

## **GREGORY P. ASNER**

Center for Global Discovery and Conservation Science  
Arizona State University  
Tempe AZ and Hilo HI  
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My research interests center on spatial ecology in biodiversity conservation, climate policy decision-making, and natural resource management. I integrate the fields of terrestrial and marine ecology, biophysics, and remote sensing to explore, conserve and manage ecosystems at large geographic scales.

### **Professional Experience**

2019 - Director, ASU Center for Global Discovery and Conservation Science  
2019 - Professor, ASU School of Earth and Space Exploration  
2019 - Professor, ASU School of Geographical Sciences and Urban Planning  
2019 - Adjunct Professor, Stanford University, School of Earth, Energy & Env. Sciences  
2007 - Professor (crtsy.), Stanford University, Earth System Science  
2002 - Professor (crtsy.), Stanford University, Emmett Interdisc. Prog. in Envir. and Resources  
2018 - 2019 Senior Staff Scientist, Dept of Global Ecology, Carnegie Institution for Science  
2001 - 2017 Staff Scientist, Dept of Global Ecology, Carnegie Institution for Science  
2004 - 2007 Assoc Professor (crtsy.), Geological & Envir. Sciences,  
2001 - 2004 Asst Professor (crtsy.), Stanford University Geological & Envir. Sciences  
1999 - 2001 Asst Professor, University of Colorado, Geological Sciences & Envir. Studies  
1998 - 1999 Postdoctoral Fellow, Stanford University, Geological & Envir. Sciences  
1996 - 1998 Visiting Scientist, National Center for Atmospheric Research, Boulder, CO

### **Professional Preparation**

1997 Ph.D. Biology, University of Colorado, Boulder  
1995 M.S. Geography, University of Colorado, Boulder  
1991 B.S. Engineering (radiative physics), University of Colorado, Boulder

### **Honors and Awards**

- The Heinz Award for the Environment, 2017
- Batseva Fellow, Israeli Academy of Sciences and Humanities, 2017
- Pongo Environment Award, 2017
- Elected Fellow, Ecological Society of America, 2016
- Elected Fellow, American Geophysical Union, 2015
- IFOF Honoree Award in Aviation, 2015
- Association for American Geographers Outstanding Contributions Award, 2014
- Nominet Trust 100 Award for Social Innovation, 2014
- Elected, U.S. National Academy of Sciences, 2013
- Popular Science Magazine Brilliant Ten Award, 2007
- Presidential Early Career Award for Scientists and Engineers (PECASE), 2000
- NASA Early Career Award, 2000
- NASA Group Achievement Award, 1999
- NASA Earth System Science Fellowship, 1996-1998
- NSF Biosphere-Atmosphere Interactions Fellowship, 1996-1998
- W.M. Keck Foundation Fellowship Award, 1995-1996
- Mabel Duncan Conservation Biology Award, 1999

## National and International Service

### Current Major Service Commitments

1998-2006- Director; **ASU Pacific Ridge-to-Reef Program**, Hilo Hawaii  
Principal Investigator; **ASU Global Airborne Observatory** (formerly Carnegie Airborne Observatory)  
2014- Editorial Board Member; **Proceedings of the National Academy of Sciences**  
2016- Science Fellow, **Planet Inc.**  
2018- Principal Investigator; **Allen Coral Atlas**, <http://allencoralatlas.org>  
2018- Principal Investigator; **Reefscape Project**, Leonardo DiCaprio Foundation  
2018- Member, **Space Studies Board**, National Academy of Sciences, Engineering and Medicine

