**JOHN R. G. TOWNSHEND**

Department of Geographical Sciences

University of Maryland

College Park, Maryland 20742

USA

E-mail : jtownshe@umd.edu

# 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.

**2009**

Huang, C., Goward, S.N., Masek, J.G., Gao, F., Vermote, E.F., Thomas, N., Schleeweis, K., Kennedy, R.E., Zhu, Z., Eidenshink, J. C., & Townshend, J.RG., (2009). Development of Time Series Stacks of Landsat Images for Reconstructing Forest Disturbance History. International Journal of Digital Earth (<http://dx.doi.org/10.1016/j.gloplacha.2008.12.009>).

Carroll, M.L, Townshend, J.R., DiMiceli, C.M., Noojipady, P. & Sohlberg, R.A. (2009). A New Global Raster Water Mask at 250 meter Resolution, International Journal of Digital Earth, 2(4), 291-308.

Huang, C., Sunghee K S, Altstatt, A, Song, K., Townshend, J.R.G., Davis, P., Rodas, O., Yanosky, A., Clay, R., Tucker, C.J., & Musinsky, J. (2009). Assessment of Paraguay’s Forest Cover Change Using Landsat Observations, **Global and Planetary Change,** 67, 1-12.

**2008**

Hansen, M., Stehman, S, Potapov, P., Loveland, T., Townshend, J., DeFries, R., Pittman, K., Arunarwati, B., Stolle, F., Steininger, M., Carroll, M. & DiMiceli, C. (2008). Humid Tropical Forest Clearing from 2000 to 2005 Quantified Using Multi-temporal and Multi-resolution Remotely Sensed Data, **Proceedings National Academy of Sciences,** 10, (27), 9439–44.

Steininger, M.K., Hansen, M., J., Townshend, J.R.G., Tucker, C.J., Skole, D., & DeFries, R. (2008). Convincing evidence of tropical forest decline, **Proceedings National Academy of Sciences** (letter) vol. 105, no. 24, E34.

Fang, H., Liang, S., Townshend, J.R, & Dickinson, R. E. (2008). Spatially and temporally continuous LAI data sets based on an assimilated filtering method: examples from North America, **Remote Sensing of Environment,** 112, 75-93.

Huang, C., Song, K., Kim, S. Townshend, J.R., Davis, P. Masek, J., & Goward, S. (2008). Use of a dark object concept and support vector machines to automate forest cover change analysis, **Remote Sensing of Environment,** 112, 970-985 (doi:10.1016/j.rse.2007.07.023).

Liu, D., Song, K., Townshend, J.R.G. & Gong, P. (2008). Using Local Transition Probability Models in Markov Random Fields for Forest Change Detection, **Remote Sensing of Environment,** 112, 2222-2231 (doi:10.1016/j.rse.2007.10.002)**.**

Neigh, C.S.R., Tucker, C.J. & Townshend, J.R.G. (2008). North American vegetation dynamics observed with multi-resolution satellite data, **Remote Sensing of Environment**, (doi:10.1016/j.rse.2007.08.018).

**2007**

Herold, M., Woodcock, C.E., Loveland T.R., Townshend, J., Brady, M. Steenmans, C. & Schmullius, C. (2007). Land Observations as part of a Global Earth Observation System of Systems (GEOSS): progress, activities and prospects, **IEEE** **Systems Journal (Special Issue on “Creating a Global Earth Observation System of Systems”)**, 2, 414-423.

Fang, H., Liang, S. Kim, H.-Y., Townshend, J.R., Schaaf, C.L, Strahler, A.H. & Dickinson R.E. (2007). Developing a spatially continuous 1 km surface albedo data set over North America from Terra MODIS products, **Journal of Geophysical Research**, v. 112, D20206, (doi:10.1029/2006JD008377).

Liang, S, Zheng, T., Wang, D., Wang, K., Liu, R., Tsay, S.-C., Running, S., & Townshend, J. (2007). Mapping high-resolution incident photosynthetically active radiation over land from polar-orbiting and geostationary satellite data, **Photogrammetric Engineering and Remote Sensing**, v. 73 (10), 1085-89.

Neigh, C.S.R., Tucker, C.J., & Townshend, J.R.G. (2007). Synchronous NDVI and surface air temperature trends in Newfoundland: 1982 to 2003. **International Journal of Remote Sensing**, v. 28 (11), 2581-2598.

Huang, C., Kim, S., Altstatt, A., Townshend, J.R.G., Davis, P., Kuan S., Tucker, C.J., Rodas, O., Yanosky, A., Clay, R. & Musinsky, J. (2007). Rapid loss of Paraguay’s Atlantic forest between 1970s and 2000 and the status of protected areas, **Remote Sensing of Environment,** 106, 460–466.

**2006**

Brown de Colstoun, E.C., DeFries, R.S., & Townshend, J.R.G. (2006). Evaluation of ISLSCP Initiative II satellite-based land cover data sets and assessment of progress in land cover data for global modeling, **Journal of Geophysical Research**, 111, D22S07, doi:10.1029/2006JD007453.

Gilruth, P.T., Kalluri, S., Robinson, J.W., Townshend, J.R., Lindsay, F., Davis, P., & Orr, B.J. (2006). Measuring performance: Moving NASA Earth science products into the mainstream user community, **Space Policy,** 22, 165-175.

**2005**

Zhang, Q., Devers, D., Desch, K., Justice, C.O. & Townshend, J.R. (2005). Mapping Tropical Deforestation In Central Africa, **Environmental Monitoring and Assessment**, Volume 101, Nos. 1-3, 69 - 83.

**2003**

Hansen, M.C. DeFries R.S, Townshend J.R.G., Carroll, M., Dimiceli, C. & Sohlberg, R. (2003). A Global percent tree cover at a spatial resolution of 500 meters: first results of the MODIS vegetation continuous fields algorithm, **Earth Interactions**, v. 7, paper 10, 15pp.

Goward, S.N., Townshend, J.R.G., Zanoni, V., Policelli, F., Stanley, T. Ryan, R., Pagnutti, M., Fletcher, R., & Underwood, L. (2003). Acquisition of Earth Science Remote Sensing Observations from Commercial Sources: Lessons Learned from Space Imaging IKONOS data, **Remote Sensing of Environment,** 88 (1-2), 209-19.

Goward, S.N., Davis, P.E., Fleming, D., Miller, L., & Townshend, J.R.G. (2003). Empirical comparison of Landsat 7 and IKONOS multispectral measurements for selected Earth Observation System (EOS) validation sites, **Remote Sensing of Environment**, 88 (1-2), 80-99.

Huang, C. and Townshend, J.R.G. (2003). A stepwise regression tree for nonlinear approximation: applications to estimating sub-pixel land cover, **International Journal of Remote Sensing**, 24 (1), 75-90.

Ouaidrari, H., El Saleous, N., Vermote, E. F., Townshend, J. R, & Goward, S. N. (2003). AVHRR Land Pathfinder II (ALP II) data set: evaluation and inter-comparison with other data sets, **International Journal of Remote Sensing** 24 (1), 135-142.

**2002**

Townshend, J.R.G. & Justice, C.O. (2002). Towards operational monitoring of terrestrial systems by moderate resolution imaging, **Remote Sensing of Environment**, 83, 351-359.

