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RESEARCH INTERESTS

- Watershed-scale modeling and managing
- Geocomputation research for improved understanding of erosional physical processes
- Information extraction and knowledge generation from geospatial datasets
- Remote sensing products and watershed modeling technology integration
- Multi-disciplinary applications of GIScience

EDUCATION

2008 **Ph.D**, Remote Sensing, GIScience, Machine Learning, Computational Sciences
The University of Mississippi, Oxford, Mississippi, Advisor: Gregory L. Easson, Ph.D.
Dissertation: *Evolutionary Computation for Information Extraction from Remotely Sensed Imagery*

2003 **M.S.**, Remote Sensing, GIS, Transportation Engineering
The University of Mississippi, Oxford, Mississippi

1999 **B.S.**, Remote Sensing, Transportation Engineering
Federal University of Santa Catarina, Florianópolis, Brazil

PROFESSIONAL POSITIONS

[**AUG/2012 – Present**] **Assistant Professor**, Department of Geosciences
Middle Tennessee State University, Murfreesboro, Tennessee

(a) PI on NSF-funded research project to investigate the formation, evolution, and long term resilience of rill and ephemeral gully channels through laboratory, field, and analytical research.

(b) Active member of the research and development team of the USDA-NRCS supported model Annualized Agricultural Non-Point Source (AnnAGNPS) pollution model. Research and development of AnnAG-NPS components to characterize sediment/chemicals sources and spatial allocation of conservation practices.

(c) Responsible for developing and implementing a new master-level graduate program in Geosciences with emphasis on Remote Sensing/GIS. Curriculum development, new courses design, student recruitment, and serving as liaison between industry and academia.

(d) Director of the Geospatial Research Center (GRC), an interdisciplinary research and educational initiative designed to increase the use and awareness of geospatial information and technology.

(e) Responsible for managing over $130,000.00 in funds allocated for building the geospatial infrastructure of the Department of Geosciences at Middle Tennessee State University.

(f) Full member of the graduate faculty and Computational Sciences Ph.D. program.

(g) Graduate advisor of six (6) master level graduate students.

(h) Received over $400,000 in external funding from NSF, USDA, NPS, and TBR, since August 2012.

(i) MTSU Campus Representative of the NASA-funded Tennessee Space Grant Consortium.

[MAR/2010 – AUG/2012], Research Civil Engineer, USDA - National Sedimentation Laboratory
Oxford, Mississippi

(a) Research to enhance temporal and spatial characterization of hydrological fluxes in agricultural watersheds for improved simulation of watershed systems physical processes.

(b) Development of novel technology based on Ground-Based LiDAR and close-range digital photogrammetry designed to support field and laboratory experiments investigating ephemeral gully channel formation and evolution.

(c) Research on computational sciences methods for efficient processing of large number of LiDAR-generated point clouds to produce hydrologically corrected topographic surface representations.

(d) Research on uncertainty and sensitivity analysis of watershed-scale modeling tools, such as AnnAGNPS and RULSE2.

[MAR/2010 – Present], Adjunct Assistant Professor, Dept. of Geology and Geological Engineering
The University of Mississippi, University, Mississippi

(a) Co-advised one (1) master-level student and one (1) Ph.D. level graduate student.

(b) Collaborative work on applied remote sensing projects.

[JAN/2014 – Present], Adjunct Assistant Professor, Dept. of Computer and Electrical Engineering
Tennessee State University, Nashville, Tennessee

(a) Full member of the graduate faculty.

(b) Co-advised two (2) master-level student and currently co-advising one (1) Ph.D. level graduate student.

(c) Collaborative work on research to integrate evolutionary computation with distributed cloud-computing technology to for improved information extraction from imagery.

[JUL/2008 – MAR/2010], Visiting Assistant Professor, Dept. of Geology and Geological Engineering
The University of Mississippi, University, Mississippi

(a) Researched novel feature extraction methods to quantitatively access infrastructure damage caused by disasters (natural or man-made) through remotely sensed imagery. My responsibilities involved playing an active role in the overall project management, overseeing the remote sensing component of the project, and supervising student workers.

(b) Developed and taught courses at undergraduate and graduate level using GIS, spatial analysis, and remote sensing techniques and theories.

(c) Active member of a multi-disciplinary committee to implement a new graduate degree program (master level) in Engineering Sciences with emphasis in Geographic Information Science and Technology (GIS&T) at the School of Engineering.

(d) Other duties included writing research grant proposals, coordinating existing collaborative research projects, peer-reviewed publications, and graduate student advising.

PUBLICATIONS (underline indicates students mentored)

Peer-Reviewed Articles

[20] **Momm, H.G.**, R.R. Wells, and R.L. Bingner, [2015]. GIS Technology for Spatiotemporal Gully Channel Evolution Measurements in Landscapes. *Natural Hazard*. pp. 1-16, doi: 10.1007/s11069-015-1615-z. (web)

[19] Wells, R.R., S.J. Bennett, R.L. Bingner, S.M. Dabney, E.J. Langendoen, **H.G. Momm**, M.J.M. Romkens, and G.V. Wilson, [2015]. USDA-ARS National Sedimentation Laboratory: A Historic Perspective. *Journal of Water Resource and Protection*. **7**, pp. 228-246, doi: 10.4236/jwarp.2015.73019. (web)

[18] Gesch, K.R., R.R. Wells, R.M. Cruise, **H.G. Momm**, and S.M. Dabney, [2015]. Quantifying uncertainty of measuring gully morphological evolution with close-range digital photogrammetry. *Soil Science Society of America Journal*. doi:10.2136/sssaj2014.10.0396. (web)

[17] **Momm, H.G.**, R.L. Bingner, Y. Yuan, M.A. Locke, and R.R. Wells, [2014]. Spatial Characterization of Riparian Buffer Effects on Sediment Loads from Watershed Systems. *Journal of Environmental Quality*. **43**:5, pp. 1736-1753. (web)

[16] Wells, R.R., **H.G. Momm**, J.R. Rigby, S.J. Bennett, R.L. Bingner, R.R. Wells, and S.M. Dabney, [2013]. An empirical investigation of gully widening rates in upland concentrated flows. *Catina*. **101**, pp. 114-121. (web)

[15] **Momm, H.G.**, R.L. Bingner, R.R. Wells, J.R. Rigby, S.M. Dabney, [2013]. Effect of topographic characteristics on compound topographic index for identification of gully channel initiation locations. *Transactions of ASABE*, **56**:2, 523-537.