### Other Past and Present Service (major contributions in **bold**)

1996-1997 Science Team; NASA Lewis & Clark Missions  
1998 Panelist; NASA Triana Mission  
1998-2008 Panelist; NASA Large-scale Biosphere-Atmosphere Experiment in Amazônia Program  
1998 Co-chair; International Forum on BRDF Remote Sensing  
1998 Panelist; NOAA Climate and Global Change Program  
1998-2015 Panelist; Natural Environment Research Council, United Kingdom  
1999-2001 Member; NSF Long-term Ecological Research (LTER) Technology Committee  
1999 Panelist; University of California, Digital Media Innovation Program  
1999 Co-organizer; NASA Large-scale Biosphere-Atmosphere Experiment in Amazônia  
1999 Advisor; Fundação Floresta Tropical (Tropical Forest Foundation), Brazil  
1999-2009 Panelist; U.S. Strategic Environmental Research and Development Program  
2000 Panelist; NASA New Millennium Program  
2000-2001 Land-use Committee; Ecological Society of America  
2001-2014 Panelist; NSF Environmental Biology Panels  
2001 Panelist; NASA Visions Working Group for Decadal Strategic Plan  
2002 Panelist; NASA Terrestrial Ecology Program  
2002 Panelist; NASA New Investigator Program  
2003 Co-convenor; AGU Chapman Conference “Ecosystem Interactions with Land-use Change”  
2003 Steering Committee; International Symposium on Remote Sensing; Honolulu, HI  
2003 Panel Chair; NASA Terrestrial Ecology Program  
2003 Panel Co-chair; NASA Northern Eurasia Environmental Science Program Initiative (NEESPI), Yalta, Ukraine  
**2003-2007 Steering Committee; NASA-Brazil Large-scale Biosphere-Atmosphere Experiment in Amazonia Program**  
2003-2006 Steering Group; U.S. Carbon Cycle Program  
2004 Panelist; NASA Carbon Cycle and Ecosystems Review  
2004-2006 Ecological Society of America (ESA) Habitat Change Rapid Response Team  
2005 Panelist; World Bank Rural Days Conference;  
2005 NSF Committee for Environmental Research and Education  
**2005-2009 NASA Senior Review Committee (Chair, 2007-2009)**  
2005 Co-convenor; Environmental Defense Fund (EDF) Global Deforestation and Forest Degradation Workshop  
2005 Search Committee; USFS Institute for Pacific Islands Forestry  
2005-2006 Panel Chair; NASA North American Carbon Program

2005 Panel Chair; Tropical Deforestation and Climate Change; UN Framework Convention on Climate Change COP-11, Montreal

2006-2007 Author; U.N. Livestock in a Changing Landscape Forum

**2007 Lead Author; FLORA satellite mission concept. National Academy Decadal Survey**

2007 Instructor; ASP Colloquium; National Center for Atmospheric Research

2007 Author; NASA Plant Physiology and Functional Types Working Group

2006-2007 Advisory Committee; Department of Land and Natural Resources; State of Hawaii

**2008-2017 Science and technology advisor to the Peruvian Ministry of Environment**

2008 Panel Chair; NASA Carbon Cycle and Ecosystems Joint Science Workshop

**2008-2018 Director; CLASlite Forest Monitoring and Training Program**

2008-2010 Advisor; National Ecological Observatory Network (NEON)

2008-2011 Steering Committee; bioDISCOVERY Program, Diversitas International

**2008-2009-2012 Working Group; NASA HypIRI-SBG satellite development team PI; Google Earth Engine, Google.org and Google Inc.**

