David W. Messinger, Ph.D.

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EDUCATION:

Ph.D., Physics (September 1998), Rensselaer Polytechnic Institute, Troy, NY
Thesis Title: "New Methods for Studying Interstellar Continuum and Spectral Polarization"
Thesis Advisor: W.G. Roberge, Ph.D.

B.S., Physics, Graduate with Distinction (May 1991), Clarkson University, Potsdam, NY

PROFESSIONAL SUMMARY:

Chester F. Carlson Center for Imaging Science,
Rochester Institute of Technology, Rochester, NY

Associate Professor (2014 - present),
Interim Director, Chester F. Carlson Center for Imaging Science (2014 - present)
My research investigates the general problem of developing methods to extract quantitative information from spectral, airborne and space-based imagery. Specific efforts include the detection of man made phenomena in large area imagery and application of advanced mathematical techniques to spectral image processing. Other research interests include the use of physics-based signatures to augment methods of hyperspectral image exploitation and the use of remote sensing techniques for multi-disciplinary research such as Archeology and Disaster Management.

The Center for Imaging Science (CIS) is an interdisciplinary academic unit within the College of Science at RIT offering degrees in Imaging Science at the BS, MS, and Ph.D. levels. The pedagogical and research focus of CIS is the "imaging chain," ranging from basic light-matter interaction phenomenology, to sensors, imaging systems, and processing of image data to provide information. The Center typically supports approximately 40 undergraduate students and over 100 graduate students with 20 full time faculty with their primary appointment in CIS and an additional 30 affiliated faculty across the RIT community. Additionally, the Center is home to over 40 research and administrative staff. The Center is a strong, interdisciplinary research organization operating with an annual research revenue of approximately $6M spread across imaging communities such as consumer electronics, government agencies, the aerospace industry, and the medical community. I was appointed as the Interim Director in 2014 after the previous Director had decided to move on to another position.

Associate Research Professor (2010 - 2014),
Assistant Research Professor (2007 - 2010),
Director, Digital Imaging and Remote Sensing Laboratory, (2007 - 2014)
As Director of the Digital Imaging and Remote Sensing (DIRS) Laboratory, I oversaw and coordinated the research efforts of ten faculty in CIS, 15 full time research staff, and over 40 undergraduate and graduate students. The Laboratory operates with annual research revenue of approximately $4M.

Research Scientist (2002 - 2007),
Digital Imaging and Remote Sensing Laboratory
I performed research into spectral image processing techniques supporting research programs within the Digital Imaging and Remote Sensing Laboratory. This work was partially funded through an Intelligence

Community Postdoctoral Research Fellowship. My research focused on the detection and characterization of gaseous effluent plumes in thermal hyperspectral imagery, as well as the development of physics-based algorithms for target detection in reflective hyperspectral imagery.

Aerospace Engineer (2000 - 2002),
Northrop Grumman, Exton, PA
I designed and implemented innovative algorithms to track clusters of ballistic objects during midcourse flight in the SBIRS-Low Program. I developed a medium-fidelity, pixel-level, infrared sensor and signal processing simulation to evaluate system requirements and algorithms as well as provided in-house infrared phenomenological expertise.

Analyst (1998 - 2000),
XonTech, Inc., Special Studies Division, Van Nuys, CA
My work with the Internal Research and Development group required the development of algorithms to determine sea-surface characteristics such as ocean wave spectra from data acquired with the NASA-JPL AVIRIS sensor. I implemented physical and statistical models of infrared and hyperspectral data as well as used signal and image processing techniques to further these efforts.

CURRENT RESEARCH INTERESTS:

- Investigation of physical and geophysical processes through analysis of remotely sensed data
- Multispectral & hyperspectral image exploitation
  - Spectral feature extraction
  - Large area image search
  - Target detection using physics-based signatures
  - Spectral image characterization
  - Application of advanced mathematical tools to spectral imagery
- LIDAR imaging

ADMINISTRATIVE EXPERIENCE:

Interim Director, Chester F. Carlson Center for Imaging Science (2014 - present):
I am responsible for the overall operation and leadership of the Center for Imaging Science, including oversight of faculty, research staff, and administrative staff. I am responsible for coordinating both the academic and research programs within the Center and serve as the Ph.D. Program Director, representing CIS at Institute level graduate education discussions. Additionally, I serve on the Executive Council of the College of Science.