Justice, C.O., Townshend, J.R.G., Vermote, E., Wolfe, R. El Saleous, N. Roy, D. & Morisette, J. (2002). An overview of MODIS Land data processing and product status., **Remote Sensing of Environment**, 83, 3-15.

Hansen, M., DeFries, R., Townshend, J.R.G., Sohlberg, R., Dimiceli, C., & Carrol, M. (2002). Towards an operational MODIS continuous field of percent tree cover algorithm: Examples using AVHRR and MODIS, **Remote Sensing of Environment**, 83, 303-319.

Hansen, M., DeFries, R., Townshend, J.R.G., Marufu, L. & Sohlberg, R. (2002). Development of a MODIS tree cover validation data set for Western Province, Zambia, **Remote Sensing of Environment,** 83, 320-335.

Zhan, X., Sohlberg, R.., Townshend, J.R.G., DiMiceli, C., Carroll, M., Eastman, J.C., Hansen, M., & DeFries, R. S. (2002). Detection of land cover changes using MODIS 250m data, **Remote Sensing of Environment**, 83, 336-350.

DeFries, R., Houghton, R.A., Hansen, M., Field, C., Skole, D., & Townshend, J.R.G. (2002). Carbon Emissions from Tropical Land Use Change Based on Satellite Observations for the 1980s and 90s, **Proceeding National Academy of Sciences**, 99, 14256-14261.

 Cihlar, J., Denning, S., Ahem, F. Arino, O, Belward, A., Bretherton, F., Cramer, W., Dedieu, G. Field, C. Francey, R., Gommes, R., Gosz, J., Hibbard, K., Igarashi, T., Kabat, P., Olson, D., Plummer, S., Rasool, I., Raupach, M., Scholes, R., Townshend, J., Valentini, R., & Wickland, D. (2002). Initiative to quantify terrestrial carbon sources and sinks, **EOS, Transactions American Geophysical Union**, 83(1), 1-7.

Kearney, M., Rogers, A.S., Townshend, J.R.G., Stevenson, J.C. Stevens, J.L., Rizzo, E., Stutzer, D & Sundberg, K. (2002). Large scale decline and collapse of coastal marshes in Chesapeake Bay and Delaware Bay, USA in response to sea level rise and human activities, **EOS Transactions, American Geophysical Union,** vol. 83, 173, 177-8.

Huang, C., Davis, L. S., & Townshend, J.R.G. (2002). An assessment of support vector machines for land cover classification, **International Journal of Remote Sensing**, 23, 725-749.

Huang, C. Townshend, J.R.G., Liang, S. Kalluri, S.N.V. & Defries, R.D., (2002). Impact of sensor’s point spread function on land cover characterization, assessment and deconvolution, **Remote Sensing of Environment**, 80, 203-212.

**2001**

Kalluri, S, Desch, K., Curry, T., Alstatt, A., Devers., D., Townshend, J., and Tucker, C.J. (2001). Historical satellite data used to map Pan-Amazon forest cover, **EOS Transactions**, American Geophysical Union, v.82, No. 18, pp. 206-7.

Steininger, M.K., Tucker. C.J., Townshend, J.R.G., Killeen, T.R., Desch, A., Bell, V., & Ernst, P. (2001). Tropical Deforestation in the Bolivian Amazon, **Environmental Conservation,** 28, 127-134.

Kalluri, S.N.V., Zhang, Z., JaJa, J., Liang, S. & Townshend, J.R.G. (2001). Characterizing land surface anisotropy from AVHRR data at a global scale using high performance computing, **International Journal of Remote Sensing,** 22, 2171-2191.

Defries, R.S. and Townshend, J.R.G. (2001). Global land cover characterization from satellite data: from research to operational implementation? **Global Ecology and Biogeography** Vol 8 (5), 367 – 379.

**2000**

Townshend, J.R.G., Huang, C., Kalluri, S.N.V., Defries, R.S., Liang, S. & Yang, K. (2000). Beware of Per-Pixel Characterization of Land Cover, **International Journal of Remote Sensing**, 21,839-843.

Teillet, P.M., El Saleous, N., Hansen, M.C., Eidenshink, J.C., Justice, C.O. & Townshend, J.R.G. (2000). An Evaluation of the Global 1-km AVHRR Land Data Set, **International Journal of Remote Sensing**, 21 (10), 1987-2022.

Kalluri, S.N.V., Ja Ja, J., Bader, D.A. , Zhang, Z., Townshend, J.R.G & Fallah-Adl, H. (2000). High performance computing algorithms for land cover dynamics using remotely sensed data, **International Journal of Remote Sensing**, 21, 1513-1536

El Saleous, N., Vermote, E., Justice, C. O., Townshend, J. R.G., Tucker, C.J., & Goward, S.N. (2000). Improvements in the global biospheric record from the Advanced Very High Resolution Radiometer (AVHRR), **International Journal of Remote Sensing,** 21, 1251-1278.

Tucker, C. J. and Townshend, J.R.G. (2000). Strategies for tropical forest deforestation assessment using satellite data, **International Journal of Remote Sensing,** 21, 1461-1472.

Hansen, M.C., DeFries, R. S., Townshend, J.R.G. & Sohlberg, R. (2000). Global land cover classification at 1 km spatial resolution using a classification tree approach, **International Journal of Remote Sensing**, 21, 1331-1364.

DeFries, R. S., Hansen, M. & Townshend, J.R.G. (2000). Global continuous fields of vegetation characteristics: a linear mixture model applied to multi-year 8km AVHRR data. **International Journal of Remote Sensing,** 1389-1414..

Zhan, X., DeFries, R., Townshend, J.R.G., Dimiceli, C., Hansen, M., Huang, C., & Sohlberg, R. (2000). The global change indicator from the Moderate Resolution Imaging Spectrometer of NASA’s Earth Observing System, **International Journal of Remote Sensing,** 21, 1433-1460.

**1999**

Zhang, Z.Y., Ja’Ja’, J., Bader, D. A., Kalluri SNV, Song, H.P., El Saleous, N.Z., Vermote, E. & Townshend, J.R.G. (1999). Kronos: A Software System for the Processing and Retrieval of Large-Scale AVHRR Data Sets, **Photogrammetric Engineering and Remote Sensing**, 66(9), 1073-82.

Defries, R. S., Hansen, M., Townshend, J.R.G, Janetos, A. & Loveland, T. (1999). A New Global 1km Data Set of Percent Tree Cover Derived from Remote Sensing, **Global Ecology and Biogeography,** 6, 247-254.

DeFries, R.S. and Townshend, J.R.G. (1999). Global land cover characterization from satellite data:from research to operational implementation? **Global Ecology and Biogeography** 8, 367–379

Estes, J.E., Belward, A., Loveland, T., Scepan, J., Strahler, A., Townshend, J.R.G. & Justice, C.O. (1999). The IGBP 1 km Land-Cover Data Set: The Way Forward., **Photogrammetric Engineering and Remote Sensing**, 65 (9), 1099-1106.

DeFries, R. S., Townshend, J.R.G. & Hansen, M. (1999). Continuous fields of vegetation characteristics at the global scale. **J. Geophysical Research,** 104, 16911-16923.

**1998**

Huang, C., Kalluri, S.N.V, Townshend, J.RG, & Yang, K. (1998). Assessing and deconvolving the impacts of the point spread function on satellite remote sensing, **IEEE International Geoscience and Remote Sensing Symposium (IGARSS '98)**, Seattle, WA;. pp. 2035-2037.

