
Professor of Remote Sensing and GIS

Russell G. Congalton has over 35 years of research and teaching experience in remote sensing, GIS, and other geospatial technologies. My research interests are divided, almost equally, between basic research on spatial data uncertainty/map accuracy and applied research applying the tools of remote sensing, GIS, and spatial data analysis to solving natural resource problems. These projects have included deer and bear habitat mapping, endangered plant habitat analysis, mapping forest change, fire and fuels management, and eelgrass mapping, to name just a few. Currently, I am conducting both basic and applied research on land cover/vegetation mapping and validation of New England forest cover types in Pawtuckaway State Park, NH using various sources of remotely sensed data and different automated image processing methodologies. I have recently concluded a NSF-funded environmental science and education project called the GLOBE Program. I was the principal investigator of the Land Cover component (one quarter of the GLOBE Program) for the over ten years. This research is international and involves developing scientific protocols and educational learning activities for GLOBE schools to perform land cover mapping and collect scientifically valid data. Over 25,000 schools in more than 100 countries participate in this program. In addition, I am working on an NSF-funded multi-investigator project evaluating the effectiveness of payments for ecological services in Mexico and also a NASA Measures multi-investigator project mapping agricultural crops worldwide at Landsat 30m resolution. Lastly, I am the Director of the New Hampshire View Program, a part of AmericaView, that is dedicated to promoting and enhancing the use of spatial data analysis and education throughout the US.

RESEARCH/PROFESSIONAL EXPERIENCE

- ◆ University of New Hampshire, Department of Natural Resources, Professor: 1999-present, Associate Professor: 1994-1999, Assistant Professor: 1991-1994. Responsible for teaching courses and conducting research in geospatial technologies and their application.
- ◆ University of California, Berkeley, Department of Forestry and Resource Management, Assistant Professor: 1985-1991. Responsible for teaching courses and conducting research in remote sensing.
- ◆ US Army Corps of Engineers Waterways Experiment Station, Post-Doctorate Research Associate: 1984-1985. Research and application of remote sensing and GIS for various Environmental Lab projects including land cover mapping, wildlife habitat, and emergency preparedness and evacuation.
- ◆ USGS EROS Data Center, Sioux Falls, SD., Internship 1981. Research in assessing the accuracy of remotely sensed imagery.

- ◆ US Forest Service/NASA Graduate Research Assistant: 1979-1983. Research/development of techniques for assessing the accuracy of remotely sensed data using discrete multivariate statistical techniques, sampling, and spatial autocorrelation analysis.
- ◆ Pacific Meridian Resources, Chief Scientist: 1988-2000. Provided expertise in remote sensing and other geospatial technologies on a consulting basis.
- ◆ Space Imaging – Solutions Group, Chief Scientist: 2000-2004. Provided expertise in remote sensing and other geospatial technologies on a consulting basis.
- ◆ The Sanborn Map Company – Solutions Group, Senior Technical Advisor: 2004-2011. Provided expertise in remote sensing and other geospatial technologies on a consulting basis.

EDUCATION

- ◆ Ph.D. Remote Sensing and Forest Biometrics, 1984, Virginia Tech, Blacksburg, VA
- ◆ M.S. Remote Sensing and Forest Biometrics, 1981, Virginia Tech, Blacksburg, VA
- ◆ B.S. Natural Resource Management, 1979, Rutgers University, New Brunswick, NJ

PUBLIC SERVICE

- ◆ Editor-in-Chief, Photogrammetric Engineering and Remote Sensing, January 2008 – March 2016.
- ◆ American Society for Photogrammetry and Remote Sensing
 - Honorary Member/Lifetime Achievement - 2017
 - Fellow - 2007
 - National Workshop Director 1997 – 2008
 - Immediate Past President 2005-2006
 - President 2004-2005
 - President-elect 2003 –2004
 - Vice President 2002 – 2003
 - Secretary/Treasurer, New England Region 2004 - present
 - Board of Directors, New England Region 1995 – 1997
 - National Board of Directors, 1989-1991
 - National GIS Division Director, 1989-1991
 - President of Northern California Region, 1990 - 1991
 - Vice President of Northern California Region, 1988 - 1989
 - Board of Directors, Northern California Region 1986 – 1987
- ◆ Chair for GIS '87. 1987. San Francisco, California
- ◆ Associate Editor for Remote Sensing & GIS, Northern Journal of Applied Forestry, 1996-2002.
- ◆ SPOT Image Corporation, Academic Advisory Council, 1995-2001.
- ◆ The Sanborn Map Company, Academic Advisory Council, Chair: 2006 –11
- ◆ University of California, Berkeley, Geospatial Innovation Facility Advisory Board member, 2006-present.
- ◆ Editorial Board, *GIScience & Remote Sensing*, 2009 – present.

- ◆ Editorial Board, *Geographies*, 2020 – present.
- ◆ Editorial Board, *Forests*, 2020 – present
- ◆ National Research Council of the National Academies, Workshop on New Directions for the National Geospatial-Intelligence Agency, 2010, Participant and invited White Paper author.
- ◆ USGS Working Group on Global Croplands and Food Security, Powell Center, Member, 2010 – 2013.
- ◆ America View, Board of Directors, March 2012 – present, Vice-Chair of Board, March 2013 – March 2014; Chair of the Board, March 2014 – March 2016; Secretary March 2016 – April 2017; Vice-Chair of the Board, August 2019 – present.

AWARDS

- ◆ Five Presidential Citations for Meritorious Service awarded by the American Society for Photogrammetry and Remote Sensing (1987, 1989, 1990, 1992 and 2016)
- ◆ Certificate of Appreciation for Meritorious Service awarded by the American Society for Photogrammetry and Remote Sensing (2000 and 2009)
- ◆ 1994 American Society for Photogrammetry and Remote Sensing John I. Davidson Award for Practical Papers (2nd Prize) for the paper entitled, "Mapping Old Growth Forests on National Forest and Park Lands in the Pacific Northwest from Remotely Sensed Data"
- ◆ 1996 ESRI Award for Best Scientific Paper in Geographic Information Systems (3rd Prize) for the paper entitled, "Predicting Rare Orchid (Small Whorled Pogonia) Habitat Using GIS"
- ◆ 1998 American Society for Photogrammetry and Remote Sensing John I. Davidson Award for Practical Papers (1st Prize) for the paper entitled, "Exploring and Evaluating the Consequences of Vector to Raster and Raster to Vector Conversion"
- ◆ 1998 ESRI Award for Best Scientific Paper in Geographic Information Systems (2nd Prize) for the paper entitled, "Exploring and Evaluating the Consequences of Vector to Raster and Raster to Vector Conversion"
- ◆ Three Outstanding Service Awards presented by the American Society for Photogrammetry and Remote Sensing (2000, 2009, and 2016)
- ◆ 2001 Certificate of Appreciation for Outstanding Service presented by the Society of American Foresters
- ◆ 2004 ESRI Award for Best Scientific Paper in Geographic Information Systems (2nd Prize) for the paper entitled, "Sampling Method and Placement: How Do They Affect the Accuracy of Remotely Sensed Maps?"
- ◆ 2005 University of New Hampshire Graduate Faculty Mentor Award – Recipient of the inaugural award.
- ◆ The Col. Claude H. Birdseye Citation awarded by the American Society for Photogrammetry and Remote Sensing (2005)
- ◆ 2007 Elected a Fellow in the American Society for Photogrammetry and Remote Sensing

- ◆ Outstanding Workshop Instructor Award by the American Society for Photogrammetry and Remote Sensing (2010)
- ◆ The SAIC Estes Memorial Teaching Award by the American Society for Photogrammetry and Remote Sensing (2012)
- ◆ 2014 ERDAS Award for Best Scientific Paper in Remote Sensing (3rd Prize) for the paper entitled, “Applicability of multi-date land cover mapping using Landsat 5 TM imagery in the Northeastern US.”
- ◆ 2016 ERDAS Award for Best Scientific Paper in Remote Sensing (1st Prize) for the paper entitled, “Optimal land cover mapping and change analysis in northeastern Oregon using Landsat imagery.”
- ◆ 2017 Elected Honorary Member of the American Society for Photogrammetry and Remote Sensing, limited to 25 living members at any one time.

GRADUATE STUDENT MENTORING

- ◆ Served as Major Professor/Chair of Committee for 50 MS students
- ◆ Served as Major Professor/Chair of Committee for 9 PhD students
- ◆ Served on Committee for another 8 PhD and 15 MS students

COURSES TAUGHT (NOT INCLUDING GUEST LECTURES, SEMINARS, OR INVESTIGATIONS)

- ◆ Department of Forestry & Resource Management, University of California, 1/1985 – 8/1991
 - ◆ Forestry 102 Forest Photogrammetry and Photointerpretation (2 1-hour lectures & 1 3-hour lab, 4 credits)
 - ◆ Every Spring 1985 – 1991
 - ◆ Forestry 202 Advanced Photo Interpretation (1 1-hour lecture & 1 3-hour lab, 3 credits)
 - ◆ Spring 1985
 - ◆ Forestry 203 Remote Sensing of Forest and Other Natural Resources (1 1-hour lecture & 1 3-hour lab, 3 credits)
 - ◆ Every Spring 1986 -1991
 - ◆ Forestry 100B Forestry Summer Camp (2-week field course on surveying, photo interpretation, mapping, and inventory, 2 credits)
 - ◆ Every Summer 1986 - 1991
- ◆ Department of Natural Resources & the Environment, University of New Hampshire, 8/1991 - Present
 - ◆ Natural Resources 757/857 Photogrammetry and Photointerpretation (2 1-hour lectures & 1 3-hour lab, 4 credits)
 - ◆ Every Fall 1991 – 2010

- ◆ Natural Resources 757/857 Remote Sensing of the Environment (2 1-hour lectures & 1 3-hour lab, 4 credits) – course name changed in 2011 to reflect changes in course
 - ◆ Every Fall 2011 – present
- ◆ Natural Resources 759/859 Digital Image Processing (2 1-hour lectures & 1 3-hour lab, 4 credits)
 - ◆ Every Spring 1992 – 2004 and then every even year spring to the present
- ◆ Natural Resources 760/860 Geographic Information Systems in Natural Resources (2 1-hour lectures & 1 3-hour lab, 4 credits)
 - ◆ Every Spring 1992- 2003 and then every odd year spring to the present
- ◆ Natural Resources 658 Introduction to Geographic Information Systems (2 1-hour lectures & 1 2-hour lab, 4 credits)
 - ◆ Every Spring 2004 – present
- ◆ Natural Resources 458 The Science of Where (5-week Summer course, Discovery Physical Science with Lab, completely online, 4 credits)
 - ◆ Every Summer 2012 – 2015, and 2018

PUBLICATIONS

Peer-Reviewed Articles

- ◆ Congalton, R. G. and R. A. Mead. 1983. A quantitative method to test for consistency and correctness in photo-interpretation. *Photogrammetric Engineering and Remote Sensing*. Vol. 49. No. 1, p. 69-74.
- ◆ Congalton, R. G., R. G. Oderwald, and R. A. Mead. 1983. Assessing Landsat classification accuracy using discrete multivariate statistical techniques. *Photogrammetric Engineering and Remote Sensing*. Vol. 49, No. 12, p. 1671-1678.
- ◆ Congalton, R. and R. Mead. 1986. A review of three discrete multivariate analysis techniques used in assessing the accuracy of remotely sensed data from error matrices. *IEEE Transactions of Geoscience and Remote Sensing*. Vol. GE-24, No 1, p. 169-174.
- ◆ Story, M. and R. Congalton. 1986. Accuracy assessment: A user's perspective. *Photogrammetric Engineering and Remote Sensing*. Vol. 52, No. 3. pp. 397-399.
- ◆ Pierce, L. and R. Congalton. 1988. A methodology for mapping forest latent heat flux densities using remote sensing. *Remote Sensing of Environment*. Vol 24, pp. 405-418.
- ◆ Congalton, R. 1988. Using spatial autocorrelation analysis to explore errors in maps generated from remotely sensed data. *Photogrammetric Engineering and Remote Sensing*. Vol. 54, No. 5, pp. 587-592.
- ◆ Congalton, R. 1988. A comparison of sampling schemes used in generating error matrices for assessing the accuracy of maps generated from remotely sensed data. *Photogrammetric Engineering and Remote Sensing*. Vol. 54, No. 5, pp. 593-600.