Director, Digital Imaging and Remote Sensing Laboratory (2008 - 2014):
I was responsible for coordinating and overseeing the research programs for those affiliated to the laboratory, managing several funded research programs, conducting annual staff performance evaluations, development of the annual report, and laboratory business development efforts. The laboratory includes ten faculty, $\sim$15 full time research staff, and $>$40 students at the BS, MS, and Ph.D. levels. Other responsibilities included proposal writing to support the faculty, staff, and students, interfacing with research sponsors and RIT administrators, as well as strategic planning for the laboratory and management of discretionary funds.

Interim Director, Digital Imaging and Remote Sensing Laboratory (2007 - 2008):
I was responsible for coordinating and overseeing the research programs for those affiliated to the laboratory while the Director was on sabbatical. This included six faculty, $\sim$10 full time research staff, and $\sim$30

graduate students at the MS and Ph.D. levels.

DIRS Algorithm and Phenomenology Group Leader (2004 - 2008):

I was responsible for the management of two full-time staff scientists and their affiliated graduate and undergraduate students. This involved personnel and budgetary management as well as contributing to the planning and proposal process for the DIRS Laboratory.

Member of the RIT College of Science Women in Science (WISe) Advisory Board, 2011 - present

Member of the RIT College of Science Strategic Planning Core Committee, 2010-2012

Member of the RIT Steering Committee for the RIT - North Carolina A&T Partnership, 2011

Member of the Advisory Board for the Biannual Publication, *Research at RIT*, 2008 - 2012

Member of the Organizing Committee for the Dept. of Energy Conference on Data Analysis (CoDA), 2013 - present

Member of the Technical Program Committee: SPIE Conference on Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery, 2009 - present

Co-Chair of the Special Joint Session: Remote Sensing and Natural Disasters 2012: SPIE Remote Sensing Europe, Edinburgh, Scotland

Member of the Search Committee: School of Mathematical Science Faculty Search, RIT, 2012-2013

Member of the Search Committee: Director of the Nanopower Research Laboratory, RIT, 2011-2012

Member of the Search Committee: Director of the Center for Imaging Science, RIT, 2003

Member of the Search Committee: Remote Sensing Faculty, Center for Imaging Science, RIT, 2003

Member of the Local Organizing Committee for the conference: Polarimetry of the Interstellar Medium, Troy, NY, June 1995

Member of the Graduate Student Committee: Rensselaer Polytechnic Institute Physics Dept., 1994 - 1996

FUNDING HISTORY:

Total Awarded as Principal Investigator:* $>$ *$3,000,000

LPA Associates, "Hyperspectral Exploitation Tool Development", **PI**, 2004 - 2005, $9,216

Kodak - RIT CIS Innovative Collaborative Research Opportunity, "Visualization of High-Dimensional Remote Sensing Data Products", Co-I, 2005, $5,000

Pacific Northwest National Laboratory, "Characterization of LWIR Imagery", **PI**, 2006, $12,055

Army Research Laboratory, "Persistent Surveillance Research", **PI**, 2006 - 2007, $46,452

VirtualScopics, through the Naval Research Laboratory, "Hyperspectral Algorithm Development", **PI**, 2007 - 2008, $100,000

Pacific Northwest National Laboratory, "Bayesian Model Averaging for Species Identification in Gaseous Plumes", **PI**, 2007 - 2008, $100,000

NGA University Research Initiative (NURI), "Dynamic Analysis of Spectral Imagery for Improved Exploitation", **PI**, 2007 - 2013, $750,000

NASA, "Hyper- and Multi-spectral Satellite Imagery and the Ecology of State Formation and Complex Societies", Co-I, 2008 - 2010, $80,485

