
Timothy Andrew Warner
Professor Emeritus of Geology and Geography

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1. Research Keywords

Accuracy assessment, machine learning, lidar, thermal remote sensing, landcover classification, geological remote sensing, remote sensing in support of nuclear non-proliferation, remote sensing of wildfire.

2. Education

- 1987 - 1992 **Ph.D.** in remote sensing in the Department of Earth and Atmospheric Sciences at Purdue University, Indiana. Dissertation Title: *Integrating satellite imagery and digital elevation data for geobotanical mapping in Quetico Provincial Park, Ontario, Canada.*
- 1982 **B.S. Honors** in geology, specializing in geological remote sensing. University of Cape Town, South Africa.
- 1979 - 1981 **B.S.** in geology. University of Cape Town, South Africa. Degree awarded with distinction in geology, and the Geochemistry Class Medal

3. Employment

- 2020 - Professor Emeritus , Department of Geology and Geography, WVU
- 2008 - 2011 Associate Department Chair, Department of Geology and Geography, WVU
- 1992 - 2020 Assistant, Associate, Full Professor, Department of Geology and Geography, WVU

4. Journal editorial appointments

- 2014 - 2020 Editor in chief, *International Journal of Remote Sensing*
- 2010 - 2019 Associate editor, *Remote Sensing Letters*
- 2015 - 2019 Editorial advisory board, *Progress in Physical Geography*
- 2007 - 2020 Editorial Board, *Geography Compass* (GIS & Earth Observation section)
- 2010 - 2014 Progress Reports Editor, *Progress in Physical Geography*
- 2008 - 2009 Associate editor (Letters), *International Journal of Remote Sensing*

5. Major affiliations & appointments

- 2013 Fulbright Scholar in the Departamento de Geofísico, Universidad de Concepción, Chile
- 2010 - 2020 WVU Regional Research Institute Research *Internal Advisory Board*
- 2007 Fulbright Scholar at Université Louis-Pasteur, Strasbourg, France
- 1994 - 2020 WVU Regional Research Institute Research Associate
- 1994 - 2001 Pacific Northwest National Laboratories (PNNL) Affiliate Staff Scientist.
- 1993 - 2001 Faculty Fellow, DOE Pacific Northwest National Laboratories (PNNL) /Battelle, through Associated Western Universities, Northwest Division

6. Awards

- 2023 *Estes Memorial Teaching Award*, American Society of Photogrammetry and Remote Sensing (ASPRS)
- 2020 *Fellow*, American Society of Photogrammetry and Remote Sensing (ASPRS)
- 2019 *Lifetime Achievement Award*, AmericaView
- 2018 Finalist for *West Virginia Professor of the Year*, Faculty Merit Foundation of West Virginia
- 2018 *WVU Mountaineer Values Award*
- 2015 *Talbert Abrams Award* from the American Society of Photogrammetry and Remote Sensing for best paper in Photogrammetry: Maxwell, A., T.A. Warner, and M.P. Strager, 2014. Combining RapidEye Satellite Imagery and LiDAR for Mapping of Mining and Mine Reclamation. *PERS* 80(2): 179–189.
- 2014 *Poster Paper Merit Award* from the Remote Sensing and Photogrammetry Society, UK, for poster presentation
- 2006 *Boeing Award for Best Paper in Image Analysis and Interpretation*, American Society of Photogrammetry and Remote Sensing. T. Warner and K. Steinmaus, 2005, Classification of orchards and vineyards with high spatial resolution panchromatic imagery. *PERS* 71 (2): 179-187.
- 2006 *Outstanding Contributions Award*, Association of American Geographers Remote Sensing Specialty Group
- 2004 *AmericaView Legacy Award*
- 1999 *Best Reviewer Award*, IEEE Transactions in Geoscience and Remote Sensing
- 1999 *Outstanding Teacher Award*, Eberly College of Arts and Sciences
- 1993 *Best Poster of Session (Sensors and Image Processing)*, Ninth Thematic Conference on Geologic Remote Sensing
- 1992 *Merit Award*, American Society for Photogrammetry and Remote Sensing
- 1992 *Stevan J. Kristof Outstanding Graduate Student in Remote Sensing Award*, Purdue University Laboratory for Applications of Remote Sensing (LARS)
- 1991 *Outstanding Graduate Student Award*, Purdue University Department of Earth and Atmospheric Sciences
- 1990 *William A. Fischer Memorial Scholarship*, American Society for Photogrammetry and Remote Sensing
- 1989 *Cambridge Instruments Photogrammetry and Remote Sensing Award*, American Society for Photogrammetry and Remote Sensing, for best student paper
- 1983 *H. G. Fourcade Award*, South African Society for Photogrammetry, Remote Sensing and Cartography, for best student paper
- 1981 *Geochemistry Class Medal* University of Cape Town

7. Research and teaching grants

- Warner, T.A., 2023-2028. *Remote Sensing for Soil Survey Applications*. USDA/Natural Resources Conservation Service, \$82,294.
- Warner, T.A., 2014-2022. *Satellite Image Awareness*. US Department of Energy, Brookhaven National Laboratory, \$132,000.
- Warner, T.A., 2006-2022. *Remote Sensing for Soil Survey Applications*. USDA/Natural Resources Conservation Service, \$266,000. (Multiple grants over this period)
- Warner, T.A., 2015-2020. *An analysis of high-resolution burn severity mapping using Worldview-3, Landsat, and field data sets*. USDA-Forest Service. \$85,951.
- Warner, T.A., 2014-2015. *Commercial satellite image workshop for IAEA safeguards applications*. US Department of Energy, Brookhaven National Laboratory, \$29,178.