- ◆ Chuvieco, E. and R. Congalton. 1988. Using cluster analysis to improve the selection of training statistics in classifying remotely sensed data. *Photogrammetric Engineering and Remote Sensing*. Vol. 54, No. 9, pp. 1275-1281.
- ◆ Chuvieco, E. and R. Congalton. 1988. Mapping and inventory of forest fires from digital processing of TM data. *Geocarto International*. Vol. 3, No. 4, pp. 41-53.
- ◆ Chuvieco, E. and R. Congalton. 1989. Application of remote sensing and geographic information systems to forest fire hazard mapping. *Remote Sensing of Environment*. Vol. 29, pp. 147-159.
- ◆ Ferris, J. and R. Congalton. 1989. Satellite and GIS estimates of Colorado River Basin snowpack. *Photogrammetric Engineering and Remote Sensing*. Special GIS Issue. Vol. 55, No. 11, pp. 1629-1635.
- ◆ Stenback, J. and R. Congalton. 1990. Using Thematic Mapper imagery to examine forest understory. *Photogrammetric Engineering and Remote Sensing*. Vol. 56, No. 9, pp. 1285-1290.
- ◆ Lunetta, R., R. Congalton, L. Fenstermaker, J. Jensen, K. McGwire, and L. Tinney. 1991. Remote sensing and geographic information system data integration: error sources and research issues. *Photogrammetric Engineering and Remote Sensing*. Vol. 57, No. 6, pp. 677-687.
- ◆ Congalton, R. 1991. A review of assessing the accuracy of classifications of remotely sensed data. *Remote Sensing of Environment*. Vol. 37, pp. 35-46.
- ◆ Congalton R. and K. Green. 1992. The ABCs of GIS: An introduction to geographic information systems. *Journal of Forestry*. Vol 90, No. 11, pp. 13-20.
- ◆ Congalton, R. and D. Schallert. 1992. Exploring the effects of vector to raster and raster to vector conversion. EPA Peer Reviewed Publication Series Report EPA/600/R-92/166. Office of Research & Development, Washington, D.C. 48p.
- ◆ Congalton, R. and G. Biging. 1992. A pilot study evaluating ground reference data collection efforts for use in forest inventory. *Photogrammetric Engineering and Remote Sensing*. Vol. 58, No. 12, pp. 1669-1671.
- ◆ Congalton R. and K. Green. 1993. A practical look at the sources of confusion in error matrix generation. *Photogrammetric Engineering and Remote Sensing*. Vol. 59, No. 5. pp. 641-644.
- ◆ Congalton, R., J. Stenback, and R. Barrett. 1993. Mapping deer habitat suitability using remote sensing and GIS. *Geocarto International*. Vol. 8. No. 3. pp. 23-33.
- ◆ Congalton, R., K. Green., and J. Teply. 1993. Mapping old growth forests on National Forest and Park lands in the Pacific Northwest from remotely sensed data. *Photogrammetric Engineering and Remote Sensing*. Vol. 59, No. 4. pp. 529-535.
- ◆ Schriever, J. R. and R. G. Congalton. 1995. Evaluating seasonal variability as an aid to cover-type mapping from Landsat Thematic Mapper data in the northeast. *Photogrammetric Engineering and Remote Sensing*. Vol. 61, No. 3. pp. 321-327
- ◆ Congalton, R. G. 1996. Accuracy assessment: A critical component of land cover mapping. IN: Gap Analysis: A Landscape Approach to Biodiversity Planning. A Peer-Reviewed Proceedings of the ASPRS/GAP Symposium. Charlotte, NC. pp. 119-131.

- ◆ Sperduto, M. and R. Congalton. 1996. Predicting rare orchid (small whorled pogonia) habitat using GIS. *Photogrammetric Engineering and Remote Sensing*. (Special Issue on GIS) Vol. 62, No. 11. pp. 1269-1279.
- ◆ Congalton, R. 1997. Exploring and Evaluating the Consequences of Vector to Raster and Raster to Vector Conversion. *Photogrammetric Engineering and Remote Sensing*. Vol. 63, No. 4. pp.425-434.
- ◆ Becker, M., R. Congalton, R. Budd, and A. Fried, 1998. A GLOBE collaboration to develop land cover data collection and analysis protocols. *Journal of Science Education and Technology*. Vol. 7., No. 1 pp. 85-96.
- ◆ Turner, M. and R. Congalton. 1998. Classification of multi-temporal SPOT-XS satellite data for mapping rice fields on a West African floodplain. *International Journal of Remote Sensing*. Vol. 19, No. 1. pp. 21-41.
- ◆ Macleod, R. and R. Congalton. 1998. A quantitative comparison of change detection algorithms for monitoring eelgrass from remotely sensed data *Photogrammetric Engineering and Remote Sensing*. Vol. 64, No. 3. pp. 207-216.
- ◆ Congalton, R., M. Balogh, C. Bell, K. Green, J. Milliken, and R. Ottman. 1998. Mapping and monitoring agricultural crops and other land cover in the Lower Colorado River Basin. *Photogrammetric Engineering and Remote Sensing*. Vol. 64, No. 11. pp. 1107-1113.
- ◆ Martin, M., S. Newman, J. Aber, and R. Congalton. 1998. Determining forest species composition using high spectral resolution remote sensing data. *Remote Sensing of Environment*. Vol. 65, No. 3. pp. 249-254.
- ◆ Congalton, R. 2001. Accuracy assessment and validation of remotely sensed and other spatial information. *The International Journal of Wildland Fire*. Vol 10. pp. 321-328.
- ◆ Pugh, S. and R. Congalton. 2001. Applying spatial autocorrelation analysis to evaluate error in New England forest cover type maps derived from Landsat Thematic Mapper Data. *Photogrammetric Engineering and Remote Sensing*. Vol. 67, No. 5. pp. 613-620.
- ◆ Lunetta, R. J. Iiames, J. Knight, R. Congalton, and T. Mace. 2001. An assessment of reference data variability using a "virtual field reference database". *Photogrammetric Engineering and Remote Sensing*. Vol. 67, No. 6. pp. 707-715.
- ◆ Zarin, D.J., V.F.G. Pereira, H. Raffles, M. Pinedo-Vasquez, F.G. Rabelo and R.G. Congalton. 2001. Landscape changes in tidal floodplains near the mouth of the Amazon River. *Forest Ecology and Management*. Vol. 154. pp. 383-393.
- ◆ Pereira, V., R. Congalton, and D. Zarin. 2002. Spatial and temporal analysis of a tidal floodplain landscape – Amapa, Brazil using geographic information systems and remote sensing. *Photogrammetric Engineering and Remote Sensing*. Vol. 68, No. 5, pp. 463-472.
- ◆ Wormstead, S., M. Becker, and R. Congalton. 2002. Tools for successful student-teacher-scientist partnerships: Lessons from GLOBE. *Journal of Science Education and Technology*. Vol. 11, No. 3. pp. 277-287.
- ◆ Congalton, R., K. Birch, R. Jones, and J. Schriever. 2002. Evaluating remotely sensed techniques for mapping riparian vegetation. *Computers and Electronics in Agriculture*. Vol. 37. pp. 113-126.

- ◆ Plourde, L. and R. Congalton. 2003. Sampling method and sample placement: How do they affect the accuracy of remotely sensed maps? *Photogrammetric Engineering and Remote Sensing*. Vol. 69, No. 3, pp. 289-297.
- ◆ Thomas, N., C. Hendrix, and R. Congalton. 2003. A comparison of urban mapping methods using high-resolution digital imagery. *Photogrammetric Engineering and Remote Sensing*. Vol. 69, No. 9. pp. 963-972.
- ◆ Bjerklie, D., S. Dingman., C. Vorosmarty, C. Bolster, and R. Congalton. 2003. Evaluating the potential for measuring river discharge from space. *Journal of Hydrology*. Vol. 278. pp. 17-38.
- ◆ Congalton, R. 2004. Putting the map back in map accuracy assessment. A peer-reviewed chapter IN: Lunetta, R.S., and J.G. Lyon (Eds.), Remote Sensing and GIS Accuracy Assessment, CRC Press, Boca Raton, FL 304p.
- ◆ Green, K and R. Congalton. 2004. An error matrix approach to fuzzy accuracy assessment: the NIMA Geocover project. A peer-reviewed chapter IN: Lunetta, R.S., and J.G. Lyon (Eds.), Remote Sensing and GIS Accuracy Assessment, CRC Press, Boca Raton, FL 304p.
- ◆ Hermann, H., K. Babbitt, M. Baber, and R. Congalton. 2005. Effects of landscape characteristics on amphibian distribution in a forest-dominated landscape. *Biological Conservation*. Vol. 123. pp. 139-149.
- ◆ Iiames, J., R. Congalton, A. Pilant, and T. Lewis. 2008. Leaf area index (LAI) change detection analysis on Loblolly Pine (*Pinus taeda*) following complete understory removal. *Photogrammetric Engineering and Remote Sensing*. Vol. 74. No. 11. pp. 1389-1400.
- ◆ Iiames, J., R. Congalton, A. Pilant, and T. Lewis. 2008. Validation of an integrated estimation of Loblolly Pine (*Pinus taeda* L.) leaf area index (LAI) utilizing two indirect optical methods in the southeastern United States. *Southern Journal of Applied Forestry*. Vol. 32. No. 3. pp 101 – 110.
- ◆ Congalton, R. 2010. Remote sensing: An overview. *GIScience and Remote Sensing*. 47, No. 4. pp. 443-459.
- ◆ Maclean, M. and R. Congalton. 2011. Investigating issues in map accuracy when using an object-based approach to map benthic habitats. *GIScience and Remote Sensing*. 48, No. 4. pp 457-477
- ◆ Rodriguez-Galiano, V., B. Ghimire, E. Pardo-Iguzquiza, M. Chica-Olmo, and R. Congalton. 2012. Incorporating the Downscaled Landsat TM Thermal Band in Land-cover Classification using Random Forest. *Photogrammetric Engineering and Remote Sensing*. Vol. 78. No. 2. pp. 129-137.
- ◆ Cormier, T., R. Congalton, and K. Babbitt. 2013. Spatio-statistical predictions of vernal pool locations in Massachusetts: Incorporating the spatial component into ecological modeling. *Photogrammetric Engineering and Remote Sensing*. Vol. 79. No. 1. pp. 25-35.
- ◆ MacLean, M. M. Campbell, D. Maynard, M. Ducey, and R. Congalton. 2013. Requirements for labeling forest polygons in an object-based image analysis classification. *International Journal of Remote Sensing*. Vol. 34 No. 7. pp. 2531-2547.
- ◆ MacLean, M. and R. Congalton. 2013. Applicability of multi-date land cover mapping using Landsat 5 TM imagery in the Northeastern US. *Photogrammetric Engineering and Remote Sensing*. Vol. 79. No. 4. pp. 359-368.

- ◆ Maynard, D. M. Ducey, R. Congalton, and J. Hartter. 2013. Modeling forest canopy structure and density by combining point quadrat sampling and survival analysis. *Forest Science*. Vol.59., No 6. pp. 681- 692. <http://dx.doi.org/10.5849/forsci.12-086>.
- ◆ MacLean, M. and R. Congalton. 2013. PolyFrag: A vector-based program for computing landscape metrics. *GIScience and Remote Sensing*. Vol. 50, No. 6. pp. 591-603. <http://dx.doi.org/10.1080/15481603.2013.856537>.
- ◆ Iiames, J, R. Congalton and R. Lunetta. 2013. Analyst variation associated with landcover image classification of Landsat ETM+ data for the assessment of coarse spatial resolution regional/global landcover products. *GIScience and Remote Sensing*. Vo. 50., No. 6. pp. 604-622.
- ◆ Maynard, D. M. Ducey, R. Congalton, J. Kershaw, and J. Hartter. 2014. Vertical point sampling with a digital camera: Slope correction and field evaluation. *Computers and Electronics in Agriculture*. Vol. 100. pp. 131-138. <http://dx.doi.org/10.1016/j.compag.2013.11.007>
- ◆ Congalton, R. J. Gu, K. Yadav, P. Thenkabail, and M. Ozdogan. 2014. Global land cover mapping: A review and uncertainty analysis. *Remote Sensing*, 6, pp. 12070-12093; doi:10.3390/rs61212070
- ◆ Gu, J. R. G. Congalton, and Y. Pan. 2015. The impact of positional errors on soft classification accuracy assessment: A simulation analysis. *Remote Sensing*. 7, pp. 579-599; doi:10.3390/rs70100579
- ◆ Campbell, M., R. Congalton, J. Hartter, and M. Ducey. 2015. Optimal land cover mapping and change analysis in northeastern Oregon using Landsat imagery. *Photogrammetric Engineering and Remote Sensing*. Vol. 81, No. 1, pp. 37-47. doi:10.14358/PERS.81.1.37
- ◆ Iiames, J.S., R.G. Congalton, T.E. Lewis, and A. Pilant. 2015. Uncertainty analysis in the creation of a fine-resolution leaf area index (LAI) reference map for validation of moderate resolution LAI products. *Remote Sensing*. 7, pp. 1397-1421; doi:10.3390/rs70201397
- ◆ Hartter, J., F. Stevens, L. Hamilton, R. Congalton, M. Ducey, and P. Oester. 2015. Modelling associations between public understanding, engagement and forest conditions in the Inland Northwest, USA. *PLoS ONE* 10(2): e0117975. doi:10.1371/journal.pone.0117975
- ◆ Lee, T., A. Perkins, A. Campbell, J. Passero, N. Roe, C. Shaw, and R. Congalton. 2015. Incipient invasion of urban and forest habitats in New Hampshire USA by the non-native tree, *Kalopanax septemlobus*. *Invasive Plant Science and Management*. Vol. 8, pp. 111-121. doi:10.1614/IPSM-D-14-00047.1
- ◆ MacLean, M. and R. Congalton. 2015. A review of using fragmentation programs to identify possible invasive plant species in locations in forest edge. *Landscape Ecology*. doi 10.1007/s10980-015-0175-7 (published online Feb. 2015)
- ◆ Grybas, H, and R. Congalton. 2015. Land cover change image analysis for Assateague Island National Seashore following Hurricane Sandy. *Journal of Imaging*. Vol. 1. pp. 85-114. doi:10.3390/jimaging1010085.
- ◆ Sivanpillai, R. and R. Congalton. 2016. Future Landsat data needs at the local and state levels: An AmericaView perspective. *Photogrammetric Engineering and Remote Sensing*. Vol. 82, No. 8. pp. 617-623.