Impact Technologies, Phase 1 SBIR, "Automated 3d Terrain Mission Profile Generation", **PI**, 2008, $10,000

Black River Systems Corporation, "Multi-Sensor Exploitation for Space Situatiuonal Awareness", **PI**, 2008-2010, $124,286

Sandia National Laboratory, "Clutter Scene Generation in DIRSIG", **PI**, 2008, $24,585

NGA University Research Initiative (NURI), "Spatial / Spectral Large Area Search Tool Development", **PI**, 2009 - 2013, $750,000

Department of Energy Nonproliferation Research and Development for Proliferation Detection, "Enhanced Radiometric Scene Simulation Through Incorporation of Process Models", **PI**, 2010 - 2013, $894,000

ITT Geospatial Systems, "Hyperspectral Algorithm Development", **PI**, 2010, $68,000

National Reconnaissance Office, "Information Theoretic Approach to Image Utility", **PI**, 2011-2012, $199,958

Goodrich Corp., "Multi-Modal Remote Sensing Data Collection", **PI**, 2012, $20,000

NGA University Research Initiative (NURI), "Hierarchical Representation of Remotely Sensed Imagery", Co-I, 2012 - 2014, $225,441

NGA University Research Initiative (NURI), "Spatiotemporal Segmentation of Full Motion Airborne Video Imagery", Co-I, 2012 - 2014, $225,441

Lawrence Livermore National Laboratory LDRD, "Small Sat Imaging and Modeling Simulation Support", **PI**, 2013-2014, $50,000

HONORS AND AFFILIATIONS:

"Top Research Presentation at NGA Academic Research Program Symposium and Workshops", USGIF, September 2010, research to be presented as invited talk at GEOINT 2010

"Best Research Demonstration", NGA Academic Research Program Symposium and Workshops, September 2010

Member of the USGIF Academic Advisory Board, June 2013 - present

Academic Advisor to the US Department of Homeland Security Remote Sensing Advisory Board, 2010-2012

Intelligence Community Postdoctoral Research Fellow, 2003 - 2005

Member of IEEE, Geoscience and Remote Sensing Society (GRSS)

Member of SPIE

Member of the US Geospatial-Intelligence Foundation (USGIF)

Department of Education Fellowship, Rensselaer Polytechnic Institute, Jan. 1997 - Aug. 1997

Graduate with Distinction, Clarkson University, May 1991

EDITORIAL & REVIEW SERVICE:

Associate Editor for Spectral and Polarimetric Imaging, Optical Engineering

Journal & Proposal Reviewer for:

- Journal of Electronic Imaging
- IEEE Transactions on Geoscience and Remote Sensing
- IEEE Transactions on Aerospace and Electronic Systems
- Optical Engineering
- NASA Postdoctoral Program (NPP)

Service on Department of Energy Program Review Panels:

- Infrared Signatures Program, Pacific Northwest National Laboratory, March, 2005
- Spectral Signatures Program, Pacific Northwest National Laboratory, March, 2005

- Alternative SNM Signatures, Pacific Northwest National Laboratory, March, 2008
- Hyperspectral Observation of Solid Signatures, Los Alamos National Laboratory, December, 2010
- Geospatial Sensor Processing Operational Concept, Los Alamos National Laboratory, July, 2012
- Benchmark Imagery, Lawrence Livermore National Laboratory, February, 2012
- Full Spectrum Exploitation, Los Alamos National Laboratory, April, 2013
- Compressive Sensing, Lawrence Livermore National Laboratory, June, 2013

TEACHING EXPERIENCE:

Graduate Level Remote Sensing: Systems, Sensors, and Radiometric Image Analysis: This course introduces the governing equations for radiance reaching an aerial or satellite based imaging systems. The course also covers the properties of these imaging systems with an emphasis on their use as quantitative scientific instruments. It also includes a treatment of methods to invert the remotely sensed image data to measurements of the Earth's surface (e.g. reflectance and temperature) through various means of inverting the governing radiometric equation.

Physics II: Head instructor for class of 65 students. Duties included course development, lecturing, homework set assignment, solution, and grading, as well as exam writing and grading.