- Warner, T.A., 2012. *Participation in the IAEA Long-Term Research and Development Science and Technology Workshop, January 2012*. US Department of Energy, Brookhaven National Laboratory, \$16,622.
- Warner, T.A., and R. Landenberger, 2011-2013. *A proposal to perform the duties of executive director of AmericaView*. AmericaView, \$123,640.
- Ghadimi, H., T. Harris and T.A. Warner, 2010-2011. *Sustainable Development Planning in Energy Rich Regions: Estimating Regional Capital Assets Using Remote Sensing and GIS*. West Virginia University Regional Research Institute. \$14,000.
- Warner, T. A., and L. Blake, 2009-2010. *Fostering information literacy in a discipline-specific environment*. WVU Libraries Course Enhancement Grant Program, \$3,000.
- Landenberger, R., T.A. Warner and J. Rye, 2008-2011. *Development of Knowledgeable Teachers: Geospatial Understanding in Earth System Science*. NSF, \$233,435.
- McGraw, J., R. Landenberger and T.A. Warner, 2007-2010. *Predicting the spread of the invasive, non-native tree, Ailanthus altissima, using remote sensing, GIS and population liability analysis*. US Forest Service. \$30,000.
- Wilson, T., H. Rauch and T.A. Warner, 2005-2007. *An Integrated Geoscience Approach to CO₂ Leakage Prediction and Detection at Geologic Sequestration Sites*. US Department of Energy National Energy Technology Laboratory. \$297,066.
- Warner, T.A., 2002-2003. *AmericaView Executive Committee Initiation*. USGS, \$28,000.
- Warner, T., M. D. Nellis, J. McGraw, T. Harris, L. Evans and P. Kinder, 2002-2003. *West Virginia View*. Ohio Aerospace Institute/NASA. \$88,200.
- J. McGraw, T. Warner, and R. Landenberger, 2002-2005. *Evaluation of the Invasion Potential of Ailanthus altissima (Tree of Heaven) in the Eastern Deciduous Forest*. USDA, \$222,505.
- Landenberger, R., T. Warner and J. McGraw, 2002. *Detection and monitoring of Ailanthus altissima (Tree of Heaven) using high spatial resolution imagery*. USDA Forest Service. \$5,000.
- Warner, T.A. and M.D. Nellis, 2002. *Enhancement to full range spectrometer*. WVU Research Corporation Research Incentive Competitive Grants Program. \$13,500.
- Warner, T.A. and M.D. Nellis, 2001-2002. *3-D Virtual reality for earth and planetary science studies*. Institute for Scientific Research/NASA. \$35,000.
- Warner, T.A., 2000. *NASA Earth Science Enterprise Scientific Data Purchase (SDP)*. IKONOS imagery to the value of \$24,083.
- Warner, T., J. McGraw, R. Landenberger and M. D. Nellis, 2000-2001. *Multiscale, multitemporal analysis of forest ecosystems using remote sensing*. NASA EPSCoR, \$33,000.
- McGraw, J., T. Warner and R. Landenberger, 2000-2001. *Censusing rare elements of vegetation for conservation purposes using remote sensing*. Eberly College of Arts and Sciences, WVU: \$31,500.
- Nellis, M. D., J. McGraw and T. A. Warner, 1999-2000. *Forest ecosystem remote sensing*. NASA EPSCoR, \$30,000, WVU Matching Funds: \$10,000.
- Warner, T.A/ and J. McGraw, 1998-2002. *Development of algorithms for segmentation and identification of individual trees in remotely sensed images of diverse forest canopies*. NSF, \$332,256.
- Monget, J-M., G. Shao, T.A. Warner, J. Carr, A. Karakos, M-C Girard and A. Druel, 1998-2002. *Joint EU/USA convergence teaching and training program on earth imaging techniques and their applications*. U.S. Department of Education \$127,185 and the European Union ECU 82,100.
- Steinmaus, K, E. Perry, G. Petrie, A. Stephan and T. Warner, 1998 - 2001. *Automated feature extraction from NTM and commercial satellite imagery*. NIMA, \$680,0000. (WVU subcontract \$60,000)
- Desai, C., T. Harris and T.A. Warner, 1998 - 2000. *Automated feature extraction from commercial satellite multispectral and panchromatic imagery*. NIMA, \$275,000.
- Warner, T.A., 1998 - 1999. *Identifying structural differences in mixed mesophytic and northern hardwood forests on the Monongahela National Forest using remote sensing data*. USDA Forest Service. \$11,000.