- ◆ Teluguntla, Pardhasaradhi, Prasad S. Thenkabail, Jun Xiong, Murali Krishna Gumma, Russell G. Congalton, Adam Oliphant, Justin Poehnelt, Kamini Yadav, Mahesh Rao and Richard Massey. 2017. Spectral matching techniques (SMTs) and automated cropland classification algorithms (ACCAs) for mapping croplands of Australia using MODIS 250-m time-series (2000–2015) data. *International Journal of Digital Earth*. DOI: 10.1080/17538947.2016.1267269
- ◆ Xiong, Jun, Prasad S. Thenkabail, Murali K. Gumma, Pardhasaradhi Teluguntla, Justin Poehnelt, Russell G. Congalton, Kamini Yadav, and David Thau. 2017. Automated cropland mapping of continental Africa using Google Earth Engine cloud computing. *ISPRS Journal of Photogrammetry and Remote Sensing*. 126:225-244. <http://dx.doi.org/10.1016/j.isprsjprs.2017.01.019>.
- ◆ Grybas, Heather, Lindsay Melendy, and Russell G. Congalton. 2017. A comparison of unsupervised segmentation optimization approaches using moderate- and high-resolution imagery. *GIScience and Remote Sensing*. DOI: 10.1080/15481603.2017.1287238
- ◆ Dowhaniuk, Nicholas, Joel Hartter, Sadie J. Ryan, Michael W. Palace, and Russell G. Congalton. 2017. The impact of industrial oil development on a protected area landscape: population pressure and struggles for land at Murchison Falls Conservation Area, Uganda. *Population and Environment*. <https://doi.org/10.1007/s11111-017-0287-x>
- ◆ Sun, Peijun, Jinshui Zhang, Russell G. Congalton, Yaozhong Pan, and Xiufang Zhu. 2017. A quantitative performance comparison of paddy rice acreage estimation using stratified sampling strategies with different auxiliary indicators. *International Journal of Digital Earth*. DOI: 10.1080/17538947.2017.1371256.
- ◆ Massey, Richard, Temuulen T. Sankey, Russell G. Congalton, Kamini Yadav, Prasad S. Thenkabail, Mutlu Odzogan, and Andrew J. Sanchez Meador. 2017. MODIS phenology-derived, multi-year distribution of conterminous U.S. crop types. *Remote Sensing of Environment*. Vol. 198. pp.490-503. <http://dx.doi.org/10.1016/j.rse.2017.06.033>.
- ◆ Sun, Peijun, Russell G. Congalton, Heather Grybas, and Yaozhong Pan. 2017. The impact of crop mapping error on the performance of upscaling agricultural maps. *Remote Sensing*. 9. DOI:10.3390/rs9090901.
- ◆ Xiong, Jun, Prasad S. Thenkabail, James C. Tilton, Murali K. Gumma, Pardhasaradhi Teluguntla, Adam Oliphant, Russell G. Congalton, Kamini Yadav, and Noel Gorelick. 2017. Nominal 30-m cropland extent of continental Africa by integrating pixel-based and object-based algorithms using Sentinel-2 and Landsat-8 Data on Google Earth Engine. *Remote Sensing*. 9, 1065; <https://doi.org/10.3390/rs9101065>.
- ◆ Yadav, Kamini and Russell G. Congalton. 2018. Issues with large area thematic accuracy assessment for mapping cropland extent: a tale of three continents. *Remote Sensing*. 10, 53. DOI:10.3390/rs10010053.
- ◆ Sun, Peijun, Russell G. Congalton, and Yaozhong Pan. 2018. Improving the upscaling of land cover maps by fusing uncertainty and spatial structure information. *Photogrammetric Engineering and Remote Sensing*. Vol. 84, No. 2. pp. 87 – 100. DOI: 10.14358/PERS.84.2.87.
- ◆ Sun, Peijun and Russell G. Congalton. 2018. Using a similarity matrix approach to evaluate the accuracy of rescaled maps. *Remote Sensing*. 10, 487. DOI:10.3390/rs10030487.
- ◆ Sankey, Temuulen Tsagaan, Richard Massey, Kamini Yadav, Russell G. Congalton, and James Tilton. 2018. Post-socialist cropland changes and abandonment in Mongolia. *Land Degradation and Development*. 1-14. <https://doi.org/10.1002/ldr.2997>

- ◆ Fraser, Benjamin T. and Russell G. Congalton. 2018. Issues in Unmanned Aerial Systems (UAS) Data Collection of Complex Forest Environments. *Remote Sensing*. 10, 908. DOI:10.3390/rs10060908.
- ◆ Sun, Peijun, Russell G. Congalton, and Yaozhong Pan. 2018. Using a simulation analysis to evaluate the impact of crop mapping error on crop area estimation from stratified sampling. *International Journal of Digital Earth*. DOI:10.1080/17538947.2018.1499827.
- ◆ Teluguntla, P., P. Thenkabail, A. Oliphant, J. Xiong, M. Gumma, R. Congalton, K. Yadav, and A. Huete. 2018. A 30-m Landsat-derived cropland extent product of Australia and China using Random Forest machine learning algorithm on Google Earth Engine cloud computing platform. *ISPRS Journal of Photogrammetry and Remote Sensing*. <https://doi.org/10.1016/j.isprsjprs.2018.07.17>
- ◆ Crowley, Morgan A., Joel Hartter, Russell G. Congalton, Lawrence C. Hamilton, and Nils C. Christoffersen. 2018. Characterizing non-industrial private forest landowners' forest management engagement and advice sources. *Society and Natural Resources*. doi:10.1080/08941920.2018.1505013
- ◆ Healy, Christine Healy, Peter J. Pekins, Russell G. Congalton, Shadi Atallah, and Lee Kantar. 2018. Habitat use of moose during critical periods in the winter tick life cycle in northern New England. *ALCES*. Vol. 54. pp. 85-100.
- ◆ Massey, Richard, Temuulen T. Sankey, Kamini Yadav, Russell G. Congalton, and James Tilton. 2018. Integrating cloud-based workflows in continental-scale cropland extent classification. *Remote Sensing of Environment*. Vol. 219. pp. 162-179. <https://doi.org/10.1016/j.rse.2018.10.013>
- ◆ Yadav, Kamini and Russell G. Congalton. 2018. Accuracy assessment of Global Food Security-support Analysis Data (GFSAD) cropland extent maps produced at three different spatial resolutions. *Remote Sensing*. 10, 1800. DOI:10.3390/rs10111800
- ◆ Fraser, Benjamin and Russell G. Congalton. 2019. Evaluating the effectiveness of Unmanned Aerial Systems (UAS) for collecting thematic map accuracy assessment reference data in New England Forests. *Forests* 10, 24; doi:10.3390/f10010024
- ◆ Oliphant, Adam J., Prasad S. Thenkabail, Pardhasaradhi Teluguntla, Jun Xiong, Murali Krishna Gumma, Russell G. Congalton, and Kamini Yadav. 2019. Mapping cropland extent of Southeast and Northeast Asia using multi-year time-series Landsat 30-m data using Random Forest classifier on Google Earth Engine. *International Journal of Applied Earth Observations and Geoinformation*. <https://doi.org/10.1016/j.jag.2018.11.014>.
- ◆ Yadav, Kamini and Russell G. Congalton. 2019. Evaluating sampling designs for assessing the accuracy of cropland extent maps in different cropland proportion regions. *Journal of Geography, Environment and Earth Science International*. 20(4), 1-20. <https://doi.org/10.9734/jgeesi/2019/v20i430111>
- ◆ Von-Thaden, J., R. Manson, R. Congalton, B. Lopez-Barrera, and J. Salcone. 2019. A regional evaluation of the effectiveness of Mexico's payments for hydrological services. *Regional Environmental Change*. <https://doi.org/10.1007/s10113-019-01518-3>

- ◆ Sun, Peijun and Russell G. Congalton. 2019. The impact of landscape characteristics on the performance of upscaled maps. *Geocarto International*.
<https://doi.org/10.1080/10106049.2019.167868>
- ◆ Gu, Jianyu and Russell G. Congalton. 2019. The positional effect in soft classification accuracy assessment. *American Journal of Remote Sensing*. Vol. 7, No. 2. Pp. 50-61.
<https://doi.org/10.11648/j.ajrs.20190702.13>
- ◆ Healy, Christine, Peter J. Pekins, Shadi Atallah, and Russell G. Congalton. 2020. Using Agent-Based Models to Inform the Dynamics of Winter Tick Parasitism of Moose. *Ecological Complexity*, Volume 41. <https://doi.org/10.1016/j.ecocom.2020.100813>
- ◆ Gu, Jianyu, Heather Grybas, and Russell G. Congalton. 2020. A comparison of forest tree crown delineation from unmanned aerial imagery using canopy height models vs. spectral lightness. *Forests*. 11, 605; doi:[10.3390/f11060605](https://doi.org/10.3390/f11060605)
- ◆ Phalke, A., M. Ozdogan, P. Thenkabail, T. Erickson, N. Gorelick, K. Yadav, and R. Congalton. 2020. Mapping croplands of Europe, Middle East, Russia, and Central Asia using Landsat 30-m data, machine learning algorithms and Google Earth Engine. *ISPRS Journal of Photogrammetry and Remote Sensing*. Vol. 167, pp. 104-122. <https://doi.org/10.1016/j.isprsjprs.2020.06.22>
- ◆ Gu, Jianyu, Heather Grybas, and Russell G. Congalton. 2020. Individual tree crown delineation from UAS imagery based on region growing and growth space considerations. *Remote Sensing*. 12, 2363. doi:[10.3390/rs12152363](https://doi.org/10.3390/rs12152363)
- ◆ Von-Thaden, J., R. Manson, R. Congalton, B. Lopez-Barrera, and K. Jones. 2020. Evaluating the environmental effectiveness of payments for hydrological services in Veracruz, Mexico: A landscape approach. *Land Use Policy*. <https://doi.org/10.1016/j.landusepol.2020.105055>
- ◆ Yadav, Kamini and Russell G. Congalton. 2020. Extending crop type reference data using phenology-based approach. *Frontiers in Sustainable Food Systems*. 4:99. doi:[10.3389/fsufs.2020.00099](https://doi.org/10.3389/fsufs.2020.00099)
- ◆ Grybas, Heather, Russell G. Congalton, and Andrew F. Howard. 2020. Using geospatial analysis to map forest change in New Hampshire: 1996 – present. *Journal of Forestry*. 2020, 598–612: <https://doi.org/10.1093/jofore/fvaa039>
- ◆ Berry, Carter Z., Kelly Jones, Leon Rodrigo Gomez Aguilar, Russell G. Congalton, Friso Holwerda, Randall Kolka, Nathaniel Looker, Robert Manson, Alex Mayer, Lyssette Muñoz-Villers, Perla Ortiz Colin, Humberto Romero-Uribe, Leonardo Saenz, Juan Von Thaden, Mariana Quetzalli, Guadalupe Williams-Linera, and Heidi Asbjornsen. 2020. Evaluating ecosystem service trade-offs along a land-use intensification gradient in central Veracruz, Mexico. *Ecosystem Services* Vol. 45. <https://doi.org/10.1016/j.ecoser.2020.101181>
- ◆ Gu, Jianyu and Russell G. Congalton. 2020. Analysis of the impact of positional accuracy when using a single pixel for thematic accuracy assessment. *Remote Sensing*. 12, 4093; <https://doi.org/10.3390/rs12244093>
- ◆ Gu, Jianyu and Russell G. Congalton. 2021. Individual Tree Crown Delineation from UAS Imagery based on Region Growing by Over-segments with a Competitive Mechanism. *IEEE Transactions on GeoScience and Remote Sensing*. <https://doi.org/10.1109/TGRS.2021.3074289>

- ◆ Grybas, Heather and Russell G. Congalton. 2021. A Comparison of Multi-Temporal RGB and Multispectral UAS Imagery for Tree Species Classification in Heterogeneous New Hampshire Forests. *Remote Sensing*. 13, 2631. <https://doi.org/10.3390/rs13132631>
- ◆ Fraser, Benjamin and Russell G. Congalton. 2021. Estimating Primary Forest Attributes and Rare Community Characteristics Using Unmanned Aerial Systems (UAS): An Enrichment of Conventional Forest Inventories. *Remote Sensing*. 13, 2971. <https://doi.org/10.3390/rs13152971>
- ◆ Grybas, Heather and Russell G. Congalton. 2021. Evaluating the capability of unmanned aerial system (UAS) imagery to detect and measure the effects of edge influence on forest canopy in New England. *Forests*. 12, 1252. <https://doi.org/10.3390/f12091252>
- ◆ Fraser, Benjamin and Russell G. Congalton. 2021. A comparison of methods for determining forest composition from high-spatial resolution remotely sensed imagery. *Forests*. 13, 2971. <https://doi.org/10.3390/rs13152971>
- ◆ Gu, Jianyu and Russell G. Congalton. 2021. Analysis of the impact of positional accuracy when using a block of pixels for thematic accuracy assessment. *Geographies*. 1, 143-165; <https://doi.org/10.3390/geographies1020009>
- ◆ Fraser, Benjamin and Russell G. Congalton. 2021. Monitoring fine-scale forest health using unmanned aerial systems (UAS) multispectral models. *Remote Sensing*. 13, 4873. <https://doi.org/10.3390/rs13234873>

Symposium Proceedings and Other Articles

- ◆ Congalton, R. G. and R. A. Mead. 1980. State of the art of Landsat classification accuracy assessment. Proceedings of the Sixth Annual Symposium on Machine Processing of Remotely Sensed Data. Purdue University, West Lafayette, IN. p. 337.
- ◆ Congalton, R. G., R. A. Mead, R. G. Oderwald, and J. Heinen. 1981. Analysis of forest classification accuracy. Remote Sensing Research Report 81-1. Agristars Report RR-U1-04066, JSC 17123. 85 pp.
- ◆ Congalton, R. G. 1981. The use of discrete multivariate analysis techniques for the assessment of Landsat classification accuracy. Masters Thesis. Virginia Polytechnic Institute and State University, Blacksburg, VA. 111 pp.
- ◆ Congalton, R. G., R. G. Oderwald, and R. A. Mead 1982. Accuracy of remotely sensed data: sampling and analysis procedures. Remote Sensing Research Report 82-1. Agristars Report RR-U2-04257, Coop Agreement 13-1134. 83 pp.
- ◆ Congalton, R. G., J. T. Heinen, and R. G. Oderwald. 1983. Update and review of accuracy assessment techniques for remotely sensed data. Remote Sensing Research Report 83-1. Final Report for Nationwide Forestry Applications Program. Coop Agreement 13-1134. 34 pp.
- ◆ Congalton, R. G. 1984. A comparison of five sampling schemes used in assessing the accuracy of land cover/land use maps derived from remotely sensed data. Ph. D. Dissertation. Virginia Polytechnic Institute and State University. Blacksburg, VA. 147 pp.
- ◆ Congalton, R. and A. Rekas. 1985. COMPARE: A computerized technique for the in-depth comparison of remotely sensed data. Proceedings of the Fifty First Annual Meeting of the American Society of Photogrammetry, Washington, DC. p. 98-106.