Zhang, Z., Kalluri, S., Ja’Ja’, J., Liang, S., & Townshend, J.R.G. (1998). High Performance Algorithms for Global Bidirectional Reflectance Distribution Function Retrieval, **IEEE Transactions in Computational Science and Engineering,** 5(4), 16-29.

Justice, C. O., Vermote, E., Townshend, J .R.G., DeFries, R., Roy, D., Hall, D. K., Salomonson, V. V., Privette,, J. L., Riggs, G., Strahler, A., Lucht, W., Myneni, R. B., Knyazikhin, Y., Running, S. W., Nemani, R. M. Wan, Z., Huete, A. R., van Leeuwen, W., Wolfe, R. E., Giglio, L., Muller, J.-P., Lewis, P., & Barnsley, M. (1998). The Moderate Resolution Imaging Spectroradiometer (MODIS): Land Remote Sensing for Global Change Research**, IEEE Transactions on Geoscience and Remote Sensing**, 36 (4), 1212-1227.

DeFries, R. S., Hansen, M., Townshend, J.R.G. & Sohlberg, R. (1998). Global land cover classification at 8 km spatial resolution. The use of training data derived from Landsat imagery in decision-tree classifiers. **International Journal of Remote Sensing,** 19, 3141-3168.

Kalluri, S.N.V., Townshend, J.R.G. & Doriswamy, P. (1998). A simple single layer model to estimate transpiration from foliage using multispectral and meteorological data, **International Journal of Remote Sensing**, 19 (5), 1037-1054.

**1997**

Skole, D.L., Justice, C.O., Townshend, J.R.G. & Janetos, A. C. (1997). A land cover change monitoring program: Strategy for an International effort, **Mitigation and Adaptation Strategies for Global Change**, 2, (2-3), 157-175.

DeFries, R., Hansen, M. Steininger, M., Dubayah, R., Sohlberg, R. & Townshend, J.R.G. (1997). Sub-pixel forest cover in Central Africa from multisensor, multitemporal data, **Remote Sensing of Environment**, 60, 228-246.

Liang, S., Fallah-Adj, H., Ja’ Ja’, J., Kalluri, S., Kaufman, Y.J. & Townshend, (J.R.G. 1997). An operational atmospheric correction algorithm for Landsat Thematic Mapper imagery, **J. Geophysical Res***.*, 102 (17), 173-186.

**1996**

Fallah-Adj, H., Ja’Ja’, J., Liang, S., Townshend, J..R.G. & Kaufman, Y. J. (1996). Fast algorithms for removing atmospheric effects from satellite images. **IEEE Transactions in Computational Science and Engineering**, 3 (2), 66-77.

Liang, S. and Townshend, J.R.G. (1996). A modified Hapke model for soil bidirectional reflectance, **Remote Sensing of Environment**, 55, 1-10.

Liang, S. and Townshend, J.R.G. (1996). Parametric Soil BRDF Model: a four-stream approximation. **Remote Sensing of Environment**, 55, 1303-1315.

**1995**

DeFries, R., Field, C.R., Fung. I., Justice, C.O., Los, S., Matson, M.A., Matthews, E.A., Mooney, H.A., Potter, C.S. Prentice, K.A., Sellers, P.J., Townshend, J.R.G., Tucker, C.J., Ustin, S.L. & Vitousek, P.M., (1995). Mapping the land surface for global atmosphere-biosphere models: Towards continuous distributions of vegetation’s functional properties, **Journal of Geophysical Research,** 100, D10, 20, 867-20,882.

DeFries, R., Hansen, M. & Townshend, J. (1995). Global discrimination of land cover from metrics derived from AVHRR Pathfinder- data. **Remote Sensing of Environment**, 54, 209-222.

Townshend, J.R.G. and Justice, C.O. (1995). Spatial variability of images and the monitoring of changes in the normalized difference vegetation index. **International Journal of Remote Sensing,** 16 (12), 2187-2196.

Hall, F.G., Townshend, J.R.G. & Ingman, T. (1995). Status of remote sensing algorithms for the estimation of land surface parameters. **Remote Sensing of Environment,** 51 (1), 138-156.

**1994**

Justice, C.O. and Townshend, J.R.G. (1994). Data sets for global remote sensing: lessons learnt, **International Journal of Remote Sensing,** 15 (17), 3621-3639.

Townshend, J.R.G., Justice C.O., Skole, D.,, C.O., Malingreau, J.-P., Cihlar J., Teillet, P., Sadowski, F. & Ruttenberg, S. (1994). The 1 km resolution global data set: needs of the International Geosphere Biosphere Program, **International Journal of Remote Sensing,** 15 (17), 3417-3442.

Townshend, J.R.G. (1994). Global data sets for land applications from the Advanced Very High Resolution Radiometer: an introduction, **International Journal of Remote Sensing,** 15 (17), 3319-3332.

DeFries, R. and Townshend, J.R.G. (1994). NDVI-derived land cover classifications on a global scale. **International Journal of Remote Sensing,** 15 (17), 3567-3586.

**1993**

Townshend, J.R.G. and Rasool, S.I. (1993). Global change, **Codata Bulletin,** 24 (4) (special issue on Data for Global Change), 1-14.

**1992**

Townshend, J.R.G., Justice, C.O., Gurney, C. & McManus, J. (1992). The effect of misregistration on the detection of vegetation change. **Trans. Inst. of Electronic and Elec. Engineers, Geosciences and Remote Sensing**, 30 (5), 1054-1060.

Townshend, J.R.G. (1992). The European contribution to the application of remote sensing to land cover classification, **International Journal of Remote Sensing**, 13, 1319-1328.

Quarmby, N.A., Townshend, J.R.G., Settle, J.J., White, K.H., Milnes, M., Hindle, T.L. & Silleos, N. (1992). Linear mixture modelling applied to AVHRR data for crop area estimation. **International Journal of Remote Sensing**, 13 (3), 415-426.

**1991**

Townshend, J.R.G., Justice, C.O., Li, W., Gurney, C., & McManus, J. (1991). Global land classification by Remote Sensing: Present Capabilities and Future Prospects. **Remote Sensing of Environment**, 35, 243-256.

Baker, J.R., Briggs, S.A., Gordon, V., Jones, A.R., Settle, J.J., Townshend, J.R.G. & Wyatt, B. (1991). Advances in classification for land cover mapping using SPOT HRV imagery**. International Journal of Remote Sensing**, 5, 1071-1085.

Justice, C.O., Townshend, J.R.G. & Kalb V.T. 1991. Representation of vegetation by continental data sets derived from AVHRR data. **International Journal of Remote Sensing,** 5, 999-1021.

Justice, C.O., Dugdale, G., Townshend, J.R.G., Narracott, A.S. & Kumar, M. (1991). Synergism between NOAA-AVHRR and Meteosat data for studying vegetation in semi-arid West Africa. **International Journal of Remote Sensing**, 6, 1349-1368.

**1990**

Townshend, J.R.G. and Justice, C.O. (1990). The spatial variation of vegetation at very large scales. **International Journal of Remote Sensing**, 11, 149-157.

**1989**

Quarmby, N.A., Townshend, J.R.G., Millington, A.C., White, K.H. & Reading, A.J. (1989). Monitoring sediment transport systems in a semi-arid area using Thematic Mapper data. **Remote Sensing of Environment**, 28, 305-315.