2009 Panelist; Tropical Extinction Symposium, Museum of Natural History; Smithsonian

2009 Panelist; US Congressional panel on satellite monitoring for carbon markets

2009 Lead Author; GOFCC-GOLD Source Book on deforestation and degradation

2009 Panelist; U.S. Congressional panel on satellite monitoring of deforestation

2009 Delegate; U.N. Framework Convention on Climate Change COP-15, Copenhagen

2010 Steering Committee; Center for Tropical Forest Science, Smithsonian Institute

**2010-2015 Editorial Board; Remote Sensing of Environment**

2010 Panelist; International Plant Biology Symposium, Harvard University

2010 Co-author; UN FAO Historical Forest Degradation report

2010 Delegate; Convention on Biological Diversity COP-10, Nagoya; United Nations

**2010-2013 Working Group; Governors Climate and Forests (GCF) Task Force, State of California**

2010 Delegate; Ambassadors for Forests, Nagoya, World Wildlife Fund

2010 PI; Global Terrestrial Ecosystem Observatory proposal, Jet Propulsion Laboratory, NASA Earth Ventures

2010 Delegate; Framework Convention on Climate Change COP-16, Cancun

**2011-2013 Senior Fellow, Energy and Climate Partnership; US State Department**

2011 Advisor; World Bank; Carbon monitoring for the UNFCCC climate treaty

2012 PI; Land Ecosystem Assessment & Forecast mission proposal, Jet Propulsion Laboratory, NASA Earth Ventures

2012 Panelist; Forest Carbon Partnership Facility; World Bank

2012 Panelist; Latin American Development Bank

2013-2018 Working Group 3 Member; GEO Biodiversity Observation Network

2013 Panelist; Prince's Rainforest Project; London

2013 PI; Linnaeus mission proposal; Jet Propulsion Laboratory, NASA Earth Ventures

2013- Advisory Board; Amazon Aid Foundation

2014-2017 Scientific Steering Committee, NGEE-Tropics, Department of Energy

2015-2017 Advisor; California Air Resources Board and CA Dept of Forestry and Fire Protection

2016- Working Group; Rapid Ohia Death Task Force; State of Hawaii

**2015-2018 Panelist; National Academy of Sciences Decadal Survey for Earth Science and Applications from Space**

2012- Editor; *Remote Sensing* journal

2017- Editorial Board; *Remote Sensing for Ecology and Conservation*

## Academic Advising

### *Graduate student advisees*

*Name (year, degree), current employer*

David Lobell (2003, PhD), Stanford U.	Roberta Martin (2003, PhD), Arizona State U.
Thomas Harris (2003, MS), Planet Inc.	Charles Wheeler (2004, MS), U. Arizona
Timothy Varga (2007, MS), Climate Pol. Inst.	John Clark (2009, MS), Google Inc.
Matthew Colgan (2012, PhD), Blue River Tech	Kyla Dahlin (2012, PhD), Michigan State U.
Eben Broadbent (2013, PhD), U. Florida	Angelica Almeyda (2013, PhD), U. Florida
Kelly McManus (2016, PhD), Stanford U.	Dana Chadwick (2016, PhD), Stanford U.
Christa Anderson (2018, PhD), WWF	Rebecca Niemiec (2018, PhD), Colorado State U.
Elsa Ordway (2018, PhD), Harvard U.	Emily Francis
Rachel Engstrand	Rachel Carlson

### *Post-doctoral advisees*

*Name (years in lab), current employer*

Sharon Hall (1999-01), Arizona State U.	Jeffrey Hicke (2000-03), U. Idaho
Lydia Olander (2003-04), Duke U.	Andrew Elmore (2003-04), U. Maryland
Roberta Martin (2004-06), Carnegie Institution	Natalie Boelman (2005-06), Columbia U.
Maoyi Huang (2005-08), Pacific NW Nat. Lab.	Choying Huang (2006-08), Taiwan Nat U.
Chris Doughty (2008-10), Northern Arizona U.	Shaun Levick (2008-10), CSIRO, Australia
Scott Loarie (2008-10), Cal Acad. Sciences	Jim Kellner (2008-11), Brown U.
Joseph Mascaro (2010-13), Planet Labs	Jean-Baptiste Féret (2010-13), U. Montpellier
Nick Vaughn (2012-13), Carnegie Institution	Mark Higgins (2011-14), USAID
Claire Baldeck (2012-15), Yale U.	Paulo Brando (2013-15), Woods Hole R.C.
David Marvin (2014-2016), The Nature Conservancy	Jomar Barbosa (2014-2016), U. of Madrid
Tarin Paz-Kagan (2016-2017), U. Tel Aviv	Dana Chadwick (2016-2017), Stanford U.
Andrew Davies (2014-2019), Harvard U.	Chris Balzotti (2015-2018), ASU
Luke Evans (2016-)	Fredrick Draper (2016-)
Philip Brodrick (2016-)	Jiwei Li (2018-)
James Askew (2018-)	Pramukta Kumar (2018-)
Shawna Foo (2018-)	Ovidiu Csillik (2018-)