- ◆ Lunetta, R., R. Congalton, A. Rekas, and J. Stoll. 1985. Using remotely sensed data to map vegetative cover for habitat evaluation in the Saginaw River Basin. Proceedings of the Fifty First Annual Meeting of the American Society of Photogrammetry, Washington, D.C. p. 88-97.
- ◆ Congalton, R. 1986. Geographic information systems specialist: a new breed. Proceedings of Joint US Forest Service and ASP workshop on Geographic Information Systems. Atlanta, Ga. p. 37-42.
- ◆ Congalton, R. and L. Pierce. 1986. An assessment of evapo-transpirational water losses in a Sierran mixed conifer forest using remotely sensed data. Proceedings of the Fifty Second Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, D.C. Vol. 5, p. 53-62.
- ◆ Congalton, R. 1986. Procedures for the preparation of a geographic spatial data base: Description and instructions for digitizing, plotting, and gridding data to be input to a geographic spatial data base. Miscellaneous Paper EL-86. Environmental Laboratory, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
- ◆ Congalton, R., R. Thomas, P. Zinke, J. Helms, and G. Smoot. 1987. Development of EOS-Aided Procedures for the Determination of the Water Balance or Hydrologic Budget of a Large Watershed. Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS). Ann Arbor, Michigan. pp. 949-954.
- ◆ Stenback, J., C. Brown, R. Barrett, and R. Congalton. 1987. Application of remotely sensed digital data and a GIS in evaluating deer habitat suitability on the Tehama deer winter range. Proceedings of the Second International Conference, Exhibits, and Workshops on Geographic Information Systems (GIS '87), San Francisco, California. pp. 440-445.
- ◆ Helms, J. and R. Congalton. 1987. Remote sensing of transpirational use of water by forest vegetation. IUFRO Conference on Management of Water and Nutrient Relations to Increase Forest Growth. Canberra, Australia. (abstract only).
- ◆ Stenbeck, J. and R. Congalton. 1988. Assessing canopy-understory relationships using Thematic Mapper imagery and an unsupervised classification approach. Proceedings of the Fifty-Fourth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, St. Louis, Missouri. Vol. 6, pp. 202 (abstract only).
- ◆ Mann, L., R. Congalton, K. Green, and M. Cosentino. 1989. Mapping forest vegetation type and structure on the Okanogan National Forest using Landsat Thematic Mapper data. Proceedings of Image Processing 89, Reno, Nevada. May, 1989. pp. 156-165.
- ◆ Congalton, R. 1989. Considerations and techniques for assessing the accuracy of remotely sensed data. Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS). Vancouver, Canada. July, 1989. pp. 1847-1850.
- ◆ Biging, G. and R. Congalton. 1989. Development of remote sensing technologies for use in forest inventory. Proceedings of Global Natural Resource Monitoring and Assessments: Preparing for the 21st Century. Venice, Italy. September, 1989. Volume 3. pp. 1241-1249.
- ◆ Congalton, R., J. Helms, and P. Zinke. 1989. A procedure for determining the water balance of a large forested watershed from remotely sensed data. Proceedings of Global Natural Resource Monitoring and Assessments: Preparing for the 21st Century. Venice, Italy. September, 1989. Volume 1. pp.334-343.

- ◆ Biging, G. and R. Congalton. 1989. Using satellite data for forest inventory. Proceedings of the National Computer Graphics Association Mapping and GIS Conference: Visual Solutions ... Right at your Fingertips. Los Angeles, CA. November, 1989. p. 36. (Abstract only).
- ◆ Green, K. and R. Congalton. 1990. Mapping potential old growth forests and other resources on National Forest and Park lands in Oregon and Washington. Proceedings of GIS/LIS 90. Anaheim, CA. November 1990. p. 712-723.
- ◆ Congalton, R. 1990. Beware the black box: Comments on the keynote address. Proceedings of GIS/LIS 90. Anaheim, CA. November 1990. p. 851-853.
- ◆ Biging, G., R. Congalton, and E. Murphy. 1991. A comparison of photointerpretation and ground measurements of forest structure. Proceedings of the Fifty-Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, Maryland. Vol. 3, pp. 6-15.
- ◆ Congalton, R. 1991. Error analysis of remotely sensed data: Where do we go from here? Proceedings of the National Center for Geographic Information and Analysis. Initiative 12. Special Session on The Integration of Remote Sensing and GIS held at the Fifty-Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, Maryland. pp.129-135.
- ◆ Congalton, R. and G. Biging. 1992. How to validate stand maps. Proceedings of Stand Inventory Technologies 92 Conference. September 13-17, Portland, OR. Am. Society for Photo. & Remote Sensing. Bethesda, MD. pp. 74-82.
- ◆ Congalton, R. 1992. Exploring multi-spectral and hyper-spectral data for forest productivity and damage assessment. Proceedings of the International Symposium on Spectral Sensing Research. November 15-20, Maui, HI. Science and Technology Corp., Hampton, VA. pp. 956-963..
- ◆ Schriever, J. R. and R. G. Congalton. 1993. Mapping forest cover-types in New Hampshire using multi-temporal Landsat Thematic Mapper data. Proceedings of the Fifty-Ninth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, New Orleans, Louisiana. Volume 2. pp. 333-342.
- ◆ Congalton, R., R. Macleod, and F. Short. 1993. Developing accuracy assessment procedures for change detection analysis. Final Report submitted to NOAA CoastWatch Change Analysis Program, Beaufort, NC. 57 p.
- ◆ Congalton, R. G. and R. D. Macleod. 1994. Change detection accuracy assessment on the NOAA Chesapeake Bay pilot study. Proceedings of the International Symposium of Spatial Accuracy of Natural Resource Data Bases, Williamsburg, VA. pp. 78-87.
- ◆ Khorram, S., G. Biging, N. Chrisman, D. Colby, R. Congalton, J. Dobson, R. Ferguson, M. Goodchild, J. Jensen, and T. Mace. 1994. Accuracy assessment of land cover change detection. Report for the NOAA Coastal Change Analysis Program. Computer Graphics Center, North Carolina State University. 70p.
- ◆ Brennan, M., D. Izraelevitz, and R. Congalton. 1994. Product accuracy assessment final report. TR 7477-1 prepared under contract FA7056-93-C-0029 Task 3 for the Remote Earth Sensing Program Office. The Analytical Sciences Corp. Reading, MA.
- ◆ Congalton, R. G. 1994. Accuracy assessment of remotely sensed data: future needs and directions. Proceedings of the Pecora 12 Symposium: Land Information from Space-Based Systems, Sioux Falls, SD. Am. Soc. Photo. and Remote Sensing. pp. 385-388.

- ◆ Macleod, R., R. Congalton, and F. Short. 1995. Using quantitative accuracy assessment techniques to compare various change detection algorithms for monitoring eelgrass distributions in Great Bay, NH generated from Landsat TM data. Proceedings of the Sixty First Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Charlotte, North Carolina. Volume 3. pp. 876-885.
- ◆ Congalton, R. and S. Pugh. 1996. Evaluating error in a remotely sensed forest cover type map using spatial autocorrelation analysis. ERDAS User's Group Meeting Proceedings. Atlanta, GA. (abstract only).
- ◆ Budd, R., A. Fried, M. Becker, and R. Congalton. 1996. Validating remotely sensed environmental data: The GLOBE initiative. Eco-Informa '96, Lake Buena Vista, FL. published by ERIM, Ann Arbor, MI. Volume 10 pp. 497-502.
- ◆ Fried, A., R. Budd, M. Becker, and R. Congalton. 1996. Monitoring global environmental resources: The GLOBE perspective. Proceedings of GIS/LIS 96. Denver, CO. November 1996. pp. 740-747.
- ◆ Pugh, S. and R. Congalton. 1997. Applying spatial autocorrelation analysis to evaluate error in New England forest cover type maps derived from Thematic Mapper data. Proceedings of the Sixty Third Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Seattle, Washington. Volume 3. pp. 648-657.
- ◆ Short, F., R. Congalton, D. Burdick, and R. Boumans. 1997. Modelling Eelgrass Habitat Change to Link Ecosystem Processes with Remote Sensing. Final Report submitted to NOAA CoastWatch Change Analysis Program, Beaufort, NC. Grant #NA36RG04970.
- ◆ Congalton, R., M. Becker, R. Budd, and A. Fried. 1997. Using GLOBE student data to validate land cover maps derived from remotely sensed imagery: Is it good enough? IN: Building Our GLOBE Community; The Second Annual GLOBE Conference. Airlie, VA.
- ◆ Congalton, R. and M. Brennan. 1998. Change detection accuracy assessment: Pitfalls and considerations. Proceedings of the Sixty Fourth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Tampa, Florida. pp. 919-932 (CD-ROM).
- ◆ Brennan, M., R. Congalton, P. Pekins, and K. Taylor. 1998. Use of remote sensing and GIS tools for common loon (*Gavia Immer*) management in New Hampshire. Proceedings of the Sixty Fourth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Tampa, Florida. pp. 470-478 (CD-ROM).
- ◆ Congalton, R., and M. Becker. 1998. Using GLOBE student data in land cover classification and accuracy assessment. Proceedings of the Spring Meeting of the American Geophysical Union. Boston, MA. (abstract only).
- ◆ Fried, A., R. Congalton, and M. Becker. 1998. New frontiers in land cover classification and accuracy assessment. Proceedings of the First International Conference on Geospatial Information in Agriculture and Forestry. ERIM International, Inc. Ann Arbor, MI. Vol. I. pp. 290-297.
- ◆ Congalton, R. and M. Becker. 1998. Evaluating the GLOBE land cover/biology investigation training methods and materials: A teacher/student pilot study. Proceedings of the Third Annual GLOBE Conference, Snowmass Village, CO.
- ◆ Congalton, R. and M. Brennan. 1999. Error in remotely sensed data analysis: Evaluation and reduction. Proceedings of the Sixty Fifth Annual Meeting of the American Society of Photogrammetry and Remote Sensing. Portland, OR. pp. 729-732 (CD-ROM)

- ◆ Brennan, M and R. Congalton. 1999. Analysis of spatially related data for Common Loon (*Gavia Immer*) management in New Hampshire. Proceedings of the Sixty Fifth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Portland, OR. pp. 203-206. (CD-ROM)
- ◆ Wormstead, S., M. Becker, J. Bourgeault, R. Congalton, and L. Ryan. 1999. The GLOBE teacher's guide: A critical link in ensuring data quality. Proceedings of the Fourth Annual GLOBE Conference, Durham, NH.
- ◆ Congalton, R. 1999. Sampling issues for assessing the accuracy of remotely sensed data. Proceedings of the Fourth Annual GLOBE Conference, Durham, NH.
- ◆ Congalton, R., L. Cannon, M. Golden, and J. Schriever. 1999. Use of regional forest vegetation mapping for analyzing endangered species habitat. EOM. Vol. 8, No. 5. pp. 8-9.
- ◆ Plourde, L. and R. Congalton. 1999. Important factors in assessing the accuracy of remotely sensed forest vegetation maps. Proceedings of the Pecora 14/Land Satellite Information III Symposium: Demonstrating the Value of Satellite Imagery, Denver, CO. Am. Soc. Photo. and Remote Sensing. pp. 261-271 (CD-ROM).
- ◆ Congalton, R., K. Birch, R. Jones, J. Powell, and J. Schriever. 2000. Evaluating remotely sensed techniques for mapping riparian vegetation. Proceedings of the Second International Conference on Geospatial Information in Agriculture and Forestry. ERIM International, Inc. Ann Arbor, MI. Vol I. pp.77-85.
- ◆ Barrett, M. and R. Congalton., 2000. GIS in the design and management of a potential ecological reserve in the University of New Hampshire's College Woods. Proceedings of the Sixty Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, DC. 11 p. (CD-ROM)
- ◆ Rowe, R. and R. Congalton., 2000. Using GLOBE student-collected reference data to validate the accuracy of land cover maps derived from remotely sensed data. Proceedings of the Sixty Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, DC. 8 p. (CD-ROM)
- ◆ Bourgeault, J, R. Congalton, and M. Becker. 2000. GLOBE Muc-a-thon: A method for effective student land cover data collection. Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS). Honolulu, Hawaii. July, 2000. Vol. II pp. 551 - 553. (CD-ROM)
- ◆ Congalton, R. and L. Plourde. 2000. Sampling methodology, sample placement, and other important factors in assessing the accuracy of remotely sensed forest maps. Proceedings of the 4th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Delft University Press, Amsterdam. pp. 117-124.
- ◆ Rowe, R., R. Congalton, and M. Becker. 2000. Using GLOBE student-collected validation data to assess the accuracy of a remotely sensed land cover map of Dutchess County, New York. Proceedings of the Fifth Annual GLOBE Conference, Annapolis, MD.
- ◆ Congalton, R., R. Rowe, and M. Becker. 2001. Using GLOBE student-collected muc-a-thon data to aid in assessing the accuracy of a Landsat Thematic Mapper-derived land cover map of Dutchess County, New York. Proceedings of the Sixth Annual GLOBE Conference, Blaine, Washington. pp. 260-269.
- ◆ Tardie, P. and R. Congalton. 2002. A change detection analysis: Using remotely sensed data to assess the progression of development in Essex County, MA from 1990 to 2001. Proceedings of

the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, DC. 7 p. (CD-ROM)

- ◆ Congalton, Russell G. 2002. The GLOBE Program: A potential source of land cover reference data. Proceedings of the 5th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Melbourne, Australia. pp. 102-109.
- ◆ Congalton, R. and M. Becker. 2002. MUC-A-THONS and land cover mapping: The saga continues: Proceedings of the Seventh Annual GLOBE Conference, Chicago, IL. pp. 55-64.
- ◆ West, D. and R. Congalton. 2003. Incorporating GLOBE data into a remotely-sensed change detection analysis of Androscoggin County, Maine. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Anchorage, AK. 12 p. (CD-ROM)
- ◆ Lennartz, S. and R. Congalton. 2004. Classifying and mapping forest cover types using IKONOS imagery in the northeastern United States. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Denver, CO. 11 p. (CD-ROM)
- ◆ Iiames, J., D. Pliant, T. Lewis, and R. Congalton. 2004. Leaf area index (LAI) change detection on loblolly pine forest stands with complete understory removal. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Denver, CO. 9 p. (CD-ROM)
- ◆ Iiames, J., R. Congalton, D. Pliant, and T. Lewis. 2004. Accounting for error propagation in the development of a leaf area index (LAI) reference map to assess the MODIS MOD15A LAI product. Proceedings of the 6th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Portland, ME. 14 p. (CD-ROM)
- ◆ Bishop, J., R. Congalton and M. Becker. 2004. Monitoring biodiversity of select restoration sites in New Zealand. Proceedings of the Eighth Annual GLOBE Conference, Boulder, CO pp. 68-73.
- ◆ Congalton, R., J. Bourgeault, and M. Becker. 2005. Androscoggin County, Maine land cover change analysis: A successful collaboration. Proceedings of the Ninth Annual GLOBE Conference, Prague, Czech Republic. CD ROM and www.globe.gov
- ◆ Bourgeault, J., M. Becker, and R. Congalton. 2005. Environmental programs unite to do “NHEET” things for teachers. Proceedings of the Ninth Annual GLOBE Conference, Prague, Czech Republic. CD ROM and www.globe.gov
- ◆ Iiames, J. and R. Congalton. 2006. A comparison of inter-analyst differences in the classification of a Landsat ETM+ scene in South-Central Virginia. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Reno, NV. 9 p. (CD-ROM)
- ◆ Bishop, J. and R. Congalton. 2006. An evaluation of the effect of terrain normalization on classification accuracy of Landsat ETM+ imagery. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Reno, NV. 12 p. (CD-ROM)
- ◆ Jacques, K., R. Congalton, and K. Babbitt. 2007. Effects of urbanization on the spatial distribution and size of wetlands in New Hampshire. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Tampa, FL. 11 p. (CD-ROM)
- ◆ Congalton, R. 2008. Thematic and positional accuracy assessment of digital remotely sensed data IN: Proceedings of the 7th Annual Forest Inventory and Analysis Symposium, 2005. pp. 149-154. R. Roberts, G. Reams, P. Van Deusen, and P. McWilliams, (eds.) Gen. Tech. Report WO-77, USDA Forest Service. 319 p.

