Tyler A. Erickson

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Education

Ph.D. 2004, University of Colorado, Department of Geography

Engineer Degree 1999, Stanford University, Civil and Environmental Engineering

M.S. 1995, California Institute of Technology, Civil Engineering

B.S. 1993, Colorado State University, Civil Engineering, Summa Cum Laude

Employment

Visiting Scientist, University Corporation for Atmospheric Research, Boulder, Colorado, 7/2010 – present
Collaborating with members of the climate modeling and weather forecasting communities to create tools that integrate common geospatial tools with multidimensional datasets.

Adjunct Assistant Professor, Department of Civil and Environmental Engineering, Michigan Technological University (MTU), 2008 – present
Developing collaborations with faculty (environmental data collection with smartphones, building web based interfaces for water quality and atmospheric measurements).

Research Scientist II, Michigan Tech Research Institute, 10/2006 – present
Research Scientist, Altarum Institute, 08/2004 – 10/2006 *(research group was acquired by MTU)*
Serving as technical lead and project manager on a variety of geospatial information data management and analysis projects for federal, state, and local agencies.

Graduate Researcher, Institute of Arctic and Alpine Research, University of Colorado, 2000 – 2004
Conducted research on the application of geostatistical techniques to the characterization and modeling of snow properties and occurrence.

Database Architect, Radium Technologies, Emeryville, California, 2000 – 2002
Created relational data models and database implementations for a variety of clients, including the Mammoth Mountain Ski Area Energy Balance Monitoring Site, a research site that archives and distributes snowpack and meteorological conditions for research.

Database Architect, Robert Half International Consulting, San Francisco, California, 1999 – 2000
Created a comprehensive database for the Hooked on Phonics website in Microsoft SQL Server, including e-commerce and on-line dynamic content; Created a database and desktop interface to automatically calculate the relative difficulty of children's books using Microsoft Access and Visual Basic.

Graduate Researcher / Teaching Assistant, Department of Civil and Environmental Engineering, Stanford University, 1997 – 1999
Assisted in teaching a graduate-level Introduction to Geostatistics course; Created a MATLAB toolbox of geostatistical algorithms; Developed algorithms for efficiently updating solutions of geostatistical systems of equations for moving window analyses. Developed algorithms for making estimates from linearly spaced observations (Fourier Kriging). Used ArcInfo, ArcView, and Avenue scripting to model geologic faults.

Hydrologist, Shepherd Miller, Inc., Fort Collins, Colorado, 1995 – 1997
Performed surface and groundwater hydrologic analyses, using Intergraph MGE, ERMA Site Geologist, MGE Terrain Analyst, Microsoft SQL Server, Microsoft Access, and Visual Basic for Applications.

Graduate Researcher, Department of Civil Engineering, California Institute of Technology, 1994 – 1995
Designed a relational database and user interface, using Microsoft Access and Visual Basic for Applications, for analyzing spatially distributed data obtained from in-situ water quality sensors in the Sacramento-San Joaquin River Delta.

Undergraduate Researcher, Department of Civil Engineering, Colorado State University, 1992 – 1993
Modeled interactions of wind speed distribution profiles resulting from changes in surface roughness; Produced a map of Design Gust Wind Speeds used by the American Society of Civil Engineers (ASCE) Building Code, using FORTRAN and vector graphics packages.

Representative Research Projects

(Note: The stated objectives describe those components of the project for which I was responsible. For project roles other than Principal Investigator, the objectives may be a subset of the overall project objectives.)

OpenClimateGIS
Objective: Build a web-based information system that distributes climate model data in commonly used geospatial data formats, and establish an open source project to share the developed technology.
Funding: National Oceanic and Atmospheric Administration (NOAA), 2010 – 2011
Role: Institutional Principal Investigator

CO2.0: Assessing the Impact of a Combined in Situ and Satellite CO2 Monitoring Network on Constraining Biospheric and Anthropogenic Fluxes for North America
Objective: Build a web-based results-dissemination system for visualizing and distributing geostatistical data assimilation model results.
Funding: National Aeronautics and Space Administration (NASA), 2010 – 2013
Role: Institutional Principal Investigator