### *Other graduate student committees*

Stanford U.	Toby Ahrens, Michael Beman, Kate Brauman, Claire Lunch, Stephen Porder
U. of Colorado	Laura Belanger, Jon Carrasco, Kathleen Farley, Cory Cleveland, Nancy Golubiewski, Amanda Warner, Khatib Nader, David Kinner, David Mixon, Jennifer Mengan
U. of Arizona	Dawn Browning
Colorado State U.	Lara Prihodko
U. of Brasilia	Ana Paula Ferreira de Carvalho, Zayra do Prado
U. of Florida	Ane Alencar
U. of Paris	Jean-Baptiste Féret, Lena Maatoug
U. of Grenoble	Guillaume Tochon
U. of Pretoria	Russell Main, Laven Naidoo
U. of Witwatersrand	Penelope Mograbi
U. of San Marcos-Peru	Raul Tupayachi, Felipe Sinca
Yale University	Kim Carlson
Wake Forest U.	Stephanie Bilodeau, Cassie Freund, John Gorelick

## Peer-reviewed Publications

### 1996-1999

1. Asner, G.P. and S.W. Beatty. 1996. Effects of an African grass invasion on Hawaiian shrubland nitrogen biogeochemistry. *Plant and Soil* 186:205-211.
2. Asner, G.P., T.R. Seastedt, and A.R. Townsend. 1997. The decoupling of terrestrial carbon and nitrogen cycles. *BioScience* 47:226-234.
3. Asner, G.P. and G. Goldstein. 1997. Correlating stem biomechanical properties of Hawaiian canopy trees with hurricane wind damage. *Biotropica* 29:145-150.
4. Asner, G.P. and C.A. Wessman. 1997. Scaling PAR absorption from the leaf to landscape level in spatially heterogeneous ecosystems. *Ecological Modelling* 103:81-97.
5. Asner, G.P., C.A. Wessman, and J.L. Privette. 1997. Unmixing the directional reflectances of AVHRR sub-pixel landcovers. *IEEE Transactions on Geoscience and Remote Sensing* 35:868-878.
6. Asner, G.P., B.H. Braswell, D.S. Schimel, and C.A. Wessman. 1998. Ecological research needs from multi-angle remote sensing data. *Remote Sensing of Environment* 63:155-165.
7. Asner, G.P. 1998. Biophysical and biochemical sources of variability in canopy reflectance. *Remote Sensing of Environment* 64:234-253.
8. Asner, G.P., C.A. Wessman, and S. Archer. 1998. Scale dependence of absorption of photosynthetically active radiation in terrestrial ecosystems. *Ecological Applications* 8:906-925.
9. Wessman, C.A. and G.P. Asner. 1998. Ecosystems and the problems of large-scale measurements. *Successes, Limitations, and Frontiers in Ecosystem Ecology*. P. Groffman and M. Pace (eds.) Springer-Verlag, Berlin.
10. Asner, G.P., C.A. Wessman, D.S. Schimel, and S. Archer. 1998. Variability in leaf and litter optical properties: implications for canopy BRDF model inversions using AVHRR, MODIS, and MISR. *Remote Sensing of Environment* 63:200-215.
11. Asner, G.P., C.A. Wessman, and D.S. Schimel. 1998. Heterogeneity of savanna canopy structure and function from imaging spectrometry and inverse modeling. *Ecological Applications* 8:926-941.
12. Asner, G.P., C.A. Bateson, J.L. Privette, N. Z. El Saleous, and C.A. Wessman. 1998. Vegetation structural effects on carbon uptake using satellite data fusion and inverse modeling. *Journal of Geophysical Research* 103:28839-28853.
13. Mesarch, M.A., E.A. Walter-Shea, G.P. Asner, E.M. Middleton, and S.S. Chan. 1999. A revised measurement methodology for conifer needle spectral optical properties. *Remote Sensing of Environment* 68:177-192.
14. Asner, G.P., A.R. Townsend, and M.C.M. Bustamante. 1999. Spectrometry of pasture condition and biogeochemistry in the Central Amazon. *Geophysical Research Letters* 26:2769-2772.
15. Diner, D.J., G.P. Asner, R. Davies, J.-P. Muller, B. Pinty, C.B. Schaaf, and J. Stroeve. 1999. New directions in Earth observing: scientific applications of multiple-view-angle remote sensing. *Bulletin of the American Meteorological Society* 80 (11):2209-2228.

