**JOHN R. G. TOWNSHEND**

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# 1. Personal Information

APPOINTMENTS

**Present appointments**

2015 Emeritus Professor, Department of Geographical Sciences, University of Maryland, College Park.

**Previous Appointments**

2015-2020 Research Professor, Department of Geographical Sciences, University of Maryland, College Park.

2009-2014 Dean, College of Behavioral and Social Sciences, University of Maryland, College Park.

2001-2009 Chair, Department of Geography, University of Maryland, College Park.

1997-2000 Affiliate member, Institute for Advanced Computing Studies, University of Maryland, College Park.

1997-1998 Acting Director Earth Systems Science Interdisciplinary Center, University of Maryland, College Park.

1989-1996 Chair, Department of Geography, University of Maryland, College Park.

1989-2015 Professor, Department of Geographical Sciences, University of Maryland, College Park.

1987-1989 Professor, Department of Geography, University of Reading, Reading, UK,

1985-1989 Director, Natural Environment Research Council’s Unit for Thematic Information Systems (NUTIS), University of Reading, UK,

1984-1987 Reader, Department of Geography, University of Reading, Reading, UK.

1979-1980 Visiting National Research Council Senior Post-Doctoral, Research Fellow at NASA’s Goddard Space Flight Center, Greenbelt, Maryland, USA.

1977-1978 Visiting Associate Professor, Graduate School of Geography, Clark University, Massachusetts, USA.

1972-1984 Lecturer, Department of Geography, University of Reading, Reading, UK.

1970-1972 Lecturer, Department of Geography, University of Dar es Salaam, Tanzania.

EDUCATION

Ph.D. 1971 Geography (Geomorphology), University College London.

B.Sc. 1967 Geography with subsidiary Geology, University College London.

AWARDS

Royal Geographical Society’s Back Award, for contributions to Remote Sensing (1984).

Outstanding Achievements Award, Association of American Geographers, Remote Sensing Specialty Group. (2005).

William T. Pecora Award for Outstanding Leadership in Advancing Global Remote Sensing (2005).

Guest Professor, Beijing Normal University, (2006-2016).

Honorary Professor, University of Wuhan, (2007).

Honorary Fellow of the UK Remote Sensing and Photogrammetry Society (2009).

University of Maryland’s Landmark Award for international service (2009).

Martha Maiden Lifetime Achievement Award for services to the environmental science information community (2011).

Honorary Professor of the Chinese Academy of Agricultural Sciences (2011).

Honorary Professor, Center for Earth Observations and Digital Earth, Chinese Academy of Sciences (2011).

Best Paper, International Journal of Digital Earth: Global; characterization and monitoring of forest cover using Landsat data, vol., 5 (5) (2012).

Outstanding Researcher, International Society for Digital Earth (2015).

Dean’s Medal. College of Behavioral and Social Sciences, University of Maryland (2015).

Best Contributing Team Award to J.R.G. Townshend and his research team at the University of Maryland, International Journal of Digital Earth (2016).

Fellow, American Association for the Advancement of Science (2020).

# 2. Research Activities

#### a. Books

i. Books authored

1. Millington, A.C., Townshend, J.R.G., Kennedy, P., Saull, R., Prince, S. and Madams, R. (1989) **Biomass Assessment: Woody Biomass in the SADCC Region**. Earthscan Publications, London.
2. Townshend, J.R.G. (1988 **Thematic Mapper Data - Characteristics and Use**. Natural Environmental Research Council, Swindon.
3. Thompson, R.D., Mannion, A.M., Mitchell, C.W., Parry, M. & Townshend, J.R.G. (1986) **Processes in Physical Geography**, Longman, London.

