

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

- Anderson, C.B.** (2018). The CCB-ID approach to tree species mapping with airborne imaging spectroscopy. *PeerJ*. In review. [[Link to pre-print](#)]
- Anderson, C.B.** (2018). Biodiversity monitoring, Earth observations, and the ecology of scale. *Ecology Letters*. In review.
- 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., 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. (2017), Scale dependence of canopy trait distributions along a tropical forest elevation gradient. *New Phytologist*, 214(3), 973-988 [[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*, 113(28), E4043-E4051. [[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

- 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](#)]
- 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 Ordemaniento Territorial. Lima, Perú. [[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

- 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