Development and Support of the USFWS Habitat Assessment and Accounting Infrastructure for the Great Lakes
Objective: Archive and distribute remote sensing imagery via open source web mapping services; Link federal, state, and provincial natural heritage, fisheries, and wildlife databases into consistent and seamless habitat layers for distribution as KML; Assess wetlands habitats in the Great Lakes basin.
Funding: US Fish and Wildlife Service (USFWS), 2010 – 2011
Role: Task Lead

Development of Decision Support Products for Spatial Quantification of Carbon Emissions from Wildfire for North America
Objective: Develop a web accessible data system that integrates vector representations of burned areas, raster representations of available fuels, and a fuel consumption and emissions model to estimate temporal and spatial effects of wildfires on air quality, using GeoDjango, PostGIS, SQLAlchemy, and OpenLayers.
Funding: National Aeronautics and Space Administration (NASA), 2008 – 2011
Role: Co-Investigator

Respiratory Health Impacts of Wildfire Particulate Emissions Under Climate Change Scenarios
Objective: Integrate a fuel consumption and emissions model, an atmospheric transport model, in-situ air quality measurements, and hospital syndromic data to predict future health impacts of wildfires.
Funding: National Institutes of Health (NIH), 2009 – 2011
Role: Technical Lead

MichiganView.org / AmericaView.org
Objective: Disseminate publicly available remote sensing data, educational resources, research results, and datasets through a consortium of academic, non-profit, and government organizations.
Funding: US Geological Survey (USGS), 2007 – present (awarded annually)
Role: Director, MichiganView Consortium; Chair, AmericaView Technical Committee

Space-time Inverse Modeling with Remotely Sensed Data
Objective: Develop theoretical and MATLAB-based numerical tools for applying geostatistical inverse modeling to the analysis of remote sensing observations collected by multiple sensors with differing spatial characteristics.
Funding: Department of Defense, 2008 – 2010
Role: Principle Investigator

Radar Detection and Monitoring of Invasive Phragmites in the Coastal Great Lakes
Objective: Create a web-based data entry system used by remote field crews to submit ground data used to assess the potential of wetlands characterization via synthetic aperture radar (SAR). Technology used includes GeoDjango, PostGIS, and GDAL/OGR.
Funding: USGS, 2010 – 2012
Role: Technical Lead

Evaluating the Ecological Impact of Natural Resource Conservation Service (NRCS) Programs
Objective: Create a prototype web-based geospatial data system for analyzing past and planned conservation practices. Techology used includes GeoServer and OpenLayers.
Funding: USDA-NRCS, 2004 – 2008
Role: Technical Lead

Transportation Applications of Restricted Use Technology Study (TARUTS)
Objective: Create a prototype system for managing asset inventory data using ESRI ArcMap, ArcSDE and PostgreSQL.
Funding: Michigan Department of Transportation (MDOT), 2008 – 2009
Role: Technical Lead

MHS Custom Area Market Tool
Objective: Create a web based system for determining hospital and clinic market areas based on drive-time in order to plan for future changes to the healthcare network using ESRI's ArcGIS Server, Python scripting, and ESRI's Network Analyst toolbox.
Funding: Altarum Institute / US Military Health System (MHS), 2008 – 2009
Role: Institutional Principal Investigator

Representative Software Development Activities

KML in Research Competition Winner
New application demonstrating the use of the KML data format for communicating spatial/temporal datasets related to atmospheric carbon cycle modeling; Application was selected as one of five professional winners in the Google for Educators *KML in Research Competition*.
Contribution: primary author
http://www.google.com/educators/kml_contest.html

PostGIS WKT Raster
A project to integrate raster data analysis functionality with existing vector analysis capabilities within PostGIS spatial databases.
Contribution: facilitated funding of initial functionality development
http://trac.osgeo.org/postgis/wiki/WKTRaster/PlanningAndFunding

GeoServer
A Java-based geospatial data server designed to publish spatial data in multiple formats using open standards.
Contribution: facilitated funding of functionality development (HTTP Basic Authentication), authored a tutorial, proposed new functionality (temporal KML), submitted bug reports
http://docs.geoserver.org/stable/en/user/security/
http://geoserver.org/display/GEOSDOC/Tropical+Storm+Tracking+with+PostGIS-GeoServer-GoogleEarth