ii. Books edited

1. Townshend, J.R.G. (Editor) (1981) **Terrain Analysis and Remote Sensing**. George Allen and Unwin, London.

iii. Chapters in books published

1. Townshend, J.R.G. (2015). Land systems analysis. In Monmonier, M. (ed.) **The History of Cartography,** Vol. 6, Part 1, University of Chicago Press, pp. 749-751.
2. Carroll, M., Townshend, J., Hansen, M., DiMiceli, C., Sohlberg, R., & Wurster, K. (2010) Vegetative Cover Conversion and Vegetation Continuous Fields. In Ramachandran, B., Justice, C.O., Abrams, M. J. (eds.) **Land Remote Sensing and Global Environmental Change: NASA’s Earth Observing System and the Science of ASTER and MODIS** Springer-Verlag, New York , pp. 725-746.
3. Townshend, J.R., Latham, J., Justice, C.O., Janetos, A., Conant, R., Arino, O., Balstad, R., Belward, A. Feuquay, J., Liu, J., Ojima, D., Schmullius, C., Singh, A. & Tschirley, J. (2010), International Coordination of Satellite Land Observations: Integrated Observations of the Land. In Ramchandran,, B., Justice, C.O., &Abrams, M. J. (eds.) **Land Remote Sensing and Global Environmental Change: NASA’s Earth Observing System and the Science of ASTER and MODIS,** Springer-Verlag, New York, pp. 835-56.
4. Liang, S., Wang, K., Wang, W., Wang D. , Gut, S., Zhang, X., Mirmelstein, J., Zhu, X., Kim, H.-Y., Running, S., Townshend, J., Tsay, S.-C., Wolf, R. Schaaf, C., & Strahler, A. (2009) Mapping High-Resolution Land Surface Radiative Fluxes from MODIS: Algorithms and Preliminary Validation Results, in Li, D, Shan, J. & Gong, J. (eds.) **Geospatial Technology for Earth Observation**, Springer, New York, pp. 141- 176.
5. Running, S.W. Nemani, R. R., Townshend, J.R.G. & Baldocchi, D.D. (2009) Next-Generation Terrestrial Carbon Monitoring, in **Carbon Sequestration and Its Role in the Global Carbon Cycle,** **Geophysical Monograph Series,** 183, American Geophysical Union, pp. 49-69.
6. Townshend, J.R., Briggs. S., Gibson, R., Hales, M, Menzel, P., Smith, B. Haruyama, Y., Ishida, C., Latham, J., Tschirley, J., Li, Deren., Li, Mengxue., Liu Liangming. and Sommeria, G.(2008)Improving the Utilization of Remotely Sensed Data. In Liang, S. (ed.) **Advances in Land Remote Sensing: System, Modeling, Inversion and Applications,** Springer-Verlag, pp. 465-483.
7. Liang, S., Schaepman, M., Jackson, T., Jupp, D., Li, X., Liu, J., Liu, R., Strahler, A., Townshend, J. & Wickland, D. (2008), Emerging issues in land remote sensing, in S. Liang (ed**.), Advances in Land Remote Sensing: System, Modeling, Inversion and Application**, Springer-Verlag, pp. 485-494.
8. Townshend, J.R.G., Justice, C.O., Skole, D.L., Belward, A., Janetos, A. Gunawan, I., Goldammer, J. & Lee, B. 2004, Meeting the Goals of GOFC: an evaluation of progress and steps for the future. In Gutman, G. et al (Eds.) **Land Change Science,** Kluwer Academic Publishers, Dordrecht, Netherlands, pp 31-52.
9. DeFries, R., Asner, G., Achard, F. , Justice, C., Laporte, N., Price, K., Small, C. & Townshend, J. 2005, Monitoring tropical deforestation for emerging carbon markets, In Moutinho, P. and Schwatrzman, S. (eds.) **Tropical Deforestation and Climate Change**, Belem, Brazil, Instituto de Pesquisa Ambiental da Amazonia, 35-46.
10. Hansen, M.C., DeFries, R.S., Townshend, J.R.G., Carrol, M., Dimiceli, C. & Sohlberg, R. 2004, The MODIS 500m global vegetation continuous field products. In Smits, P. and Bruzone, L. (eds.) **Analysis of Multi-temporal Remote Sensing Images**, Vol. 3, World Scientific Publishing, Singapore, pp. 295-301.
11. Townshend, J.R.G., DeFries, R.S., Zhan, X., Sohlberg, R.A., Hansen, M.C., Dimiceli, C., Carroll, M.L. & Eastman, J.C. 2002. MODIS 250m and 500m time series data for change detection and continuous representation of vegetation characteristics. In Bruzzone, L. and Smits, P. (eds.) **Analysis of Multitemporal Remote Sensing Images**, Vol. 3, World Scientific, Publishing, Singapore, pp. 233-41.
12. Townshend, J.R.G. 2001 Landsat imagery in Geography, in Smelser, J. and Blates, P.B. (eds.) **International Encyclopedia of the Social and Behavioral Sciences**, Pergamon, v. 12, pp. 8255-60.
13. Chan, J. C.-W., DeFries, R.S. & Townshend, J.R.G. 2001, Improved recognition of spectrally mixed land cover classes using spatial textures and voting classifications, In Skarbek, W. (ed.) **Computer Analysis of Images and Patterns, Lecture Notes in Computer Science**, v. 2124, Springer-Verlag, Berlin, pp. 217-227.
14. Townshend, J.R.G. 2000 The Integrated Global Observation Strategy, in Ahern, F., Gregoire, J.-M., & Justice, C. (eds.) **Forest fire monitoring and mapping: a component of Global Observations of Forest Cover.** Report of a Workshop, Ispra Italy, European Commission, EUR 19588 EN, pp. 55-60.
15. DeFries, R. S., Townshend, J.R.G. & Los, S.O., 1997. Scaling land cover heterogeneity for global atmosphere-biosphere models, in Quattrochi, D.A. & Goodchild, M.F. (eds.) **Scale in Remote Sensing and GIS**, CRC Press, pp. 231-246.
16. Spence, T., and Townshend, J.R.G. 1996 The Global Climate Observing System, in Karl, T. (ed.)., **Long-term climate monitoring by the Global Climate Observing System**, Kluwer Academic Publishers, Dordrecht, Netherlands, pp. 1-4.
17. Townshend. J.R.G. and Skole, D.L. 1995. The global 1km AVHRR data set, in P. Mather (ed.), **Understanding the Terrestrial Environment, Remote Sensing Data Systems and Networks**, John Wiley and Sons, pp. 75-82.
18. Drake, N.A., Bryant, R.G., Millington, A.C., & Townshend, J.R.G. 1994. Playa sedimentology and geomorphology: mixture modelling applied to Landsat Thematic Mapper data of Chott el Djerid, Tunisia, **Sedimentology and Geochemistry of Modern and Ancient Saline Lakes, Society for Sedimentary Geology Special Publication**, No. 50, 125-131.
19. DeFries, R.S. and Townshend, J.R.G. 1993. Global land cover: comparison of ground-based data sets with AVHRR data, in Foody, G.M. and Curran, P. (eds.) **Environmental Remote Sensing from Regional to Global Scales**, John Wiley, New York, pp. 84-110.
20. Townshend, J.R.G., Tucker, C.J. & Goward, S.N. 1993. Global Vegetation Mapping, in Gurney, R., Foster, J. and Partensin, C. (Eds.) **Atlas of Satellite Observations related to Global Change**, Cambridge University Press 301-311.
21. Townshend, J.R.G. 1991 Environmental data bases, in Maguire, D., Goodchild, M. and Rhind, D. (eds.) **Geographical Information Systems: Principles and Applications.** Longman, UK., 201-216.
22. Townshend, J.R.G. 1988. Remote sensing: local and global views. In Clark, M.J., Gregory, K.J., & Gurnell, A.M. (eds.) **Horizons in Physical Geography**, MacMillan, London 62-85.
23. Millington, A.C., Jones, A.R., Quarmby, N.A. & Townshend, J.R.G. 1987. Remote sensing of sediment transfer processes in playa basins. In Frostick, L. and Reid, I. (eds.) **Desert sediments: Ancient and Modern. Geol. Soc. of London Special Pub**., 369-381.
24. Tucker, C.J., Townshend, J.R.G., Goff, T.E. $ Holben, B.N. 1986. Continental and global scale remote sensing of land cover. In Trabalka, J.R. & Riechle, D.E. (eds.) **The Changing Carbon Cycle: a Global Analysis**. Springer-Verlag, New York, 221-241.
25. Millington, A.C. and Townshend, J.R.G. 1986. The potential of satellite remote sensing for geomorphological investigations. In Gardner, V. (ed.) **International Geomorphology**, John Wiley, London, 331-342.
26. Townshend, J.R.G. 1983. Effects of sensor resolving power on the utility of imagery from Earth resources satellites. In Fuller, R.M. (ed.) **Ecological mapping from ground, Earth and Space**. Institute of Terrestrial Ecology, Monks Wood, 101-112.
27. Townshend, J.R.G. 1981. Regionalization of terrain and remotely sensed data. In J.R.G. Townshend (ed) **Terrain Analysis and Remote Sensing**, George Allen and Unwin, London, 109-132.
28. Townshend, J.R.G. 1981. Image analysis and interpretation for land resources survey. In J.R.G. Townshend (Ed) **Terrain Analysis and Remote Sensing**, George Allen and Unwin, London, 59-108.
29. Townshend, J.R.G. 1981. **An introduction to the study of terrain**. In J.R.G. Townshend (ed) Terrain Analysis and Remote Sensing, George Allen and Unwin, London, 1-15.
30. Townshend, J.R.G. and Hancock, P. 1981. The role of remote sensing in mapping surficial deposits. In J.R.G. Townshend (ed) **Terrain Analysis and Remote Sensing**, George Allen and Unwin, London, 204-218.
31. Justice, C.O. and Townshend, J.R.G. 1981. The use of Landsat data for land cover inventories of Mediterranean lands. In J.R.G. Townshend (ed) **Terrain Analysis and Remote Sensing**, George Allen and Unwin, London, 133-153.
32. Justice, C.O. and Townshend, J.R.G. 1981. Integrating ground data with remote sensing, in J.R.G. Townshend (Ed) **Terrain Analysis and Remote Sensing**, George Allen and Unwin, London, 38-58.
33. Townshend, JRG and Co Justice 1980. The potential of Landsat-3 RBV images for thematic mapping (geomorphological, geological and land cover applications), in **Cartographic processing and analysis of satellite imagery**, pp 139-144.
34. Townshend, J.R.G. and Bush, P. 1980. The materials and origins of the Bahrain playas. In Doornkamp, J.C., Brunsden, D. & Jones, D.K.C. (eds.) **Bahrain Surface Materials Resource Survey**, Geobooks, Norwich, 169-191.
35. Townshend, J.R.G. 1976. **Ground sampling for interpretation of Skylark rocket photography.** In E.C. Barrett and L.C. Curtis (eds.) Environmental Remote Sensing II, Edward Arnold, London, 237-262.

iv Edited journal issues

1. Justice, C.O. and Townshend, J.R.G. (eds.) 2002. Land remote sensing using MODIS data. Special edition of **Remote Sensing of Environment**, 83, 1-359.
2. Townshend, J.R.G. (Editor) 1994. Global data sets for the land from the Advanced Very High Resolution Radiometer, Special edition of the **International Journal of Remote Sensing**, 15 (17), 3315-3639.
3. Townshend, J.R.G. (Editor) 1989. Comparison of passive microwave with near-infrared and visible data for terrestrial environmental monitoring. Special edition of the **International Journal of Remote Sensing**, 10 (10), 1575-1690.

#### b. Articles in refereed journals

**2020**

DiMiceli, C., Townshend, J., Carrol, M. & Sollberg, R. (2020) Evolution of the representation of global vegetation by vegetation continuous fields, **Remote Sensing of Environment**, (submitted).

Song D.-X., Huang C., Tao He, T., Sexton, J.O. Li, A., Li S., Wu, H. & Townshend, J.R. (2020) Improved modeling and analysis of the patch size-frequency distribution of forest disturbances in China based on a Landsat forest cover change product**, International Journal of Digital Earth,** (DOI: 10.1080/17538947.2020.1810337).

**2018**

Song, X.P., Hansen, M.C., Stehman, S.V., Potapov, P.V., Tyukavin. A., Vermote, E.V. & Townshend. J.R. (2018) Global land change from 1982 to 2016, **Nature**, 560, 639-643.

**2017**

Song, X.P., Huang. C.Q., & John R. Townshend, J.R. (2017) Improving global land cover characterization through data fusion, **Geospatial Information Science**, 20, 141-150.

Carroll, M.L., DiMiceli, C.M., Townshend, J.R.G., Sohlberg, R.A., Elders, A., Devadiga, S., Ma, P. Sayer, A.M. & Levy, R. C. (2017), Development of an operational land water mask for MODIS collection 6, **International Journal of Digital Earth**, 10 (2), 207-218.

**2016**

Sexton, J.O., Noojipady, P., Song, X.-P., Feng, M., Song, D.-X., Kim, D.-H., Anand, A. Huang, C., Channan, S., Pimm, S.L. & Townshend, J. R. (2016). How much forest is there? **Nature Climate Change**, 6, 192–196.