Millington, A.C., Drake, N.A., Townshend, J.R.G., Quarmby, N.A., Settle, J.J. and Reading, A.J. (1989). Monitoring salt playa dynamics using Thematic Mapper data. **Trans. Inst. of Electronic and Elec. Engineers, Geosciences and Remote Sensing**, 27, 754-761.

Townshend, J.R.G., Quarmby, N.A., Millington, A.C., Drake, N., Reading, A.J., & White, K.H. (1989). Monitoring playa sediment transport systems using Thematic Mapper data. **Advances in Space Research,** 9, 177-183.

Townshend, J.R.G., Choudhury, B.J., Giddings, L., Justice, C.O., Prince, S.D., & Tucker, C.J. (1989). Comparison of data from the Scanning Multifrequency Microwave Radiometer with data from the Advanced Very High Resolution Radiometer for terrestrial environmental monitoring: an overview. **International Journal of Remote Sensing,** 10, 1687-1690.

Townshend, J.R.G., Justice, C.O., Choudhury, B.J., Tucker, C.J., Kalb, V.T. & Goff, T.E. (1989). A comparison of SMMR and AVHRR data for continental land cover characterization. **International Journal of Remote Sensing**, 10, 1633-1642.

Justice, C.O., Townshend, J.R.G. & Choudhury, B.J. (1989). Comparison of AVHRR and SMMR data for monitoring vegetation phenology at a continental scale. **International Journal of Remote Sensing**, 10, 1607-1632.

Justice, C.O., Markham, B.L., Kennard, R. & Townshend, J.R.G. (1989). Spatial degradation of satellite data, **International Journal of Remote Sensing,** 10, 1539-1561.

**1988**

Mason, D.C. and Townshend, J.R.G. (1988). Research related to geographical information systems at the Natural Environment Research Council’s Unit for Thematic Information Systems. **International Journal of Geographic Information Systems,** 2, 121-141.

Townshend, J.R.G. and Justice, C.O. 1988. Selecting the spatial resolution of satellite sensors required for global monitoring of land transformations. **International Journal of Remote Sensing**, 9, 187-236.

**1987**

Townshend, J.R.G., Justice, C.O. & Kalb, V. (1987). Characterization and classification of South American land cover types using satellite data. **International Journal of Remote Sensing,** 8, 1189-1207.

Justice, C.O., Townshend, J.R.G. and Markham, B.L (1987). MODIS spatial resolution study. **International Journal of Remote Sensing,** 8, 1119-1127.

**1986**

Quarmby, N.A. and Townshend, J.R.G. (1986). Preliminary analysis of SPOT data for a semi-arid area. **International Journal of Remote Sensing**, 7, 1869-1877.

Townshend, J.R.G. and Justice, C.O. (1986). Analysis of the dynamics of African Vegetation using the normalized difference vegetation index. **International Journal of Remote Sensing,** 7, 1435-1445.

**1985**

Atkinson, P., Cushnie, J.L., Townshend, J.R.G. & Wilson, A. (1985). Improving Thematic Mapper land cover classification using filtered data. **International Journal of Remote Sensing**, 6, 955-961.

Justice, C.O., Townshend, J.R.G., Holben, B.N. & Tucker, C.J. (1985). The phenology of global vegetation using meteorological satellite data. **International Journal of Remote Sensing,** 6, 1271-1318.

Townshend, J.R.G., Goff, T.E. & Tucker, C.J. (1985). Multitemporal dimensionality of imagery of the normalized difference vegetation index at continental scales. **Trans. Inst. of Electronic and Elec. Engineers, Geosciences and Remote Sensing**, GE-23, 888-895.

**1984**

Tucker, C.J., Townshend, J.R.G. & Goff, T.E. (1984). Continental land cover classification using meteorological satellite data. **Science,** 227, 369-375.

Townshend, JRG (1984). Agricultural land-cover discrimination using thematic mapper spectral bands **Int. J. Remote Sensing**, 1984, 5(4), 681-698.

Townshend, J.R.G. and Tucker, C.J. (1984). Objective assessment of Advanced Very High Resolution Radiometer data for land cover mapping. **International Journal of Remote Sensing**, 5 (2),.497-504.

**1983**

Townshend, J.R.G., Gayler, J.R., Hardy, J.R., Jackson, M.J. & Baker, J.R. (1983). Preliminary assessment of Landsat 4 Thematic Mapper products. **International Journal of Remote Sensing,** 4, 187-828.

Townshend, J.R.G. 1983. Remote sensing of land resources. **Bull. Soc. of University Cartographers**, 16, 1-8.

Forshaw, M.R.B., Haskell, A., Miller, P.F., Stanley, D.J. & Townshend, J.R.G. (1983). A review paper: spatial resolution of remotely sensed imagery**. International Journal of Remote Sensing**, 4, 479-520.

Gurney, C.M. and Townshend, J.R.G. (1983). The use of contextual information in the classification of remotely sensed data. **Photogrammetric Engng. and Remote Sensing**, 49, 55-64.

**1981**

Townshend, J.R.G. and Justice, C.O. (1981). Image processing of remotely sensed data - a user view. **International Journal of Remote Sensing,** 2, 313-330.

Townshend, J.R.G. (1981). The spatial resolving power of Earth resources satellites. **Progress in Physical Geography**, 5, 32-55.

Justice, C.O. and Townshend, J.R.G. (1981). A comparison of unsupervised classification procedures using Landsat MSS data for an area of complex surface conditions in Basilicata, southern Italy. **Remote Sensing of Environment,** 12, 407-420.

**Pre-1981**

Townshend, J.R.G. and Justice, C.O. (1980). Unsupervised classification of MSS Landsat data for mapping an area of complex terrain: principles and problems. **International Journal of Remote Sensing**, 1, 105-20.

Townshend, J.R.G. and Justice, C.O. (1980). The role of Landsat 3 RBV images for thematic mapping. **Annales des Mines**, Avril-Mai 1980, 139-144.

Penning-Rowsell, E.C. and Townshend, J.R.G. (1978). The influence of scale on the factors affecting stream channel slope. **Trans. Inst. of British Geographers,** New Series 3, 395-415.

Townshend, J.R.G. (1970). Geology, slope form and slope processes and their relation to the occurrence of laterite. **Geographical Journal,** 136, 392-399.