[14] Quan, B, M.J.M. Romkens, R.L. Bingner, **H.G. Momm**, D. Wilcox, [2013]. Changes in Spatiotemporal Land Use Patterns in Selected Hydrogeomorphic Areas of China and the USA, *International Journal of Geosciences*, **4**:3, pp. 537–548, doi: 10.4236/ijg.2013.43049. (web)

[13] **Momm, H.G.**, R.L. Bingner, R.R. Wells, S.M. Dabney, and L.D. Frees, [2013]. Effect of Terrestrial LiDAR Point Sampling Density in Ephemeral Gully Characterization. *Open Journal of Modern Hydrology*. **3**, pp. 38-49, doi: 10.4236/ojmh.2013.31006. (web)

[12] Easson, C.G., M. Slattery, **H.G. Momm**, J.B. Olson, R.W. Thacker,and D.J. Gochfeld, [2013]. "Exploring Individual- to Population-Level Impacts of Disease on Coral Reef Sponges: Using Spatial Analysis to Assess the Fate, Dynamics, and Transmission of *A*plysina Red Band Syndrome (ARBS)". *PLoS ONE* **8**:11, doi:10.1371/journal.pone.0079976. (web)

[11] **Momm, H.G.**, R.L. Bingner, R.R. Wells, and D. Wilcox, [2012]. AGNPS GIS-based Tool for Watershed-Scale Identification and Mapping of Cropland Potential Ephemeral Gullies. *Applied Engineering in Agriculture Journal*, **28**:1, pp 1–13.

[10] **Momm, H.G.** and G. Easson, [2011]. Evolving spectral transformations for multitemporal information extraction using evolutionary computation. *Journal of Applied Remote Sensing*. **5:**1, pp. 053564-18.

[09] Correa V.S., A.L. Cerdeira, A.L. Fachin, B.W. Bertoni, P.S. Pereira, S.C. Franca, **H.G. Momm**, R.M. Moraes, and A.M.S. Pereira, [2011]. Assessment of Stryphnodendron adstringens (Mart.) Coville for establishing an in situ germplasm bank in Brazil. *Genetic Resources and Crop Evolution*, **59**:7, pp. 1349–1356.

[08] Morel, L.J.F., D.M. Baratto, P.S. Pereira, S.H.T. Contini, **H.G. Momm**, B.W. Bertoni, S.C. Franca, and A.M.S. Pereira, [2011]. Loganin production in Palicourea rigida H. B. K. (Rubiaceae) from populations native to Brazilian Cerrado. *Journal of Medicinal Plants Research*. **5**:12, pp. 2559–2565.

[07] **Momm, H. G.** , G. Easson, and R. Bingner, [2011]. Evaluation of the use of Remotely Sensed Evapotranspiration Estimates into AnnAGNPS Pollution Model. *Ecohydrology*, **4**:5, pp. 650–660.(web)

[06] Easson, G.L., S. Delozier, and **H. G. Momm**, [2010]. Estimating Speed and Direction of Small Dynamic Targets through Optical Satellite Imaging. *Remote Sensing*, **2**:5, pp. 1331–1347.(web)

[05] **Momm, H. G.** and G. Easson, [2010]. Evolutionary Computation for Remote Sensing Applications. *Geography Compass*, 4:3, pp. 172–192.(web)

[04] **Momm, H. G.**, G. Easson, and J. Kuszmaul, [2009]. Evaluation of the Use of Spectral and Textural Information by an Evolutionary Algorithm for Multi-Spectral Imagery Classification. *Computers, Environment and Urban Systems*, **33**, pp. 463–471.(web)

[03] **Momm, H. G.**, G. Easson, and J. Kuszmaul, [2008]. Uncertainty analysis of an evolutionary algorithm to develop remote sensing spectral indices, in Image Processing: Algorithms and Systems VI, edited by Jaakko T. Astola, Karen O. Egiazarian, Edward R. Dougherty, Proceedings of SPIE-IS&T Electronic Imaging, SPIE Vol. 6812, 68120A. (Manuscript reviewed).(web)

[02] Cerdeira, A.L., L.C. Paraiba, K. Kataguiri, D. Bolonhezi, M.A.F. Gomes, C.A. Spadotto, C.F. Neto, M.B. Matallo, and **H.G. Momm**, [2008]. Nitrate in Groundwater in Ribeirao Preto City Area in Brazil, *Pesticidas: Revista de Ecotoxicologia e Meio Ambiente*, **18**, pp. 1-8.

[01] Moraes, R.M., **H.G. Momm**, B. Silva, V. Maddox, H. Lata, G. Easson, and D. Ferreira, [2005]. Geographic Information System Method for Assessing Chemo-Diversity in Medicinal Plants. *Planta Medica*, **71**, pp. 1157-1164.