Feng, M., Sexton, J. O., Channan, S., & Townshend, J. R. (2016). A global, high-resolution (30-m) inland water body dataset for 2000: first results of a topographic–spectral classification algorithm, **International Journal of Digital Earth** Vol. 9, (2), ([http://dx.doi.org/10.1080/17538947. 2015.1026420](http://dx.doi.org/10.1080/17538947.%202015.1026420)).

Liu, F.-J., Huang, C., Pang, Y., Li, M., Song, D., Song, X.-P., Channan, S., Sexton, J.O. Jiang, D., Zhang, P., Guo, Y., Li, Y.-F., & Townshend, J.R. (2016). Assessment of the three factors affecting Myanmar's forest cover change using Landsat and MODIS vegetation continuous fields data, **International Journal of Digital Earth** Vol. 6 (6), 1-24.

Song X-P., Sexton J. O., Huang C., Channan S., & Townshend J. R. (2016), Characterizing the magnitude, timing and duration of urban growth from time series of Landsat-based estimates of impervious cover. **Remote Sensing of Environment**, v.175:1-13. (doi:10.1016/j.rse.2015.12.027).

Montesano, P. M., Neigh, C. S., Sexton, J., Feng, M., Channan, S., Ranson, K. J., & Townshend, J. R. (2016). Calibration and Validation of Landsat Tree Cover in the Taigaˆ’ Tundra Ecotone. **Remote Sensing**, 8(7), 551, (<https://doi.org/10.3390/rs8070551>).

**2015**

Sexton, J.O., Noojipady, P., Song, X.P., Feng, M., Song, D.X., Kim, D.H., Anand, A., Huang, C., Channan, S., Pimm, S.L. & Townshend, J.R., (2015). Conservation policy and the measurement of forests. **Nature Climate Change**, 6, 192–196. (doi:10.1038/nclimate2816).

Channan, S., Feng, M., Kim, D. H., Sexton, J. O., Song, X. P., Song, D. X., Noojipady, P, Collins. K., Anand, A., & Townshend, J. R. (2015). The GLS+: An Enhancement of the Global Land Survey Datasets. **Photogrammetric Engineering & Remote Sensing**, 81(7), 521-525.

Kim, D. H., Sexton, J. O., & Townshend, J. R. (2015). Accelerated deforestation in the humid tropics from the 1990s to the 2000s. **Geophysical Research Letters**, 42 (9), 3495–3501.

Sexton, J. O., Noojipady, P., Anand, A., Song, X. P., McMahon, S., Huang, C., Feng, M., Channan, S. & Townshend, J. R. (2015). [A model for the propagation of uncertainty from continuous estimates of tree cover to categorical forest cover and change](http://www.sciencedirect.com/science/article/pii/S0034425714003629). **Remote Sensing of Environment**, 156, 418-425.

Haddad, N.M., Brudvig, L.A., Clobert, J., Davies, K.F., Gonzalez A., Holt R.D., Lovejoy T.E., Sexton, J.O., Austin M.P., Collins C.D., Cook W.M., Damschen, E.I., Ewers R.M., Foster B.L, Jenkins C., King, A., Laurance, W.F., Levey D.J., Margules, C.R., Melbourne, B.A., Nicholls, A.O., Orrock, J.L., Song, D.-X. & Townshend J.R. (2015). [Habitat fragmentation and its lasting impact on Earth's ecosystems.](http://advances.sciencemag.org/content/1/2/e1500052.short) **Science Advances**, 20 Mar 2015, Vol. 1(2), e1500052 (DOI: 10.1126/sciadv.1500052).

Song, X. P., Huang, C., Saatchi, S. S., Hansen, M. C., & Townshend, J. R. (2015). Annual Carbon Emissions from Deforestation in the Amazon Basin between 2000 and 2010. **PLOS ONE**. (DOI: 10.1371/journal.pone.0126754).

**2014**

Nagol, J. R., Sexton, J. O., Kim, D. H., Anand, A., Morton, D., Vermote, E., & Townshend, J. R. (2014). [Bidirectional effects in Landsat reflectance estimates: Is there a problem to solve?](http://www.sciencedirect.com/science/article/pii/S0924271614002317) **ISPRS Journal of Photogrammetry and Remote Sensing,** [103](http://www.sciencedirect.com/science/journal/09242716/103/supp/C), 129–135.

Song, D., C. Huang, J.O. Sexton, S. Channan, M. Feng, & J.R. Townshend. (2014). [Use of Landsat and Corona data for mapping forest cover change from the mid-1960s to 2000s: Case studies from the Eastern United States and Central Brazil](http://www.sciencedirect.com/science/article/pii/S0924271614002305). **ISPRS J. of Photogrammetry and Remote Sensing**. (DOI: 10.1016/j.isprsjprs.2014.09.005).

Kim, D.-H., J.O. Sexton, P. Noojipady, C. Huang, A. Anand, S. Channan, M. Feng, & Townshend J.R. (2014). [Global, Landsat-based forest-cover change from 1990 to 2000](http://www.sciencedirect.com/science/article/pii/S0034425714003149). **Remote Sensing of Environment**, [Volume 155](http://www.sciencedirect.com/science/journal/00344257/155/supp/C), 178–193, DOI: 10.1016/j.rse.2014.08.017).

Song, X.P., C. Huang, J.O. Sexton, S. Channan, & Townshend, J.R.. (2014). [Annual Detection of Forest Cover Loss Using Time Series Satellite Measurements of Percent Tree Cover](http://www.mdpi.com/2072-4292/6/9/8878). **Remote Sensing**, 6 (9), 8878-8903, (DOI: 10.3390/rs6098878).

Song, D.X., C., Huang, P., Noojipady, S., Channan, & Townshend J.R., (2014). [Comparison of remote sensing based forest area and change estimation with national forestry inventory between 2000 and 2005 in China](http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6947432&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D6947432). **Geoscience and Remote Sensing Symposium (IGARSS), 2014 IEEE International**, 4268-71, (DOI: 10.1109/IGARSS.2014.6947432).

**2013**

Song, X.P, Huang, C.Q., Feng, M., Sexton, J.O., Channan, S. & Townshend, J.R., (2013). Integrating global land cover products for forest cover characterization: an application in North America, **International Journal of Remote Sensing**, 7 (9), 709-24. (DOI: 10.1080/17538947.2013.856959).

Hansen, M., Potapov, P., Moore, R, Hancher, M. Turubanova, S, Tyukavina, A, Thau, D., Stehman, S., Goetz, S., Loveland T., Kommareddy A., Egorov, A., Chini L., Justice, C. & Townshend, J.R.G. (2013). Quantifying global forest dynamics through data mining of satellite imagery, **Science**, 342, 851-3.

Li, M.X. and Townshend, J.R. (2013). Populating Digital Earth: Recommendations for Improving Access to Chinese Remote Sensing Data for Terrestrial Applications, **International Journal of Digital Earth**, (DOI: 10.1080/17538947.2013.829130).

Liang, S., Zhao, X., Liu, S., Yuan, W., Cheng, X., Xiao, Z., Zhang, X., Liu, Q., Cheng ,J., Tang, H., Qu, Y., Bai1, Y., Qu, Y., Ren, H., Yu, K., & Townshend, J.R. (2013). A Long-term Global LAnd Surface Satellite (GLASS) Dataset for Environmental Studies, **International Journal for Digital Earth. (**http://dx.doi.org/10.1080/17538947.2013.805262).

Jiang, B., Liang, S.L., Townshend, J.R. & Dodson, Z. M., (2013). Assessment of the radiometric performance of Chinese HJ-1 CCD data, **IEEE Journal of Selected Topics in Applied Remote Sensing,** 6(2), 840-50.

Feng, M., Sexton, J.O.; Huang, C., Masek. J.G., Vermote, E.F., Gao, F., Narasimhan, R. Channan, S., Wolfe, R.E., & Townshend, J.R. (2013). Global surface reflectance products from Landsat: Assessment using coincident MODIS observations, **Remote Sensing of Environment**, 134, 276-293.

Sexton, J.O, Song, X.P, Feng, M, Noojipadi, P., Anand, A., Huang, C., Kim, D.H, Collins, K.M, Channan, S, DiMiceli, C & Townshend, J.R. (2013). Global, 30-m resolution continuous fields of tree cover: Landsat-based rescaling of MODIS continuous fields and lidar-based estimates of error, **International Journal of Digital Earth** 6 (5), 427-448. (DOI:10.1080/17538947.2013.786146).