- Warner, T.A., 1997 - 1998. *AWU Faculty Fellowship (Renewal)*. Associated Western Universities and the Pacific Northwest National Laboratory, \$6,000.
- Warner, T.A., 1997 - 2000. *Spatial analysis of hyperspectral imagery*. US Department of Energy, \$100,000.
- McGraw, J., T.A. Warner, M. A. Fajvan, L. Gribko, C. B. Yuill, J. R. Cumming, R. Thomas, W. T. Peterjohn. 1997 - 1998. *New Frontiers in High Resolution Remote Sensing for Forest Ecosystem Evaluation in the Central Appalachians*. NSF EPSCoR, \$150,000.
- Warner, T.A., 1996 - 1997. *Multisensor image analysis for land-cover classification*. Pacific Northwest National Laboratory. \$34,052.
- McGraw, J., T.A. Warner, M. A. Fajvan, and C. B. Yuill. 1996 - 1997. *Applications of remote sensing and image processing in studies of forest tree population dynamics and ecology*. NSF \$25,000
- McGraw, J., T.A. Warner, M. A. Fajvan, C. B. Yuill, W. T. Peterjohn, J. R. Cumming, K. Garbutt, L. Gribko, R. Thomas, P. Ziemkiewicz, J. Skousen, and R. Arora. 1996 - 1997. *Forest Ecological Assessment Program: Planning Activity*. NSF EPSCoR, \$50,000.
- Warner, T.A., 1996. *AWU Faculty Fellowship: Feature selection for Hyperspectral Remote Sensing*. Associated Western Universities and the Pacific Northwest National Laboratory, \$10,000.
- Warner, T.A. 1995 - 1997. *Integration of Remotely-sensed geobotanical and structural methods for hydrocarbon exploration in West-Central West Virginia*. Department of Energy. \$58,450, Matching funds from NRCCE \$38,500.
- Warner, T.A. and D. Weiner, 1993. *Remote sensing of agricultural land use patterns in the Eastern Transvaal, South Africa*. WVU Senate Research Grant Program. \$7,294.
- Warner, T.A., 1993. *X and C band backscatter characteristics of natural forests under conditions of moderate relief*. WV Space Grant Consortium \$13,600.
- Cai, G. and Warner, T.A., 1993. *Spatial models of vegetation dynamics and global change*. NASA Global Change Fellowship for Graduate Student G. Cai. \$22,000

8. Publications

A. Books

- Warner, T.A., D.J. Campagna and F. Sangermano, 2021. *Remote Sensing with TerrSet 2020/IDRISI (fourth edition)*. Geocarto International Centre, Hong Kong, 721 p. Kindle edition. Available at: <https://www.amazon.com/gp/product/B08V1LBT15> (Previous editions in 2009, 2013 and 2017).
- Warner, T.A., M.D. Nellis and G.M. Foody (eds), 2009. *The SAGE Handbook of Remote Sensing*. SAGE, London, UK, 504p.

B. Papers

- Li, W., D. Li, T. A. Warner, S. Liu, F. Baret, P. Yang, J. Jiang, M. Dong, T. Cheng, Y. Zhu, W. Cao, and X. Yao, 2025. Improved generality of wheat green LAI models through mitigation of the effect of leaf chlorophyll content variation with red edge vegetation indices. *Remote Sensing of Environment* 318, 114589. DOI: 10.1016/j.rse.2024.114589.
- Farhadpour S., T.A. Warner, and A.E. Maxwell, 2024. Selecting and Interpreting Multiclass Loss and Accuracy Assessment Metrics for Classifications with Class Imbalance: Guidance and Best Practices. *Remote Sensing* 16(3):533. DOI: 10.3390/rs16030533
- Gu, Y., Y. Wang, Y. Wu, T. A. Warner, T. Guo, H. Ai, H. Zheng, T. Cheng, Y. Zhu, W. Cao, X. Yao, 2024. Novel 3D photosynthetic traits derived from the fusion of UAV LiDAR point cloud and multispectral imagery in wheat. *Remote Sensing of Environment* 311, 114244. DOI: 10.1016/j.rse.2024.114244.
- Volke, M.I., R. Abarca-Del-Rio and T.A. Warner, 2024. Cost-effective disaster-induced land cover analysis: a semi-automatic methodology Using machine learning and satellite imagery. *International Journal of Remote Sensing* 45(2), 279-305. DOI: 10.1080/01431161.2023.2292015