- ◆ Graham, M. and R. Congalton. 2009. Evaluating issues in map accuracy: A study of mapping benthic habitat on the Texas Gulf Coast. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, MD. 11 p. (CD-ROM)
- ◆ Congalton, R. 2009. Change detection accuracy assessment: pitfalls and possibilities. Proceedings of MultiTemp 2009: The Fifth International Workshop on the Analysis of Multi-temporal Remote Sensing Images. Groton, CT. pp. 276-282.
- ◆ Graham, M. and R. Congalton. 2009. A comparison of the 1992 and 2001 National Land Cover Datasets in the Lamprey River Watershed, NH. Proceedings of the Fall Meeting of the American Society of Photogrammetry and Remote Sensing, San Antonio, TX. 8 p. (CD-ROM)
- ◆ Rudko, A. and R. Congalton. 2010. Using GIS to model common loon (*Gavia immer*) habitat. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, San Diego, CA. 6 p. (CD-ROM)
- ◆ Maclean, M. A. Rudko, and R. Congalton. 2010. Multi-temporal image analysis of the Coastal Watershed, NH. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, San Diego, CA. 7 p. (CD-ROM)
- ◆ Maclean, M. and R. Congalton. 2010. Mapping and analysis of fragmentation in southeastern New Hampshire. Proceedings of the Fall Meeting of the American Society of Photogrammetry and Remote Sensing, Orlando, FL. 5 p. (CD-ROM)
- ◆ Maclean, M. and R. Congalton. 2011. Using object-oriented classification to map forest community types. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Milwaukee, WI. 10 p. (CD-ROM)
- ◆ Congalton, R. J. Jensen, and J. Shan. 2011. Writing a scientific journal paper: Preparation through publication. Feature Article in: Photogrammetric Engineering and Remote Sensing. Vol. 77. No. 5. pp. 445-450.
- ◆ Maclean, M. and R. Congalton. 2012. Map accuracy assessment issues when using an object-oriented approach. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Sacramento, CA. 5 p. (CD-ROM)
- ◆ Campbell, M. and R. Congalton. 2012. Landsat-based land cover change analysis in northeastern Oregon's timber-resource-dependent communities. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Sacramento, CA. 12 p. (CD-ROM)
- ◆ Hamilton, L., J. Hartter, F. Stevens, R. Congalton, M. Ducey, M. Campbell, D. Maynard, and M. Staunton. 2012. Forest views: Northeast Oregon survey looks at community and environment. Carsey Institute, University of New Hampshire, Issue Brief No. 47. 12p.
- ◆ Thenkabail, P., J. Knox, M. Ozdogan, M. Gumma, R. Congalton, A. Wu, C. Milesi, A. Finkral, M. Marshall, I. Mariotto, S. You, C. Giri, and P. Nagler. 2012. Assessing future risks to agricultural productivity, water resources and food security: how can remote sensing help? High Impact Article in: Photogrammetric Engineering and Remote Sensing. Vol. 78. No. 8. pp. 773-782.
- ◆ Hamilton, L., Hartter, J., Stevens, F., Congalton, R., Ducey, M., Campbell, M., Maynard, D., and M. Staunton. 2012. Forest Views: Northeast Oregon Survey Looks at Community and Environment. Issue Brief No. 47. Carsey Institute. University of New Hampshire, Durham.

- ◆ MacLean, M. and R. Congalton. 2013. Predicting woody invasive species presence using a new fragmentation program: Polyfrag. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, MD. 8 p. (www.asprs.org)
- ◆ Kovacs, J. and R. Congalton. 2013. Forest cover type analysis of New England forests using innovative WorldView-2 imagery. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, MD. 7 p. (www.asprs.org)
- ◆ Sivanpillai, R. and R. Congalton. 2014. Panel discussion on future Landsat data needs at the local and state levels. Proceedings of the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Louisville, KY. 3 p. (www.asprs.org)
- ◆ Hartter, J. F. Stevens, L. Hamilton, P. Oester, R. Congalton, M. Ducey, and M. Crowley. 2014. Forest Management and Wildfire Risk in Inland Northwest. Carsey Institute. University of New Hampshire. National Issue Brief No. 70. 8 p.
- ◆ Xiong, J., Thenkabail, P. S., James C. T., Gumma, M. K., Teluguntla, P., Congalton, R. G., Poehnelt, J., Kamini Yadav., et al., and Massey, R. 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m Africa: Cropland Extent Product (GFSAD30AFCE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30AFCE.001>
- ◆ Teluguntla, P., Thenkabail, P.S., Xiong, J., Gumma, M., Congalton, R., Oliphant, A., Sankey, T., Poehnelt, J., Yadav, K., Phalke, A., Smith, C. 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m for Australia, New Zealand, China, and Mongolia: Cropland Extent Product (GFSAD30AUNZCNMOCE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30AUNZCNMOCE.001>
- ◆ Oliphant, A., Thenkabail, P. S., Teluguntla, P., Xiong, J. Congalton, R., Yadav, K., Massey, R., Gumma, M., Smith, C. 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m for Southeast & Northeast Asia: Cropland Extent Product (GFSAD30SEACE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30SEACE.001>
- ◆ Gumma, M.K., Thenkabail, P.S., Teluguntla, P., Oliphant, A., Xiong, J., Congalton, R., Yadav, K., Smith, C. 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m for South Asia, Afghanistan and Iran: Cropland Extent Product (GFSAD30SAAFIRCE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30SAAFIRCE.001>
- ◆ Phalke, A., Ozdogan, M., Thenkabail, P. S., Congalton, R., Yadav, K., Massey, R., Teluguntla, P., Poehnelt, J., and Smith, C. (2017). NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m for Europe, Middle-east, Russia and Central Asia: Cropland Extent Product (GFSAD30EUCEARUMECE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30EUCEARUMECE.001>
- ◆ Massey, R., Sankey, T.T., Yadav, K., Congalton, R.G., Tilton, J.C., Thenkabail, P.S., (2017). NASA Making Earth System Data Records for Use in Research Environments (MEaSURES)

Global Food Security-support Analysis Data (GFSAD) @ 30m for North America: Cropland Extent Product (GFSAD30NACE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30NACE.001>

- ◆ Zhong, Y., Giri, C., Thenkabail, P.S., Teluguntla, P., Congalton, R., Yadav, K., Oliphant, A., Xiong, J., Poehnelt, J., and Smith, C. 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-support Analysis Data (GFSAD) @ 30-m for South America: Cropland Extent Product (GFSAD30SACE). NASA EOSDIS Land Processes DAAC. Retrieved from <https://doi.org/10.5067/MEaSURES/GFSAD/GFSAD30SACE.001>
- ◆ Congalton, R.G., Yadav, K., McDonnell, K., Poehnelt, J., Stevens, B., Gumma, M.K., Teluguntla, P., and Thenkabail, P.S., 2017. NASA Making Earth System Data Records for Use in Research Environments (MEaSURES) Global Food Security-Support Analysis Data (GFSAD) @ 30-m: Cropland Extent Validation (GFSAD30VAL), NASA EOSDIS Land Processes DAAC, USGS Earth Resources Observation and Science (EROS) Center: Sioux Falls, SD, USA. <https://doi:10.5067/MEaSURES/GFSAD/GFSAD30VAL.001>
- ◆ Sun, Peijun, Russell G. Congalton, and Yaozhong Pan. 2018. Comparing the impact of the mapping error on aggregation models. Proceedings of Spatial Accuracy 2018. Beijing, China. May 21-24, 2018. pp. 25-34. https://docs.wixstatic.com/ugd/ab9b0d_17da0c4c0983484a86f77801faf95089.pdf
- ◆ Sun, Peijun and Russell G. Congalton. 2019. Comparing the impact of the mapping error on the representation of landscape pattern on upscaled maps. Proceedings of the Eighth International Conference on Agro-Geoinformatics. Istanbul Turkey. July 16-19, 2019. pp. 319-324. <https://ieeexplore.ieee.org/document/8820256>.

Books, Book Chapters, and Monographs

- ◆ Bartlett, D., R. Congalton, M. Becker, E. Abrams, and J. Campbell. 1996. Land Cover/Biology Investigation. IN: GLOBE Program Teachers Guide. Second Edition. GLOBE Office, Washington, DC.
- ◆ Congalton, R. and M. Becker. 1997. Validating Student Data for Scientific Use: An Example from the GLOBE Project. IN: Internet Links for Science Education: Student-Scientist Partnerships, Karen Cohen, (Editor). Plenum Press, New York. pp.133-156.
- ◆ Biging, G., D. Colby, and R. Congalton. 1998. Sampling Systems for Change Detection Accuracy Assessment. IN: Remote Sensing Change Detection Environmental Monitoring Methods and Applications, R. Lunetta and C. Elvidge (Editors). Ann Arbor Press, Chelsea, MI. pp. 281-308.
- ◆ Congalton, R. and K. Green. 1999. Assessing the Accuracy of Remotely Sensed Data: Principles and Practices. CRC/Lewis Press, Boca Raton, FL. 137 p.
- ◆ Congalton, R. 1999. Multi-scale Resource Data. IN: GIS Solutions in Natural Resource Management, S. Morain, (Editor). OnWord Press, Sante Fe, NM. pp. 125-139.
- ◆ Khorram, S., G. Biging, N. Chrisman, D. Colby, R. Congalton, J. Dobson, R. Ferguson, M. Goodchild, J. Jensen, and T. Mace. 1999. Accuracy Assessment of Remote Sensing-Derived Change Detection, A Monograph published by the American Society for Photogrammetry and Remote Sensing. Bethesda, MD. 64 p.

- ◆ Mowrer, H. T. and R. G. Congalton. (eds.) 2000. Quantifying Spatial Uncertainty in Natural Resources: Theory and Applications for GIS and Remote Sensing. Ann Arbor Press, Chelsea, Michigan. 244p.
- ◆ Congalton, R. and L. Plourde. 2002. Quality Assurance and Accuracy Assessment of Information Derived from Remotely Sensed Data. IN: Manual of Geospatial Science and Technology. John Bossler. (Editor). Taylor & Francis, London. pp. 349-361.
- ◆ Bishop, J., R. Congalton, and M. Becker. 2008. Monitoring Biodiversity of Select Restoration Sites in New Zealand. IN: Biodiversity for Sustainable Development. Azmal Hussain (Editor). The Icfai University Press, Hyderabad, India. Pp.273-280.
- ◆ Congalton, R. and K. Green. 2009. Assessing the Accuracy of Remotely Sensed Data: Principles and Practices. 2nd Edition. CRC/Taylor & Francis, Boca Raton, FL 183p.
- ◆ Congalton, R. 2009. Accuracy Assessment of Spatial Data Sets. IN: Manual of Geographic Information Systems. M. Madden (Editor). American Society for Photogrammetry and Remote Sensing, Bethesda, MD. pp. 225 – 233.
- ◆ Congalton, R. 2009. Accuracy and Error Analysis of Global and Local Maps: Lessons Learned and Future Considerations. IN: Remote Sensing of Global Croplands for Food Security. P. Thenkabail, J. Lyon, H. Turrall, and C. Biradar. (Editors). CRC/Taylor & Francis, Boca Raton, FL pp. 441-458.
- ◆ Congalton, R. 2010. How to Assess the Accuracy of Maps Generated from Remotely Sensed Data. IN: Manual of Geospatial Science and Technology, 2nd Edition. John Bossler. (Editor). Taylor & Francis, Boca Raton, FL pp. 403-421.
- ◆ Dodge, R. and R. Congalton 2013. Meeting Environmental Challenges with Remote Sensing Imagery. American Geosciences Institute. Alexandria, VA. 82p.
- ◆ Congalton, R. 2015. Assessing Positional and Thematic Accuracies of Maps Generated from Remotely Sensed Data. IN: Remote Sensing Handbook: Vol. I: Data Characterization, Classification, and Accuracies: Advances of Last 50 Years and A Vision for the Future. P. Thenkabail (Editor). CRC/Taylor & Francis, Boca Raton, FL. pp. 583-601.
- ◆ Teluguntla, P., P. Thenkabail, J. Xiong, M. Krishna Gumma, C. Giri, C. Milesi, M. Ozdogan, R. Congalton, J. Tilton, T. Sankey, R. Massey, A. Phalke, and K. Yadav. 2015. Global Food Security Support Analysis Data (GFSAD) at Nominal 1-km (GCAD) derived from Remote Sensing in Support of Food Security in the Twenty-first Century: Current Achievements and Future Possibilities. IN: Remote Sensing Handbook: Vol. II: Land Resources: Monitoring, Modeling, and Mapping: Advances of Last 50 Years and A Vision for the Future. P. Thenkabail (Editor). CRC/Taylor & Francis, Boca Raton, FL. pp. 131-159.
- ◆ Green, Kass, Russell G. Congalton, and Mark Tukman. 2017. Imagery and GIS: Best Practices for Extracting Information from Imagery. ESRI Press. Redlands, CA. 437p.
- ◆ Grybas, Heather, and Russell G. Congalton. 2018. Land cover change image analysis for Assateague Island National Seashore following Hurricane Sandy. IN: Image Processing in Agriculture and Forestry. Gonzalo Pajares Martinsanz and Francisco Rovira-Mas (Editors). MDPI. Basel, Switzerland. pp. 172-198.
- ◆ Congalton, R. and K. Green. 2019. Assessing the Accuracy of Remotely Sensed Data: Principles and Practices. 3rd Edition. CRC/Taylor & Francis, Boca Raton, FL 328p.