Full Length Conference Articles

[18] Gao, P., **H.G. Momm**, and S. Shetty, [2014]. Evolutionary Computation for Feature Extraction from Remotely Sensed Imagery: Exploration of Optimal Parameters. Proceedings of the PECORA 19 conference. Denver, Colorado, U.S.A., November 17-20. [8 pages]

[17] Almutairi, L.M., S. Shetty, and **H.G. Momm**, [2014]. Scalable Evolutionary Computation for Efficient Information Extraction from Remote Sensed Imagery. Proceedings of the PECORA 19 conference. Denver, Colorado, U.S.A., November 17-20. [7 pages]

[16] Bingner R., R. Kuhnle, R.R. Wells, **H.G. Momm**, M. Altinakar, J. Singh, and D. Shen, [2014].Watershed Runoff and Sediment Transport Impacts from Management Decisions Using Integrated AnnAGNPS and CCHE1D Models. Proceedings of the 11th International Conference on Hydroscience & Engineering: Hydro-Engineering for Environmental Challenges, Hamburg, Germany, 28 September to 2 October. [8 pages]

[15] Williams, S., **H.G. Momm**, and R.L. Bingner, [2013]. Watershed-scale characterization of riparian vegetation as potential filter strips using multi-source remote sensing, Published in proceedings of the ASPRS 2013 Annual Conference - Baltimore, Maryland, USA, March 24–28. [7 pages]

[14] **Momm, H.G.**, R.L. Bingner, R.R. Wells, and S.M. Dabney, [2011]. Analysis of Topographic Attributes for Identification of Ephemeral Gully Channel Initiation in Agricultural Watersheds. Published in the proceedings of the ASABE Annual International Meeting, Paper number 1111250, Louisville, Kentucky, USA, August 7-10. [14 pages]

[13] Wells, R.R., **H.G. Momm**, S.J. Bennett, R.L. Bingner, and S.M. Dabney, [2011]. An Experimental Study of Gully Sidewall Expansion. Published in the proceedings of the International Symposium on Erosion and Landscape Evolution, Anchorage, Alaska, September 18-21, 2011. [9 pages]

[12] **Momm, H.G.**, R.R. Wells, R.L. Bingner, and S.M. Dabney, [2011]. Gully Evolution in Agricultural Fields Using Ground-Based LiDAR. Published in the proceedings of the International Symposium on Erosion and Landscape Evolution, Anchorage, Alaska, September 18-21, 2011. [8 pages]

[11] **Momm, H.G.**, R.L. Bingner, R.R. Wells, and S.M. Dabney, [2011]. Application of Ground-Based LiDAR for Gully Investigation in Agricultural Landscapes, Published in the proceedings of the ASPRS 2011 Annual Conference - Milwaukee, Wisconsin, USA, May 1-5. [10 pages]

[10] Bingner, R.L, R.R. Wells, **H.G. Momm**, F.D. Theurer and L.D. Frees [2010]. Development and Application of Gully Erosion Components within the USDA AnnAGNPS Watershed Model for Precision Conservation, Published in the proceedings of 10th International Conference on Precision Agriculture, July 18-21, Denver, Colorado, USA. [15 pages]

[09] **Momm, H.G.**, G.L. Easson, and B. Gunter, [2010]. Improved feature extraction from high-resolution remotely sensed imagery using object geometry, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XVI, edited by Sylvia Shen and Paul Lewis, Published in the proceeding of the Proceedings of the SPIE Defense, Security and Sensing Symposium, SPIE, Vol. 7695, 76951C, Orlando, Florida, USA, April 5-9. [11 pages]

[08] Bingner, R., **H.G. Momm**, and G. Easson, [2009]. Remote Sensing Applications in Soil and Water Management. Published in the proceedings of the American Society of Agricultural and Biological Engineers Annual International Meeting, Reno, Nevada, June 21-24.

[07] **Momm, H.G.**, G. Easson, and R. Binger, [2009]. Comparison of MODIS and Proxy-VIIRS Derived Evapotranspiration Estimates for Improved Agricultural Best Practices Assessment. Published in the proceedings of the ASPRS 2009 Annual Conference - Baltimore, Maryland, USA, March 9-13. [10 pages]

[06] **Momm, H.G.**, G. Easson, and J. Kuszmaul, [2007]. Integration of Logistic Regression and Genetic Programming to Model Coastal Louisiana Land Loss Using Remote Sensing. Proceedings of the ASPRS 2007 Annual Conference - Tampa, Florida, May 1-5. [8 pages]

[05] **Momm, H.G.**, H. Robinson, G. Easson, and H. Sloan, [2006]. Web-based delivery of geospatial and transportation data for a rural intelligent transportation systems project. Published in the proceedings of the "Tools of Trade" 10th National Conference on Transportation Planning for Small and Medium-Sized Communities. Nashville, Tennessee, September 13-15. [9 pages]

[04] **Momm, H.G.**, G. Easson, and D. Wilkins, [2006]. Genetic Programming as a Preprocessing Tool to Aid Multi-Temporal Imagery Classification. Published in the proceedings of the ASPRS 2006 Annual Conference - Reno, Nevada, May 1-5. [10 pages]

[03] Uddin, W. and **H.G. Momm**, [2003]. Airborne and Spaceborne Remote Sensing Terrain Mapping for Planning and Design of Transportation Infrastructure Assets. Airports: Planning, Infrastructure and Environment - International Conference, Rio de Janeiro - RJ - Brazil, June 8-11. [15 pages]

[02] Uddin, W., **H.G. Momm**, and S. Garza, [2003]. Application of the PEDD Methodology of Modulus Backcalculation for TRB Nonlinear Pavement Analysis Project. Published in the proceedings of the 82nd Annual Meeting of the Transportation Research Board Washington, D.C., USA, January. [24 pages]

[01] Boriboonsonsin, K. and **H.G. Momm**, [2002]. Evaluation of Asphalt Pavement Damage Models Using LTPP Data in Northern Mississippi, International Contest on LTPP Data Analysis 3rd Year, 2001 - 2002. [19 pages]

[31] **Momm, H.G.**, R.L. Bingner, L. Kraemer, and R.R. Wells, [2015]. Integrating GIS With AnnAGNPS Watershed Model for Optimal Placement of Conservation Practices in Agricultural Watersheds. 10th Federal Interagency Sedimentation Conference, Reno, Nevada, U.S.A, April 19-23.

[30] **Momm, H.G.**, A. Giley, and R.L. Bingner, [2015]. Evaluating the Impact of Wetlands on Targeting and Integrating Conservation Practices in Watershed Systems. Tennessee Water Resources Symposium, Burns, Tennessee, U.S.A., April 1-3.