- Wang, Y., Y. Gu, J. Tang, B. Guo, T.A. Warner, C. Guo, H. Zheng, F. Hosoi, T. Cheng, Y. Zhu and W. Cao , 2024. Quantify Wheat Canopy Leaf Angle Distribution Using Terrestrial Laser Scanning Data. *IEEE Transactions on Geoscience and Remote Sensing* 62: 1-15. DOI 10.1109/TGRS.2024.3353225
- Zhou, C., Q.Tang, Y. Zhao, T. A. Warner, H.Liu, and J. J. Clague, 2024. Reduction of Subsidence and Large-Scale Rebound in the Beijing Plain after Anthropogenic Water Transfer and Ecological Recharge of Groundwater: Evidence from Long Time-Series Satellites InSAR. *Remote Sensing*, 16(9), 1528. DOI: 10.3390/rs16091528
- Li, W., D. Li, S. Liu, F. Baret, Z. Ma, C. He, T.A. Warner, C. Guo, T. Cheng, Y. Zhu, W. Cao and X. Yao, 2023. RSARE: A physically-based vegetation index for estimating wheat green LAI to mitigate the impact of leaf chlorophyll content and residue-soil background. *ISPRS Journal of Photogrammetry and Remote Sensing* 200, 138-152. DOI: 10.1016/j.isprsjprs.2023.05.012
- Ma, Z., W. Li, T.A. Warner, C. He, X. Wang, Y. Zhang, C. Guo, T. Cheng, Y. Zhu, W. Cao and X. Yao, 2023. A framework combined stacking ensemble algorithm to classify crop in complex agricultural landscape of high altitude regions with Gaofen-6 imagery and elevation data. *International Journal of Applied Earth Observation and Geoinformation* 122, 103386. DOI: 10.1016/j.jag.2023.103386
- Wang, K., J. Zhu, X. Xu, T. Li, X. Wang, T.A. Warner, T. Cheng, Y. Zhu, W. Cao, X. Yao, and Z. Zhang, 2023. Quantitative monitoring of salt stress in rice with solar-induced chlorophyll fluorescence. *European Journal of Agronomy* 150, 126954. DOI: 10.1016/j.eja.2023.126954
- Yin, Y., J. Zhu, X. Xu, M. Jia, T.A. Warner, X. Wang, T. Li, T. Cheng, Y. Zhu, W. Cao, and X. Yao, 2023. Tracing the nitrogen nutrient status of crop based on solar-induced chlorophyll fluorescence. *European Journal of Agronomy* 149, 126924. DOI: 10.1016/j.eja.2023.126924
- Zhu, J., Y. Yin, J. Lu, T.A. Warner, X. Xu, M. Lyu, X. Wang, C. Guo, T. Cheng, Y. Zhu, W. Cao, X. Yao, Y. Zhang, and L. Liu, 2023. The relationship between wheat yield and sun-induced chlorophyll fluorescence from continuous measurements over the growing season. *Remote Sensing of Environment* 298, 113791. DOI: 10.1016/j.rse.2023.113791
- Warner, T.A., T.A. Miller, I.P. La Puma, L.A. Nolan, N.S. Skowronski, and A.E. Maxwell, 2022. Exploring golden eagle habitat preference using lidar-based canopy bulk density. *Remote Sensing Letters*, 13(6), 556-567. DOI: 10.1080/2150704X.2022.2055985
- Zhang, J., J. Li, , A. Bao, , T. A. Warner, L. Li, C. Chang, J. Bai & T. Liu, 2022. Characterizing seasonal and long-term dynamics of a lacustrine wetland in Xinjiang, China, using dense time-series remote sensing imagery. *International Journal of Remote Sensing* 43(14), 5502-5525. DOI: 10.1080/01431161.2022.2135415
- Zhou, C., H. Lan, R. Bürgmann, T.A. Warner, J.J. Clague, L. Li, Y. Wu, X. Zhao Y. Zhang, and J. Yao, 2022. Application of an improved multi-temporal InSAR method and forward geophysical model to document subsidence and rebound of the Chinese Loess Plateau following land reclamation in the Yan'an New District. *Remote Sensing of Environment* 279: 113102. DOI: 10.1016/J.RSE.2022.113102
- Zhou, Y., J. Shunping and T.A. Warner, 2022. Regional Spatiotemporal Patterns of Fire in the Eurasian Subarctic Based on Satellite Imagery. *Remote Sensing* 14(24), 6200. DOI: 10.3390/rs14246200
- Maxwell, A.E., T.A. Warner & L.A. Guillén, 2021. Accuracy Assessment in Convolutional Neural Network-Based Deep Learning Remote Sensing Studies—Part 1: Literature Review. *Remote Sensing* 13(13), 2450. DOI: 10.3390/rs13132450
- Maxwell, A.E., T.A. Warner, and L. A. Guillén, 2021. Accuracy Assessment in Convolutional Neural Network-Based Deep Learning Remote Sensing Studies—Part 2: Recommendations and Best Practices. *Remote Sensing* 13(13), 2591. DOI: 10.3390/rs13132591
- Ramezan, C.A., T.A. Warner, A.E. Maxwell and B.S. Price, 2021. Effects of Training Set Size on Supervised Machine-Learning Land-Cover Classification of Large-Area High-Resolution Remotely Sensed Data. *Remote Sensing*. 13 (3), 368. DOI: 10.3390/rs13030368

