Increasing science data dimensionality via high-fidelity multi-sensor fusion. *Remote Sensing of Environment*, 124, 454-465. [[Link](#)]
- Asner, G. P., Martin, R. E., Knapp, D. E., Tupayachi, R., **Anderson, C. B.**, Carranza, L., Houcheime, M., Sinca, F., & Weiss, P. (2011). Spectroscopy of canopy chemicals in humid tropical forests. *Remote Sensing of Environment*, 115(12), 3587-3598. [[Link](#)]

Published Reports and Books

- Pulgar-Vidal, M. G., Llactayo, W.L., Victoria, E.A., Salcedo, K.P., Marchand, G.L., Pérez, A.M., Garcia, W.C., Asner, G. P., Clark, J. K., Tupayachi, R., Knapp, D. E., Sousan, S., Pérez, P., **Anderson, C. B.**, Martin, R. E., & Kennedy-Bowdoin, T. (2011). Cuantificación de la cobertura de bosque y cambio de bosque a no bosque de la Amazonía Peruana: periodo 2009-2010-2011, Ministerio del Ambiente, Dirección General de Ordenamiento Territorial. Lima, Perú. [[Link](#)]
- Asner, G. P., Knapp, D. E., Martin, R. E., Tupayachi, R., **Anderson, C. B.**, Mascaro, J., Sinca, F., Chadwick, K.D., Sousan, S., Higgins, M., Farfan, W., Silman, M. R., Llactayo, W. A., & Neyra, A. F. (2014). The carbon geography of Perú. Minuteman Press, Berkeley, CA. 69 pp. ISBN: 978-0-9913870-7-6 (English edition) and ISBN: 978-0-9913870-6-9 (Spanish edition). [[Link](#)]

Technical Reports

- Anderson, C. B.**, Knapp, D. E., Boardman, J. W., Eastwood, M. E., & Asner, G. P. (2015). CAO Imaging Calibration and Validation Report 2015. Carnegie Institution for Science. [[Link](#)]

Editorial Experience

Reviewer for: *American Journal of Botany*, *Biogeosciences*, *BMJ Global Health*, *Climate*, *Forests*, *Nature Communications*, *Remote Sensing of Environment*, *Remote Sensing*, *Sensors*, *Sustainability*

Conference Abstracts and Presentations

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- Anderson, C. B.** & Daily, G. C., Earth Observations for Predicting Multi-scale Biodiversity Patterns, Society for Conservation Biology, Santa Cruz, May 2017
- Anderson, C. B.** & Daily, G. C., Life on the edge: improved forest cover mapping in mixed-use tropical regions, Stanford GIS Day, Stanford, December 2016
- Anderson, C. B.** & Daily, G. C., Field and airborne imaging spectroscopy for assessing ecosystem-scale biodiversity, ASD Lunch & Learn UC-Davis, Davis, October 2016
- Anderson, C. B.** & Daily, G. C., Remote sensing of ecosystem-scale biodiversity with LiDAR and imaging spectroscopy, Chinese Academy of Sciences, Hangzhou, July 2016
- Baldeck, C. A., Asner, G. P., Martin, R. E., **Anderson, C. B.**, Knapp, D. E., Kellner, J. R., Wright, S. J., Tree species mapping in a diverse tropical forest with airborne imaging spectroscopy, Ecological Society of America, Sacramento, 2014
- Marvin, D. C., Asner, G. P., **Anderson, C. B.**, Féret, J. B., Knapp, D. E., Martin, R. E., Schnitzer, S. A., Mapping lianas in tropical forests using high-resolution imaging spectroscopy, Ecological Society of America, Sacramento, 2014.
- Higgins, M. A., Asner, G. P., **Anderson, C. B.**, Martin, R. E., Knapp, D. E., Perez, E., Elespuru, N., Alonso, A., Meso-scale drivers of forest structure and function in northwestern Amazonia, American Geophysical Union, San Francisco, 2013.
- Baldeck, C. A., Asner, G. P., Kellner, J. R., Martin, R. E., **Anderson, C. B.**, Knapp, D. E., Remote tree species Identification in a diverse tropical forest using airborne imaging spectroscopy, American Geophysical Union, San Francisco, 2013.
- Martin, R. E., **Anderson, C. B.**, Knapp, D. E., Asner, G. P., Airborne imaging spectroscopy of forest canopy chemistry in the Andes-Amazon corridor, American Geophysical Union, San Francisco, 2013.
- Somers, B., Asner, G. P., **Anderson, C. B.**, Knapp, D. E., Martin, R. E., Biodiversity patterns along a climate gradient in Panama, Belgian Earth Observation Day, Bruges, 2013.
- Knapp, D. E., Asner, G. P., Boardman, J. W., Kennedy-Bowdoin, T., Eastwood, M., **Anderson, C. B.**, Martin, R.E., Green, R.O., Fusing hyperspectral and LiDAR data from CAO-VSWIR for increased data dimensionality, American Geophysical Union, San Francisco, 2012.
- Asner, G. P., Kennedy-Bowdoin, T., Kellner, J.R., Martin, R. E., **Anderson, C. B.**, Carranza-Jimenez, L., Knapp, D. E., Impacts of the 2010 amazon drought on forest structure and function using CAO ATOMS. American Geophysical Union, San Francisco, 2012.

Relevant Skills

600+ Hours of airborne data collection over five years globally
Flight planning and execution in five countries

Lead technical operator for three airborne instruments
CAO custom visible to shortwave infrared imaging spectrometer
ITRES CASI-1500 visible to near infrared imaging spectrometer
Optech Pegasus HA500 airborne LiDAR

Imaging spectroscopy analysis

- Sensor calibration, validation, and noise analysis
- Full-stream image processing (raw → radiance → surface reflectance)
- Image orthorectification
- Image classification (SAM, SVM, RandomForest)
- Imaging spectroscopy to chemometric calibration development (PLS-R)

LiDAR image analysis

- Full-stream data processing (raw → calibrated LAS points → raster and classified point mosaics)
- Vegetation change analysis from multi-temporal data collections
- Canopy vertical profile analysis from point cloud density
- LiDAR and imaging spectrometer sensor fusion

3+ years of lab chemistry analysis in plant ecophysiology and biochemistry

- Leaf elemental analysis (B, C, Ca, Fe, K, Mg, Mn, N, P, Zn)
- Leaf structure analysis (LMA, SLA, % water, cellulose, lignin, hemicellulose, non-structural carbohydrates)
- Leaf pigment analysis (chlorophyll-A, chlorophyll-B, total carotenoids)
- Management and storage of over 12,000 dry and frozen leaf samples
- Herbarium development and management

Geospatial and scientific software experience

- Custom algorithm development in Python, IDL, R, JavaScript, and KML
- ENVI, ArcGIS, GDAL, QGIS, SAGA, LAStools, Optech LMS Suite, Applanix PosPAC, SigmaPlot

Memberships

- American Geophysical Union
- Ecological Society of America
- California Native Plant Society
- Bay Area Tropical Forest Network
- Stanford Energy Club