PUORG Data and Software
Research software for characterizing complexity and quantifying uncertainty in environmental systems distributed by a research group at the University of Michigan.
Contribution: provided basic geostatistical algorithms in MATLAB
http://puorg.engin.umich.edu/

OWSLib
A Python library for accessing Open Geospatial Consortium (OGC) Web Service compliant data sources.
Contribution: testing, submitting bug fixes
http://trac.gispython.org/lab/wiki/OwsLib/

pylibkml
A Python wrapper for the libkml, Google's open source C++ library for parsing and operating on KML.
Contribution: primary author
http://code.google.com/p/pylibkml/

python-consume
A Python port of the USDA Forest Service Fire and Environmental Research Applications (FERA) CONSUME 3.0, a non-spatial model that estimates fuel consumption and emissions from wildland fires.
Contribution: secondary author
http://code.google.com/p/python-consume/

python-fwi
A Python port of the Canadian Fire Weather Index (FWI) model.
Contribution: secondary author
http://code.google.com/p/pyfwi/

Selected Publications / Presentations

42. **Erickson, T.A.**, B. J. Thelen, and B. Koziol. 2010. Geostatistical Space-Time Inverse Modeling with Remotely Sensed Data: Final Project Report. National Geospatial Intelligence Agency.

41. Williams, M.W., **T.A. Erickson**, and J.L. Petrzelka. 2010. Visualizing Meltwater Flow Through Snow at the Centimeter-to-meter Scale Using a Snow Guillotine. Hydrological Processes, 24:15, 2098-2110, doi:10.1002/hyp.7630.

40. **Erickson, T.A.** 2009. Using KML to Visualize 4-D Atmospheric Carbon Monitoring Data. Google Tech Talk, Google, San Francisco, California, December 14. *(INVITED)*

39. **Erickson, T.A.** 2009. ASPRS Workshop: Introduction to Open Source Geospatial Software. 4-hour workshop offered at the American Society for Photogrammetry and Remote Sensing (ASPRS) / Management Association for Private Photogrammetric Surveyors (MAPPS) 2009 Specialty Conference, San Antonio, Texas, November 16.

38. **Erickson, T.A.** 2009. Building Open Source Geospatial Data Systems to Manage Spatio-Temporal Data. Talk presented at the ASPRS/MAPPS 2009 Specialty Conference, San Antonio, Texas, November 17.

37. **Erickson, T.A.** 2009. A Data System for Visualizing 4-D Atmospheric CO2 Models and Data. Talk presented at the Free and Open Source Software for Geospatial (FOSS4G) conference, Sydney, Australia, October 22.

36. **Erickson, T.A.** and R. Kemker. 2009. Pylibkml - a Python Wrapper for the libkml Library. Online documentation and source code. http://code.google.com/p/pylibkml/.

35. French, N.H., **T.A. Erickson**, and D. McKensie. 2009. The Wildland Fire Emissions Information System: Providing Information for Carbon Cycle Studies with Open Source Geospatial Tools. Poster presented at the NACP All-Investigators Meeting, San Diego, California, February 17–20.

34. **Erickson, T.A.**, B. Thelen, and B. Koziol. 2008. Using Geostatistical Inverse Modeling to Address Uncertainty in Sensor Data Fusion. Eos Trans. AGU 89(53), Fall Meet. Suppl., Abstract IN33B-1171

33. **Erickson, T.A.**, and B. Thelen. 2008. Incorporating Optical Sensor Models into Remote Sensing Analyses to Improve Accuracy. Talk presented at the The 17th William T. Pecora Memorial Remote Sensing Symposium, Denver, Colorado, November 20.

32. **Erickson, T.A.** 2008. Geospatial Information Systems for Web Distribution of Spatio-Temporal Data. Poster presented at the Scientific Applications with Google Earth Conference, University of Michigan, Ann Arbor, Michigan, October 22.

31. **Erickson, T.A.** 2008. Innovative Sources and Distribution Methods for Geospatial Data. Talk presented at the ASPRS-EGLR Autumn Meeting, Dundee, Michigan, October 17.

30. **Erickson, T.A.**, and B. Thelen. 2008. A Geostatistical Inverse Modeling Approach for Producing Earth Surface Estimates from Remotely Sensed Data. Talk presented at the IEEE International Geoscience & Remote Sensing Symposium, Boston, Massachusetts, July 9.