Astrophysics II: Teaching assistant for graduate/undergraduate course. Duties included guest lecturing, homework and exam grading, and providing office hours.

Physics I & II Recitation: Instructor for three recitations of up to 30 students each per semester. Duties included problem solving, homework and exam grading, and providing office hours.

THESES ADVISED:

Senior Thesis Project

[4] Chris Lapszynski, Imaging Science, Rochester Institute of Technology, 2013, "Incorporating Spatial Information in Graph Models of Spectral Imagery"

[3] Joshua Zollweg, Imaging Science, Rochester Institute of Technology, 2010, "Point Density and Shift-Outlier Change Detection"

[2] Sarah Paul, Imaging Science, Rochester Institute of Technology, 2007, "Investigation of Visiball Glasses Claims"

[1] Rachael Gold, Imaging Science, Rochester Institute of Technology, 2005,"Performance Analysis of the Invariant Algorithm for Target Detection in Hyperspectral Imagery"

Masters of Science

[9] Michael Harris, Imaging Science, Rochester Institute of Technology, 2014, "Material Property Extraction from High-resolution RGB Oblique Imagery"

[8] Christian Lewis, Imaging Science, Rochester Institute of Technology, 2014, "The Development of a Performance Assessment Methodology for Activity Based Intelligence: A Study of Spatial, Temporal, and Multimodal Considerations"

[7] Jordyn Stoddard, Imaging Science, Rochester Institute of Technology, 2014, "Toward Image-Based Three-Dimensional Reconstruction from Cubesats: A Study of the Impacts of Spatial Resolution and SNR on Point Cloud Quality"

[6] Maria Busuioceanu, Imaging Science, Rochester Institute of Technology, 2013, "Utility of Compressive Sensing for Remote Sensing Applications"

[5] Joshua Zollweg, Imaging Science, Rochester Institute of Technology, 2012, "Using GIS Databases for Simulated Nightlight Imagery"

[4] Sam Brisebois, Imaging Science, Rochester Institute of Technology, 2011, "The Hyper-Log-Chromaticity Space for Illuminant Invariance"

[3] Alfredo Lugo, Imaging Science, Rochester Institute of Technology, 2010, "Analysis of Multitemporal, Low Spatial Resolution, Multispectral Imagery"

[2] Justin Kwong, Imaging Science, Rochester Institute of Technology, 2009, "Hyper- and Multispectral Satellite Imagery and the Ecology of State Formation and Complex Societies"

[1] Josef Bishoff, Imaging Science, Rochester Institute of Technology, 2008, "Target Detection Using Oblique Angle Hyperspectral Imagery"

Ph.D.

[12] Lei Fan, Imaging Science, Rochester Institute of Technology

[11] Leidy Dorado-Muñoz, Imaging Science, Rochester Institute of Technology

[10] Amanda Ziemann, Imaging Science, Rochester Institute of Technology, expected 2015, "A Manifold Learning Approach to Target Detection in High Resolution Hyperspectral Imagery"

[9] Jiangqin Sun, Imaging Science, Rochester Institute of Technology, 2014, "Temporal Signature Modeling and Analysis"

[8] Shea Hagstrom, Imaging Science, Rochester Institute of Technology, 2014, "Voxel-Based LIDAR Analysis and Applications"

[7] James Albano, Imaging Science, Rochester Institute of Technology, 2013, "The Commute Time Distance Transformation and Applications to Spectral Image Processing"

[6] Weihua Sun, Imaging Science, Rochester Institute of Technology, 2013, "Urban Feature Extraction from High Resolution Multispectral Satellite Imagery"

[5] Kelly Canham, Imaging Science, Rochester Institute of Technology, 2012, "Feature Extraction from Hyperspectral Imagery in Support of Cultural Archeology in Oaxaca, Mexico"

[4] Ryan Mercovich, Imaging Science, Rochester Institute of Technology, 2011, "Anomalous Change Detection in High Resolution, Multitemporal, Multispectral Imagery"