- Fang, F., B. McNeil, T.A. Warner, G. Dahle and E. Eutsler, 2020. Street tree health from space? An evaluation using WorldView-3 data and the Washington D.C. Street Tree Spatial Database. *Urban Forestry & Urban Greening* 49: 126634. DOI: 10.1016/j.ufug.2020.126634
- Fang, F., B. McNeil, T.A. Warner, A. Maxwell, G. Dahle, E. Eutsler and J. Li, 2020. Discriminating tree species at different taxonomic levels using multi-temporal WorldView-3 imagery in Washington D.C., USA. *Remote Sensing of Environment* 246: 111811. DOI: 10.1016/j.rse.2020.111811
- Maxwell, A. and T.A. Warner, 2020. Thematic classification accuracy assessment with inherently uncertain boundaries: an argument for center-weighted accuracy assessment metrics. *Remote Sensing* 12, 1905. DOI: 10.3390/rs12121905
- Skowronski, N.S, M.R. Gallagher and T.A. Warner, 2020. Decomposing the Interactions between Fire Severity and Canopy Fuel Structure Using Multi-Temporal, Active, and Passive Remote Sensing Approaches. *Fire* 3 (1), 7. DOI: 10.3390/fire3010007.
- Warner, T.A., N.S. Skowronski, and I. La Puma, 2020. The influence of prescribed burning and wildfire on lidar-estimated forest structure of the New Jersey Pinelands National Reserve. *International Journal of Wildland Fire* 29(12): 1100-1108. DOI: 10.1071/WF20037
- Zhou, C., H. Lan, H. Gong, Y. Zhang, T.A. Warner, J.J. Clague and Y. Wu, 2020. Reduced rate of land subsidence since 2016 in Beijing, China: evidence from Tomo-PSInSAR using RadarSAT-2 and Sentinel-1 datasets. *International Journal of Remote Sensing* 41(4): 1259-1285. DOI: 10.1080/01431161.2019.1662967
- Gaertner, B., N. Zegre, T.A. Warner, R. Fernandez; Y. He, and E. Merriam, 2019. Contribution of Growing Season Length to Water Cycle Intensification: Implications for Long Term Forest Evapotranspiration in the central Appalachian Mountains, USA. *Science of the Total Environment* 650: 1371-1381. DOI: 10.1016/j.scitotenv.2018.09.129
- Li, J., T.A. Warner, Y. Wang; J. Bai; and A. Bao, 2019. Mapping glacial lakes partially obscured by mountain shadow for time series and regional mapping applications. *International Journal of Remote Sensing* 40(2): 615-641. DOI: 10.1080/01431161.2018.1516314
- Maxwell, A.E., M.P. Strager, T.A. Warner, C.A. Ramezan, A.N. Morgan, and C.E. Pauley, 2019. Large-Area, High Spatial Resolution Land Cover Mapping using Random Forests, GEOBIA, and NAIP Orthophotography: Findings and Recommendations. *Remote Sensing* 11, 1409. DOI: 10.3390/rs11121409
- Maxwell, A., and T.A. Warner, 2019. Is high spatial resolution DEM data necessary for mapping palustrine wetlands? *International Journal of Remote Sensing* 40(1): 118-137. DOI: 10.1080/01431161.2018.1506184
- Ramezan, C.A., T.A Warner and A.E. Maxwell, 2019. Evaluation of Sampling and Cross-Validation Tuning Strategies for Regional-Scale Machine Learning Classification. *Remote Sensing* 11, 185. DOI: 10.3390/rs11020185
- Shen, Z., J. Li, T.A. Warner and L. Zhao, 2019. A Multitemporal Remote Sensing Image Registration Method Based on Water Bodies for the Lake-Rich Region. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 12(11): 4327-4341. DOI: 10.1109/JSTARS.2019.2950686.
- Simic Milas, A, T.A. Warner, N.H. Younan, I. Balenovic, and MD Larson, 2019. Preface for the Special Issue of IJRS Drones section in conjunction with the 6th UAS4Enviro conference. *International Journal of Remote Sensing* 40(24): 9065-9069. DOI: 10.1080/01431161.2019.1658409
- Warner, T. A., 2019. How to write an effective peer-review report: an editor's perspective. *International Journal of Remote Sensing*. 40(13): 4871-4875. DOI: 10.1080/01431161.2019.1596342
- Chen, Q., T. Kutser, A. Collin and T.A. Warner, 2018. Preface to special issue: Fine resolution remote sensing of species in terrestrial and coastal ecosystems. *International Journal of Remote Sensing* 39(17): 5597-5599. DOI: 10.1080/01431161.2018.1507661
- Fang, F., B.E. McNeil, T.A. Warner and A.E. Maxwell, 2018. Combining high spatial resolution multi-temporal satellite data with leaf-on LiDAR enhances the ability to discriminate tree species at the crown-level. *International Journal of Remote Sensing*. 39(23): 9054-9072. DOI: 10.1080/01431161.2018.1504343