### 2000-2002

16. Bateson, C.A., G.P. Asner, and C.A. Wessman. 2000. Endmember bundles: A new approach to incorporating endmember variability in spectral mixture analysis. *IEEE Transactions on Geoscience and Remote Sensing* 38:1083-1094.
17. White, M.A., G.P. Asner, R.R. Nemani, J.L. Privette, and S.W. Running. 2000. Monitoring fractional cover and leaf area index in arid ecosystems: digital camera, radiation transmittance, and laser altimetry results. *Remote Sensing of Environment* 74:45-57.
18. Privette, J.L., G.P. Asner, F. Huemmrich, et al. 2000. The Prototype Validation Exercise (PROVE) for EOS land and atmosphere products. *Remote Sensing of Environment* 74:1-12.
19. Asner, G.P., C.A. Wessman, C.A. Bateson, and J.L. Privette. 2000. Impact of tissue, canopy and landscape factors on reflectance variability of arid ecosystems. *Remote Sensing of Environment* 74:69-84.

20. Asner, G.P. and D.B. Lobell. 2000. A biogeophysical approach for automated SWIR unmixing of soils and vegetation. *Remote Sensing of Environment* 74:99-112.
21. Asner, G.P. 2000. Contributions of multi-view angle remote sensing to land surface and biogeochemical research. *Remote Sensing Reviews* 18:137-162.
22. Asner, G.P., A.R. Townsend, and B.H. Braswell. 2000. Satellite observation of El Niño effects on Amazon forest phenology and productivity. *Geophysical Research Letters* 27:981-984.
23. Asner, G.P., A.R. Townsend, W. Riley, P.A. Matson, J.C. Neff, and C.C. Cleveland. 2001. Physical and biogeochemical controls of terrestrial ecosystems responses to nitrogen deposition. *Biogeochemistry* 54:1-39.
24. Neff, J.C. and G.P. Asner. 2001. Dissolved organic carbon in terrestrial ecosystems: synthesis and model. *Ecosystems* 4:29-48.
25. Lobell, D.B., G.P. Asner, B. Law, R. Treuhaft. 2001. Sub-pixel canopy cover estimation of coniferous forest using SWIR imaging spectrometry. *Journal of Geophysical Research* 106:5151-5160.
26. Asner, G.P. 2001. Cloud cover in Landsat observations of the Brazilian Amazon. *International Journal of Remote Sensing* 22:3855-3862.
27. Asner, G.P. and R.O. Green. 2001. Imaging spectroscopy measures desertification in the Southwest U.S. and Argentina. *EOS Transactions* 82(49):601-606.
28. Asner, G.P., M. Keller, R. Pereira, and J. Zweede. 2002. Remote sensing of selective logging in Amazônia: Assessing limitations based on detailed field measurements, Landsat ETM+ and textural analysis. *Remote Sensing of Environment* 80(3):483-496.