**2012**

Sexton, J.O., Song, X.P., Huang, C.Q., Channan, S., Baker, M.E., & Townshend, J.R. (2012). Urban growth of the Washington, D.C.-Baltimore, MD metropolitan region from 1984 to 2010 by annual, Landsat-based estimates of impervious cover, **Remote Sensing of Environment,** 129, 42–53, (<http://dx.doi.org/10.1016/j.rse.2012.10.025>).

Townshend, J.R., Masek, J.G. Huang, C.Q., Vermote, E.F., Hansen, M.C., Gao, F. Wolfe, R., Channan, S., Sexton, J., Feng, M., Li, M., X., Narasimhan, R., Kim, D.H., Noojipady, P., Song, K., Song, D.X., Song, X.P., Tan, B. & Zhang, G.X. (2012). Global characterization of land cover using Landsat data: opportunities and challenges, **International Journal of Digital Earth**, 5 (5), 373-379.

Houghton, J., Townshend, J., Dawson, K., Mason, P., Zillman, J. & Simmons, A. (2012). The GCOS at 20 years: the origin, achievement and future development of the Global Climate Observing System, **Weather**, 67, 227–235.

Feng, M., Huang, C.H., Channan, S, Vermote, E.F., Masek, J.G., & Townshend, J.R. (2012). Quality assessment of Landsat surface reflectance products using MODIS data, **Computers and Geosciences,** v.36, pp. 9-22. ([doi:10.1016/j.cageo.2011.04.011](http://dx.doi.org/10.1016/j.cageo.2011.04.011)).

**2011**

Carroll, M.L., Townshend, J.R.G., DiMiceli, C.M., Loboda, T.,& Sohlberg, R.A. (2011). Shrinking lakes of the Arctic: spatial relationships and trajectory of change, Geophysical Research Letters, 38, L20406, doi:10.1029/2011GL049427.

**2010**

Huang, C., Goward, S.N., Masek, J.G., Gao, F., Vermote, E.F., Thomas, N., Schleeweis, K., Kennedy, R.E., Zhu, Z., & Townshend, J.R.G. (2010). Reconstruction of forest disturbance history from the Landsat record, Remote Sensing of Environment, 113 (2), 183-198.

Li, M.X., Townshend, J.R., and Wu, B.F. (2010). Contributions to the global earth observation system of systems by China, Journal of Remote Sensing 14 (3), 571-578.

Huang, C., Thomas, N., Goward, S.N., Masek, J.G., Zhu, Z., Townshend, J.R.G., & Vogelmann, J.E. (2010). Automated masking of cloud and cloud shadow for forest change analysis using Landsat images, International Journal of Remote Sensing, 31 (20), 5449-5464.

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Townshend, J.R.G., Williams, D.F. & Justice, C.O. (1979). An evaluation of Landsat RBV imagery for an area of complex terrain. **Proceedings 13th Int. Symp. on Remote Sensing of Environment**, Ann Arbor, MI, pp. 1839-1852.

**1977**

Townshend, J.R.G. (1977). A framework for monitoring the environment through the use of remote sensing. In Van Genderen, J.L. and Collins, W.G. (eds.) **Monitoring Environmental Change by Remote Sensing**, Remote Sensing Society, Reading, UK, pp. 1-5.

**1976**

Justice, C.O., Williams, D.F., Townshend, J.R.G. & Savigear, R.A.G. (1976). The provision of environmental information from space imagery for Basilicata, southern Italy. In Van Genderen, J.L. and Collins, W.G. (eds.) **Land Use Studies by Remote Sensing**, Remote Sensing Society, Reading, U.K., pp. 1-39.

**1974**

Townshend, J.R.G., Savigear, R.A.G. & Justice, C.O. (1974). A comparison of the capabilities of the ERTS and the Earth Resources Skylark Rocket within Central Argentina, in B.T. Battrick and N.T. Duc (eds.) **European Earth Resources Experiments**, ESRO SP-100, pp. 383-403.

Drennan, D.S.H., Hardy, J.R., Savigear, R.A.G., Townshend, J.R.G., Bray, C.J., Justice, C.O. & Owen-Jones, E.S. (1974). The interpretation and use of false-colour infrared and true colour photography of part of Argentina obtained by Skylark Earth Resources Rocket. **Proc. 9th Int. Symp. on Remote Sensing of Environment**, Ann Arbor, MI, pp. 1475-1496.

**1973**

Clark, D.D., Hardy, J.R., Parsons, A.J., Ridgway, RB, Savigear, RAG & Townshend, J.R.G. (1973). Preliminary results from Skylark earth resources rocket experiment in Argentina: In **Approaches to earth survey problems through use of space techniques; Proceedings of the Symposium**, Konstanz, West Germany, pp. 495-499.

#### e. Talks and other professional papers presented.

***2012***

Environmental monitoring using Landsat-class data: challenges and opportunities for land cover. the **Second International Conference on Mountain Environment and Development (ICMED) 2012**, Chengdu, China, 16th October.

Global Forest Cover Monitoring using Landsat Satellite Data**, Joint Global Change Centers Workshop of Beijing Normal University and Tsinghua University**, Beijing China, 4th July.

***2011***

Global Forest mapping at Landsat Resolutions. Invited presentation at the **Center for Earth Observation and Digital Earth**, Chinese Academy of Sciences, 14th. December.

***2010***

Earth Science Data Records (ESDR) of Global Forest Cover Change, **National Geomatics Center of China**, Beijing, China, 30th November.

***2009***

Geospatial data as information commons: Lessons learnt from the Global Land Cover Facility (GLCF) and Global Observations of Forests and Land Cover (GOFC/GOLD). **Digital Asia Regional Strategy Research Center Conference,** Mita Campus, Keio University, Tokyo, January 30th 2009 (Keynote talk).

Establishing the data policy necessary for a GEO Global Agricultural Monitoring System of Systems, & Opportunities for China in a Global Agricultural Monitoring System of Systems. **GEO Workshop on Developing an Agricultural Monitoring System of Systems**, Institute for Remote Sensing Applications, Beijing, China, 11th-13th February.

Challenges of Monitoring the world’s land cover. Invited opening plenary talk of the **Annual Meeting of the American Society of Photogrammetry and Remote Sensing**, Baltimore, MD, 11th March.

Integrated Global Observations of the Land, **Annual Conference of the Association of American Geographers**, Las Vegas, NV, 26th March.

Essential Climate Variables. **NASA’s Land Cover Land Use Change Annual 2009 Meeting**, Bethesda, Maryland.

Challenges and opportunities for Terrestrial Earth Observation. **Annual Lecture of the Remote Sensing and Photogrammetric Society**, University of Nottingham, UK, 7th April.

Towards operational global forest monitoring: next steps (invited). **33rd Int. Symposium on Remote Sensing of Environment, Sustaining the Millenium Development Goals**, Stresa, Italy May 7th.

Challenges in transitioning from research to operational terrestrial monitoring systems (invited keynote)., **2nd International Conference on Earth Observation for Global Changes (EOGC 2009)**, May 25th-29th Chengdu, Sichuan, China

Terrestrial Monitoring Systems: Transitioning from Research to Operations (invited keynote), **17th International Geoinformatics Conference**, George Mason University, Virginia, 12th August.

Integrated Global Observations of the Land: Transforming a Plan into Reality. (invited keynote) **6th International Symposium on Digital Earth**, Beijing, 9th – 11th September.

Challenges in Achieving Operational Land Cover and Land Use Monitoring, **2009 International Society for Photogrammetry and Remote Sensing International Workshop on Virtual Changing Globe for Visualization and Analysis**, University of Wuhan, Wuhan, China, 27th-28th October 2009.

***2008***

Integrated Global Observations of the Land (IGOL): Implications for Land Surface Imaging. **25th Meeting of the CEOS Working Group On Information Systems And Services (WGISS-25),** Sanya, China 30th January.

Asia-Pacific Region’s Forest and Land Cover Monitoring Network: a Proposal for its phased evolution *and* Overview of the work of GOFC-GOLD, IGOL to GEOSS and Status of the Regional Networks **Symposium on Asia-Pacific Regional Forest Monitoring**, Beijing, 11th June.

The future of terrestrial remote sensing: challenges and opportunities. **XXI Congress, International Society for Photogrammetry and Remote Sensing**, Beijing, 10th July (invited plenary presentation)

Land Cover. **Invited Seminar, Department of Geography, George Mason University**, Va, 16th July.

New Approaches to Forest Monitoring using Remote Sensing**, GEO Forest Monitoring Symposium**, Iguacu, Brazil, 4th November.