#### c. Monographs and reports

1. Townshend, J.R., Latham, J., Arino, O., Balstad, R., Belward, A., Conant, R., Elvidge, C., Feuquay, J., El Hadani, D., Herold, M., Janetos, A., Justice, C.O., Liu, Jiyuan, Loveland, T., Nachtergaele, F., Ojima, D., Maiden, M., Palazzo, F., Schmullius, C., Sessa, R., Singh, A., Tschirley, J. & Yamamoto, H. (2008). Integrated Global Observation of the Land: an IGOS-P Theme, **IGOL Report No. 8, GTOS 54.**
2. Townshend J.R. and Brady M.A (2006). A Revised Strategy for GOFC-GOLD, **GOFC-GOLD Report** No. 24.
3. Ciais, Ph., Moore, B., Steffen, W., Hood, M., Quegan, S., Cihlar, J., Raupach, M., Rasool, I., Doney, S., Heinze, H., Sabine, C., Hibbard, K., Schulze, D., Heimann, ,M., Chédin, A., Monfray, P., Watson, A., LeQuéré, C., Tans, P., Dolman, H., Valentini, R., Arino, O., Townshend, J., Seufert, G., Field, C., Igrashi, T., Goodale, C., Nobre, A., Inoue, G., Crisp, D., Baldocchi, D., Tschirley, J., Denning, S., Cramer, W., Francey, R. & Wickland, D. (2006). **A Strategy to Realize a Coordinated System of Integrated Global Carbon Cycle Observations, Integrated Global Carbon Observation Theme**. IGOS Partnership.
4. Herold, M., Achard, F., De Fries, R., Skole, D., Brown S., and J. Townshend (2006). **Report of the Workshop on Monitoring Tropical Deforestation for Compensated Reductions,** Friedrich-Schiller University Jena, Germany, 21st - 22nd March 2006.
5. Janetos, A. C. and Townshend. J.R. (2006). Integrated Global Observations of the Land (IGOL) – an IGOS-P Theme Special Meeting on Observational Priorities for Conservation and Biodiversity, (3rd-4th November 2005), H. John Heinz III Center, Washington DC, **IGOL Report No. 4**.
6. Liu, J.Y. and Townshend, J. (2005). Special IGOL Meeting: To obtain Chinese input on the development of the IGOL Theme Report, Institute for Geographical Sciences and Natural Resources, Beijing, China, (3rd September 2005), **IGOL Report No. 3**.
7. Townshend, J.R.G., Cihlar, J., Justice, C.O., Malingreau, J.-P., Ruttenberg, S., Sadowski, F., Skole, D. & Teillet, P. (1992). Improved Global Data for Land Applications. **IGBP Report No. 20**, Stockholm, International Geosphere Biosphere Programme.
8. U.K. Working Group on Geographic Information (1988). **Geographic Information in the Environmental Sciences**. Natural Environment Research Council, Swindon, UK (Chairman of the Working Group).

#### d. Other articles

1. Carroll, M.L, Wooten, M.R., Dimiceli, C., Sohlberg, R.A. & Townshend. J.R.G. (2016). ABoVE: Surface Water Extent, Boreal and Tundra Regions, North America, 1991-2011. **ORNL DAAC**, Oak Ridge, Tennessee, USA, <http://dx.doi.org/10.3334/ORNLDAAC/1324>.
2. Channan, S., Townshend, J., Sexton, J., Huang, C., Feng, M., Masek, J., Vermote, E., Collins, K., Song, X-P., Noojipadi P., Kim, D., & Song, D., (2012). Global forest cover change mapping at Landsat Resolution**. Global Land Project Newsletter** Issue Number 9, ISSN 2316-3747.
3. DiMiceli, CM Carroll, ML Sohlberg RA, Huang C, Hansen MC, & Townshend, J.R. (2011**)***.* **Annual global automated MODIS vegetation continuous fields (MOD44B) at 250 m spatial resolution for data years beginning day 65, 2000–2010, collection 5 percent tree cover**, University of Maryland, College Park, MD, USA.
4. Hansen M, DeFries, R Townshend JR, Carroll M, Dimiceli C, & Sohlberg R. (2006). **Vegetation continuous fields MOD44B, 2001 percent tree cover**. University of Maryland College Park, MD, USA.
5. Gutman, G., Krankina, O., & Townshend, J.R.G. (2002). Remote sensing of forest cover in western Russia and Fennoscandia, **The Earth Observer,** 13, (5), 23-26.
6. Townshend, J.R.G. (1999). The Integrated Global Observation Strategy (IGOS) and Data and Information Systems and Services, **Paper IGOS-P, 4, doc 04**, 4th Meeting of the IGOS Partnership, Stockholm, Sweden.
7. Zhan, X., DeFries, R. M., Hansen, M. Townshend, J.R.G., DiMiceli, C. Sohlberg, R., & Huang, C. (1999). MODIS Enhanced Land Cover and Land Cover Change Product, **Algorithm Theoretical Basis Documents (ATBD)** Version 2.0., NASA, GSFC, Greenbelt, MD 94pp.
8. Zhang, Z.Y., Ja’Ja’, J., Bader, D. A., Kalluri S., Song, H.P., El Saleous, N.Z., Vermote, E., & Townshend, J.R.G. (1999). Kronos: A Java-Based Software System for the Processing and Retrieval of Large Scale AVHRR Data Sets, **UNM Technical Report: EECE-TR-99-006**, University of New Mexico, Department of Electrical and Computer Engineering, 19pp.
9. Townshend, J.R.G. (1997) Statement (pp. 47-48), Evidence (pp. 49-53), Response to written questions (pp. 129-135), The Commercial Space Act of 1997, Parts I-III, **Hearings before the Committee on Science, Subcommittee on Space and Aeronautics,** U.S. House of Representatives, One hundred fifth Congress, 1st Session, U.S. Government Printing Office, Washington 1997.
10. Townshend, J.R.G. (1995). Global observing systems and how they relate to the IGBP. **Global Change Newsletter**, 24, pp. 17-18.
11. Strahler, A. and Townshend, J.R.G. (1996). MODIS Land Cover Product, **Algorithm Theoretical Basis Document (ATBD),** Version 4.1.
12. Townshend, J.R.G. (1996). Data policy in the IGBP, **IGBP Newsletter**, 27. p.23.
13. Townshend, J.R.G. (1996). Data in IGBP, **IGBP Newsletter**, 27, p.3.
14. Townshend, J.R.G. (1994). Data and Information System (DIS), **Report of the 4th Meeting of the National IGBP Committees**, Bonn Germany, pp. 13-16.
15. Townshend, J.R.G. (1993). Remote sensing and GIS Development. In Eynon, D. (ed.), **1993 GIS Sourcebook**, GIS World Inc., Fort Collins Colorado, pp. 226-228.
16. Townshend, J.R.G. (1992). The Global 1 km AVHRR Data Set: Further Recommendations. International Geosphere Biosphere Program's Data and Information System Paris. **IGBP-DIS Working Paper** No. 4.
17. Townshend, J.R.G., Achutuni, R., Avissar, A., Grody, N., Hastings, D., Justice, C.O. Ropelewski, C., Shaake, J., & Tarpley, D. (1991). Product development plan for operational satellite land surface products for the NOAA Climate and Global Change Program. In **Product Development Plans for Operational Satellite Products, NOAA Climate and Global Change Program Special Report** No. 5, pp. 43-57.
18. Townshend, J., (1991). Land use planning: Introduction, **Report of the Earth Observation User Consultation Meeting**, ESA p 196-206.
19. Tucker, C.J., J.R.G. Townshend, J.R.G. & Goff, T.E., (1983). Continental Land Cover Classification Using .Meteorological Satellite Data **NASA Technical Memorandum** 85060, NASA Goddard Space Flight Center.
20. Townshend, J.R.G. and Jackson, M.J. (1983). Down to detail with the Thematic Mapper, **Geographical Magazine**, 55, pp. 442-443.
21. Justice, C. and Townshend, J. (1981). A comparison of unsupervised classification procedures on Landsat MSS for an area of complex surface conditions in Basilicata, southern Italy, **NASA Technical Memorandum**, 82098, NASA, Goddard Space Flight Center.
22. Justice, C.O. and Townshend, J.R.G. (1979). Clear images from space**. Geographical Magazine**, 51, pp. 828-831.
23. Townshend, J.R.G. (1974). The relationship between slope angle and particle size of some coarse debris covered slopes. In Mitchell, C.W. (ed.) **Studies on the Geomorphology and Agriculture of the northern Sahara.** University of Reading, Reading, UK, pp. 45-53.
24. Cooke, R.U. and Townshend, J.R.G. (1970). Pattern of Peru’s great earthquake, **Geographical Magazine,** 42, pp. 765-766.
25. Townshend, J.R.G. (1968). A measure of topological asymmetry for drainage basin networks, **Bloomsbury Geographer,** 1, pp. 1-13.

e. Conference Proceedings

**2014**

Song, X.P., Huang, C. & Townshend, J.R. (2014) An integrated framework for evaluating the effects of deforestation on ecosystem services. **The 35th International Symposium on Remote Sensing of Environment** (ISRSE35), IOP Conference Series: Earth and Environmental Science 17, 012061, doi:10.1088/1755-1315/17/1/012061, 22-26 April, 2012, Beijing, China.