- He, Y., T.A. Warner, B. E. McNeil and E. Lee, 2018. Reducing uncertainties in applying remotely sensed land use and land cover maps in land-atmosphere interaction: identifying change in space and time. *Remote Sensing* 10(4), 506. DOI: 10.3390/rs10040506
- Maxwell, A. E., T.A. Warner, and F. Fang, 2018. Implementation of Machine Learning Classification in Remote Sensing: An Applied Review. *International Journal of Remote Sensing* 39(9): 2784-2817. DOI: 10.1080/01431161.2018.1433343
- Simic Milas, A., A.P. Cracknell and T.A Warner, 2018. Editorial: Drones – the third generation source of remote sensing. *International Journal of Remote Sensing* 39(21): 7125-7137. DOI: 10.1080/01431161.2018.1523832
- Simic Milas, A., J. J. Sousa, T. A. Warner, A. C. Teodoro, E. Peres, J. A. Gonçalves, J. D. Garcia, R. Bento, S. Phinn and A. Woodget, 2018. Preface to special issue: Unmanned Aerial Systems (UAS) for environmental applications. *International Journal of Remote Sensing* 39(15-16): 4845-4851. DOI: 10.1080/01431161.2018.1491518
- Zhou, C., H. Gong , Y. Zhang, T.A. Warner, and C. Wang, 2018. Spatiotemporal Evolution of Land Subsidence in Beijing Plain 2003-2015 using Persistent Scatterer Interferometry (PSI) with Multi-source SAR Data. *Remote Sensing* 10(4), 552. DOI: 10.3390/rs10040552
- Abarca Del Río, R. and T.A. Warner, 2017. Chilean remote sensing (special issue preface), *International Journal of Remote Sensing* 38(24), 7469-7472. DOI: 10.1080/01431161.2017.1366107
- DeWitt, J.D., P.G. Chirico and S.E. Bergstresser, and T.A. Warner, 2017. Multi-scale 46-year remote sensing change detection of diamond mining and land cover in a conflict and post-conflict setting. *Remote Sensing Applications: Society and Environment* 8: 126-139. DOI: 10.1016/j.rsase.2017.08.002
- DeWitt, J.D., T.A. Warner, P.G. Chirico and S.E. Bergstresser, 2017. Creating high resolution bare earth digital elevation models (DEMs) from stereo imagery using lidar point cloud procedures in an area of densely vegetated deciduous forest. *GIScience and Remote Sensing* 54(4): 552-572. DOI: 10.1080/15481603.2017.1295514
- He, Y., E. Lee and T.A. Warner, 2017. A time series of annual land use and land cover maps of China from 1982 to 2013 generated using AVHRR GIMMS NDVI3g data. *Remote Sensing of Environment*, 199: 201-217. DOI: 10.1016/j.rse.2017.07.010.
- Li, X, C. Elvidge, Y. Zhou , C. Cao & T.A. Warner, 2017. Remote sensing of night-time light (special issue preface), *International Journal of Remote Sensing* 38(21): 5855-5859. DOI: 10.1080/01431161.2017.1351784.
- Maxwell, A. E., T.A. Warner, B.C. Vanderbilt, and C. Ramezan, 2017. Land cover classification and feature extraction from National Agriculture Imagery Program (NAIP) Orthoimagery: A review. *Photogrammetric Engineering and Remote Sensing* 83(11): 737-747. DOI: 10.14358/PERS.83.10.737
- Warner, T.A., 2017. WVU. Nature of image data. *The Geographic Information Science & Technology Body of Knowledge* (3rd Quarter 2017 Edition), John P. Wilson (ed.). DOI: 10.22224/gistbok/2017.3.1
- Warner, T.A., N.S. Skowronski and M.R. Gallagher, 2017. High spatial resolution burn severity mapping of the New Jersey Pine Barrens with WorldView-3 near-infrared and shortwave infrared imagery. *International Journal of Remote Sensing* 38(2): 598-616. DOI: 10.1080/01431161.2016.1268739
- Maxwell, A.E., T.A. Warner, and M.P. Strager, 2016. Predicting Palustrine Wetland Probability using Random Forest Machine Learning and Digital Elevation Data-Derived Terrain Variables. *Photogrammetric Engineering and Remote Sensing* 82(6): 437-447. DOI: 10.14358/PERS.82.6.437.
- DeWitt, J.D., T.A. Warner, and J.F. Conley, 2015. Comparison of DEMs derived from USGS DLG, SRTM, a statewide photogrammetry program, ASTER GDEM and lidar. *GIScience & Remote Sensing* 52(2):179-197. DOI: 10.1080/15481603.2015.1019708
- Ghadimi, H., T. Harris, and T.A. Warner, 2015. A geospatial approach to measuring regional and sub-regional inclusive wealth: the case of resource rich West Virginia, USA. *Regional Science Policy and Practice*. 7(4): 199-224. DOI: 10.1111/rsp3.12067.

- Hall, J.C., Chhangani, A.K., and Warner, T.A., 2015. Spatial characteristics of nest sites of critically endangered Indian vultures (*Gyps indicus*) in Rajasthan, India. *Indian Forester* 141(10): 1079-1083.
- Maxwell, A.E., and T.A. Warner, 2015. Differentiating mine-reclaimed grasslands from spectrally similar land cover using terrain variables and object-based machine learning classification. *International Journal of Remote Sensing* 36(17): 4384-4410. DOI: 10.1080/01431161.2015.1083632.
- Maxwell, A.E., T.A. Warner, M.P. Strager, J.F. Conley and A.L. Sharp, 2015. Assessing machine learning algorithms and image- and LiDAR-derived variables for GEOBIA classification of mining and mine reclamation. *International Journal of Remote Sensing* 36(4): 954—978. DOI: 10.1080/01431161.2014.1001086.
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9. Teaching

A. University semester-length courses

Between 1992 and 2020, I generally taught the following courses on an annual basis:

- Geog 107 Physical Geography (200-300 freshman students)
- Geog/Geol 455/655 Introduction to Remote Sensing (25-40 seniors and graduate students)
- Geog/Geol 755 Advanced Remote Sensing (5-10 graduate students)

In addition, from 1993 to 2006 on an annual basis I taught:

- Geog 415 Environmental Systems Geography (approximately 30 seniors)

From 2008 to 2010 I annually taught:

- Geog 456 Remote sensing applications (approximately 10 seniors and graduate students)

In 2013, as part of my Fulbright appointment at the Universidad de Concepción, I taught:

- *Percepción Remota y Procesamiento de Imágenes* (in English)