The significance of land cover and land use dynamics on global change and earth system science. Beijing Normal University, **Opening of College of Global Change and Earth Sciences,** Beijing Normal University,17th December.

***2007***

Scientific and international needs for the Mid-Decadal Global Landsat Data Set, **Workshop on MDGLS, Phase 3**, Annapolis, Maryland, 27th March 2007.

Improving estimates of global land cover change, **Annual Meeting of the Association of American Geographers**, San Francisco, 20th April 2007

Integrated Global Observations of the Land, **14th Meeting of the Integrated Global Observation Strategy Partnership,** UNESCO, Paris, 30th May 2007.

Challenges and successes in the provision of land cover information using remote sensing. **Invited presentation at George Mason University**, (Part of the "Advanced Certificate of GeoInformation Science" for Heilongjiang Bureau of Surveying and Mapping) 23rd July 2007.

Integrated Global Observations of the Land (IGOL): A new strategy for sustained observations of the land, **Institute for Applications of Remote Sensing**, Invited seminar Beijing, 6th August 2007.

Improving the Delivery and Use of Remote Sensing Products, (Keynote speech**) 7th International Workshop of Geographical Information Systems**, Beijing, 14th September 2007.

Integrated Global Observations of the Land., **14th bis Meeting of the Integrated Global Observation Strategy Partnership,** Cape Town, South Africa, 27th. November 2007.

***2006***

Land cover change and disaster preparedness. Invited presentation at the **National Disaster Reduction Center of China, Beijing**, 4th January 2006.

Opportunities and Challenges for Remote Sensing in Monitoring the Earth’s Land Cover. **Invited presentation at Beijing Normal University**, 5th January 2006.

Products from the Global Land Cover Facility relevant to Hydrology, **Seminar at National Weather Service**, NOAA, Silver Spring, MD, February 13th 2006.

Integrated Global Observations of the Land, **GOFC-GOLD Land Cover Implementation Team meeting,** Jena, Germany, 23.-24.March 2006.

Challenges in the mapping and monitoring of forest and landcover using remote sensing (Invited plenary opening talk.) **The 2nd International Conference on Land cover /Land use study using Remote Sensing and Geographic Information System**, Ulaanbaatar, Mongolia, 8th June 2006

Introduction to the Global Terrestrial Observing System’s Panel on Global Observations of Forest and Landcover Dynamics, **GOFC-GOLD East Asia regional workshop on forest and land cover observations**, at Ulaanbaatar, Mongolia, June 9th 2006.

The importance of International Programs in specifying requirements for Moderate Resolution sensing of Global Vegetation., **Global Vegetation Workshop 2006**, University of Montana, Missoula, 8th-10th August 2006.

Governance of the ESIP Federation; The Global Land Cover Facility; Policy issues relating to scientific data, **Workshop on a Federated Approach to Environmental Data in China**, Beijing Normal University, China, 23rd-25th October 2006.

Pervasive remote sensing. **14th International Conference on Geoinformatics,** Wuhan China, October 28th-29th (Invited Keynote presentation).

***2005***

The Global Land Cover Facility: Creating and Delivering Earth Systems Science Data to the World. **NASA’s Land Cover Land Use Change Science Team Meeting,** University College University of Maryland, Jan 2005.

GOFC-GOLD **NASA’s Land Cover Land Use Change Science** **Team Meeting,** University College, University of Maryland, Jan 2005.

Land Cover Change: Challenges in Populating Digital Earth with Reliable Information. **International Society for Digital Earth, Tokyo**, 30th March 2004 (invited plenary presentation).

Integrated Global Observations of the Land**. Fourth International Implementation Planning Meeting for The Coordinated Enhanced Observing Period (CEOP) and the First Integrated Global Observing Strategy Partners (IGOS-P) Integrated Global Water Cycle Observations Theme (IGWCO) Workshop**, University of Tokyo, 1st Mar 2005.

Perspective on international activities on land remote sensing, Session on US Operational Global Land Remote Sensing, **Association of American Geographers, 2005 Annual Meeting**, Denver, 6th April 2005.

GOFC-GOLD: an Overview, **Symposium on Improved Observations of Land Cover and Fire for Earth Science and Sustainable Development**, Beijing, April 22nd 2005.

Where have all the forests gone? The contribution of remote sensing for monitoring the Earth’s vegetation. **13th. Annual Gregory Lecture**, University of Southampton UK, 10th. May 2005.

The Global Earth Observing System of Systems: Challenges in satisfying terrestrial observational needs, **3rd Multitemp Conference**, Biloxi, Mississippi, 16th May 2005.

The Status of the Integrated Global Observations of the Land (IGOL) Theme, **Meetings of the CEOS Strategic Implementation Team and the Integrated Global Observation Strategy Partnership**, Geneva, Switzerland, 23rd-26th May 2005.

Land cover and land use change. Presentation at meeting on **“One Planet, many People: Atlas of Our Changing Environment”**, Woodrow Wilson International Center for Scholars, Washington DC, 15th June 2005.

Global Observations of Forest and Landcover Dynamics, **Workshop on Remote Sensing Analysis of Tropical Deforestation and Baselines for Carbon Crediting and Biodiversity**, Carnegie Institution, Washington DC, 6th to 7th. July 2005.

The contribution of remote sensing for monitoring the Earth. **Invited Seminar at Chinese National University of Geosciences**, Wuhan, China, 31st August 2005.

The contribution of remote sensing for monitoring the Earth’s vegetation. **Invited seminar, Institute for Geographical Sciences and Natural Resources, Chinese Academy of Sciences**, Beijing, China. 2nd September 2005.

Applications of Remote Sensing, **9th International Symposium on Physical Measurements and Signatures in Remote Sensing,** Beijing, China, 17th-19th. October 2005.

Defining continuous fields, **Workshop on Validation of Global Continuous Fields**, South Dakota State University, Brookings South Dakota, 27th October 2005.

***2004***

The Global Land Cover Facility in the age of REASoN. **NASA’s Land Cover Land Use Change:** **Significant Results Meeting,** University College University of Maryland, Jan 21st 2004.

GOFC/GOLD: a status report. **NASA’s Land Cover Land Use Change Science:** **Significant Results Meeting,** University College, University of Maryland, Jan 21st 2004.

Building a data and information network within northern Eurasia. **Observational data in support of Northern Eurasia Earth Science Partnership Initiative (NEESPI)**, St. Petersburg, Russia, 23rd-26th Feb. 2004.

Some challenges for the GOFC/GOLD Land Cover Implementation Team, **GOFC/GOLD Land Cover Implementation Team Meeting**, Friedrich Schiller University, Jena, Germany 3rd March.

Characterization of global land cover. **Centenary Meeting of the Association of American Geographers**, Philadelphia, Pennsylvania, 18th April 2004

The work of the CEOS Utilization Team, **CEOS Workshop on Rapid Response Information Systems**, Wuhan, China. 5th-7th May 2004.

Introduction to the Role of Rapid Response Systems, **CEOS Workshop on Rapid Response Information Systems**, Wuhan, China. 5th-7th May 2004.

Integrated Global Observations of the Land. 11th. **Meeting of the Integrated Global Observation Strategy Partners,** FAO, Rome, 27th May 2004.

The Global Land Cover Facility: Creating and Delivering Earth Systems Science Data to the World, **Presentation to Staffers of US Congress, House of Representatives**, Rayburn House Office Building, Washington DC 4th. June 2004.

Problems and prospects for remote sensing at the beginning of the 21st century. **Invited presentation to the British Association of Remote Sensing Companies**, London, 29th June 2004.

A Science Perspective on Global Monitoring Systems in Balancing Interests in Satellite Earth Observation. **Meeting on Balancing Interests in Satellite Earth Observation,** University of Maryland University College, July 19th 2004.

Monitoring of the Earth’s Land Cover. **Goddard Scientific Colloquium**, Goddard Space Flight Center, Greenbelt, MD, October 29th. 2004.

***2003***

The Earth Science Information Federation in the Age of REASoN. Present progress of future activities of the Global Land Cover Facility, **10th. Meeting of the ESIP Federation**, Pasadena, California, 6th - 9th January 9, 2003.

The Role of the Global land Cover Facility in the work of the FRA of FAO, **Ad hoc expert meeting on the Framework for Global Monitoring of Forests**, Land Use and Environment, FAO Headquarters, Rome 22nd - 24th. January 2003..

The use of MODIS in providing near real-time information on forest fires, **Association of American Geographers’ Annual Conference**, New Orleans, 6th March 2003.