[3] Aaron Weiner, Imaging Science, Rochester Institute of Technology, 2010, "A Systems Level Characterization of a Mobile Trace Fugitive Gas Detection Method Using Agile Fourier Transform Infrared Spectrometry"

[2] Ariel Schlamm, Imaging Science, Rochester Institute of Technology, 2010, "Detection of Man-Made Material in Large Area Search Using Hyperspectral Imagery"

[1] Shawn Higbee, Imaging Science, Rochester Institute of Technology, 2009, "Gas Plume Constituent Species Identification Using Bayesian Analysis with LWIR Hyperspectral Imagery"

INVITED PRESENTATIONS:

[21] Joint Statistical Meeting, Special Session on Far-Away Image Analysis, "Data-driven approaches to detection in complex spectral imagery", Boston, MA, July 2014

[20] Rochester Science Cafe Series, "Hyperspectral Imaging: Observing the World in Hundreds of Colors", Rochester, NY, February 2014

[19] University of Maryland, Norbert Weiner Center, February Fourier Talks, "A graphical operator framework for signature detection in hyperspectral imagery", College Park, MD, February 2014

[18] Latin American Remote Sensing conference, "Detection in Spectral Imagery Using Graphical Data Models", Santiago, Chile, October 2013

[17] Geospatial InfoFusion III Panel Discussion, "Synergistic Data Fusion through Multi-Sensing Enablement", SPIE Defense & Security Sensing, Baltimore, MD, May 2013

[16] Department of Energy Conference on Data Analysis, Invited Speaker, "Graph Theory Approaches to Spectral Image Analysis", Santa Fe, NM, February 2012

[15] GEOINT 2011, Invited Panelist, "Science & Technology Workshop: Multi-INT Fusion", October 2011

[14] Applied Imagery and Pattern Reconition (AIPR) Workshop 2011, Invited Speaker, "Imaging for Decision Making: Lessons Learned in Remote Sensing for Disaster Relief Efforts", October 2011

[13] Imaging Spectrometry XVI, Keynote Speaker, "Production of imagery-derived maps to aid the Japanese earthquake / tsunami relief effort", August 2011

[12] Optical Society of America, Rochester Chapter, Invited Speaker, "Advances in Hyperspectral Image Processing and an Overview of the RIT Support to the Haiti Relief Effort", February 2011

[11] Cornell University, Society of Physics Students, Invited Speaker, "Using Airborne or Space-based Imagery to Search Large Areas, Without Knowing What You're Looking For", February, 2011

[10] GEOINT 2010, Invited academic speaker, New Orleans, "Spatial / Spectral Large Area Search Tool Development", November 2010

[9] University of Buffalo, Department of Mechanical and Aerospace Engineering, Invited Colloquium Speaker, "Novel Approaches to Hyperspectral Image Analysis: Beyond Statistics and Linear Geometry", November 2009

[8] NSG RDT&E Forum 2.0, Member of Panel on Academic Collaboration with the Intelligence Community and the NSG, April 2009

[7] Physics Department, SUNY Brockport, Departmental Colloquium, "Spectral Remote Sensing: What is the dimension of my image, how do I calculate it, and why do I care?", March 2009

[6] Information Institute 2008, Workshop on Image and Video Processing, Air Force Research Laboratory, Rome NY, "Advanced Mathematical Approaches to Spectral Image Processing", June 2008

[5] Telops Workshop on Hyperspectral Remote Sensing, "Topological Approaches to Exploitation of Hyperspectral Imagery: Beyond Statistics and Linear Geometry", October 2007

[4] School of Mathematical Sciences, RIT, Departmental Colloquium, "Characterization of High-Dimensional Spectral Image Data", December 2006

[3] International Geoscience and Remote Sensing Symposium 2006, "Improving Background Multivariate Normality and Target Detection Performance Using Spatial and Spectral Segmentation", August 2006

[2] International Symposium on Spectral Sensing Research 2006, "Detection of Gaseous Effluents from Airborne LWIR Hyperspectral Imagery Using Physics-Based Signature Predictions", May 2006