[29] Wells, R.R., **H.G. Momm**, S.J. Bennett, and S.M. Dabney, [2015]. Gully measurement strategies in a pixel using Python. European Geosciences Union - General Assembly, Vienna, Austria, April 12-17.

[28] **Momm, H.G.**, [2014]. Automating ArcGIS Geoprocessing Tasks using Python Scripts: An Overview, The 13th Middle Regional TNGIC Forum On Geographic Information Systems. Murfreesboro, Tennessee, U.S.A., November 19-20.

[27] **Momm, H.G.**, I. Murray, S.W. Williams, and Z. Law, [2014]. Applied GIS methodology for LiDAR point cloud classification, 2014 AutoCarto Conference, Pittsburgh, Pennsylvania, U.S.A., October 6-8.

[26] **Momm, H.G.**, R.R. Wells, and A. McCloud, [2014]. Using spatial-autocorrelation to quantify drainage network spatial persistence, 2014 AutoCarto Conference, Pittsburgh, Pennsylvania, U.S.A., October 6-8.

[25] Bingner, R.L., J.A. Kostel, J.J. Monchak, Y. Yuan, and **H.G. Momm**, [2014]. Evaluating Wetland Impacts on Nutrient Loads within Watershed Systems Using AnnAGNPS, 69th SWCS International Annual Conference, Lombard, Illinois, USA, July 27-30.

[24] Bingner, R.L., A. Sadeghi, **H.G. Momm**, C. Graff, G. McCarty, and Y. Yuan, [2014]. Conservation Practice Impacts on Nutrient Loads from the Maryland CEAP Choptank Watershed using AnnAGNPS, 69th SWCS International Annual Conference, Lombard, Illinois, USA, July 27-30.

[23] Bingner, R.L., Y. Yuan, **H.G. Momm**, and M. Anderson, [2014]. Evaluation of Watershed Conservation Management Practices to reduce Pollutant Loads in Grand Lake St. Marys Using AnnAGNPS, 69th SWCS International Annual Conference, Lombard, Illinois, USA, July 27-30.

[22] Gesh, K.R., R.R. Wells, **H.G. Momm**, S. Dabney, and R. Cruse, [2014]. Quantification of ephemeral gully erosion with close range digital photogrammetry, 69th SWCS International Annual Conference, Lombard, Illinois, USA, July 27-30.

[21] **Momm, H.G.**, R.L. Bingner, and Y. Yuan, [2013]. Watershed-Scale Evaluation of Riparian Vegetation Impacts on Water Quality. Presentation at the 23rd Tennessee Water Resources Symposium, Burns, Tennessee, USA, April 3-5.

[20] **Momm, H.G.**, R.R. Wells, and R.L. Bingner, [2013]. Measuring Gully Channel Widening using Open Source and Commercial GIS, Proceedings of the 6th International Symposium on Gully Erosion in a Changing World, Iasi, Romania, 06-12 May.

[19] Wells, R.R., **H.G. Momm**, J.R. Rigby, S.J. Bennett, R.L. Bingner, and S.M. Dabney, [2013]. Gully Widening: Effects of Slope and Discharge. Proceedings of the 6th International Symposium on Gully Erosion in a Changing World, Iasi, Romania, 06-12 May.

[18] Wells R.R., R.L. Bingner, C.V. Alonso, S.J. Bennett, J. Casali, S.M. Dabney, L.M. Gordon, E.J. Langendoen, **H.G. Momm**, M.J.M. Romkens, and G.V. Wilson, [2013]. An Introspective Look at Gully Erosion Research: Past, Present and Future. Proceedings of the 6th International Symposium on Gully Erosion in a Changing World, Iasi, Romania, 06-12 May.

[17] Easson, C., D.J. Gochfeld, M. Slattery, **H.G. Momm**, J.B. Olson, and R.W. Thacker, [2013]. Inferring process from pattern: determining a transmission mechanism for Aplysina Red Band Syndrome (ARBS) in natural sponge populations using spatial analysis. Proceedings of the 42nd Benthic Ecology Meeting, Savannah, Georgia, March 20-24.

[16] Nordberg, E.N., V.A. Cobb, and **H.G. Momm**, [2013]. Large Ranging Snakes in a Small Nature Preserve: The Seasonal Movement Patterns of Timber Rattlesnakes (*Crotalus horridus*) in Middle Tennessee. Proceedings of the Southeast Partners in Amphibian and Reptile Conservation (SEPARC), McCormick, South Carolina, USA, February 21-24.

[15] Bingner R. L., **H.G. Momm**, R.R. Wells, and S.M. Dabney, [2012]. Contributions and Concerns of Concentrated Flow Erosion and Assessment Technologies in Watershed Systems. EGU General Assembly Conference, Vienna, Austria, 22 - 27 April.

[14] Ursic, M.E., E.J. Langendoen, **H.G. Momm**, D. G. Wren, and R. A. Kuhnle, [2012]. Using terrestrial LiDAR to characterize morphology and texture of a sand and gravel bed in a laboratory flume. Proceedings of the 2012 Hydraulic Measurements and Experimental Methods Conference, Snowbird, Utah, USA, August 12-15.

[13] Bingner, R.L., **H.G. Momm**, T.G. Mueller, Y. Yuan, and M.A. Locke, [2012]. Assessment of Riparian Buffers as an Alternative Conservation Practice using the USDA AnnAGNPS Watershed Pollutant Loading Model. Proceedings of the 67th International SWCS Annual Conference, Fort Worth, Texas, USA, July 22-25.

[12] **Momm, H.G.**, R.L. Bingner, R.R. Wells, and J.R. Bingner, [2012]. Effect of Topographic Characteristics on Compound Topographic Index for Identification of Gully Channel Initiation Location. Proceedings of the 67th International SWCS Annual Conference, Fort Worth, Texas, USA, July 22-25.

[11] **Momm, H.G.** and G. Easson, [2011]. Bridging the Semantic Gap Using Evolutionary Computation, Proceedings of the ASPRS 2011 Annual Conference - Milwaukee, Wisconsin, USA, May 1-5.

