ROBERT E. ROTH *curriculum vitae*

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Last Update: October 1st, 2018

Research Interests: Cartography, geographic visualization, and geovisual analytics with emphasis on user experience (UX) design, human-computer interaction, web mapping, user-centered design, usability engineering, visual storytelling, and map-supported human reasoning and decision making.

APPOINTMENTS

2016–   **Associate Professor of Cartography**
              Department of Geography, University of Wisconsin–Madison

2015–   **Faculty Director**
              University of Wisconsin Cartography Lab

2017   **Visiting Faculty**
              International Training Center (ITC) Department of Geo-Information Processing, University of Twente (Netherlands)

2011–2016   **Assistant Professor of Cartography**
              Department of Geography, University of Wisconsin–Madison

EDUCATION

2011   **Doctor of Philosophy: Geography**
              The Pennsylvania State University
              Title: *Interacting with maps: The science and practice of cartographic interaction*

2007   **Master of Science: Cartography and GIS**
              The University of Wisconsin–Madison
              Title: *The role of mapping typological uncertainty in decision making*

2005   **Bachelor of Science: Cartography and GIS**
              The University of Wisconsin–Madison

GRANTS

2016-2021   **Roth RE (PI)**. Elements of Interactive Cartography: Design principles for interactive, online, and mobile maps. *National Science Foundation CAREER Award, Geography and Spatial Sciences Program (GSS), Information Integration & Informatics Program (III), and Cyber-Human Systems Program (CHS)*. (Award #1555267: $454,264)

2016-2020   Williams JW (PI), S Goring, and **RE Roth (Co-PI)**. Neotoma Paleoecology Database, community-led cyberinfrastructure for global change research (Wisconsin lead institution with seven partners). *National Science Foundation, Geoinformatics (GI) Program.* (Award #1550707: $353,394)

2017-2019	Moore SA (PI), **RE Roth (Co-PI)**, M Robertson, and S Tai. Living with waste: Visualizing new economies and slow violence. *UW-Madison Holtz Center Annual Competition for Developing Research Clusters*. ($30,000).
2016-2019	Goring S (PI) and **RE Roth (Co-PI)**. Leveraging domain repositories in Flyover Country, a mobile app for geoscience outreach, data discovery, and visualization (in collaboration with University of Minnesota). *National Science Foundation, Geoinformatics (GI) Program.* (Award #1550855: $162,778)
2016-2017	**Roth RE (PI)**. Designing better interactive maps: Towards a syntactics of interaction primitives for online and mobile map design. *Wisconsin Alumni Research Foundation*. ($32,959)
2015-2017	Moore SA (PI), MM Robertson (Co-PI), and **RE Roth (Co-PI)**. Explaining transboundary flows of hazardous waste in North America. *National Science Foundation, Geography and Spatial Sciences Program (GSS).* (Award #1539712: $399,962)
2015-2016	**Roth RE (PI)**. Elements of Interactive Cartography. *Wisconsin Alumni Research Foundation*. ($37,154)
2014	Moore SA and **RE Roth (Co-PI)**. Living with waste: New global economies in the Midwest. *Global Midwest, an initiative of the Andrew W. Mellon Foundation* ($8,200)
2014-2015	**Roth RE (PI)**. Visual storytelling with maps. *Wisconsin Alumni Research Foundation*. ($35,793)
2013-2014	**Roth RE (PI)**. Design and development recommendations for a Great Lakes water level visualization tool. *National Oceanic & Atmospheric Administration*. (Award #167152: $44,141).
2013-2014	Woodward KA and **RE Roth (Co-PI).** Visualizing Protest: Mapping the spaces of political struggle, 2010-2012. *Wisconsin Alumni Research Foundation*. (Award #140529: $26,033)
2012-2013	Severtson DJ and **RE Roth (Co-PI).** Making better health decisions: The impact of interactive mapping of uncertainty on environmental risk beliefs and decision making. *Wisconsin Alumni Research Foundation*. (Award #130525: $26,634)

PUBLICATIONS

student conducting research under my supervision

GUEST EDITED JOURNAL ISSUES

3. Griffin A, AC Robinson, and **RE Roth**. 2017. Special issue on research issues in interactive cartography and visualization sponsored by the International Cartography Association (ICA). *International Journal of Cartography*.

2. Robinson AC and **RE Roth**. 2014. Special issue on cognition, behavior, and representation sponsored by the International Cartography Association (ICA). *Cartographic Perspectives* 77.