Recent research in land cover characterization using MODIS data at the University of Maryland. **Invited presentation at the USGS's EROS Data Center**, Sioux Falls, South Dakota, 30th April 2003.

GOFC/GOLD. **Seminar at the Northern Laboratory of the Canadian Forest Service**, Edmonton, Canada, 28th May 2003.

Requirements and uses of key observations that support an Integrated Earth Observing System: Terrestrial Observations. **UCAR Workshop on Earth System Observations** Natural History Museum, Smithsonian, Washington D.C., August 13th-15th.

Improving the utilization of remotely sensed data. **Invited presentation to the Committee on Environmental Satellite Data Utilization**, National Research Council, Washington DC, 9th. September 2003

Utilization of remotely sensed data. Invited presentation to **International Association of Chinese Professionals in Geographic Information Science**, George Mason University, 22nd October 2003.

Rapid Adoption of Remote Sensing : Lessons Learned from the CEOS Utilization Team. 30th **International Symposium on Remote Sensing of Environment**, Honolulu, Hawai’i, November 10th-14th, 2003 (invited).

Report of the CEOS Ad Hoc Utilization Team, **Special Session at the 17th Plenary for the Committee on Earth Observing Systems**, Colorado Springs, Colorado, USA, 18th November 2003.

Characterization and monitoring of the world’s land cover Invited presentations to **the Institute for Applications of Remote Sensing and Beijing Normal University**, Beijing, China, 8th and 9th. September 2003.

MODIS LAND Products, Invited presentation to the **National Remote Sensing Center of China**, Beijing, China, , Beijing, China, 9th December 2003.

Update on MODIS and related US activities, Invited presentation to the **Chinese Meteorological Society’s Meeting**, Beijing China, 10th. December 2003.

***2002***

Earth Observation: Map making for all? **Royal Geographical Society/Institute for British Geographers Annual Meeting**, Belfast, United Kingdom, Invited presentation at the Chair of Conference’s session, January 3rd 2002.

The IGBP Discover Product: a Retrospective. **2nd Meeting Landsat Global Data Working Group**, World Resources Institute, January 10th 2002.

Global Observations of Forest Cover. **Seminar at Canadian Forest Service Pacific Laboratory**, Victoria, British Columbia, Canada, March 2002, March 6th. 2002.

Global Observations of Forest Cover and Global Observations of Landcover Dynamics. Invited plenary presentation, **29th International Symposium on Remote Sensing of Environment**, Buenos Aires, April 9th. 2002.

GOFC/GOLD Requirements for ALOS, **The Kyoto and Carbon Initiative, 2nd. Meeting Science Advisory Panel**, NASDA, UCSB, Santa Barbara, USA 14th.. May 2002.

Land Cover Science at the Global Land Cover Facility, **ESIP Federation Meeting, Summer 2002**, University College University of Maryland, College Park, MD., USA, 15th. May 2002.

Global Observations of Forest Cover: the role of remote sensing in monitoring the world's forests. Invited plenary presentation at **Geoinformatics 2002**, Nanjing, China.

Community Engagement. Invited plenary presentation at the **2nd. Public Workshop on the Strategic Evolution of Earth Science Enterprise Data (SEEDS)**, San Diego, 17th.-19th. June 2002.

MODIS Land Cover Continuous Fields and Vegetation Cover Products. **MODIS Vegetation Workshop**, Missoula, University of Montana, 17th July 2002.

Progresos en la Evaluación de la Vegetación del Planeta desde el Espacio. **Guyra Paraguay Seminar** Edificio Naciones Unidas, Asuncion, Paraguay, 20th August 2002.

The role of MODIS Products in providing land cover information to meet national and international priorities (Invited keynote presentation), **APEIS (Asia-Pacific Environmental Innovation Strategy Project) Capacity Building Workshop on Integrated Environmental Monitoring of Asia-Pacific Region,** Beijing, China, 20-21st. September 2002.

Improving the characterization of the world's land cover, **Seminar, Department of Geography, University of Maryland Baltimore County**, 8th. October 2002.

Vegetation Cover Conversion, Vegetation Continuous Fields, **2nd. Workshop for Earth Science Satellite Remote Sensing**, George Mason University, Virginia, 16th. October.

Observations and Monitoring Systems, Panelist presentation at the **U.S. Climate Change Science Workshop** Washington DC, December 3, 2002

The use of EOS data for monitoring land cover and land cover change in the framework of GOFC/GOLD. **Advanced Training Workshop on Land Use and Land Cover Change Study,** National Taiwan University, Taipei, Taiwan, 15th. December 2002.

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Land Cover and Land Use Change: An Overview of Recent MODLAND Results. **MODIS Science Team** **Meeting**, Columbia, Maryland, January 2001.

The Integrated Global Observation Strategy Partnership. Sidebar presentation at the **Commission on** **Sustainable Development**, United Nations Headquarters, New York, April 19th 2001.

Global Observations of Forest Cover. **CEOS Working Group on Information Systems and Services,** Sioux Falls, South Dakota, May 9th. 2001.

The Terrestrial Carbon Observations Initiative, **CEOS Strategic Implementation Team**, CNES Headquarters, Paris, 31st. May 2001.

Data and Information Systems and Service Principles**, 7th Integrated Global Observation Strategy Partnership** Meeting, IOC, UNESCO, Paris, June 1st 2001.

Land Cover and Land Cover Change Products from MODIS. **Graduate Workshop on MODIS**, George Mason University, 4th June 2001.

Global Observations of Forest Cover. Land Cover Subgroup of the **CEOS Working Group on Calibration and Validation,** Frascati**,** ItalyJune 7th. 2001.

Global Observations of Forest Cover. **Remote Sensing of Forest Cover in Northwestern Russia and Fennoscandia**, Center for International Environmental Cooperation if the Russian Academy o Sciences, St. Petersburg, Russia, 25th. June 2001.

Improvements in Landsat Pathfinder (for Monitoring Tropical Deforestation) and Their Extension to Extra-tropical Areas, **NASA Meeting on Temperate and Boreal Regions: Land Use and Cover Change Program,** October 30th. 2001.

The Earth System Science Information Partnership Federation. **Task Group on the Usefulness and Availability of NASA's Space Mission Data, National Research Council**, Washington DC. July 30th. 2001.

The WGISS Test Facility and GOFC. Joint presentation with Terry Fisher. **15th CEOS Plenary,** Kyoto, Japan, 6th. November, 2001.

Status of land cover and land cover change products. **MODIS Science Team Meeting**, Baltimore, MD, December 18th. 2001.

***2000***

Satellite Contributions to the monitoring of the terrestrial carbon cycle. **Joint GTOS/IGBP Meeting on Defining Terrestrial Carbon Observations**, Ottawa, Canada, 8th-11th February 2000.

The Role of the Earth Science Information Partnership Federation, Presentation of position paper **NASA Meeting on New-DISS**, University of Maryland University College, 23rd -25th February 2000.

The Global Climate Observing System: The Challenges of Implementation**. 28th. International Symposium on Remote Sensing of the Environment,** Cape Town South Africa, 27th. March 2000. (Invited paper)

The Earth Science Information Partnership. **NASA’s Inter-disciplinary Working Group**, Tucson, Arizona, April 2000.

Global Observations of Forest Cover. **NASA’s Land Cover and Land Use Meeting**, Reston, Virginia, April 2000.

The Integrated Global Observation Strategy.**IGBP International Workshop on Terrestrial Carbon Research and Observations, Costa da Caparica,** Portugal, May 2000.

Preliminary land surface products from the NASA Moderate Resolution Imaging Spectroradiometer (MODIS), **IGARSS2000**, Honolulu, Hawaii, July 2000.

The Vegetation Cover Conversion product from MODIS Data **American Geophysical Union**, San Francisco, December 2000.

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#### f. Contracts And Grants

**Principal Investigator**

2014-2020 **Enhanced Land Cover Products from MODIS: Vegetation Continuous Fields Maintenance and Refinements,** NASA, $950,000.

2015-2018 **Multi-source imaging of time-series tree and water cover at continental to global scales** NASA LCLUC, $740,960.

2011 -2014 **Enhanced Land Cover Products from MODIS: Vegetation Continuous Fields Maintenance and Refinements**, NASA, $660,000.

2008-2013 **Earth Science Data Records of Global Forest Cover Change** NASA-Goddard Space Flight Center, $3,757,765.

2008-2011 **Enhanced Land Cover and Land Cover Change Products from MODIS** (UMD) NASA Earth Observing System, $750,000.