[1] Kodak Research Laboratories Colloquium, "Exploitation Algorithms for Hyperspectral Imagery", March 2004

SELECTED PUBLICATIONS:

Book Contributions:

[2] "Fundamentals of Polarimetric Remote Sensing", John R. Schott, SPIE, April 2009

[1] "Spectral Sensing Research for Water Monitoring Applications and Frontier Science and Technology for Chemical, Biological, and Radiological Defense", eds. D. Woolard & J. Jensen, *Detection of Gaseous Effluents from Airborne LWIR Hyperspectral Imagery Using Physics-Based Signature Predictions*, **D.W. Messinger**, C. Salvaggio, N.M. Sinisgalli, World Scientific, March 2009

Refereed Articles:

[29] "A framework for streaming analysis of time series data: from recognition, to memorization, to prediction", J. Sun & **D. W. Messinger**, submitted to IEEE Trans. on Knowledge and Data Engineering, 2014

[28] "Spatial segmentation of multi/hyperspectral imagery by fusion of spectral-gradient-textural attributes", S. R. Vantaram, S. Piramanayagam, E. Saber, & **D. W. Messinger**, submitted to Journal of Applied Remote Sensing, 2014

[27] "Assessing the Impact of the Edge-Weighting Function in a Graph-Based Approach to Anomaly Detection", J. Albano, A. Ziemann, & **D. W. Messinger**, to appear in the Proceedings of WHISPERS 2013

[26] "Analysis and Utility of Atmospheric Compensation of Simulated Compressive Sensing (CS) Measurements", M. Busuioceanu, **D.W . Messinger**, J. Greer, & C. Flake, to appear in the Proceedings of WHISPERS 2013

[25] "Nearest Neighbor Diffusion Based Pan-sharpening Algorithm for Spectral Images", W. Sun, B. Chen, & **D. W. Messinger**, Optical Engineering, 53(1), January 2014

[24] "Knowledge-Based Automated Road Network Extraction System Using Multispectral Images", W. Sun & **D. W. Messinger**, Optical Engineering, 52(4), April 2013

[23] "Commute Time Distance Transformation Applied to Spectral Imagery and its Utilization in Material Clustering", J. Albano, **D. W. Messinger**, & S. Rotman, Optical Engineering, 51(7), 076202, July 2012

[22] "Interest Segmentation of Large Area Spectral Imagery for Analyst Assistance", A. Schlamm, **D. W. Messinger**, & B. Basener, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 5, no. 2, April 2012

[21] "Metrics of Spectral Image Complexity with Application to Large Area Search", **D. W. Messinger**, A. Ziemann, B. Basener, & A. Schlamm, Optical Engineering, vol. 51(3), March 2012

[20] "Encoding of Topological Information in Multi-Scale Remotely Sensed Data: Applications to Segmentation and Object-Based Image Analysis", A. H. Syed, E. Saber, & **D. W. Messinger**, IEEE Conference on Geographic Object Based Image Analysis (GEOBIA), Rio de Janeiro, Brazil, May 2012

[19] "Fusing Small-Footprint Waveform LIDAR and Hyperspectal Data for Canopy-Level Species Classification and Herbaceous Biomass Modeling in Savanna Ecosystems", M.J.D. Sarrazin, J.A.N. van Aardt, G.P. Asner, J. McGlinchy, **D. W. Messinger**, & J. Wu, Canadian Journal of Remote Sensing, vol. 37, no. 6, pp 653 - 665, December 2011

[18] "Spatially adaptive hyperspectral endmember selection and spectral unmixing", K. Canham, A. Schlamm, A. Ziemann, B. Basener, & **D. W. Messinger**, IEEE Trans. on Geoscience and Remote Sensing, vol. 49, n. 11, November 2011

[17] "Geospatial disaster response during the Haiti earthquake: A case study spanning airborne deployment, data collection, transfer, processing, and dissemination", van Aardt, J. A., McKeown, D., Faulring, J. W., Raqueno, N. G., Casterline, M. V., Renschler, C., Eguchi, R., **Messinger, D. W.**, Krzaczek, R., Cavillia, S., Antalovich, J., Philips, N., Bartlett, B.D., Salvaggio, C., Ontiveros, E.M., Gill, S., Photogrammetric Engineering and Remote Sensing, 77, 9, pp. 943-952 (2011)