29. Lobell, D.B., G.P. Asner, B. Law, R. Treuhaft. 2002. View angle effects on canopy reflectance and spectral mixture analysis of coniferous forests using AVIRIS. *International Journal of Remote Sensing* 23:2247-2262.
30. Lobell, D.B. and G.P. Asner. 2002. Moisture effects on soil reflectance. *Soil Science Society of America Journal* 66:722-727.
31. Asner, G.P. and K.B. Heidebrecht. 2002. Spectral unmixing of vegetation, soil and dry carbon in arid regions: Comparing multi-spectral and hyperspectral observations. *International Journal of Remote Sensing* 23:3,939-3,958.
32. Treuhaft, R.N., G.P. Asner, B.E. Law, and S. Van Tuyl. 2002. Forest leaf area density profiles from the quantitative fusion of radar and hyperspectral data. *Journal of Geophysical Research* 107:4568 doi:10.1029/2001JD000646
33. Lobell, D.B., G.P. Asner, I. Ortiz-Monasterio, and T. Benning. 2002. Remote sensing of regional crop production in the Yaqui Valley, Mexico: Estimates and uncertainties. *Agriculture, Ecosystems and Environment* 94(2):205-220.
34. Asner, G.P., M. Palace, M. Keller, R. Pereira Jr., J.N.M. Silva, and J.C. Zweede. 2002. Estimating canopy structure in an Amazon forest from laser rangefinder and IKONOS satellite observations. *Biotropica* 34:483-492.
35. Hicke, J.A., G.P. Asner, J. Randerson, S. Los, S. Birdsey, C.J. Tucker, and C.B. Field. 2002. Changes in North American net primary production, 1982-1998. *Geophysical Research Letters* 29:69-73.
36. Hicke, J.A., G.P. Asner, J.T. Randerson, S. Los, R. Birdsey, J.C. Jenkins, C.J. Tucker, and C.B. Field. 2002. Trends in North American net primary productivity derived from satellite observations, 1982-1998. *Global Biogeochemical Cycles* 16 doi:10.1029/2001GB001550.
37. Townsend, A.R., G.P. Asner, C.C. Cleveland, M. Lefer, and M.M.C. Bustamante. 2002. Unexpected changes in soil phosphorus dynamics following forest-to-pasture conversion in the humid tropics. *Journal of Geophysical Research* 107:8,067-8,076.
38. Pereira, R., J. Zweede, G.P. Asner, and M. Keller. 2002. Forest canopy damage from conventional and reduced impact selective logging in Eastern Amazon, Brazil. *Forest Ecology and Management* 168:77-89.
39. Townsend, A.R., G.P. Asner, P.P. Tans, and J.W.C. White. 2002. Land use effects on atmospheric <sup>13</sup>C imply a sizable terrestrial CO<sub>2</sub> sink in tropical latitudes. *Geophysical Research Letters* 29 doi:10.1029/2001GL013454.