2008-/2011 **Recent North American Forest Dynamics via Integration of Aster, Modis, and Landsat Reflectance Data**, NASA - Goddard Space Flight Center, $348,270 (PI: Jeff Masek).

2008-2011 **Vegetation Change Tracking: Algorithm Development and Prototype Application in the Southeastern United States** U.S. Geological Survey, $359,215 (PI: Chengquan Huang).

2008-2010 **Three Decades of Forest Cover Change in the Americas** NASA - Goddard Space Flight Center $299,871

2008 **Reason Metrics Tools - Updates and Operations NASA** - Goddard Space Flight Center $95,288

2003-2008 **Global Land Cover Facility,** REASoN program, NASA $1,650,000 (Principal Investigator).

2004-2007 **Advanced Land Cover Products** MODIS Science Team membership NASA $1.5m (Principal Investigator and Team Member) .

2003-2006 **NPP Science Team**, NASA, $25k (Co-investigator).

1996-2003 **MODIS Science Team Member - Enhanced Land Cover products**. NASA $1.90m (PI and Team member) .

2000-2003 **Advanced methods for monitoring deforestation**, NASA, LCLUC Program $360k (Principal Investigator).

1997-2002 **Land Cover Earth System Information Partnership**, NASA, $5.35m (Principal Investigator).

1997-2002 **Enhancing Earth System Science using Commercial Terrestrial Remote Sensing Systems**, Stennis Space Flight Center, NASA, $206k/year (Co- Investigator).

1997-2001 **Satellite-based identification of linked vegetation index and sea surface temperature**, NASA, GSFC $186k (Principal Investigator).

1998-2000 **National Partnership for Advanced Computational Infrastructure** UMCP Partnership with the San Diego Super-Computing Center, National Science Foundation (Co-Principal Investigator) 90k/year.

1997-1999 **A Meta-data System for the Global Observing Systems**, $80k, NOAA (Principal Investigator).

1997 **Advanced Center for Global Remote Sensing Studies**, Center of Excellence in Remote Sensing. NASA, $430,000 (Co-Principal Investigator).

1997 **Support for the Earth System Science Interdisciplinary Center**, NASA, $600k (Co-Principal Investigator).

1995-1997 **AVHRR Version 2 Pathfinder product**. NASA $900k (Co-PI)

1995 **Workshop on electronic networking**. NSF and START, $50k (PI)

1995-1998 **Global Climate Observing System**, support for Chairman, NASA, $360k (PI).

1993-1998 **NSF High Performance Computing Grand Challenge grant on Land Cover Change,** NSF, (Co-PI) $3.5m.

1993-1997 **Coastal marshland loss in Chesapeake Bay**. NASA $190k/year (Co-PI)

1993-1995 **AVHRR Land Pathfinder support**. NASA $80k (PI).

1992-1998 **Landsat Pathfinder Humid Tropical Forest Project**. National Aeronautical and Space Administration (Co-PI). $1.7m.

1992-1993 **Compositing Methods for Pathfinder**. National Aeronautical and Space Administration (PI). $30,000

1991-1997 **Global Classification of Land Cover**. National Aeronautical and Space Administration. $900,000 (PI).

1988-1989 **Tropical Rain Forest Monitoring**. European Community, $145,000.

1988-1989 **Estimation of Crop Statistics using AVHRR data**. European Community. $35,000.

1988 **Impact of misregistration on image properties.** National Aeronautical and Space Administration, $20,000.

1985-1989 **Support of the NERC Unit for Thematic Information Systems (NUTIS)** to conduct research into Remote Sensing, Geographic Information Systems and Digital Cartography. United Kingdom’s Natural Environment Research Council. $2,250,000.

1985 **Image Processing Equipment Grant**, United Kingdom’s Natural Environment Research Council. $64,000.

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# 3. TEACHING

#### a. Courses taught

University of Maryland, College Park

*300 level*

Research and Writing in Geography (310) (1991, 1992, 1993)

*400 level*

Advanced Remote Sensing (440)

*600 and 700 level s*

El Nino Seminar (788W) (Spring 1998).

Introduction to Graduate Geography (600) (Fall 1990, 1991, 1992, 1997, 1998, 1999).

Introduction to Graduate Physical Geography (788W then 602) (Spring 2003,2004, Fall 2004, Spring 2006, 2007, 2008).

Land Cover Seminar (788W) (Spring 2001).

Remote Sensing (609) (Spring 1999, 2000).

Research Preparation in Geography (610), Spring 1994, 1995, 1997).

Research Tutorial for Master’s students (610M) (Fall 2001, 2002).

Seminar on Graduate Student Orientation (788C) (Fall 2006, 2007, 2008)

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#### b. Advising

Master’s

G. Gisladottir (1984) The application of remotely sensed data for land cover mapping in Icelandic rangelands. M. Phil.

Moon Kim (1994) The use of narrow spectral bands for improving remote sensing estimation of fractionally absorbed photosynthetically active radiation. MA.

Marc Steininger (1994) Monitoring tropical reforestation using Thematic Mapper data. MA.

Eric Brown de Coulston (1993) Estimating APAR using ASAS data. MA.

Holly Offerman (1995). Modeling the impact of deforestation on habitat. MA.

Nathan Pollack (1998). The impacts of ENSO on the vegetation response of the Indian sub-continent. MA.

Doctoral

C.O. Justice (1978) The effects of ground conditions on Landsat multispectral scanner data for an area of complex terrain in southern Italy. Ph.D.

D.F. Williams (1978) The identification of the location and intensity of gully erosion in Basilicata, Southern Italy. Ph.D.

C.M. Gurney (1980) The use of contextual information in remote sensing. Ph.D.

E.J. Milton (1982) Factors affecting the multispectral response of vegetated surfaces. Ph.D.

P.J. Hancock (1982) Landsat multispectral scanner and radiometer investigations of selected bare particulate flood plain surfaces in Basilicata Province, southern Italy. Ph.D.

A. Singh (1984) Tropical forest monitoring using digital Landsat data in northeastern India. Ph.D.

T.J. Munday (1985) Multispectral remote sensing of surficial materials. Ph.D.

D.W. Lynn (1986) The use of thermal infrared data for soil mapping. Ph.D.

M.J. Barnsley (1986) Bidirectional characteristics of vegetated surfaces. Ph.D.

J.L. Cushnie (1987) The use of spatial filtering in the classification of finer resolution data. Ph.D.

K. White (1989) Piedmont Erosion and Deposition in the Tunisian Southern Atlas. Ph.D.

P. Kennedy (1989) Monitoring the vegetation of Tunisian grazing lands using the Normalized Difference Vegetation Index. Ph.D.

Satya Kalluri (1994) Estimating ET from remotely sensed data. Ph.D.

Marc Steininger (1998) Tropical secondary forests in the Amazon. Ph.D.

Chengquan Huang (1999) Improved land cover characterization from satellite remote sensing. Ph.D.

Eric Brown de Coulston (2001) Use of AVHRR and POLDER data for improved land cover characterization. Ph.D.

Mathew Hansen (2002) Improved characterization of the Earth's land cover. Ph.D.

Chris Neigh (2008) American carbon cycle. Ph.D.

Kuan Song (2010) Tackling uncertainties and errors in the global monitoring of forest change. Ph.D.

Hua Wei (2011) Semantic Integration Of Geospatial Concepts – A Study of Land Use Land Cover Classification Systems. Ph.D.

Xiaopeng Song (2015)Improved quantification of forest cover change and implications for the carbon cycle. Ph.D.

DoHyung Kim (2015) Estimation of Pan-Tropical deforestation and implications for conservation. Ph.D.

D.X. Song (2016) Integrated Use of Landsat and Corona Data for Long-Term Monitoring of Forest Cover Change and Improved Representation of its Patch Size Distribution. Ph.D.

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# 4. SERVICE

#### a. Professional

Offices and committee memberships

###### International

2013-17 Vice Chair, **International Expert Committee of the Chinese Academy of Sciences’ Institute of Remote Sensing and Digital Earth**.

2013-15 Editorial Advisor, **Volume 6, History of Cartography.**

2008-15 Member, Editorial Board of the **International Journal of Digital Earth.**

2005-15 Member, Executive Committee **International Society for Digital Earth.**

2010 Member, **Scientific Steering Committee of the Institute for Global Change Studies**, Tsinghua University, China.

2008-13 Member, **Science Advisory Committee of the College of Global Change and Earth Sciences**, Beijing Normal University, China.

1996-14 Chair, Advisory Committee to **UNEP’s Division of Environmental Information, Assessment and Early Warning - North America**.