[10] **Momm, H.G.** and G. Easson G. [2010]. Population Restarting: A Study Case of Feature Extraction From Remotely Sensed Imagery Using Textural Information. Proceedings of the 12th Annual Conference on Genetic and Evolutionary Computation, Portland, Oregon, USA July 07-11.

[09] Easson, C., D. Gochfeld, **H.G. Momm**, M. Slattery, J. Olson, R.W. Thacker, [2010] Mapping impacts of disease on sponge communities using Geographic Information Systems (GIS). International Sponge Symposium, Girona, Spain, September 20-24.

[08] **Momm, H.G.** and G. Easson, [2009]. Improved Feature Extraction from High Resolution Remotely Sensed Imagery using Object Geometry. The 10th Annual Conference on High Technology - Jackson, Mississippi, USA, November 18-19.

[07] **Momm, H.G.** and G. Easson, [2008]. Assessment of a Non-linear Optimization Algorithm for Imagery Classification. Journal of the Mississippi Academy of Sciences, Vol. 53, No 1, pp. 96. [Awarded best research presentation in the Mathematics, Computer Science and Statistic Division]

[06] **Momm, H.G.**, J. Kuszmaul, and G. Easson, [2007]. Coastal Louisiana Land Loss Modeling: An Optimized Logistic Regression Approach. Proceedings of the Mid-South Area Engineering and Sciences Conference, The University of Mississippi, Oxford, Mississippi, USA, May 17-18.

[05] **Momm, H.G.** and G. Easson, [2006]. Quantitative Comparison of Dense Cloud Detection of an Evolutionary Image Classification Algorithm to the MODIS Cloud Mask and to the VIIRS Cloud Mask. AGU Fall Meeting, San Francisco, California, USA, December 11-15.

[04] **Momm, H.G.**, H. Robinson, G. Easson, and H. Sloan, [2005]. Web-based Searching and Delivery of Geospatial Data Using ArcIMS and MYSQL. Sigma Xi Student Research Poster Symposium, University, Mississippi, USA.

[03] **Momm, H.G.**, B. Silva, V. Maddox, G. Easson, H. Lata, D. Ferreira, and R.M. Moraes, [2004]. The Use of Geographic Information Systems as a Decision Making Tool for the Domestication and Conservation of Medicinal Species. CD Proceedings of the III International Symposium in Breeding Research on Medicinal and Aromatic Plants. Campinas - SP - Brazil July 5-8, 2004.

[02] **Momm, H.G.**, H. Robinson, G. Easson, and H. Sloan [2004]. Use of GIS Visualization Tools to Aid in Locating Traffic Monitoring Cameras. Sigma Xi Student Research Poster Symposium, University, Mississippi, USA.

[01] **Momm, H.G.**, B. Silva, V. Maddox, G. Easson, H. Lata, D. Ferreira, and R.M. Moraes, [2004]. GIS Methodology: A Tool for Accessing Chemo-Diversity in Medicinal Plants. Natural Center for Natural Products Research Poster Symposium, University, Mississippi, USA.

Book Chapters

[02] **Momm, H.G.**, R.L. Bingner, R.R. Wells, and S.D. Dabney, [2011]. Methods for Gully Characterization in Agricultural Croplands using Ground-Based Light Detection and Ranging. *Sediment Transport Flow and Morphological Processes*. ABM Faruk Bhuiyan (Ed.), ISBN 978-953-307-374-3, InTech.(web)

[01] **Momm, H.G.** and G. Easson, [2011]. Feature Extraction from High-Resolution Remotely Sensed Imagery using Evolutionary Computation, *Evolutionary Algorithms*, Eisuke Kita (Ed.), ISBN: 978-953-307-171-8, InTech. (web)

Technical Reports

[05] **Momm, H.G.**, Z. Law, S.N. Hidayati,J. Walck, K. Sadler, M. Abolins, L. Simpson, and J. Aber, [in press]. National Resource Condition Assessment for Stones River National Battlefield. National Park Service, Fort Collins, Colorado.

[04] Wilson G.V., R.R. Wells, S.M. Dabney, **H.G. Momm**, A.J. Hudspeth, E.A. Gregory, and R. Saunders, [2011]. Above Ground Plots at the MAFES-Holly Springs Experiment Station for Studying Impacts of Seepage on Erosion. National Sedimentation Laboratory Tech. Research Report No. 78. Oxford, MS. Watershed Physical Process Research Unit, National Sedimentation Laboratory.

[03] Easson, G.,B. Davis, **H.G. Momm**, and K. Holekamp, [2010]. SERRI Project: Specification, Validation, and Verification of Imagery Products for Disaster Management and Response. SERRI Report 63889-02.

[02] Easson, G., **H.G. Momm**, and R. Bingner, [2009]. Evaluation for the Integration of a Virtual Evapotranspiration Sensor Based on VIIRS and Passive Microwave Sensors into the Annualized Agricultural Non-Point Source [AnnAGNPS] Pollution Model. Technical Report of the NASA - Rapid Prototyping Capability Research Grant No: NNS06AA98B, Order No: NNS07AA57T.

[01] Kuszmaul, J., **H.G. Momm**, and G. Easson, [2007]. Rapid Prototyping of NASA Next Generation Sensors for the SERVIR System of Fire Detection in Mesoamerica. Technical Report of the NASA - Rapid Prototyping Capability Research Grant No. DONNS06AA65D.

Forthcoming

[03] **Momm, H.G.**, R.L. Bingner, <u>R. Emilaire</u>, J. Garbrecht, R.R. Wells, and R.A. Kuhnle. Multi-objective landscape-based optimization of watershed discretization for improved pollutant loading simulations. Under review for publication in the Journal of the American Water Resources Association.

[02] Wells, R.R., **H.G. Momm**, K. Gesch, S. Dabney, and R. Cruse. Quantification of ephemeral gully erosion in Iowa farm fields. Under review for publication in the Soil Science Society of America Journal.