**2013**

Feng M., Huang, C.Q., Sexton, J.O., Channan, C., Raghuram, N., & Townshend, J.R. (2012) An approach for quickly labeling land cover types for multiple epochs at globally selected locations, **Geoscience and Remote Sensing Symposium (IGARSS), 2012 IEEE International,** 22-27 July 2012, pp. 6203-6.

**2011**

Song, X.P., Huang, C., Sexton, J.O. Feng, M., Narasimhan, R., Channan, S., & Townshend, J.R. (2011) An assessment of global forest cover maps using regional higher-resolution reference data sets. **Proceedings Geoscience and Remote Sensing Symposium, (IGARSS) Symposium**, 2011 IEEE International, Vancouver, Canada, 24-29 July 2011 pp.752-755.

Kim, D.H.; Raghuram; N., Sexton, J O.; Huang, C. & Townshend, J.R. (2011) Methodology to select phenologically suitable Landsat scenes for forest change detection," **Proceedings Geoscience and Remote Sensing Symposium** (IGARSS), 2011 IEEE International, 24-29 July 2011, pp.2613-16, (doi: 10.1109/IGARSS.2011.6049738).

**2006**

Townshend, J. (2006) Challenges in the mapping and monitoring of forest cover using remote sensing, **Proceedings of the Second International Conference on Remote Sensing/GIS**, Ulaanbaatar, Mongolia, 8th-9th June 2006, Ulaanbaatar, Mongolia, pp. 1-4.

**2005**

Song, K., Huang, C., Townshend, J. & Kim, S. (2005) Improved methods for automating the mapping of deforestation, **Proceedings 9th International Symposium on Physical Measurements and Signatures in Remote Sensing**, Eds Liang, S., Liu, J., Li, X., Liu, R. and Schaepman, M., Beijing, China, pp. 571-3.

Townshend, J., Tsolmon, R., Skole, D., Schmullius, C., Herold, M., Justice, C., Csiszar, I., & Goldammer, J. (2005) GOFC-GOLDAn international effort to improve the provision of operational information on Land Cover and Fire. **Proceedings of the First National Conference on Remote Sensing/GIS in Mongolia**, 2 May, 2005 Ulaanbaatar, Mongolia, pp. 15-23.

**2003**

Hansen, M.C., DeFries, R.S., Townshend, J.R.G., Carroll, M., Dimiceli, C., & Sohlberg, R.A. (2003) Development of 500 meter vegetation continuous field maps using MODIS data, **IEEE International Geoscience and Remote Sensing Symposium, (IGARSS '03)**. v. 1, 264- 266.

**2002**

Goward, S., Goetz, A.F.H., Schott, J.R., Thome, K.J., Townshend, J.R., Ustin, S.L., Woodcock, C.E., Koger, T., Pearlman, & Turner R.W. (2002). The Resource21 Science Advisory Board: Recommendations for a Global Observatory to Continue the Landsat Mission Heritage Conference **Proceedings Pecora 15/Land Satellite Information IV/ISPRS Commission I/FIEOS 2002**.

Townshend, J.R.G., Justice, C.O., Hansen, M., Defries R., Sohlberg, R., Zhan, X., Caroll, M., & DiMiceli, C. (2002), The use of EOS data for characterizing and monitoring land cover change in the framework of the program of Global Observations of Forest Cover/Global Observations of Landcover Dynamics, **Proceedings of Advanced Training Workshop on Land Use and Land Cover Change Study**, Dec 9-20, 2002, National Taiwan University, Taiwan, pp. 357-398.

**2000**

Chan, J.W., DeFries, R.S., Zhan, X., Huang, C., & Townshend, J.R.G. (2000). Texture features for land cover change detection at 250 m resolution-an application of machine learning feature subset selection, **Proceedings Geoscience and Remote Sensing Symposium, 2000.,** vol. 7, pp. 3060-3062.

Tucker, C.J., Steininger, MK, Townshend, JRG, Killeen, TR & Desch, A. (2000) Tropical deforestation in the Bolivian Amazon, Szu, H.H., Vetterli, M., Campbell, W.J., and Buss, J.R. (eds), **Proc SPIE**, **Wavelet Applications VII** v. 4056, pp. 2-11.

Zhan, X. Jiang, Y. & Townshend, J.R.G. (2000), A simple assessment of the expansion of American urban areas from the 1970s to the 1990s using the North American Landscape Characterization Data Set. **Proceedings IEEE Geoscience and Remote Sensing Symposium IGARSS 2000**, Honolulu, Hawaii, pp. 3060-63.

Huang, C., Townshend, J.R.G., Zhan, X., Hansen, M., DeFries, R., & Solhberg, R. (2000), Detecting land cover changes based on their trajectories in the spectral space, **Proceedings IEEE Geoscience and Remote Sensing Symposium IGARSS 2000**, Honolulu, Hawaii, pp. 1984-87.

**1999**

Lindsay, F.E., Townshend, J.R.G., Ja’Ja’, J., Humphries, J., Plaisant, C., & Schneiderman, B. (1999) Developing the next generation of Earth science data systems: the Global Land Cover Facility **Proceedings IEEE Geoscience and Remote Sensing Symposium, (IGARSS '99),** vol.1, pp. 616-18.

Townshend, J.R.G. (1999), The Integrated Global Observation Strategy: a framework for enhancing Earth Observations, Earth Observation: from Data to Information, **Proceedings 1999 Remote Sensing Society Conference**, Cardiff, U.K. pp. 7-12.

Kalluri, S.N.V., Zhang, Z., JaJa, J., & Townshend, J.R.G. (1999). Retrieval of global broad band albedo from AVHRR using high performance computing techniques, **Proceedings of IEEE Geoscience and Remote Sensing Symposium (IGARRSS 99)**, Hamburg, Germany, 28th. June-2nd. July pp. 2244-46

Kalluri, S.N.V., Zhang, Z., JaJa, J., Bader, D.A., Song, H., El Saleous, N., Vermote, E. & Townshend, J.R.G. (1999), A hierarchical data archiving and processing system to generate custom tailored products from AVHRR data, **Proceedings of IEEE Geoscience and Remote Sensing Symposium (IGARRSS 99)**, Hamburg, Germany, 28th. June-2nd. July, pp. 2374-2376.

Townshend, J.R.G. and Maiden, M. (1999). The EOS Federation Concept **Proceedings Land Use/Cover Change/Data and Information Systems Workshop (LUCC-DIS), SEA-START Report No. 3** The Environmental Research Institute, University of Chulalonkorn, Bangkok, Thailand, 13-18th August 1998, pp. 27-31.