40. Lobell, D.B., J.I. Ortiz-Monasterio, C.L. Addams, and G.P. Asner. 2002. Soil, climate and management impacts on regional agricultural productivity. *Agricultural and Forest Meteorology* 114:31-43.
41. Lobell, D.B., J.A. Hicke, G.P. Asner, C.B. Field, C.J. Tucker, and S. O. Los. 2002. Satellite estimates of productivity and light use efficiency in United States agriculture, 1982-1998. *Global Change Biology* 8:722-735.

### **2003-2005**

42. Asner, G.P., J.M.O. Scurlock, and J.A. Hicke. 2003. Global synthesis of leaf area index observations: Implications for ecological and remote sensing studies. *Global Ecology and Biogeography* 12:195-205.
43. Hicke, J.A., G.P. Asner, E.S. Kasishke, N.H.F. French, J.T. Randerson, G.J. Collatz, B.J. Stocks, C.J. Tucker, S.O. Los, C.B. Field. 2003. Postfire response of North American boreal forest net primary productivity. *Global Change Biology* 9:1145-1157.
44. Zavaleta, E.S., B.D. Thomas, N.R. Chariello, G.P. Asner, M.R. Shaw, and C.B. Field. 2003. Plants reverse warming effect on ecosystem water balance. *Proceedings of the National Academy of Sciences* 100:9892-9893.
45. Asner, G.P., S.A. Archer, R.F. Hughes, J.N. Ansley, and C.A. Wessman. 2003. Net changes in regional woody vegetation cover and carbon storage in North Texas rangelands, 1937-1999. *Global Change Biology* 9:316-335.
46. Lobell, D.B. and G.P. Asner. 2003. Climate and management contributions to recent trends in U.S. agricultural yields. *Science* 299:1032.
47. Lobell, D.B. and G.P. Asner. 2003. Comment on climate and management contributions to recent trends in U.S. agricultural yields. *Science* 300:1505.
48. Asner, G.P., C. Borghi, and R. Ojeda. 2003. Desertification in Central Argentina: Regional changes in ecosystem carbon-nitrogen. *Ecological Applications* 13:629-648.
49. Harris, A.T., G.P. Asner, and M.E. Miller. 2003. Changes in vegetation structure following long-term grazing in pinyon-juniper ecosystems. *Ecosystems* 6:368-383.
50. Martin, R.E., G.P. Asner, R.J. Ansley, and A.R. Mosier. 2003. Effects of woody vegetation encroachment on soil nitrogen oxide emissions in a temperate savanna. *Ecological Applications* 13:897-910.
51. Treuhaft, R.N., G.P. Asner, and B.E. Law. 2003. Structure-based forest biomass from fusion of radar and hyperspectral observations. *Geophysical Research Letters* 30:1472-1476.
52. Asner, G.P. and K.B. Heidebrecht. 2003. Imaging spectroscopy for desertification studies: Comparing AVIRIS and EO-1 Hyperion in Argentina drylands. *IEEE Transactions on Geoscience and Remote Sensing* 41:135-155.
53. Lobell, D.B. and G.P. Asner. 2003. Comparison of Earth Observing-1 ALI and Landsat ETM+ for crop identification and yield prediction in Mexico. *IEEE Transactions on Geoscience and Remote Sensing* 41:128-134.
54. Harris, A.T. and G.P. Asner. 2003. Grazing gradient detection with airborne imaging spectroscopy on a semi-arid rangeland. *Journal of Arid Environments* 55:391-404.
55. Asner, G.P., M.M.C. Bustamante, and A.R. Townsend. 2003. Scale dependence of biophysical structure in deforested lands bordering the Tapajós National Forest, Central Amazon. *Remote Sensing of Environment* 87:507-520.
56. Asner, G.P. and A.S. Warner. 2003. Canopy shadow in IKONOS satellite observations of tropical forests and savannas. *Remote Sensing of Environment* 87:521-533.
57. Hurtt, G., X. Xiao, M. Keller, M. Palace, G.P. Asner, et al. 2003. IKONOS imagery for the Large Scale Biosphere-Atmosphere Experiment in Amazônia (LBA). *Remote Sensing of Environment* 88:111-127.
58. Asner, G.P., J.A. Hicke, and D.B. Lobell. 2003. Per-pixel analysis of forest structure: Vegetation indices, spectral mixture analysis and canopy reflectance modeling. *Methods and Applications for*