[01] Bingner, R.L., R.R. Wells, **H.G. Momm**, J.R. Rigby, and F.D. Theurer. Ephemeral gully channel width and erosion simulation technology. Under review for publication in the Natural Hazard Journal.

Invited Presentations

- Invited talk in the Agricultural & Biosystems Engineering graduate seminar at Iowa State University, with presentation entitled: "Spatial-Temporal Characterization of Ephemeral Gullies Using Geospatial Technology: Field, Laboratory, and Model Development". (APR 28, 2014).

- Invited talk in the NSF-funded Workshop on Semantics in Geospatial Architectures: Applications and Implementations, organized by the SOCoP INTEROP at the University of Wisconsin-Madison, with presentation titled: "Developing Semantics Rules using Evolutionary Computation for Information Extraction from Remotely Sensed Imagery". (OCT 28-29, 2013)

- Invited talk in the Vanderbilt University's Department of Earth and Environmental Sciences colloquium series with presentation titled "Information Extraction from Remotely Sensed Datasets for Urban and Natural Resource Studies". (SEP 19, 2013)

- Invited talk in the graduate seminar in the Civil and Environmental Engineering Department at Tennessee Technological University, with presentation titled: "Spatial-Temporal Investigation of Ephemeral Gully Channel Evolution Using Geospatial Technology: Field, Laboratory, and Model Development". (SEP 10, 2013)

- Invited talk in the Principal Investigators meeting in the Earth and Environmental Sciences Department at Vanderbilt University with presentation titled: "Remote Sensing Research for Spatial-Temporal Quantification of Vulnerability Dynamics: Introductory Remarks". (SEP 13, 2013)

- Invited talks at the Hunan University of Science and Technology (China) with presentations titled: "Integration of Remote Sensing, GIS and the AnnGNPS model for Analysis of Pollutant Loads in Agricultural Watersheds","Use of Remotely Sensed Climate Data for Evapotranspiration Estimates into the AnnAGNPS Pollution Model", and "Effect of Topographic Characteristics on Compound Topographic Index for Identification of Gully Channel Initiation Locations". (MAY 28–31, 2013)

- Invited talk at Guangzhou University (China) with presentation titled: "Integration of Remote Sensing and GIS Technology into the USDA-AnnGNPS Pollution Model". (JUNE 3, 2013)

- Invited talk in the 9$^{\text{th}}$ meeting of the TN State & Federal GIS User Group in Cookeville, TN, with presentaion titled "Batch Processing in ArcGIS using Python Scripts: An Introduction". (AUG 9, 2013)

- Invited talk at the Ribeirao Preto University (UNAERP) in Riberao Preto, Sao Paulo, Brazil, with presentation titled: "Geographic Information Science and Technology for Domestication and Conservation of Medicinal Plants". (JUL 8, 2004)

- Invited talk at the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHA-LAC), City of Knowledge, Panama City, Panama, with presentation titled: "Rapid Prototyping of NASA Next Generation Sensors for the SERVIR System of Fire Detection in Mesoamerica". (AUG 19, 2008)

EXTERNAL FUNDING ACTIVITIES

<u>Middle Tennessee State University</u>(Only pending and funded are listed.)

Status: **Pending**	Amount: **$270,441**
Title:	Domain Knowledge Formalization and Utilization for Information Extraction from Remotely Sensed Imagery using Evolutionary Computation
Agency:	National Geospatial Agency
Role :	Principal Investigator
Collaborators:	Sachin Shetty - Tennessee State University

Status: **Pending**	Amount: **$396,157**
Title:	Enhanced GIS Database for TDOT Legacy Data
Agency:	Tennessee Department of Transportation
Role :	Co-Investigator
Collaborators:	Vanderbilt University

Status: **Pending**	Amount: **$106,194**
Title:	2015-18 Tennessee Space Grant Consortium MTSU Campus Request
Agency:	NASA
Role :	Principal Investigator
Collaborators:	Vanderbilt University

Status: **Funded**	Amount: **$275,000**
Title:	RUI–Collaborative Research: Pattern emergence and resilience of rill networks and their relation to soil loss, landscape degradation, and erosion prediction technology
Agency:	National Science Foundation
Role :	Principal Investigator
Collaborators:	S. Bennet (SUNY Buffalo) and R.R. Wells (USDA - National Sedimentation Laboratory)

Status: **Funded**	Amount: **$40,000**
Title:	Aiding Student Success in STEM: A pilot project engaging students in multi-disciplinary Geographic Information Systems (GIS) research projects
Agency:	Tennessee Board of Regents
Role :	Co–Investigator
Collaborators:	M. Wilson (Austin Peay State University)

Status: **Funded**	Amount: **$10,000**
Title:	Technologies for Managing Water and Sediment Movement in Agricultural Watersheds
Agency:	U.S. Department of Agriculture – National Sedimentation Laboratory
Role :	Principal Investigator
Collaborators:	S. Dabney (USDA - National Sedimentation Laboratory

Status: **Funded**   Amount: **$65,119**
Title: Natural Resource Assessment (NRCA) of the Stones River National Battlefield Park
Agency: National Park Service
Role :   Principal Investigator
Collaborators: Co-PI: Zada Law, Co-PI: Kim Sadler, Co-PI: Jeffrey Walck, Co-PI: Jeremy Aber

Status: **Funded**   Amount: **$80,000**
Title: Estimating the Future Demands on Agricultural Freight Transport in the Upper Mid-West US due to Climate Change using Remote Sensing and Regional Climate Models
Agency: National Center for Freight and Infrastructure Research and Education
Role: Co-Investigator
Collaborators: J. (Vanderbilt University) and M. Miller (University of Wisconsin-Madison)

Status: **Funded**   Amount: **$39,031**
Title: More Efficient Science Calculation of the Revised Universal Soil Loss Equation, Version 2 (RUSLE2)
Agency: U.S. Department of Agriculture – National Sedimentation Laboratory
Role :   Principal Investigator
Collaborators: University of Tennessee Knoxville

Status: **Funded**   Amount: **$20,556**
Title: Geosciences Research for Improved Ecosystem Service Evaluations and Assessments
Agency: U.S. Department of Agriculture – National Sedimentation Laboratory
Role :   Principal Investigator
Collaborators:

Status: **Funded**   Amount: **$14,000**
Title: Geospatial Technology Research For Characterization of Watershed Processes at Multiple Scales
Agency: U.S. Department of Agriculture – National Sedimentation Laboratory
Role :   Principal Investigator
Collaborators:

The University of Mississippi

Status: **Selected***   Amount: **$282,613**
Title: Target Detection from multi temporal imagery using evolutionary computation
Agency: NGA - University Research Initiative
Role: Principal Investigator
Collaborators: G.L. Easson (The University of Mississippi)
                  *This project was selected but not awarded due to the lack of funds.