- ◆ Pischke, Erin C., Z. Carter Berry, Randall K. Kolka, Jacob Salcone, Diana Cordoba, Xoco Shinbrot, Sergio Miguel Lopez Ramirez, Kelly W. Jones, Russell G. Congalton, Robert H. Manson, Juan Jose Von Thaden Ugalde, Theresa Selfa, Sophie Avila, Heidi Asbjornsen. 2019. Lessons learned about collaborating across coupled natural-human systems research on Mexico's Payments for Hydrological Services Program. IN: Collaboration Across Boundaries for Social-Ecological Systems Science: Experiences Around the World. Stephen Perz (Editor). Palgrave Macmillan. 437p. (ISBN-13: 978-3030138264)
- ◆ Congalton, Russell G. and Benjamin Fraser. 2020. Unmanned Aerial Systems (UAS) and Thematic Map Accuracy Assessment. IN: Applications of Small Unmanned Aircraft Systems: Best Practices and Case Studies. J. B. Sharma (Editor). CRC/Taylor & Francis, Boca Raton, FL. 289p.

Reviews

- ◆ Congalton, R. 1988. review of F. Becker (editor-in-chief), J. Cihlar (issue editor), The Use of Landsat Data in Forestry, Remote Sensing Reviews, Volume 2, Issue 1. Harwood Academic Publishers, reviewed in Earth-Science Reviews. Vol. 25, pp.253-254.
- ◆ Congalton, R. 1990. review of Stan Aronoff, Geographic Information Systems: A Management Perspective, WDL Publications, Ottawa, Canada, reviewed in Journal of Forestry. Vol. 88, No.9, pp.37-38.
- ◆ Congalton, R. 1993. review of William J. Ripple (Editor), Geographic Information Systems for Resource Management: A Compendium , Am. Soc. for Photo. & Remote Sensing, Baltimore, MD., reviewed in Geo Info Systems Vol. 3, No.1, pp.64.
- ◆ Congalton, R. 1997. review of Keith R. McCloy. 1995. Resource Management Information Systems: Process and Practice. Taylor & Francis, Inc. Bristol, PA., reviewed in Forest Science. Vol. 43, No. 3. pp. 453.
- ◆ Congalton, R. 2000. review of T. Lillesand and R. Kiefer. 2000. Remote Sensing and Image Interpretation, Fourth Edition. Wiley & Sons, NY. Reviewed in Journal of Forestry. Vol. 98, No. 6. pp. 91-92.
- ◆ Congalton, R. 2000. Review of ERDAS IMAGINE 8.4 image processing software - Image processing with class. In: GeoSpatial Solutions. Vol 10., No. 10. pp. 48-49
- ◆ Congalton, R. 2009. review of A. Stein, W. Shi, and W. Bijker (eds.), Quality Aspects in Spatial Data Mining, CRC Press: Boca Raton, FL, reviewed in Photogrammetric Engineering & Remote Sensing. Vol. 75, No.12, pp.1369.
- ◆ Congalton, R. 2015. review of T. Lillesand, R. Kiefer, and J. Chipman, Remote Sensing and Image Interpretation, 7th edition, John Wiley and Sons, Hoboken, NJ, reviewed in Photogrammetric Engineering & Remote Sensing. Vol. 81, No.8, pp.615-616.
- ◆ Congalton, R. 2018. Review of S. Goward, D. Williams, T. Arvidson, L. Rocchio, J. Irons, C. Russell, and S. Johnston, Landsat's Enduring Legacy:Pioneering Global Land Observations from Space. American Society for Photogrammetry and Remote Sensing, Bethesda, MD, reviewed in Photogrammetric Engineering & Remote Sensing. Vol. 84, No.1, pp. 9 & 13.

PRESENTATIONS (NOT INCLUDING WORKSHOPS, WEBINARS, AND GUEST LECTURES)

- ◆ The advantages and disadvantages of digital image processing using a personal computer. Presented at the Northern California Region of the American Society of Photogrammetry and Remote Sensing (ASPRS) Annual Meeting, Oakland, California. October, 1985.
- ◆ A review of three discrete multivariate analysis techniques used in assessing the accuracy of remotely sensed data from error matrices. An invited presentation at the 1985 International Geoscience and Remote Sensing Symposium (IGARSS). Amhearst, Massachusetts. November 1985
- ◆ Using remotely sensed data and other geographic information to map deer habitat in California. An invited presentation at the ASPRS-ACSM Joint California Conference on Surveying and Mapping. Palm Springs, California. October 16-18, 1986.
- ◆ Image processing on a personal computer. An invited presentation at the 26th Annual California State University, Fresno Surveying and Photogrammetry Conference. Fresno, California. January 23-24, 1987.
- ◆ Snow mapping - seasonal streamflow estimates. An invited presentation at the Forty-fourth Annual Meeting of the Colorado River Water Users Association, Las Vegas, Nevada, December 9-11, 1987
- ◆ Beware the black box - GIS and accuracy. An invited presentation at the first California Geographic Information Systems Society (CGISS) Meeting, San Francisco, California, February 24, 1988.
- ◆ Considerations and techniques for assessing the accuracy of remotely sensed data. Presented at the International Geoscience and Remote Sensing Symposium (IGARSS). Vancouver, Canada. July 1989.
- ◆ Remote sensing of forest ecosystems. An invited presentation to the Remote Sensing Branch of the Environmental Monitoring Systems Laboratory (EMSL) at the EPA, Las Vegas, NV. November 3, 1989.
- ◆ Assessing the accuracy of remotely sensed data: Some considerations and techniques. An invited presentation for the Remote Sensing Branch of the Environmental Monitoring Systems Laboratory (EMSL) at the EPA, Las Vegas, NV. November 3, 1989.
- ◆ Applications of GIS to AVHRR Data. An invited presentation as part of a one day shortcourse on AVHRR satellite data at the American Society of Photogrammetry and Remote Sensing (ASPRS) Annual Meeting, Denver CO, March 1990.
- ◆ A procedure for determining the water balance of a large forested watershed from remotely sensed data. Presented at Global Natural Resource Monitoring and Assessments: Preparing for the 21st Century. Venice, Italy. September, 1989.
- ◆ Introduction to Remote Sensing. An invited presentation at the US Forest Service Remote Sensing Meeting, Portland, OR. June 12-13, 1990.
- ◆ Considerations and Techniques for Accuracy Assessment. An invited presentation at the US Forest Service Remote Sensing Meeting, Portland, OR. June 12-13, 1990.

- ◆ Hardwood forest inventory and species discrimination from SPOT and Landsat Thematic Mapper data. An invited presentation at the Oak Woodlands and Hardwood Rangeland Management Symposium, Davis, California, November 2, 1990
- ◆ Beware the black box: An invited presentation as part of the keynote address. Proceedings of GIS/LIS 90 - An annual meeting for geographic information systems (GIS) professionals. Anaheim, CA. November 1990.
- ◆ Remote Sensing: Potential for Forestry Applications. An invited Executive Seminar presented to Boise Cascade Corp. Boise, Idaho, November 26, 1990.
- ◆ The need for assessing the accuracy of remotely sensed data. An invited presentation at the Remote Sensing Seminar on Forestry Applications. sponsored by EOSAT - The Earth Observing Satellite Corporation. World Forestry Center, Portland, OR. November 28, 1990.
- ◆ Error analysis of remotely sensed data: Where do we go from here? An invited presentation for the National Center for Geographic Information and Analysis. Initiative 12. Special Session on The Integration of Remote Sensing and GIS held at the Fifty-Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Baltimore, MD. December, 1990
- ◆ The introduction of satellite data into the type mapping arena: Classification accuracy, applicability and value to forestry. An invited presentation at the Association of Consulting Foresters Workshop, Auburn, California. April 18, 1991.
- ◆ Assessing error in spatial data. An invited presentation at the Ecosystems Research Center Seminar Series, Cornell University, October 18, 1991
- ◆ How to validate stand maps. An invited presentation at the Stand Inventory Technologies 92 Conference sponsored by the Am. Society for Photo. & Remote Sensing. Portland, OR, September 13-17, 1992.
- ◆ Exploring multi-spectral and hyper-spectral data for forest productivity and damage assessment. Presented at the International Symposium on Spectral Sensing Research., Maui, HI., November 15-20, 1992.
- ◆ The ABC's of GIS. An invited presentation at the GIS: Getting it Started Conference sponsored by the NH Office of State Planning, Concord, NH. June 16, 1993
- ◆ Accuracy assessment of remotely sensed data: future needs and directions. An invited presentation at the Pecora 12 Symposium, Sioux Falls, SD. August 1993.
- ◆ Can we make good decisions with bad data? An invited plenary session presentation at the ERDAS User's Group Meeting. Atlanta, GA. October 1993.
- ◆ Mapping forest cover types in New Hampshire using multi-temporal Landsat Thematic Mapper data. Presented at the Fifty-Ninth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, New Orleans, Louisiana. February 16, 1993
- ◆ Accuracy assessment for forest and habitat mapping using remote sensing. An invited speaker for a panel discussion on Using Remote Sensing for Forest and Habitat Mapping at the Annual American Society for Photogrammetry and Remote Sensing Annual Convention, Reno, NV April 25-28, 1994

- ◆ Change detection accuracy assessment on the NOAA Chesapeake Bay pilot study. Presented at the International Symposium of Spatial Accuracy of Natural Resource Data Bases, Williamsburg, VA. May, 1994
- ◆ The basics of assessing the accuracy of remotely sensed data. An invited seminar presented to NASA staff at the Kennedy Space Center, August 17, 1994.
- ◆ Beyond the error matrix: Advance accuracy assessment considerations and techniques. An invited seminar presented to NASA staff at the Kennedy Space Center, August 17, 1994.
- ◆ Accuracy assessment: A critical component of land cover mapping. Presented at the Gap Analysis: A Landscape Approach to Biodiversity Planning (ASPRS/GAP) Symposium. Charlotte, North Carolina, March 1, 1995
- ◆ Using quantitative accuracy assessment techniques to compare various change detection algorithms for monitoring eelgrass distributions in Great Bay, NH generated from Landsat TM data. Presented at the Sixty First Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Charlotte, North Carolina, March 1 1995
- ◆ Evaluating error in a remotely sensed forest cover type map using spatial autocorrelation analysis. Presented at the ERDAS User's Group Meeting, Atlanta, GA, February, 1996
- ◆ Assessing the accuracy of remotely sensed data: A retrospective review. An invited keynote presentation at the Second International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Fort Collins, Colorado, May 23, 1996
- ◆ Monitoring global environmental resources: The GLOBE perspective. Presented at GIS/LIS 96. Denver, CO. November, 1996
- ◆ Applying spatial autocorrelation analysis to evaluate error in New England forest cover type maps derived from Thematic Mapper data. Presented at the Sixty Third Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Seattle, Washington, April 9, 1997
- ◆ Using GLOBE student data to validate land cover maps derived from remotely sensed imagery: Is it good enough? Presented at Building Our GLOBE Community; The Second Annual GLOBE Conference. Airlie, VA, July 1997
- ◆ Change detection accuracy assessment: Pitfalls and considerations. Presented at the Sixty Fourth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Tampa, Florida, April 2, 1998
- ◆ Use of remote sensing and GIS tools for common loon (*Gavia Immer*) management in New Hampshire. Presented at the Sixty Fourth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Tampa, Florida, April 2, 1998
- ◆ New frontiers in land cover classification and accuracy assessment. Presented at the First International Conference on Geospatial Information in Agriculture and Forestry, Lake Buena Vista, Fl. June 1998
- ◆ Evaluating the GLOBE land cover/biology investigation training methods and materials: A teacher/student pilot study. Presented at the Third Annual GLOBE Conference, Snowmass Village, CO, August 6, 1998