[16] "Techniques for the graph representation of spectral imagery", R. Mercovich, J. Albano, and **D. W. Messinger,**, Proceedings of the 2011 IEEE WHISPERS workshop, Lisbon, Portugal, June 2011

[15] "A graph theoretic approach to anomaly detection in hyperspectral imagery", **D. W. Messinger**, and J. Albano, Proceedings of the 2011 IEEE WHISPERS workshop, Lisbon, Portugal, June 2011

[14] "Improved detection and clustering of hyperspectral image data by preprocessing with a Euclidean distance transform", A. Schlamm, and **D. W. Messinger**, Proceedings of the 2011 IEEE WHISPERS workshop, Lisbon, Portugal, June 2011

[13] "A detection-identification process with geometric target detection and subpixel spectral visualization", B. Basener, A. Schlamm, **D. W. Messinger**, and E. Ientilucci, Proceedings of the 2011 IEEE WHISPERS workshop, Lisbon, Portugal, June 2011

[12] "Spectro-polarimetric BRDF determination of in-scene materials and its use in target detection applications", B. Bartlett, M. Gartley, **D. W. Messinger**, C. Salvaggio, J. Schott, Journal of Applied Remote Sensing, Vol. 4, 043552, 1 November 2010

[11] "A Euclidean Distance Transformation for Improved Anomaly Detection in Spectral Imagery", A. Schlamm & **D. W. Messinger**, accepted for publication in the Proceedings of the 2010 IEEE WNY Image Processing Workshop, Rochester, NY, November 2010

[10] "Spectral Image Complexity Estimated Through Local Convex Hull Volume", **D. W. Messinger**, A. Ziemann, B. Basener, & A. Schlamm, Proceedings of the 2010 IEEE WHISPERS workshop, Reykjavik, Iceland, June 2010

[9] "Geometric Estimation of the Inherent Dimensionality of Single and Multi-material Clusters in Hyperspectral Imagery", A. Schlamm, **D. W. Messinger**, & B. Basener, Journal of Applied Remote Sensing, Vol. 3, 033527, 22 April 2009

[8] "Spin-Image Target Detection Algorithm Applied to Low Density 3D Point Clouds", M. Foster, J. Schott, & **D. W. Messinger**, Journal of Applied Remote Sensing, Vol. 2, 023539, 29 September 2008

[7] "Detection of Gaseous Effluents from Airborne LWIR Hyperspectral Imagery Using Physics-Based Signature Predictions", **D. W. Messinger**, C. Salvaggio, N.M. Sinisgalli, Int. Journal of High Speed Electronics and Systems, vol 17 (4) December 2007

[6] "A Comparative Evaluation of Background Characterization Techniques for Hyperspectral Unstructured Matched Filter Target Detection", J. West, **D. W. Messinger**, & J. Schott, Journal of Applied Remote Sensing, Vol 1, 013520, 13 July 2007

[5] "Landscape Classification in Regional Archaeology Survey Employing Stepwise Unmixing of Hyperspectral Imagery from the Earth Observing 1 Satellite", William D. Middleton & **D. W. Messinger**, Proceedings of the 36th International Symposium on Archeometry, Quebec City, Canada, May 2006

[4] "Three-Band Temperature Extraction from Airborne Imagery with Imprecise Atmospheric Knowledge", C. Salvaggio, M. Boonmee, N. Sinisgalli, **D. W. Messinger**, J. Geophysical Research, 111, D13107, doi: 10.1029/2005JD006770, 2006

[3] "Interstellar Polarization in the Taurus Dark Clouds: Wavelength Dependent Position Angles and Cloud Structure Near TMC - 1", **D. W. Messinger**, D.C.B. Whittet, & W.G. Roberge. Astrophysical Journal, 1997, vol 487, p. 314