Status: **Funded**   Amount: **$275,667**
Title: Evaluation of the Integration of a Virtual Evapotranspiration Sensor Based on VI-IRS and Passive Microwave Sensors into the Annualized Agricultural Non-Point Source Pollution Model
Agency: NASA
Role :   Not Listed. As a graduate student I could not assume an investigator role. I designed the research, wrote the entire grant proposal, designed and implemented all the experiments, and worked on the results documentation.
Collaborators: G.L. Easson (The University of Mississippi) and NASA-Stennis Space Center

INTERNAL FUNDING ACTIVITIES AT MTSU

Replacement of computing infrastructure of the Department of Geosciences main teaching laboratory.	$33,453.00
Faculty Development Grant to attend the "Application Development with IDL" course in Boulder, CO.	$1,434.00
TBR Access and Diversity Grant	
(i). American Society of Photogrammetry and Remote Sensing (ASPRS) Annual Meeting, Baltimore, MD	$1,959.00
(ii). 6th Int. Symposium on Gully Erosion in a Changing World, Iasi, Romania	$3,647.00
Faculty Research and Creative Activity	$5,376.00

HONORS AND AWARDS

Awarded best research presentation in the Mathematics, Computer Science and Statistic Division, Mississippi Academy of Sciences, 2008.
Graduate Student Honor Society.

TEACHING

Courses Taught/Scheduled (underline indicates new developed course)

Middle Tennessee State University - Department of Geosciences

PEOG 6070 – Quantitative Methods in Geosciences: SP16

PEOG 4511/5511 – Advanced Remote Sensing (hyperspectral and RADAR): FA15

PEOG 6060 – Advanced Topics in Geosciences: SP15,SU15

PEOG 4289 – Topics and Problems in Physical Geography: FA14

GEOL 6030 – Geosciences Colloquium: FA14

PEOG 6040 – Geospatial Systems and Applications (watershed modeling with GIS): FA14,SP16

PGEO 6050 - Programming for Geospatial Database Applications: SP14,FA15

PGEO 4570/5570 – Advanced Geographic Information Systems (GIS): FA13, SP15

PGEO 4560/5560 – Intermediate Geographic Information Systems (GIS): SP13

PGEO 4530/5530 – Introduction to Geographic Information Systems (GIS): FA12

The University of Mississippi - Department of Geology and Geological Engineering

GE 511 – Spatial Analysis: SP10, SP09

GE 500 – Remote Sensing: SP09

Geol 500/GE 470 – Introduction to Geographic Information Systems: FA09, FA08

ENGR 6200 – Advanced Remote Sensing: Hyperspectral: FA09

Geol 615 – Geometrics: FA08

The University of Mississippi - Department of Civil Engineering

ENGR 207 – Engineering Graphics I (AutoCAD): SP2002, FA2002, and SU2006

MENTORING AND ADVISING

<u>PhD Dissertations</u>

Co-advisor. Cole Easson. **Individual and Population Responses of a Common Caribbean Sponge, Aplysina Couliformis, to Combinations of Natural and Anthropogenic Stressors**, The University of Mississippi, Environmental Toxicology, Spring 2013.

<u>Master Theses and Projects</u>

Co-advisor. Lindsey Langsdon. **A GIS Investigation of Regional Geologic Controls on Mercury Deposits in the Southwest Region of Arkansas**. The University of Mississippi, Department of Geology and Geological Engineering, August 2011.

Co-advisor. Laila Muthyib Almutairi. **Scalable Evolutionary Computation for Efficient Information Extraction from Remote Sensed Imagery**. Tennessee State University, Computer and Information Systems Engineering, Summer 2014.

<u>Master Theses and Projects (In Progress)</u>

Advisor. Alexander McCloud. **Tentative title: Using spatiotemporal analysis to quantify drainage network spatial persistence**. Middle Tennessee State University, Department of Geosciences, in progress.

Advisor. Ian Murray. **Tentative title: Applied GIS methodology for LiDAR point cloud classification**. Middle Tennessee State University, Department of Geosciences, in progress.

<u>Undergraduate Honor Thesis</u>

Alexander McCloud. **Investigating the Effect of Small Scale Topographic to Predict Rill Channels Formation**. Middle Tennessee State University, Department of Geosciences, Fall 2013.

PROFESSIONAL AFFILIATIONS

American Society for Photogrammetry and Remote Sensing (ASPRS) - 2004 to present
    Volunteer in the GIS division of the American Society of Photogrammetry and Remote Sensing (ASPRS).
American Geophysical Union (AGU) - 2009
The International Society for Optical Engineering (SPIE) - 2009
American Society of Civil Engineers (ASCE) - 2002, 2003
Institute of Transportation Engineers (ITE) - 2002, 2003

PROFESSION SERVICE

<u>Invited reviewer to the following journals</u>

Remote Sensing journal (1 paper)
Computers, Environment and Urban Systems journal (5 papers)
Wetlands (1 paper)
Oxford University Press (2 book chapters)
Transactions of the American Society of Agricultural and Biological Engineers (2 papers)
Chinese Optics Letters (1 paper)
Engineering Applications of Artificial Intelligence (1 paper)

Journal of Geophysical Research (1 paper)
Land Degradation & Development (1 paper)
Hydrolody (1 paper)
Journal of Geophysical Research (1 paper)
Applied Engineering in Agriculture (2 papers)
Water (1 paper)
International Journal of Remote Sensing (1 paper)
Water Science and Technology (1 paper)

Invited reviewer to the following grant proposals

2014 - Department of Homeland Security review panel in Arlington, VA
2014 - NASA Post-Doctoral program
2013 - NASA Post-Doctoral program

Symposium and Conferences

Member of the technical and organizing committee of the 7th International Symposium on Gully Erosion (7th ISGE) - "Integrating Processes, Management, and Prediction", to happen in May 2016 at the National Soil Erosion Research Laboratory (NSERL) and Purdue University, 275 South Russell St., West Lafayette, IN 47907, USA.