- ◆ Using GIS to map endangered orchid habitat in NH and Maine. An invited presentation at the University of Rhode Island, Department of Natural Resources Science Fall Seminar Series. November 20, 1998
- ◆ Error in remotely sensed data analysis: Evaluation and reduction. Presented at the Sixty Fifth Annual Meeting of the American Society of Photogrammetry and Remote Sensing. Portland, OR, May 1999
- ◆ Analysis of spatially related data for Common Loon (*Gavia Immer*) management in New Hampshire. Presented at the Sixty Fifth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Portland, OR, May 1999
- ◆ Important factors in assessing the accuracy of remotely sensed forest vegetation maps. Proceedings of the Pecora 14/Land Satellite Information III Symposium: Demonstrating the Value of Satellite Imagery, Denver, CO. Am. Soc. Photo. and Remote Sensing. December 1999
- ◆ GIS in the design and management of a potential ecological reserve in the University of New Hampshire's College Woods. Proceedings of the Sixty Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, DC. May 2000
- ◆ Using GLOBE student-collected reference data to validate the accuracy of land cover maps derived from remotely sensed data. Proceedings of the Sixty Sixth Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Washington, DC. May 2000
- ◆ GLOBE Muc-a-thon: A method for effective student land cover data collection. Presented at the International Geoscience and Remote Sensing Symposium (IGARSS). Honolulu, Hawaii. July, 2000.
- ◆ Sampling methodology, sample placement, and other important factors in assessing the accuracy of remotely sensed forest maps. Presented at the 4th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Amsterdam, The Netherlands, July 2000
- ◆ Using GLOBE Student-Collected Muc-a-thon Data to Aid in Assessing the Accuracy of a Landsat Thematic Mapper-Derived Land Cover Map of Dutchess County, NY - Presented at the Sixth Annual GLOBE Conference, Blaine, WA, July 2001
- ◆ Land Cover Mapping and the GLOBE Program - Presented at the GLOBE Baltic Countries Student Conference, Estonia, August 2001
- ◆ Putting the Map Back in Map Accuracy Assessment – the Invited Keynote Presentation at the EPA Remote Sensing and GIS Accuracy Assessment Symposium. Las Vegas, NV, December 2001
- ◆ The GLOBE Program: A potential source of land cover reference data – Presented at the 5th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Melbourne, Australia. July 2002
- ◆ MUC-A-THONS and land cover mapping: The saga continues - Presented at the Seventh Annual GLOBE Conference, Chicago, IL July 2002
- ◆ Incorporating GLOBE data into a remotely-sensed change detection analysis of Androscoggin County, Maine. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Anchorage, AK, May 2003

- ◆ Student-Teacher-Scientist Partnerships. Invited presentation at the Central New York Region of the American Society for Photogrammetry and Remote Sensing Meeting, Rochester, NY September 2003
- ◆ The GLOBE Program: Remote Sensing and GIS for Everyone. Invited presentation at the St. Louis Region of the American Society for Photogrammetry and Remote Sensing Meeting, St. Louis, MO, October 2003
- ◆ Emerging Technologies in Remote Sensing and Image Analysis. Invited presentation at the Mid-South Region of the American Society for Photogrammetry and Remote Sensing Meeting, Huntsville, AL, November 2003
- ◆ Classifying and mapping forest cover types using IKONOS imagery in the northeastern United States. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Denver, CO. May 2004
- ◆ Leaf area index (LAI) change detection on loblolly pine forest stands with complete understory removal. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Denver, CO. May 2004
- ◆ Accounting for error propagation in the development of a leaf area index (LAI) reference map to assess the MODIS MOD15A LAI product. Presented at the 6th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Science. Portland, ME. June 2004
- ◆ Monitoring biodiversity of select restoration sites in New Zealand. Presented at the Eighth Annual GLOBE Conference, Boulder, CO July 2004
- ◆ The remote sensing 10-year industry forecast and its implications on science and training. Invited presentation to the Board of Directors and Scientific Council of Leica Geosystems, Inc. Atlanta, GA, May 2005
- ◆ Advancing the technology of remote sensing. Invited presentation at the Pecora 16 Conference, Sioux Falls, SD, October 2005
- ◆ A comparison of inter-analyst differences in the classification of a Landsat ETM+ scene in South-Central Virginia. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Reno, NV, April 2006
- ◆ An evaluation of the effect of terrain normalization on classification accuracy of Landsat ETM+ imagery. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Reno, NV, April 2006
- ◆ Assessing the Accuracy of Remotely Sensed Data: Principles and Practices. Invited 4-hour presentation to the Advanced Geospatial Intelligence Lecture Series at the National Air and Space Intelligence Center, Ball Aerospace, Dayton, OH. June 2006
- ◆ The basics of map accuracy assessment. Invited presentation to the Management Association for Private Photogrammetric Surveyors (MAPPS) at their 25th Anniversary Conference, Mt. Washington, NH, July 2007
- ◆ Loons in New Hampshire: Doing quite well, thank you. Invited presentation for the Generate Enthusiasm in Math and Science (GEMS) Program funded by NSF, University of West Georgia, November 2007

- ◆ Land Cover Mapping in New Zealand: An Evaluation of the Effect of Terrain Normalization on Classification Accuracy. Invited presentation for the Generate Enthusiasm in Math and Science (GEMS) Program funded by NSF, University of West Georgia, November 2007
- ◆ Locating vernal pools using statistical and spatial modeling. Invited seminar as part of the Environmental Engineering and Science Seminar Series at UNH, February 29, 2008
- ◆ The publication process: From submission to print. Invited presentation at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Portland, OR, May 2008
- ◆ ISPRS 2008 Beijing – An Amazing Experience. Invited presentation to the New England Region of the American Society for Photogrammetry and Remote Sensing at their Annual Banquet and Business Meeting, November 3, 2008
- ◆ Land Cover Mapping in New Zealand: An Evaluation of the Effect of Terrain Normalization on Classification Accuracy. Invited to present the Annual Chauncy Harris Lecture at Brigham Young University, November 13, 2008
- ◆ Loons in New Hampshire: Doing quite well, thank you. Invited presentation the Nashua Audubon Society as part of the UNH Speaker’s Bureau, April 14, 2009
- ◆ Preparing for manuscript submission. Invited presentation as part of a Student Advisory Council Special Session on “Academic Publishing” at the 75th Annual ASPRS Conference in Baltimore, MD, March 12, 2009
- ◆ The review process and the role of reviewers and editors. Invited presentation at the 30th Canadian Symposium on Remote Sensing. Lethbridge, Alberta, June 24, 2009
- ◆ Change detection accuracy assessment: Pitfalls and possibilities. Invited presentation for the Fifth International Workshop on the Analysis of Multi-temporal Remote Sensing Images, Groton, CT. July 29, 2009
- ◆ A comparison of the 1992 and 2001 National Land Cover Datasets in the Lamprey River Watershed, NH. Presented at the Fall Meeting of the American Society of Photogrammetry and Remote Sensing, San Antonio, TX. November 2009
- ◆ Using GIS to model common loon (*Gavia immer*) habitat. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, San Diego, CA. March 2010
- ◆ Multi-temporal image analysis of the Coastal Watershed, NH. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, San Diego, CA. March 2010
- ◆ Assessing the Accuracy of Remotely Sensed Data: Doing It Right. Presented at the Fall AmericaView Meeting in Sioux Falls, SD, October 2010
- ◆ The Publication Process: Preparing for Manuscript Submission. Invited Presentation at the ASPRS Conference, Orlando, FL. November 2010
- ◆ Mapping and analysis of fragmentation in southeastern New Hampshire. Presented at the Fall Meeting of the American Society of Photogrammetry and Remote Sensing, Orlando, FL. November 2010
- ◆ Preparing a Manuscript for Submission. Invited Presentation at the AmericaView Fall Technical Meeting. Madison, WI. October 2010

- ◆ Land Cover Mapping in New Zealand: An Evaluation of the Effect of Terrain Normalization on Map Accuracy. Invited presentation for the University of Connecticut, Department of Natural Resources and the Environment Seminar Series, Storrs, CT. December 3, 2010
- ◆ Using object-oriented classification to map forest community types. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Milwaukee, WI. May 2011
- ◆ Preparing a Manuscript for Publishing. Invited presentation at the Am. Soc. for Photo. & Remote Sensing Annual Conference, Sacramento, CA. March 22, 2012.
- ◆ Map accuracy assessment issues when using an object-oriented approach. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Sacramento, CA. March 2012
- ◆ Landsat-based land cover change analysis in northeastern Oregon's timber-resource-dependent communities. Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, Sacramento, CA. March 2012
- ◆ Change Detection Accuracy Assessment: Pitfalls and Potential. Invited Keynote/Plenary Address at the University of South Carolina Geography Colloquium, Columbia, SC. April 20, 2012
- ◆ Assessing the Accuracy of Remotely Sensed Data. An invited presentation to the US Fish&Wildlife Service - Geospatial Working Group, April 11, 2013
- ◆ What You Should Know About Manuscript Submission. Invited presentation for Preparing Future Faculty, Graduate School, UNH, April 26, 2013
- ◆ A Review of AmericaView Accomplishments. An invited presentation at the Am. Society for Photogrammetry & Remote Sensing Annual Conference, Louisville, KS, March 27, 2014
- ◆ Assessing the Accuracy of Remotely Sensed Data. An invited presentation at Yale University, New Haven, CT. April 10, 2014
- ◆ Community and Forests: Human-Ecosystem Responses to Landscape Change in NE Oregon, An invited presentation for the College of Natural Resources Seminar Series, Virginia Tech, Blacksburg, VA, April 14, 2014
- ◆ Changes in Assateague Island from Hurricane Sandy using Landsat Imagery, An invited presentation. AmericaView Fall Technical Meeting, Sioux Falls, SD. October 22, 2015.
- ◆ Loons in New Hampshire: Doing Quite Well, Thank You. An invited presentation as part of the UNH Speaker's Bureau, Lee Library, Lee, NH February 16, 2016.
- ◆ Viewing New Hampshire from Space. Presented at the AmericaView Fall Technical Meeting, Lafayette, LA, October 18, 2016.
- ◆ Innovative Methods for Mapping Global Croplands at 30m Resolution. An invited presentation. GeoLunch. University of California, Berkeley, December 1, 2016.
- ◆ Promoting Interest in Remote Sensing Education at the 5-7th Grade Level. An invited presentation as part of the AmericaView Education Panel: Challenges and Solutions in Stem at the Annual ASPRS Conference, Baltimore, MD. March 15, 2017.

- ◆ Remote Sensing: Mapping the Earth from Space. An invited presentation. Pease Public Library, Plymouth, NH as part of their Discover Space Exhibit. April 18, 2017.
- ◆ Evaluating the Performance of Various Sampling Strategies Used to Assess the Accuracy of Large Area Crop Maps. An invited presentation at the Pecora Conference, Sioux Falls, SD, November 14, 2017.
- ◆ Using Unmanned Aerial Systems (UAS) to Map Forests: Some Lessons Learned. An Invited Presentation at the New Hampshire Farm & Forest Expo, Manchester, NH, February 2, 2018.
- ◆ Using UAS to Collect Thematic Accuracy Reference Data: Successes and Lessons Learned, Presentation at the Annual ASPRS Conference, Denver, CO, February 7, 2018.
- ◆ Using UAS Imagery to Obtain Forest Type and Structure: Lessons Learned So Far, An Invited Presentation at the New England Society of American Foresters Meeting, Nashua, NH March 28, 2018.
- ◆ Evaluating Unmanned Aerial Systems (UAS) for Investigating Forest Characteristics, An Invited Presentation at the AmericaView Annual Meeting, Reston, VA (USGS), March 26, 2019.
- ◆ Reaping the Benefits of No-Cost Imagery for GeoSpatial Education. An *invited* presentation at the Pecora 21 Remote Sensing Conference, Baltimore, MD. October 7, 2019.
- ◆ Mapping and Monitoring Forest and Other Resources Using Unmanned Aerial Systems (UAS). An *invited* presentation to the Active Retirement Association, Durham, NH, April 8, 2021.
- ◆ Using Unmanned Aerial Systems (UAS) for Mapping Forest Characteristics in New England. An *invited* presentation to the Integrated Digital Forestry Initiative Seminar Series. Purdue University (presented virtually). October 21, 2021.
- ◆ Loons in New Hampshire: Bringing Science and Technology Together. An *invited* presentation to the Active Retirement Association, Durham, NH, October 28, 2021.

FUNDED RESEARCH PROJECTS

| | |
|-----------------|---|
| <u>Project:</u> | Using a GIS to Build an Emergency Preparedness Plan for New Orleans |
| Description: | Transportation networks, shelters, medical facilities, utility lines, and other important features were mapped in a GIS to prepare for a hurricane strike of New Orleans. |
| Date: | January 1984 - December 1984 |
| Role: | Post-Doctoral Research Associate |
| Funding Source: | U. S. Army Corps of Engineers |
| <u>Project:</u> | Evaluating White-tail Deer Habitat in the Saginaw River Basin, Michigan using Remotely Sensed Data |
| Description: | The U.S Fish & Wildlife Service Habitat Evaluation Procedures (HEP) were extrapolated to include remotely sensed data in the evaluation. |

Date: January 1984 - December 1984

Role: Post-Doctoral Research Associate

Funding Source: U. S. Army Corps of Engineers

Project: Development of EOS-aided Procedures for the Determination of the Water Balance or Hydrologic Budget of a Large Watershed

Description: This multi-disciplinary project addressed the problem of estimating the water balance of a large forested watershed and included research in remote sensing, microwave technology, hydrology, and silviculture.

Date: April 1985 - January 1989

Role: Principal Investigator

Funding Source: NASA

Project: An Assessment of Evapotranspirational Water Losses in the Sierran Fir Zone Red

Using Remotely Sensed Data

Description: Pilot study conducted to demonstrate feasibility of produces estimates of evapotranspirational water losses from remotely sensed data.

Date: July 1985 - June 1986

Role: Principal Investigator

Funding Source: California Space Institute

Project: Remote Sensing and Spatial Data Bases for Natural Resource Management in California

Description: An investigation and development of methods for determining the accuracy of remotely sensed and other spatial data; including sampling, statistical testing, and autocorrelation analysis.