29. **Erickson, T.A.** and C. Brooks. 2008. A la Carte Geospatial: Integrating Proprietary and Open-Source Software to Create Server-Based Geospatial Data Management Systems. Talk presented at Improving Michigan's Access to Geographic Information Networks (IMAGIN) Annual Conference and Expo, GIS:

Strengthening our Economic Future, May 4-7.

28. **Erickson, T.A.**. 2008. Modern Methods for Web Distribution of Geographic Datasets. Talk presented at the Michigan Technological University RSI Seminar Series, Houghton, Michigan, March 31.

27. **Erickson, T.A.**. 2008. Water Resource Characterization and Remote Sensing Data Analysis using Geostatistical Techniques. Talk presented at the Michigan Technological University Environmental Engineering Graduate Seminar, Houghton, Michigan, March 31.

26. **Erickson, T.A.**. 2008. Software Research Needs: Geospatial and Decision Support Tools/Models: Applying Geospatial Decision Support Tools to Assess Water Quality and Human Health Risk in the Great Lakes Region. Talk presented at the Graham Environmental Sustainability Institute; Conference on Water, Health, and the Environment: Setting the Research Agenda, Ann Arbor, Michigan, March 26-27. *(INVITED)*

25. **Erickson, T.A.**. 2007. MichiganView Consortium: Promoting Remote Sensing in the Great Lakes Region. Talk presented at the Great Lakes Regional Data Exchange and CRSS/ASPRS Specialty Conference, October 29, Ottawa, Ontario, Canada.

24. **Erickson, T.A.** and P. Gienke. 2007. What's Going on out There? Using GeoServer for management of Spatio-Temporal Environmental Data. Talk presented at the Free and Open Source Software for Geospatial (FOSS4G) Conference, Sept 24-27, Victoria, British Columbia, Canada.

23. Brooks, C., R. Shuchman, E. Keefauver, B. Koziol, **T.A. Erickson**, C. Ide. 2007. The Great Lakes Environmental and Molecular Sciences (GLEAMS) Center: Enhancing Community Decision Making through Geospatial Decision Support System (DSS) Tools. Talk presented at the Michigan Environmental Health Association (MEHA) 63rd Annual Education Conference, Kalamazoo, Michigan.

22. **Erickson, T.A.** and A.M. Michalak. 2007. Application of Geostatistical Inverse Modeling to Satellite Remote Sensing Data. Talk presented at Inverse Problem Symposium, Michigan State University, East Lansing, Michigan, June 12.

21. **Erickson, T.A.** 2007. MichiganView Program Overview. Talk presented at IMAGIN's 2007 Annual Conference, Geography on the Move: Affecting Decisions, Kalamazoo, Michigan, May 7.

20. Bannick, R. R., and **T.A. Erickson**. 2006. Geomapping Drive-Time Based Market Areas for DoD TRICARE Beneficiaries. Talk presented at the 2006 ESRI Health GIS Conference, Denver, Colorado, October 23-26.

19. **Erickson, T.A.**, and A. M. Michalak. 2006. Merging of Variable-resolution Imagery Using Geostatistics and Sensor PSFs. In American Society for Photogrammetry and Remote Sensing (ASPRS) 2006 Conference Proceedings, 8p., Reno, Nevada, U.S.A.

18. **Erickson, T.A.**, and A. M. Michalak. 2006. What Does a Pixel Represent? Accounting for the Non-Uniform Spatial Information Content of Remotely-Sensed Data Used for Data Assimilation. Eos Trans., AGU 87(52): Fall Meet. Suppl. Abstract 31A-0869.

17. **Erickson, T.A.**, M. W. Williams, and A. Winstral. 2005. Persistence of Topographic Controls on the Spatial Distribution of Snow in Rugged Mountain Terrain, Colorado, USA. Water Resources Research 41:W04014, doi:10.1029/2003WR002973.

16. **Erickson, T.A.**, S. Savage and R. Shuchman. 2005. Ecological and Human Health Risk Assessment for the Kalamazoo River Superfund Site Using a Web-based GIS. Talk presented at the Geocomputation

International Conference, August 1.