2009-12 Member, **International Advisory Committee to the Center for Earth Observation and Digital Earth** (CEODE), Chinese Academy of Sciences.

2006-11 Member, Advisory **Committee for LIESMARS, Wuhan University**, China.

2004-10 Co-Chair **IGOS-P Theme Team** on Integrated Global Observations of the Land (IGOL).

2008-09 Co-chair of the **Working Group on Regional Data Set Collection** of the CEOS Land Surface Imaging Constellation Study Team.

2008-09 Member, **CEOS Land Surface Imaging Constellation Study Team**.

2006 Terrestrial Lead for the **Committee for Earth Observing System’s Response Team to the Global Climate Observing System’s Implementation Plan**.

2000-06 Chair, Science and Technical Board of **Global Observations of Forest Cover (GOFC) Panel of the Global Terrestrial Observing System.**

2003-04 Chair, **Committee on Earth Observing Satellites’ Ad Hoc Team on the Utilization of Remote Sensing Data**.

2004 Chair of Program Committee for the **CEOS Workshop on Rapid Response Information Systems**, Wuhan, China.

1999-00 Chair, Ad hoc Committee on Data and Information System and Services of the **Integrated Global Observation Strategy Partnership.**

1999 Session Chairman and Member of Organizing Committee of the Technical Forum on the Integrated Global Observation Strategy into the New Millenium, **Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space UNISPACE III**, Vienna, Austria, 23rd. July 1999.

1996-99 Member of the **Strategic Implementation Team of the Committee for Earth Observing Satellites**.

1995-98 Chairman Joint Scientific and Technical Committee of the **Global Climate Observing System**.

1994-6 Chairman **International Geosphere Biosphere Programme’s - Data and Information System's Standing Committee**.

1994-6 Member of the **IGBP Science Committee**.

1994-5 Member of the **GTOS Data Management Working Group.**

1994-5 Chairman of the Joint **GCOS/GTOS Terrestrial Observation Panel**.

1993 Member of the **Ad Hoc Planning Committee of the Global Terrestrial Observation System** (GTOS) (invited by UNEP).

1992-4 International Council of Scientific Unions’ nominated member of the Joint Standing Committee of the **Global Climate Observing System**.

1991-3 Member **International Geosphere Biosphere Program’s - Data and Information System's Standing Committee**.

1989-92 Chairman, International Geosphere Biosphere Program’s **Land Cover Change Committee.**

1987-9 Member of the **European Space Agency’s Expert Advisory Group** on High Resolution Imaging Spectrometers

###### Federal

2004-05 Member **Steering Committee for User Consultative Meeting for the Development of the US Global Environmental Observation Plan**.

2000-03 Member NASA’s **Earth Science Information Systems and Services Advisory Subcommittee (FACA Committee)**.

2000-02 Member, **NOAA Council on Long-term Climate Monitoring**.

1998-00 Member of NASA’s **Earth Science Enterprise’s New Data and Information Systems and Services (New-DISS) Team**.

1992-3 Member **NOAA’s Operational Measurements Science Review Panel.**

1991-4 Chairman, **NASA/NOAA AVHRR Pathfinder Science Working Group** for Land Applications.

1990 Chairman, **National Oceanographic and Atmospheric Administration's Operational Advisory Team on Land Surface Products** for the NOAA Climate and Global Change Program.

1990- Associate Member (1992-96) and then member (1996- present) of **NASA’s MODIS Science Team**.

###### National

###### United States

2007-10 Member **Advisory Council of the National Center for Atmospheric Research.**

2007 Member **External Review Team for the Department of Geography, University of California, Santa Barbara**.

2006-7 Member **NRC Committee on Archiving, Stewardship, and Access of Environmental Data at NOAA.**

* 1. Member, **National Research Council’s Space Studies Board’s Committee** to review the NASA Earth Science Enterprise Strategic Plan

2000 Member **National Research Council’s** Review Panel on NASA’s Earth Science Enterprise Science Plan.

1999-2000 President of the **Earth Science Information Partnership's Federation.**

1999 Member, **National Research Council's Board on Earth Sciences and Resources.**

1998-99 Chair, Rules Sub-Committee, **Earth Science Information Partnership Federation** .

1997-98 Member of **National Research Council’s** Visiting Group to the Distributed Active Archive Center at NASA’s Goddard Space Flight Center.

1992-98 Member **National Academy of Science’s Committee on Geophysical and Environmental Data**.

###### United Kingdom

1987-90 Member of the **Council of the Royal Geographical Society** .

1987-8 Chairman of the **United Kingdom’s Natural Environment Research Council’s Working Group on Geographic Information**.

1986-9 Member of the **Royal Geographical Society's Research Committee**.

1986-9 Member of the **Natural Environment Research Council's Geological Grants Committee.**

1986-9 Member of **the British National Space Centre’s Earth Observation Programme Board.**

1985-9 Member of the **Natural Environment Research Council's Geological Training Awards Committee**.

1985-7 Member of the United Kingdom’s **Department of the Environment’s Committee on Handling Geographic Information** (Chorley Committee).

1980-96 Associate Editor of the **International Journal of Remote Sensing**.

1975-77 Honorary General Secretary of the **Remote Sensing Society**.

ii Reviewing activities

NASA, NOAA, International Journal of Remote Sensing, Remote Sensing of Environment, International Journal of Digital Earth.

iii External Examiner For Higher Degrees

University of Dundee (Ph.D.),

Imperial College, University of London (Ph.D.),

University College London (Masters in Remote Sensing),

University of Lund, Sweden, (Ph.D.)

University of Sheffield, (Ph.D.)

Towson University, Western Australia, (Ph.D.)

Cranfield Institute of Technology (Masters in Remote Sensing)

University of Southampton (Ph.D.)

iv Paid Consultancies

United Nations Environment Programme

United Nations Development Programme

UN Food and Agricultural Organization

NASA

Raytheon STX

Resource21 LLC

Northrop Grumman

#### b. Campus

i. Departmental

2000 Chair, **Promotion Committee** for Dr. Charles Christian.

2000 Member **APT Committee** for Associate Professor DeFries and Assistant Professor Liang.

1998-99 Chair, **Departmental Appointments, Promotion and Tenure Committee**.

1998 Chair, **Promotion and Tenure Committee** for Assistant Professor Martha Geores.

1998 Member, **Departmental Faculty Salary Review Committee**.

1997-98 Chair, **Five Year Review Committee** for Dr. H. Brodsky.

1998 Member, **Three year Review Committee** for Dr. S. Liang and Five year Review Committee for Dr. S. Prince.

1997-99 **Departmental Director of Research**.

1997 Chair, **Research Faculty Salary Review Committee**.

1997 Chair, **Departmental Faculty Salary Review Committee**.

ii. College

2008 Chair, **Research Sub-committee** ofBSOS Committee to Respond to the Campus Strategic Plan

2008 Member, **BSOS Committee to Respond to the Campus Strategic Plan**

2007 Member, **BSOS Communications Council**

2007 Member, **Search Committee for Chair of Anthropology.**

2005 Chair, **Search Committee for the Chair Department of Sociology**

2002 Chair, **Search Committee for the Chair Department of Government and Politics**.

2000-1 Member, **Promotion and Tenure Committee of the College of Behavioral and Social Sciences**.

1991 Member, **Search Committee for the Dean of the College of Behavioral and Social Sciences**.

1989-91 Member, **Promotion and Tenure Committee of the College of Behavioral and Social Sciences**.

1989-90 Member, **Computing Committee of the College of Behavioral and Social Sciences.**

iii. University

2012 Member, **Campus Committee on Innovation and Entrepreneurship**.

2011 Member **Campus Facilities Council.**

2011 Member Blue Team, **UM, UMB Merger**.

2011 Member **Task Force on China**, Chair Research Sub-Committee.

2010-11 Chair,  **Search Committee**, **Vice President for Research**.

2007 Member **University Working Group on Climate Initiative**.

2002-3 Chair, **Research Advisory Committee to the Office of Information Technology.**

1999 Member, UMCP **Goddard Earth Sciences and Technology Center Steering Committee**.

1999-1 Member **APT Committee of the** **Earth System Science Interdisciplinary Center**.

1998 Chair and then member, **Search Committee for the Director and Faculty of the Earth System Science Interdisciplinary Center**.

1994-5 Represented Campus at **Executive Committee** **meetings of CIESIN**.

1992-3 Chair **Internal Review Committee, Department of Geology**.

1991-2 Member of the **APAC Committee on Environmental Science and Policy**.



September 13, 2020