UNIVERSITY SERVICES

Middle Tennessee State University - Department of Geosciences

Faculty search committee, 2012, 2013, 2015
Department of Geosciences Strategic Plan Committee, 2014
Director of the Geospatial Research Center, 2012 to present
Coordinator of the GIS track in the Department of Geosciences graduate program, 2012 to present

Middle Tennessee State University

Master Plan Development, 2015
Grade Appeals Committee, 2015
Non Instructional Assignment Committee, 2015
Environmental Health and Safety Committee, 2013, 2014
Grade Appeals Committee, 2014

The University of Mississippi

Instructional Technology Standing Committee, 2007, 2008

PROFESSIONAL DEVELOPMENT

Exelis Instructor Led Courses,
    Application Development with IDL, course in Boulder, CO.
ESRI Instructor Led Courses
    Data Management in the Multiuser Geodatabase (3 days)
    Introduction to ArcGIS Server (2 days)

Introduction to the Multiuser Geodatabase (2 days)
Writing Advanced Geoprocessing Scripts Using Python (2 days)
Introduction to ArcGIS II (2 days)
Introduction to Programming ArcObjects with VBA (3 days)
Introduction to ArcView GIS 2 (2 days)
HAZUS-MH training, Indiana Department of Homeland Security (2 days)

COMPUTER SKILLS

Operating Systems:	Windows NT/XP/7/Server 2003, Sun Solaris 10, Linux, MacOSX
Programming Languages:	C, C++, Java, Visual Basic, IDL, Matlab, R, Python, Avenue, FORTRAN
Image Processing:	ERDAS, ENVI, GIMP
Geospatial Application:	ArcView 3.x, ArcGIS, ArcIMS/ArcServer, Mapserver 4.5, GRASS, GeoDa, and R-Geo, Quantum GIS, GMT
Surveying and Mapping:	Terramodel
Graphic Design:	Adobe Illustrator, AutoCAD, 3D Studio Max, Graphviz, Inkscape
Finite Element Analysis:	ABAQUS, PATRAN
Database:	MS Access, MySQL, SQLite, ArcSDE, Microsoft SQL
Decision Support System:	HAZUS-MH MR1
Web Server:	IIS 6.0, Apache, Apache Tomcat
Web Development:	Dreamweaver 4, Flash 6.0, Fireworks 4
Geostatistical:	Variowin, GSLIB, R, SciPy
Photogrammetry	PhotoModeler, Leica Photogrammetry Suite
Multi-threading:	OpenMP

SCIENTIFIC SOFTWARE PRODUCTS

AGWET– AnnAGNPS Wetland. *Python and FORTRAN*. GIS-based software package designed to characterize existing wetlands and to estimate potential locations for placement of new wetlands in agricultural watersheds. AGWET is included as a component of the U.S. Department of Agriculture supported AnnAGNPS pollution and watershed management model.

AGBUF – AnnAGNPS Buffer. *C++ and FORTRAN*. GIS-based software package designed to characterize riparian buffer vegetation at multiple scales and their spatial relationship with multiple sediment/nutrient sources. AGBUF is included as a component of the U.S. Department of Agriculture supported AnnAGNPS pollution and watershed management model. (Momm *et al.*, 2014).

PEG – Potential Ephemeral Gully. *Avenue, C++, and FORTRAN*. GIS-based computer program for automated estimation of potential ephemeral gully mouth based on compound topographic index and gully characteristics. The development of this technology was a collaborative effort with Ronald Bingner and Darlene Wilcox and the final product has been integrated into the U.S. Department of Agriculture supported AnnAGNPS pollution and watershed management model. (Momm *et al.*, 2012).

Automated Quantification of Ephemeral Gully Evolution in Farm Fields. *Python*. GIS-based computer program to systematically analyze, in automated fashion, time series of point clouds generated from close-range digital photogrammetry from gully and rill channels for estimating volume change, cross-section generation, and production of tabular and graphical results. This is a collaborative work with USDA-ARS-National Sedimentation Laboratory and Iowa State University.

Quantification of Channel Lateral Widening Evolution in Laboratory Experiments. *Python.* GIS-based computer program to identify image color discontinuities, from time series of images collected using a single digital camera, representing channel edges based on soil and water image color reflectance distances. This software was originally devised for application in laboratory experiments to automate the extraction of channel edge evolution over time. This was a collaborative work with USDA-ARS-National Sedimentation Laboratory. (Momm *et al.*, 2015).

Computational Methods for Morphological Characterization of Channels from Point Clouds. *C++.* Computer program devised to quantitatively and morphologically characterize gully channels located in agricultural fields represented by large three-dimensional point clouds (millions of points) in a semi-automated way. Components include, pre-processing (cross-validation, quadrant method, thinning, three-dimension distance to fitted surface, and smoothing) and morphological analysis (cross-section generation, thalweg generation, and cross-section fitting). (Momm *et al.*, 2011).

EvoImage Evolutionary Computation for Imagery Analysis. *C++, Java.* Suite of computer programs designed for development of mathematical equations used devised for information extraction from remotely sensed imagery. This technology combines multiple image cues including spectral, textural, and image region geometry into the decision making process. (Momm and Easson, 2011, Momm *et al.*, 2010, Momm *et al.*, 2019).