B. Short courses

- **Satellite image awareness.** International Atomic Energy Agency (IAEA), Vienna, Austria
 - October 8-12, 2024
 - August 30 – September 2, 2022
 - November 9-12, 2021
 - November 26-29, 2019
 - November 20-24, 2018
 - November 21-24, 2017
 - November 22-25, 2016
 - November 24-27, 2015
 - November 11-14, 2014
- **Scientific writing and publishing workshop.**
 - April 4, 2019. Association of American Geographers Annual Meeting, Washington, D.C.
 - June 24-28, 2019, Capital Normal University, Beijing, China
 - July 4-6, 2019, Chang'an University, Xi'an, China
 - October 22, 2019 1st International Conference on Geospatial Information Sciences, Mérida, Mexico.
 - June 4-8, 2018 Capital Normal University, Beijing, China
 - July 2-6, 2018 Xinjiang Institute of Ecology and Geography, China
 - July 5-9, 2017 Capital Normal University, Beijing, China
 - July 4-8, 2016 Capital Normal University, Beijing, China
 - June 8-12, 2015 Capital Normal University, Beijing, China
- **Remote sensing curriculum and pedagogy.**
 - December 10-12, 2018. Marshall University, Huntington, WV
- **Remote sensing for soil Survey applications,** US Natural Resources Conservation Service, Fort Worth, Texas & Bozeman, MT, and Lincoln, NE.
 - September 23-27, 2024
 - May 22-26, 2023
 - August 5-9, 2019
 - March 26-30, 2018
 - May 2-6, 2016
 - March 2-6 2015
 - May 4-8 2015
 - March 3-7 2014
 - September 2012

- May 2010
- July 2009
- **Remote sensing for safeguards applications.** International Atomic Energy Agency (IAEA), Vienna, Austria
 - May 5 – 9, 2014.
- **Study abroad - Introduction to remote sensing.** Demokritus University and Aristotle University, Greece
 - May 2006
 - May 2004
 - May 2002
- **Data mining using the Internet for decision support and hydrocarbon resource evaluation**
 - August 1999, Trondheim, Norway, International Association of Mathematical Geology Annual Meeting

10. Student advising

PhD

- Christopher Ramezan, PhD (Geography) 2019. Object-based supervised machine learning regional scale land-cover classification using high resolution remotely sensed data.
- Jessica DeWitt, PhD (Geography) 2016. Towards quantifying the effects of resource extraction on land cover and topography through remote sensing analysis: Confronting issues of scale and data scarcity
- Aaron Maxwell, PhD (Geology) 2015. Remote sensing for monitoring the mountaintop mining landscape: applications for land cover mapping at the individual mine complex scale.
- Sheila Kazar, PhD (Geography) 2011. Reclaimed surface mine terrestrial pools: Integrating remote sensing, spatial data and field work.
- Xiangfeng Chen, PhD (Geology) 2005. Integrating visible, near infrared and short wave infrared hyperspectral and multispectral thermal imagery for geological mapping at Cuprite, Nevada.
- Abdullah Almutairi, PhD (Geography) 2004. An investigation of the role of image properties in influencing the accuracy of remote sensing change detection analysis.
- Jong Yeol Lee, PhD (Geography) 2000. Integrating spatial and spectral information for automatic feature identification in high spatial resolution remotely sensed images.

Geology MS

- Marla Denicola, MS, 2020. (Co-advised with Dr. J. Steven Kite) Mapping Surficial Geology in the New River Gorge National River and Bluestone National Scenic River, West Virginia, using LiDAR-derived Digital Elevation Data.
- Jessica Gormont, MS (Option II project), 2007. Using LiDAR and GIS tools to determine land stability in the Appalachians: A case study in Gilmer County, West Virginia.
- Heather Freeman, MS (Option II project), 2003. Evaluation of the use of hyperspectral imagery for identification of microseeps near Santa Barbara, California.
- Dana Jennings, MS (Option II project), 2002. A Pilot Study: Using knowledge-based classification to identify springs in a portion of the Sewickley Creek Basin, Pennsylvania.
- Heath Rasco, MS, 1999. Multiple data set integration and GIS techniques used to investigate linear structural controls in the Southern Powder River Basin, Wyoming.

Geography MA

- Brandyn Balch, MA, 2019. Using lidar to approximate keystone structure and evaluate management practices in potential habitats of the endangered Karner blue butterfly (*Lycaeides melissa samuelis*).
- Ben Sawyer, MA (Professional Studies Option), 2013. Remote sensing of forest types in the Great Dismal Swamp National Wildlife Refuge using object-based methods.
- Cassidy Rhea, MA, 2012. Evaluation of the potential for detection and classification of *Ailanthus altissima* (tree of heaven) using lidar data.
- Ben Baker, MA, 2012. Forest fragmentation mapping, change detection, and gas well site identification in remotely sensed imagery: the role of spatial resolution.