Townshend, J.R.G. (1999). Introduction to Land Cover Classification Approaches and Methods. **Proceedings Land Use/Cover Change/Data and Information Systems Workshop (LUCC-DIS), SEA-START Report No. 3** The Environmental Research Institute, University of Chulalonkorn, Bangkok, Thailand, 13-18th August 1998, pp. 17-19.

**1998**

Huang, C., Townshend, J.R.G., Zhan, X. W., Hansen, M., DeFries, R. & Sohlberg, R. (1998) Developing the spectral trajectories of major land cover processes. **Proceedings SPIE, Hyperspectral Remote Sensing and Application**, Beijing, China, v. 3502, pp. 155-162.

Hansen, M., DeFries, R., Dimiceli, C., Huang, C., Sohlberg, R., Zhan, X. & Townshend, J. (1998). Red and infrared space partitioning for detecting land cover change. **International Geoscience and Remote Sensing Symposium (IGARSS)** 1998, Seattle, Washington, July 1998, pp. 2512-14.

Zhan, X., Huang, C. Townshend, J., DeFries, R., Hansen, M., Dimiceli, C., Sohlberg, R., Hewson-Scardelletti, J. & Tomkins, A. (1998). Land cover change detection with change vector in the red and near infrared space. **International Geoscience and Remote Sensing Symposium (IGARSS)** 1998, Seattle, Washington, July 1998, pp. 859-861.

Huang, C., Kalluri, S.N.V., Townshend, J.R.G. & Yang, K. (1998). Assessing and deconvolving the impacts of the point spread function on satellite remote sensing. **International Geoscience and Remote Sensing Symposium (IGARSS)** 1998, Seattle, Washington, July 1998, pp. 2035-2037.

Williams, D. and Townshend, J.R.G. (1998). The concept of an integrated global observation strategy. **27th International Symposium on Remote Sensing of Environment**, Tromso, Norway, June 1998, pp. 95-98.

**1997**

Townshend, J. R.G.. DeFries, R., Dubayah, R. Goward, S.N., Kearney, M., Tucker, C., & Vermote, E. (1997). Land cover characterization at regional and global scales: lessons learnt and prospects. Observations and Interactions, **Proceedings Remote Sensing Society Conference**, Reading U.K., Remote Sensing Society, Nottingham, U.K., pp. 367-372.

Liang, S. and Townshend, J.R.G. (1997). Angular signatures of NASA/NOAA Pathfinder AVHRR land data and applications to land cover identification (1997**). International Geoscience and Remote Sensing Symposium** (IGARSS) 1997, Singapore, pp. 1781-1783.

Kalluri, S.N.V., Zhang, Z., Liang. S., Ja’ Ja’, J., & Townshend, J.R.G. (1997). Retrieval of bidirectional reflectance distribution function (BRDF) at continental scales from AVHRR data using high performance computing, **International Geoscience and Remote Sensing Symposium (IGARSS)** 1997, Singapore, pp. 174-176.

Kalluri, S.N.V., Huang, C., Mathieu-Marni, S., Townshend, J.R.G., Yang. K. Chellappa, R., & Fleig, A. (1997). A comparison of mixture modelling algorithms and their applicability to MODIS data. **International Geoscience and Remote Sensing Symposium (IGARSS)** 1997, Singapore, pp. 171-172.

Townshend, J.R.G. (1997). Data policy and SEA-START**. Proc Workshop on Development of the data and information system for SEA-START Region: First Step in Implementation**, Jan 27-31 1997, Bangkok, Thailand, Boonjawat J. (ed), SEA-START RC Report No. 1, pp. 110-113

Townshend, J.R.G. (1997). Implementation of the Global Climate Observing System: Strategies for implementation of *in situ* components, **First Symposium on Integrated Observing Systems, American Meteorological Society**, Long Beach, California, pp. 96-101.

**1996**

Townshend, J.R.G., Justice, C.O., Wolf, D., Maiden, M. & James, M. (1996). Long term data sets for the land from remote sensing, in Takagi, M. (ed.) **Proceedings of the 2nd SEIKEN Symposium on Global Environmental Monitoring from Space**, 26th-28th Feb. 1996, University of Tokyo, pp. 127-146.

DeFries, R., Hansen, M. & Townshend, J. (1996). Proportional estimation of land cover characteristics from satellite data, **International Geoscience and Remote Sensing Symposium, (IGARSS '96) Remote Sensing for a Sustainable Future**, Lincoln, NE , v.1, 535-537.

Rizzo, E., Rogers, A.S., Kearney, M.S., Townshend, J.R.G., & Lawrence W.T. (1996). Changes in Blackwater Marsh, Maryland 1938-1993 determined by aerial photography and Thematic Mapper data. **Technical Papers, Second Annual ASPRS/ACSM Annual Meeting**, Baltimore, MD, pp. 200-229.

**1995**

Kearney, M.S., Rogers, A.S., Townshend, J.R.G., Lawrence, W.T., Dorn, K., Eldred, K., Stutzer, D., Lindsay, F. & Rizzo, E. (1995). Developing a model for determining coastal marsh health, **Third Thematic Conference on Remote Sensing for Marine and Coastal Environments**, Seattle, Washington, Environmental Research Institute of Michigan, ann Arbor, pp. 527-537.

Kalluri, S.N.V., Townshend. J.R.G., Smith P.E. & James, M.E. (1995). Processing long term satellite data for global change research: the AVHRR Pathfinder challenge, **International Geoscience and Remote Sensing Symposium (IGARSS ‘95) on Quantitative Remote Sensing for Science and Applications**, Firenze Italy, pp. 1171-1173.

Liang, S., Davis, L., Townshend, J., Chellappa, R., DeFries, R., Dubayah, R., Goward, S., JaJa, J., Krishnamachar, S., Roussopoulos, N., Saltz, J., Samet, H., Shock, T. & Srinivasan, M. (1995). Land cover dynamics investigation using parallel computers, Geoscience and Remote Sensing Symposium, 1995. **International Geoscience and Remote Sensing Symposium (IGARSS '95). Quantitative Remote Sensing for Science and Applications**, Firenze, Italy v. 1, 332-334

Townshend, J.R.G., Bell, V., Desch, A., Havlicek, C., Justice C., Lawrence, W.L, Skole, D., Chomentowski, W., Moore III, B., Salas, W. & Tucker, C.J., (1995). The NASA Landsat Pathfinder Humid Tropical Deforestation Project. In **Proceedings Land Satellite Information in the Next Decade**, ASPRS Conference, Vienna Virginia, 25-28th Sep. 1995, IV-76 to IV-87.

Fallah-Adl, H., JáJá,, J., Liang, S., Kaufman, Y.J., & Townshend, J. (1995) Efficient algorithms for atmospheric correction of remotely sensed data Conference on High Performance Networking and Computing archive Proceedings of the 1995 **ACM/IEEE Conference on Supercomputing**, Article 12, San Diego, California, USA December 04 - 08, 1995.

**1994**

Parulekar, R. Davis, L. Chellappa, R. Saltz, J. Sussman, A., & Townshend, J. (1994). High performance computing for land cover dynamics **Proceedings of the 12th IAPR International Conference on Pattern Recognition**, 1994. Vol. 3 - Conference C: Signal Processing, Jerusalem, Israel, pp. 234-238.