[2] "Moderate Resolution Spectropolarimety of the 3 μm Ice Band Toward the BN Object", J. H. Hough, A. Chrysostomou, **D. W. Messinger**, D.K. Aitken, & P.F. Roche. Astrophysical Journal, 1996, vol 461, p. 902

[1] "Grain Alignment by Ambipolar Diffusion in Molecular Clouds", W.G. Roberge, S. Hanany, & **D. W. Messinger**. Astrophysical Journal, 1995, vol 453, p. 238

Conference Proceedings:

[84] "Effects of cubesat design parameters on image quality and feature extraction for 3D reconstruction", J. Stoddard, **D. W. Messinger**, & John Kerekes, 2014 IEEE International Geoscience and Remote Sensing Symposium (IGARSS), July 2014

[83] "Activity-based intelligence tipping and cueing using polarimetric sensors", L. Fan & **D. W. Messinger**, Polarization: Measurement, Analysis, and Remote Sensing XI, Proceedings of SPIE vol. 9099, Baltimore, MD, May 2014

[82] "A multimodal, activity-based intelligence experiment using motion imagery sensors", C. Lewis, **D. W. Messinger** & B. Neuberger, Motino Imagery for ISR and Situational Awareness II, Proceedings of SPIE vol. 9089, Baltimore, MD, May 2014

[81] "Assessment of Schrodinger eigenmaps for target detection", L. Dorado-Muñoz, **D. W. Messinger** & W. Czaja, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XX, Proceedings of SPIE vol. 9088, Baltimore, MD, May 2014

[80] "Hyperspectral target detection using graph theory models and manifold geometry via an adaptive implementation of locally linear embedding", A. Ziemann, **D. W. Messinger**, & J. Albano, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XX, Proceedings of SPIE vol. 9088, Baltimore, MD, May 2014

[79] "Schroedinger eigenmaps with nondiagonal potentials for spatial-spectral clustering of hyperspectral imagery", N. Cahill, W. Czaja, & **D. W. Messinger**, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XX, Proceedings of SPIE vol. 9088, Baltimore, MD, May 2014

[78] "Graph-based hyperspectral image segmentation with improved affinity matrix", L. Fan & **D. W. Messinger**, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XX, Proceedings of SPIE vol. 9088, Baltimore, MD, May 2014

[77] "Estimating sampling completeness of LIDAR datasets using voxel-based geometry", S. Hagstrom, **D. W. Messinger**, & K. Salvaggio, Laser RADAR Technology and Applications XIX, Proceedings of SPIE vol. 9080, Baltimore, MD, May 2014

[76] "Discrete Topology Based Hierarchical Segmentation for Efficient Object-Based Image Analyis: Application to Object Detection in High Resolution Satellite Images", A.H. Syed, E. Saber, & **D. W. Messinger**, ISPRS-International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 2013

[75] "Target detection performed on manifold approximations recovered from hyperspectral data", A. K. Ziemann, **D. W. Messinger**, & J. Albano, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XIX, Proceedings of SPIE vol. 8743, Baltimore, MD, May 2013

[74] "A semi-supervised classification algorithm using the TAD-derived background as training data", L. Fan, B. Ambeau, & **D. W. Messinger**, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XIX, Proceedings of SPIE vol. 8743, Baltimore, MD, May 2013

[73] "Target detection using the background model from the topological anomaly detection algorithm", L. P., Dorado-Muñoz, **D. W. Messinger**, & A. Ziemann, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XIX, Proceedings of SPIE vol. 8743, Baltimore, MD, May 2013

[72] "The SHARE 2012 data collection campaign", A. Giannandrea, N. Raqueno, **D. W. Messinger**, J. Faulring, J. Kerekes, J. van Aardt, K. Canham, S. Hagstrom, E. Ontiveros, A. Gerace, J. Kaufman, K. Vongsy, H. Griffith, B. Bartlett, E. Ientilucci, J. Meola, L. Scarff, & B. Daniels, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XIX, Proceedings of SPIE vol. 8743, Baltimore, MD, May 2013

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