Date: January 1986 - September 1990

Role: Principal Investigator

Funding Sources: USDA Agricultural Experiment Station (McIntire-Stennis)
University of California

Project: Development of a Habitat Suitability Map for the Eastern Tehama Deer Herd

- Description: Mapped from satellite data 1.5 million acres of land for deer habitat suitability. Map used to intelligently and systematically plan habitat improvement.
- Date: March 1986 - October 1989
- Role: Co-Principal Investigator
- Funding Source: California Department of Fish and Game
- Project: A Review of and Recommendations for Monitoring Evapotranspiration in Italy
- Description: Reviewed the literature and made recommendations for future research as applied to Italy for the uses of monitoring evapotranspiration.
- Date: June 1987 - September 1987
- Role: Principal Investigator
- Funding Source: Telespazio (Italian government)
- Project: An Evaluation of Three Techniques for Mapping Hardwood Vegetation in California
- Description: Comparison of Thematic Mapper and SPOT satellite data with high altitude aerial photography for mapping hardwood species.
- Date: July 1987 - June 1988
- Role: Principal Investigator
- Funding Source: California Space Institute
- Project: Geographic Information Systems in Natural Resource Management
- Description: Set up GIS workstation and devised tutorials for classroom and workshop instruction.
- Date: July 1987 - June 1988
- Role: Principal Investigator
- Funding Source: University of California Innovative Research Grant Program
- Project: Snow Mapping and Seasonal Streamflow Estimation in the Colorado River Basin Employing GIS and Digital Satellite Data

Description: Incorporated GIS and remotely sensed data into a modeling approach for predicting the snow water equivalent (SWE) and therefore the water runoff in the Colorado Basin on a repeatable and quickly updateable basis.

Date: July 1987 - June 1989

Role: Principal Investigator

Funding Source: University of California Water Resources Center

Project: An Evaluation of Current, and Recommendations for Future, Uses of Remotely Sensed Data for Commercial Forest Inventory

Description: This project was designed to demonstrate the usefulness of digital satellite data for mapping the species, size class, and density of forests for commercial forest inventories.

Date: January 1989 - September 1991

Role: Co-Principal Investigator

Funding Source: NASA

Project: Remote Sensing Techniques for Hardwood Rangeland Monitoring

Description: A continuation of the work described above concentrating on Advanced techniques for discriminating not only species but also size class and density of hardwood vegetation.

Date: June 1989 - October 1990

Role: Principal Investigator

Funding Source: California State Department of Forestry

Project: Exploring Remotely Sensed Data for Forest Productivity and Damage Assessment

Description: Evaluated and compared new experimental airborne sensor systems with existing satellite data for use in forest productivity and damage assessments along a transect in Oregon.

Date: December 1991 - November 1992

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Applying Spatial Statistics to Improve the Use of Geographical Data

Description: This project will improve the mapping and monitoring of ecosystems by exploring the application of advanced statistical techniques to remotely sensed data and GIS.

Date: July 1992 - June 1995

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Using Remotely Sensed Data to Map Forest Types in the Seacoast Region of New Hampshire

Description: Investigated the use of various dates of Landsat Thematic Mapper data to determine if seasonal variations could improve classification of forest types in New Hampshire.

Date: August 1991 - December 1992

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Using GIS to Map Potential Small Whorled Pogonia (Isotria medeolides) Habitat in New Hampshire and Massachusetts

Description: Building a GIS to identify optimal site characteristics for an endangered orchid and testing to see if additional ones can be located.

Date: January 1992 - December 1993

Role: Principal Investigator

Funding Source: US Fish & Wildlife Service

Project: Development and Application of Advanced Techniques for Mapping and Monitoring Ecosystems Using Remotely Sensed Data and GIS. (This project is part of my EPA Visiting Scientist Position at the Environmental Monitoring Systems Lab, Las Vegas, NV)

Description: Comparison of high resolution hyper-spectral and multi-spectral remotely sensed data for mapping forest and other ecosystems Development of spatial statistics for sampling and validation of remotely sensed maps.

Date: October 1991 - September 1993

Role: Principal Investigator

Funding Source: US EPA

Project: Developing Accuracy Assessment Procedures for Change Detection and Analysis

Description: Development and application of techniques to verify the results of the NOAA change detection analysis pilot study for the Chesapeake Bay.

Date: October 1992 - September 1993

Role: Principal Investigator

Funding Source: NOAA Coastwatch Program

Project: Assessment & Management of Genetic Diversity in National Forests

Description: Development of a GIS in conjunction with setting up reserves for genetic diversity within the White Mountain National Forest.

Date: January 1993 - December 1993

Role: Associate Investigator

Funding Source: US Forest Service

Project: Modeling Eelgrass Habitat and Change to Link Ecosystem Processes with Remote Sensing and GIS

Description: Development of a GIS and use of remote sensing to model eelgrass habitat in the Great Bay, NH. Evaluate changes over time and validate model for future predictions

Date: October 1993 - September 1996

Role: Co-Principal Investigator

Funding Source: NOAA

Project: A Pilot Project for Using Spatial Analysis to Map Black Bear Habitat in New Hampshire

Description: This project combines remote sensing and GIS techniques to identify potential black bear habitat in the three northern counties of New Hampshire.

Date: September 1993 - July 1994

Role: Principal Investigator

Funding Source: New Hampshire Department of Fish and Game

Project: Accuracy Assessment of Multi-spectral Imagery

Description: This project explores the sources of error in multi-spectral imagery and provides a new mechanism for prioritizing these errors.

Date: May 1994 - July 1994

Role: Principal Investigator

Funding Source: The Analytical Sciences Corporation (TASC)

Project: Accuracy Issues in Spatial Analysis

Description: This project combines remote sensing and GIS techniques to investigate various accuracy assessment issues including the level of effort needed to collect valid reference data. The analysis is based on area surrounding Pawtuckaway State Park, New Hampshire.

Date: July 1995 - June 1998

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Integrating Reference Data and Accuracy Assessment in Support of the GLOBE (Global Learning and Observation to Benefit the Environment) Program

Description: This project provides for scientific protocols and educational learning activities to support student (K-12) environmental data collection for use in ongoing scientific research projects.

Date: May 1995 - April 1998

Role: Principal Investigator

Funding Source: NSF (with NOAA and NASA funds as well)

Project: Change Detection Accuracy Investigation

Description: This project explores the use of accuracy assessment in change detection analysis including an evaluation of sampling schemes and development of analysis procedures.

Date: March 1996 - June 1997

Role: Principal Investigator

Funding Source: The Analytical Sciences Corporation (TASC)

Project: Scientific Protocols for the Land Cover/Biology GLOBE Program Investigation

Description: This project continued our GLOBE work and incorporated all the science investigation for land cover/biology. New protocols and learning activities on remote sensing change detection and on GIS were developed.

Date: May 1998 – April 2002

Role: Principal Investigator

Funding Source: NSF (with NOAA and NASA funds as well)

Project: Important Factors in Assessing the Accuracy of Remotely Sensed Forest Vegetation Maps

Description: This project will evaluate the effects of various sampling strategies, especially random placement, on collecting reference data for use in accuracy assessment. The study area will be Pawtuckaway State Park, NH.

Date: July 1998 - June 2001

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Development of Space-Based Techniques for Measuring River Discharge

Description: This project investigates various types of remotely sensed data to determine stream width and flow. It is a pilot study to explore what is currently available and discover what will be available in the near future

Date: August 1998 – July 1999

Role: Associate Investigator

Funding Source: NASA

Project: GIS for Cultural Features in Maine and New Hampshire

Description: This project investigated the use of GIS for recording and managing the cultural features in Maine and New Hampshire. It is a pilot study for the development of a cultural feature GIS for the entire US

Date: October 2001 – June 2002

Role: Principal Investigator

Funding Source: Claesson and Associates.

Project: Improving The Accuracy Of Remotely Sensed Forest Vegetation Maps Using High Spatial Resolution Imagery And Advanced Classification Techniques

Description: This project evaluated the use of high spatial resolution satellite imagery and airborne digital camera data for mapping forest vegetation in New England. These image data sets are new and present some unique opportunities and some difficult problems to the digital image processing community

Date: October 2001 – September 2004

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Scientific Support for the GLOBE Land Cover Investigation

Description: This project continues our GLOBE work and incorporates all the science investigation for land cover/biology. Our work with Maine will be completed and a new initiative with New Zealand will be started.

Date: August 2002 – May 2007

Role: Principal Investigator

Funding Source: NSF (with NOAA and NASA funds as well)

Project: Mapping Forest Vegetation from Remotely Sensed Data: Pixels or Polygons

Description: This project evaluated the use of high spatial resolution satellite imagery and compared traditional single pixel analysis methods with cutting-edge object-oriented approaches for mapping forest vegetation.

Date: October 2004 – September 2007

Role: Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
 University of New Hampshire

Project: Immersing Teachers and Student in Research-based Science using the GLOBE Program

Description: In this project, we worked with schools around New Hampshire to introduce the concepts of the earth as a system using examples from the GLOBE Program.

Date: April 2006 – August 2007

Role: Co - Principal Investigator

Funding Source: NH Dept. of Education

Project: New Hampshire View

Description: This project is part of the AmericaView Initiative to support and enhance the use of remote sensing research, education, and applications in New Hampshire.

Date: October 2006 – September 2007 (Affiliate Status)
 October 2007 – September 2008 (Associate Status)
 October 2008 –present (Full Status)

Role: Principal Investigator (New Hampshire View Director)

Funding Source: US Geological Survey

Project: Ecosystem Services in a Fragmenting Forested Landscape

Description: This project is a multi-investigator study of the Great Bay Watershed in New Hampshire. The project will document historic and ongoing patterns of populations density, land use, land cover, and forest fragmentation in the watershed and will evaluate the use of remotely sensed imagery at varying spatial resolutions and GIS technology for providing this analysis

Date: October 2007 – September 2011

Role: Co-Principal Investigator

Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
University of New Hampshire

Project: Community and Forest: Linked Human-Ecosystem Responses to Natural Disturbances in Oregon

Description: This project is a multi-investigator study of Union, Baker, and Willowa counties in NE Oregon looking at the relationship between land cover changes/timber harvesting and the social/economic situation in this area.

Date: October 2010 – June 2014

Role: Co-Principal Investigator

Funding Source: USDA

Project: Global Cropland Area Database from Remotely Sensed Data

Description: This project is a multi-investigator study for mapping the 8 major agricultural crops globally at 30-meter resolution. Part of the NASA Measures initiative.

Date: June 2013 – August 2018

Role: Principal Investigator

Funding Source: USGS through the NASA Measures initiative

Project: Evaluating the Effects of Hydrological Service Payments in Mexico

Description: This project is a multi-investigator study of three watershed areas to evaluate the impacts of payments for hydrological services has had on land cover and water quality.

Date: January 2013 – December 2019

Role: Co-Principal Investigator

Funding Source: NSF

Project: Validating Remotely Sensed Forest and Other Land Cover Maps using Object-based Image Analysis and Over Large Areas

Description: This project evaluated forest and other land cover maps generated from remotely sensed data using both traditional pixel-based and newly developed object-based classification approaches

Date: October 2014 – September 2018

Role: Principal Investigator
 Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
 University of New Hampshire
Project: Mapping Forest Type and Structure from Unmanned Aerial Systems (UAS) Imagery
 Description: This project evaluated the use of unmanned aerial systems (UAS) for mapping forest edge, invasive species, and as a reference data set for use in thematic accuracy assessment.
 Date: October 2018 – September 2021
 Role: Principal Investigator
 Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
 University of New Hampshire
Project: Using Geospatial Analysis to Map Forest Change in New Hampshire: 1996- present
 Description: This project used a combination of imagery and NOAA C-CAP maps to look at amount and distribution of forest change in NH.
 Date: May 2018 – May 2019
 Role: Principal Investigator
 Funding Source: Society of American Foresters
Project: Evaluating Mapping Riparian Habitat and Stream Characteristics from Multi-resolution, Remotely Sensed Imagery
 Description: This project evaluated mapping and monitoring of riparian habitat and stream characteristics from multi-resolution, remotely sensed imagery. .
 Date: October 2021 – September 2024
 Role: Principal Investigator
 Funding Source: USDA Agricultural Experiment Station (McIntire-Stennis)
 University of New Hampshire

CONSULTING SERVICES

Gould Inc. Taught three day short course on image processing for Imaging &
 Graphics Division government, industry, and education personnel. May 1985

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| Expert Witness El Dorado County, CA | Used historical aerial photography to make measurements for settlement of property dispute. May 1987 |
| Hammon, Jensen, Wallen and Associates | Provided image processing and accuracy assessment expertise for a project to map three National Forests in Eastern Washington from Remotely Sensed Data. Forest vegetation mapped by species, size class, density, and structure. April 1988 - October 1990 |
| Pacific Meridian Resources | Served as Chief Scientist - Provide image processing, GIS, and accuracy assessment expertise for mapping forest and other resources on a variety of projects. June 1989 – April 2000 |
| Space Imaging. LLC | Serve das Chief Scientist - Provide image processing, GIS, and accuracy assessment expertise for mapping forest and other resources on a variety of projects. April 2000 – April 2005 |
| Sanborn Mapping, Inc. | Served as Senior Technical Advisor - Provide image processing, GIS, and accuracy assessment expertise for mapping forest and other resources on a variety of projects. April 2005 – present |
| NOAA CoastWatch Program | Provided expertise in assessing the accuracy of satellite mapping performed for the Chesapeake Bay Pilot Study and other projects. September 1989 - July 1996 |
| EPA EMAP Program | Provided expertise for quality assurance and quality control (QA/QC) and as a member of the Landscape Characterization Working Group for the Enviromental Monitoring and Assessment Program (EMAP) September 1989 - December 1995 |
| California Dept. of Forestry, Accuracy Assessment Task Force | Provided expertise in assessing the accuracy of satellite mapping performed for the California Dept. of Forestry including establishing a set of operating procedures October 1991 - July 1995 |
| Advisory Board, Center for Mapping, Ohio State University | Member of Advisory Board reviewing research and projects for the Center April 1991 - October 1995 |
| Academic Advisory Council, SPOT Image Corporation | Member of the Advisory Board reviewing satellite data products and providing educational and scientific expertise. July 1995 - July 2002 |
| Office of the President of President of the United | Member of four person evaluation team looking at methods of predicting Coca production in Columbia for |

States

the Office of National Drug Control Policy (ONDCP)
April 2002 – June 2003

Academic Advisory
Council,
Sanborn Mapping Co.

Chair of the Advisory Board reviewing projects and
providing educational and scientific expertise.
August 2006 – August 2011

Ducks Unlimited

Consultant through Ducks Unlimited to the National Wetlands
Inventory Program designing a methodology for assessing the
thematic accuracy of the Status and Trends Wetlands data set
November 2018 - present