- Arthur Elmes, MA, 2010. Exploring the utility of a GIScience approach to modeling invasive species: A case study of *Ailanthus altissima*.
- Aaron Burkholder, MA, 2010. Seasonal trends in separability of leaf reflectance spectra for *Ailanthus altissima* and four other tree species.
- Jeffrey Dunn, MA, 2008. Remote Sensing of Grazing Halos: Examining policy in the Florida Keys National Marine Sanctuary.
- Jacob Drvar, MA (Professional Studies Option), 2007. Evaluating the potential of remote Sensing to detect the rate of landscape change: A Monongalia County Case Study.
- Jeremy Tensen, MA (Professional Studies Option), 2007. Vegetation unmixing with Hyperion data.
- Sandy Frank, MA (Professional Studies Option), 2006. Standard operating procedure for primary remote sensing data acquisition.
- Eric Hopkins, MA (Professional Studies Option), 2006. Lidar-derived forest metrics and bird species occurrence: A case study from the Core Arboretum, Morgantown, WV.
- Brian Renzella, MA (Professional Studies Option), 2005. Remote Sensing of corridor landscapes: a case study of the National Road, Wheeling, West Virginia.
- Christopher Schaney, MA, 2003. The history of Presque Isle and the City of Erie, Pennsylvania: A remote sensing case study.
- Jim Anderson, MA (Professional Studies Option), 2002. A comparison of four change detection techniques for two urban areas in the United States.
- Jian Zhang, MA (Professional Studies Option), 2002. A comparison of digital photogrammetric and LIDAR high resolution digital elevation models.
- Abdullah Almutairi, MA, 2000. Monitoring land-cover change detection in an arid urban environment: a comparison of change detection techniques.
- Jennifer McCullough, MA (Professional Studies Option), 1999. The Fernow Experimental Forest: An analysis of historical change.
- John Bender, MA, 1999. Identifying structural differences in mixed mesophytic and Northern hardwood forests on the Monongahela National Forest using remote sensing data.
- Joe Glotfelty, MA, 1999. Automatic selection of optimal window size and shape for texture analysis.
- Zainal Majeed, MA, 1999. An Evaluation of AVHRR NDVI data for monitoring Western spruce budworm defoliation.
- Thomas Key, MA, 1998. An evaluation of the relative value of spectral and phenological information for tree crown classification of digital images in the Eastern Deciduous Forest.
- Christopher Ferro, MA, 1998. Scale and texture in digital image classification.
- Jessica Biggers, MA, 1996. An examination of abandoned hazardous waste, class and race in West Virginia.
- Doug Brown, MA, 1996. Potential of remote sensing and geographical information systems to evaluate mine areas.
- Roger Cottrell, MA, 1996. An investigation of the economic aspects of environmental regulation of the surface coal mining industry in Central Appalachia.
- Mike Shank, MA, 1995. Addressing categorical uncertainty in image classification.

11. Postdoctoral research associates

- Dr. Rick Landenberger, 1999 to 2008. Individual tree and plant identification, monitoring of exotic species, West Virginia View.
- Dr. Tomas Brandtberg, 2000 to 2002. Individual tree identification in high resolution imagery and lidar data.

12. Service

A. General service to my profession

External reviewer for faculty tenure & promotion decisions (72 evaluations since 2003)

Member of external departmental review panels

- Department of Geography and Environmental systems, University of Maryland Baltimore County, 2018
- Geographic Science Program, James Madison University, 2012

- Department of Geography and Geology, The University of Southern Mississippi, 2009
- Department of Geography, Geology, and the Environment, Slippery Rock University, 2003

Organized the *Appalachian Remote Sensing Conference & Workshops*

- May 14, 2003
- May 10-11, 2005

Review panel service (selected)

2017-2019	Fulbright Scholar Review Panel
2013-2018	National Research Council of the National Academies Research Associateship Programs Panel
2003	NASA Educator Astronaut Minimum Qualifications Review Panel, Washington DC
1998	NSF Instrumentation and Laboratory Improvement Panel

B. Service to professional organizations (selected)

2016-2018	Chair, Honors Committee, Remote Sensing Specialty Group of the American Association of Geographers (AAG)
2010-2012	Chair, Research Committee, AmericaView
2007	Chair, Ad hoc membership admission review committee, AmericaView
2005-2008	Chair, Honors Committee, Remote Sensing Specialty Group of the AAG
2004-2005	Chair, Honors Committee, South East Division of the AAG (SEDAAG)
2003-2005	Chair, Remote Sensing Specialty Group of the AAG
2003-2004	Secretary, AmericaView Inc, and founding board member
1997-2001	Chair, Awards Committee, Remote Sensing Specialty Group of the AAG
1992-1997	Chair, Scholarship Committee, American Society of Photogrammetry and Remote Sensing
1990-1992	Chair, Student Affairs Committee, American Society of Photogrammetry and Remote Sensing

C. Service to the other units at WVU, College and University (selected)

2017-2019	WVU Export Control Committee
2011-2014	WVU Strategic Planning Council
2011	WVU Advanced Energy Initiative, Review Panel, <i>Developing Interdisciplinary Research Teams</i>
2010	WVU Regional Research Institute, Chair, Search Committee for Research Assistant Professor
2004-2006	WV Nano Search Committee
2004-2006	WVU Graduate Council
2003-2006	College Graduate Studies Committee
2003	WVU Post-Baccalaureate Placement Task Force
2001-2003	Dean's Advisory Council
2000-2002	College Curriculum and Academic Quality Committee

D. Service to the Department of Geology and Geography, WVU (selected)

2017 - 2020	Chair, Department Faculty Evaluation Committee
2011-2013	Geography Undergraduate program coordinator
2000-2006	Geography Graduate Program Director
1995-1996	Geography Graduate Program Director