15. Manty, D., M. Hodges, S. Balla, **T.A. Erickson**, C. Brooks, S. Bihn, and B. Levin. 2005. Bringing High-tech GIS Tools to Community Decision-Making. Talk presented at the USEPA Community Involvement Conference, Buffalo, New York, July 13.

14. Brooks, C., **T.A. Erickson**, R. Shuchman, S. Savage, M. O'Haver, C. Ide, and J. Means. 2005. Lake St. Clair Web-based Geospatial Information Management System for Watershed Data. Talk presented at the Lake Michigan: State of the Lake - 4th Biennial Conference, Green Bay, Wisconsin.

13. **Erickson, T.A.** 2004. Working with Spatially Correlated Measurements in the Modeling of Environmental Properties. Talk presented at the Cryospheric and Polar Processes Division Seminar, National Snow and Ice Data Center, Boulder, Colorado, April 2. *(INVITED)*

12. **Erickson, T.A.** 2004. Development and Application of Geostatistical Methods to Modeling Spatial Variation in Snowpack Properties, Front Range, Colorado. Ph.D. dissertation submitted to the Department of Geography, University of Colorado, Boulder, Colorado.

11. **Erickson, T.A.** and M.W. Williams. 2003. Topographic Controls on the Spatial Distribution of Snow in an Rugged Alpine Basin. Poster presented at the American Geophysical Union Fall Meeting, San Francisco, California, USA, December 8-12.

10. **Erickson, T.A.**, and M. W. Williams. 2003. The Soddie Lysimeter Array: Spatially-variable Snowmelt Data and Analyses. Talk presented at the International Workshop on Mountain Hydrology, Einsiedeln, Switzerland, April 2-4.

9. **Erickson, T.A.**, and M. W. Williams. 2002. Snow Guillotine: Visualization and Statistics of Meltwater Flowpaths in a Wet Snowpack. Talk presented at the International Snow Science Workshop, Penticton, British Columbia, Canada, September 29-October 4.

8. **Erickson, T.A.** and D. Donahue. 2002. Relational Databases as a Tool to Manage Environmental Data at the Research Plot Scale. Talk presented at the Western Snow Conference. Granby, Colorado.

7. **Erickson, T.A.** and M.W. Williams. 2001. The Soddie Dataset: A Multi-year Dataset of Spatially-Distributed Snowmelt Measurements. Poster presented at the American Geophysical Union Fall 2001 Meeting in San Francisco, California.

6. Ackerman, T., **T.A. Erickson**, and M.W. Williams. 2001. Combining GIS and GPS to Improve Our Understanding of the Spatial Distribution of Snow Water Equivalence (SWE). Talk presented at the ESRI Users Conference, San Diego, California, July 10.

5. **Erickson, T.A.**, M.W. Williams, and M. Tomaszewski. 2001. Landscape Controls on Snow Accumulation in an Alpine Catchment. Poster presented at the Western Snow Conference, Sun Valley, Idaho, April 16-19.

4. **Erickson, T.A.**, M. Williams, and R. Sommerfeld. 2000. Spatial Statistics of Snowmelt. XIII International Conference on Computational Methods in Water Resources, p. 1147-1152, L.R. Bentley, J.F. Sykes, C.A. Brebbia, W.G. Gray, and G.F. Pinder, editors, A.A. Balkema, Calgary, Alberta, Canada.

3. **Erickson, T. A**. 2000. Contributions to Best Linear Unbiased Estimation. Engineer thesis submitted to the Department of Civil and Environmental Engineering, Stanford University, Stanford, California.

2. Levy, D.B., J.A. Schramke, K.J. Esposito, **T.A. Erickson**, and J.C. Moore. 1999. The Shallow Ground Water Chemistry of Arsenic, Fluorine, and Major Elements: Eastern Owens Lake, California. Applied Geochemistry, 14:53-65.

1. Levy, D.B., J.A. Schramke, K.J. Esposito, **T.A. Erickson**, and J.C. Moore. 1997. Geochemistry of Arsenic and Fluorine in Shallow Ground Water: Eastern Owens Lake, California. 4th International Symposium on Environmental Geochemistry Proceedings: U.S. Geological Survey Open-File Report OF97-496, p. 53, R.B. Wanty et al. editors.