**1991**

Townshend, J.R.G. (1991). Complementarity and Synergism in Remote Sensing (invited paper). In **Spatial Data 2000**, Joint Meeting of the Remote Sensing Society and the American Society of Photogrammetry and Remote Sensing, Christ Church Oxford, 17-20 September 1991, pp. 56-62.

Townshend, J.R.G. (1991). Land Use Planning. **Proc. Earth Observation User Consultation Meeting**, ESTEC, Noordwijk, The Netherlands 29-31 May 1991, European Space Agency, ESA SP-1143, pp. 196-206.

**1990**

Townshend, J.R.G. (1990). Global Environmental Monitoring (invited opening paper), In **Proc. 5th Australasian Remote Sensing Conference**, Perth, Western Australia, pp. 19-26.

Townshend, J.R.G. 1990. Geoprocessing technologies for environmental analysis planning and monitoring. (invited paper) **Geoprocessamento,** Universidade de Sao Paulo, Brazil, pp. 109-117.

**1989**

Quarmby, N.A., Tobin, A., Townshend, J.R.G., Singh, S.M., Milnes, M., & Silleos, N. (1989). Crop production and yield monitoring, In Remote Sensing for Operational Applications. **Proc. 15th Annual Conference of the Remote Sensing Society**, University of Bristol, UK, pp. 345-350.

Townshend, J.R.G. and Justice, C.O. (1989). The spatial variation of land cover at very coarse scales. In Remote Sensing for Operational Applications. **Proc. 15th Annual Conference of the Remote Sensing Society**, University of Bristol, UK, pp. 415-420.

Townshend, J.R.G., Justice, C.O. Markham, B.L., & Briggs, S.A. (1989). Spatial resolution requirements for MODIS-N. **Proceedings of 4th International Colloquium on Spectral Signatures of Objects in Remote Sensing**, Aussois, France, 18th-22nd January 1988, ESA, Nordwijk; ESA SP-287, pp. 329-333.

Townshend, JRG (1989). Mapping, monitoring and forecasting of Global/Continental change "Survey and Mapping 89", The **3rd UK National Land Surveying and Mapping Conference and Exhibition**, University of Warwick, 17-21 April, 1989.

**1988**

Quarmby, N.A., Townshend, J.R.G. & Cushnie, J.L. (1988). Monitoring urban land cover from SPOT HRV imagery in south east England. **Proc. Int. Conference on SPOT-1, Image Utilisation Assessment and Results,** Paris, France, pp. 575-582.

Quarmby, N.A. and Townshend, J.R.G. (1988). Preliminary analyses of SPOT HRV multispectral products for an arid and a temperate environment. **Proc. Int. Conference on SPOT-1, Image Utilisatio**n, Assessment and Results, Paris, France, pp. 583-612.

Wyatt, B; Jones, A; Settle, J; Townshend, J; Baker, J; and Briggs, S. (1988). Topographic suppression and advances in classification for land cover mapping using SPOT-1 HRV imagery, **SPOT 1 Image Utilization, Assessment, Results** (SEE N88-28346 22-43); CNES France; pp. 559-566.

Millington, A.C. Quarmby, N.A. Drake, N. Reading, A.J. and Townshend, J.R.G. (1988) Monitoring Playas Using Thematic Mapper Data, **Geoscience and Remote Sensing Symposium, 1988. IGARSS '88. Remote Sensing: Moving Toward the 21st Century** Vol 1, pp. 377-380.

**1987**

Townshend, J.R.G., Millington, A.C., Quarmby, N.A., White, K.H. and Reading, A. (1987). The use of Thematic Mapper data in monitoring sediment transport in semi-arid areas. **Proc. 3rd Annual Landsat Workshop**, NASA, pp. 169-174.

Quarmby, N.A., Townshend, J.R.G. and Millington, A.C. (1987). Change detection algorithms for monitoring sediment transport in south-central Tunisia. **Advances in Digital Image Processing, Proc. 13th Annual Conf. of the Remote Sensing Society**, Nottingham, pp. 174-183.

**1986**

Millington, A.C. Jones, A.R., Quarmby, N, Townshend, J.R.G. (1986). Monitoring geomorphological processes in desert marginal environments using multitemporal satellite imagery, **Symposium on Remote Sensing for Resources Development and Environmental Management,** Enschede, v. 2. A.A. Balkema, Boston. pp. 631-637.

Townshend, J.R.G., Justice, C.O. and Tucker, C.J. (1986). Techniques for land cover classification using remotely sensed satellite data. **Proc. Int. Symp. on Mapping from Modern Imagery, Proc. of the 12th Annual Conf. of the Remote Sensing Society**, Edinburgh, UK, pp. 34-44.

**1985**

Townshend, J.R.G. and Tucker C.J. (1985). Continental land cover classification using satellite data Preprint for the **36th Congress of the International Astronautical Federation: Peaceful Space and Global Problems of Mankind.** Stockholm, Sweden, October 7-12, 1985.

**1984**

Millington, A.C. and Townshend, J.R.G. (1984). Remote Sensing Applications in African Erosion and Sedimentation Studies, In Challenges in African Hydrology and Water Resources: **Proceedings of the Harare Symposium, IAHS Publication** No. 144,. p 373-384.

Milton, E.J., Townshend, J.R.G., Webb, J. & Pugh, C. (1984). The use of Thematic Mapper data for land cover survey. **Proc. of an EARSeL/ESA Symp., on Integrated Approaches in Remote Sensing**, Guildford, UK (ESA SP-214) pp. 151-159.

Townshend, J.R.G., Justice, C.O., Holben, B.N. & Tucker, C.J. (1984). Monitoring and mapping global vegetation using data from meteorological satellites. **Proc. of an EARSeL/ESA Symp, on Integrated Approaches in Remote Sensing**, Guildford, UK (ESA SP-214), pp. 75-79.

Townshend, J.R.G. and Harrison, A. (1984). Estimation of the spatial resolving power of the Thematic Mapper of Landsat 4. **Proc. 10th Annual Conf. of the Remote Sensing Society.** Satellite Remote Sensing: Review and Preview, Reading, UK, pp. 433-442.

**1982**

Bird, A C, Williams, T H, Barnett, M E, Munday, T J & Townshend, J (1982). The Imperial College multi-channel electronic image classifier and its applications to the classification of surface types by multi-spectral analysis, **Remote sensing of arid and semi-arid lands;** **Proceedings of the International Symposium on Remote Sensing of Environment**, Cairo, Egypt; pp. 665-674.

**1981**

Townshend, J.R.G. and Tucker, C.J. (1981). The utility of AVHRR data from NOAA 6 and 7 for vegetation mapping. **Proc. Int. Conf. on Matching Remote Sensing Technologies and their Applications**, Remote Sensing Society, School of Oriental and African Studies, London, pp. 97-110.

Markham, B., and Townshend, J.R.G. (1981). Land cover classification accuracy as a function of sensor spatial resolution. **Proceedings 15th Int. Symp. on Remote Sensing of Environment**, Ann Arbor, MI, pp. 1075-1090.

**1979**

Townshend, J R G and Justice, C O (1979). The potential of Landsat-3 RBV images for thematic mapping (geomorphological, geological and land cover applications) **3rd International Conference on Cartographic processing and analysis of satellite imagery**, Toulouse, France; 1979. pp. 139-144.

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.

2***001***

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.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### 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.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# 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)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### 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.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# 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