- Remote Sensing of Forests: Concepts and Case Studies. M. Wulder and S.E. Franklin (eds.) Kluwer Academic Publishers, New York.
59. Asner, G.P. 2004. Biophysical remote sensing signatures of arid and semi-arid regions. Remote Sensing for Natural Resources, Management and Environmental Monitoring. S. Ustin (ed.) John Wiley & Sons, New York.
  60. Ustin, S.L., S. Jacquemoud, P.J. Zarco-Tejada, and G.P. Asner. 2004. Remote sensing of environmental processes: State of the science and new directions. Remote Sensing for Natural Resources, Management and Environmental Monitoring. S. Ustin (ed.) John Wiley & Sons, New York.
  61. Ustin, S.L., D.A. Roberts, J.A. Gamon, G.P. Asner, and R.O. Green. 2004. Using imaging spectroscopy to study ecosystem processes and properties. *BioScience* 54:523-534.
  62. Treuhhaft, R.N., B.E. Law, and G.P. Asner. 2004. Forest attributes from radar interferometric profiling and its fusion with optical data. *BioScience* 54:561-571.
  63. Hall, S.J., G.P. Asner, and K. Kitayama. 2004. Land use, climate and substrate controls over soil nitrogen dynamics and N-oxide emissions in Borneo. *Biogeochemistry* 70:27-58.
  64. Galloway, J., et al., G.P. Asner, et al. 2004. Regional and global N cycles: Past, present and future. *Biogeochemistry* 70:153-226.
  65. Hicke, J.A., R.L. Sherriff, T.T. Veblen, and G.P. Asner. 2004. Carbon accumulation in Colorado ponderosa pine stands. *Canadian Journal of Forest Research* 34:1283-1295.
  66. Asner, G.P., A.R. Townsend, M.M.C. Bustamante, G.B. Nardoto, and L.O. Olander. 2004. Pasture degradation in the Central Amazon: Linking carbon and nutrient dynamics with remote sensing. *Global Change Biology* 10:844-862.
  67. Keller, M., M. Palace, G.P. Asner, R. Pereira Jr., and J.N.M. Silva. 2004. Coarse woody debris in undisturbed and logged forests in the Eastern Brazilian Amazon. *Global Change Biology* 10:784-795.
  68. Asner, G.P., M. Keller, and J.N.M. Silva. 2004. Spatial and temporal dynamics of forest canopy gaps following selective logging in the eastern Amazon. *Global Change Biology* 10:765-783.
  69. Lobell, D.B., I. Ortiz-Monasterio, and G.P. Asner. 2004. Relative importance of soil and climate variability for nitrogen management in irrigated wheat. *Field Crops Research* 87:155-165.
  70. Defries, R., J. Foley, and G.P. Asner. 2004. Trade-offs from land-use change: Using ecological knowledge to balance human needs and ecosystem function. *Frontiers in Ecology and Environment* 2:249-257.
  71. Boyer E.W., R.W. Howarth, J.N. Galloway, F.J. Dentener, C. Cleveland, G.P. Asner, P. Green, and C. Vörösmarty. 2004. Current nitrogen inputs to world regions. Agriculture and the Nitrogen Cycle: Assessing the Impact of Fertilizer Use on Food Production and the Environment. A.R. Mosier, K. Syers, and J.R. Freney (eds.) Island Press. Washington, DC.
  72. Hicke, J.A., D.B. Lobell, and G.P. Asner. 2004. Cropland area and net primary production computed from 30 years of USDA agricultural harvest data. *Earth Interactions* 8:1-20.
  73. Asner, G.P., A. Elmore, L. Olander, R.E. Martin, and A.T. Harris. 2004. Grazing systems, ecosystem responses and global change. *Annual Review of Environment and Resources* 29:261-299.
  74. Asner, G.P. and K.B. Heidebrecht. 2004. Desertification alters ecosystem-climate interactions. *Global Change Biology* 10:1-13.
  75. Lobell, D.B. and G.P. Asner. 2004. Cropland distributions from temporal unmixing of MODIS data. *Remote Sensing of Environment* 93:412-422.
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## **Published Book Reviews**

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Asner, G.P. 2002. The Cutting Edge: Conserving Wildlife in Logged Tropical Forests, by R.A. Fimbel et al., Columbia Press, New York. *The Quarterly Review of Biology*.

## **Patents**

*Remote Sensing Analysis of Forest Disturbances*; United States Patents 8189877, 20090214084, 20120288159-A1 and 20130216103; International Classification G06K9/62; Expiration: May 21, 2028. Patent applies to a general methodology for monitoring any forest disturbances with satellite imagery. The patents protect the Carnegie Landsat Analysis System (CLAS), Carnegie Landsat Analysis System-Lite (CLASlite), Automated Monte Carlo Unmixing (AutoMCU), and Multispectral and Hyperspectral Libraries. The invention can be used to monitor any type of forest disturbance or degradation including selective logging, agricultural expansion, cattle ranching, and natural hazards such as fire and windstorms.

## **Professional Organizations**

American Geophysical Union  
American Association for the Advancement of Science  
Association for Tropical Biology and Conservation  
Ecological Society of America  
International Coral Reef Society  
Organization for Tropical Studies  
U.S. National Academy of Sciences

## Science Communication Examples

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