1. Buckingham TMA and **RE Roth**. 2010. Second special digital issue. *Cartographic Perspectives* 66.

REFEREED ARTICLES

42. Moore SA, *H Rosenfeld, *E Nost, *K Vincent, and **RE Roth**. (accepted). Undermining methodological nationalism: Cosmopolitan analysis and visualization of the North American hazardous waste trade. *Environment and Planning A.* [doi.org/10.1177/0308518X18784023](doi.org/10.1177/0308518X18784023)

41. Ricker B and **RE Roth**. 2018. Mobile maps and responsive design. *Geographic Information Science and Technology Body of Knowledge.* University Consortium of Geographic Information Science.

doi.org/10.22224/gistbok/2018.2.5

40. Vincent K*, **RE Roth**, S Moore, Q Huang, *N Lally, *CM Sack, *E Nost, and *H Rosenfeld. (accepted) Improving spatial decision making using interactive maps: An empirical study on interface complexity and decision complexity in the North American hazardous waste trade. *Environment and Planning B.* doi.org/10.1177/2399808318764122

39. Moore SA, **RE Roth**, *H Rosenfeld, *E Nost, *K Vincent, *R Arefin, and TMA Buckingham. (accepted) Undisciplining environmental justice research with visual storytelling. *Geoforum*. doi:10.1016/j.geoforum.2017.03.003

38. Rosenfeld HJ*, S Moore, *E Nost, **RE Roth**, and *K Vincent. 2018. Hazardous aesthetics: A "merely interesting" toxic tour of waste management data. *Geohumanities*. 4(1): 262-281. doi:10.1080/2373566X.2017.1423235

37. **Roth RE**, S Young, *C Nestel, *CM Sack, *B Davidson, *V Knoppke-Wetzel, *F Ma, *R Mead, *C Rose, and *G Zhang. 2018. Global landscapes: Teaching globalization through responsive mobile map design. *The Professional Geographer*. 70(3): 395-411. doi.org:10.1080/00330124.2017.1416297

36. Williams JW, EC Grimm, J Blois, DF Charles, E Davis, SJ Goring, RW Graham, AJ Smith, M Anderson, AC Ashworth, J Betancourt, BW Bills, RK Booth, P Buckland, BB Curry, T Giesecke, ST Jackson, C Latorre, J Nichols, T Purdum, **RE Roth**, M Stryker, and H Takahara. 2018. The Neotoma Paleoecology Database, a multiproxy, international, community-curated data resource. *Quaternary Research*. 89(1): 156-177. doi:10.1017/qua.2017.105

35. **Roth RE**, A Çöltekin, L Delezari, HF Filho, A Griffin, A Hall, J Korpi, I Lokka, A Mendonça, K Ooms, and C van Elzakker. 2017. User studies in Cartography: Opportunities for empirical research on interactive maps and visualizations. *International Journal of Cartography.* 3(Supp 1): 61-89. doi:10.1080/23729333.2017.1288534

34. **Roth RE**. 2017. User interface (UI) and user experience (UX) design. *Geographic Information Science and Technology Body of Knowledge.* University Consortium of Geographic Information Science. CV-13. doi:10.22224/gistbok/2017.2.5

33. **Roth RE**, D Hart, *R Mead, and *C Quinn. 2017. Wireframing for interactive & web-based mapping: Designing the NOAA Lake Level Viewer. *Cartography and Geographic Information Science*. 44(4): 338-357. doi:10.1080/15230406.2016.1171166

32. Nost E*, *H Rosenfeld, *K Vincent, SA Moore, and **RE Roth**. 2017. HazMatMapper: An online and interactive geographic visualization tool for exploring transnational flows of hazardous waste and environmental justice. *The Journal of Maps*. 13(1): 14-23. doi:10.1080/17445647.2017.1282384

31. Sack CM* and **RE Roth**. 2017. Design and evaluation of an Open Web Platform cartography lab curriculum. *Journal of Geography in Higher Education*. 41(1): 1-23. doi:10.1080/03098265.2016.1241987

30. **Roth RE** and AM MacEachren. 2016. Geovisual analytics and the science of interaction: An empirical study. *Cartography and Geographic Information Science*. 43(1): 30-54. doi:10.1080/15230406.2015.1021714

29. **Roth RE**. 2015. Interactivity and Cartography: A contemporary perspective on user interface and user experience design from geospatial professionals. *Cartographica*. 50(2): 94-115. doi:10.3138/cart.50.2.2427

28. Weiss MJ*, *M Omri, *G White, **RE Roth**, and LC Naughton-Treves. 2015. Who owns paradise? Using web mapping to enhance a geography course exercise about forest conservation. *The Journal of Maps*. 11(3): 525-533. doi:10.1080/17445647.2014.935504

27. **Roth RE**, KS Ross, and AM MacEachren. 2015. User-centered design for interactive maps: A case study in crime analysis. *International Journal of Geo-Information*. 4(1): 262-301. doi:10.3390/ijgi4010262

26. **Roth RE**, *C Quinn, and D Hart. 2015. The competitive analysis method for evaluating water level visualization tools. In: A. Vondrakova, J. Brus, and V. Vozenilek (eds) *Modern Trends in Cartography, Lecture Notes in Geoinformation and Cartography*. 241-256. doi:10.1007/978-3-319-07926-4_19

25. **Roth RE**, *RG Donohue, *CM Sack, *T Wallace, and T Buckingham. 2014. A process for keeping pace with evolving web mapping technologies. *Cartographic Perspectives*. 78: 25-52. doi:10.14714/CP78.1273

24. Dong W, *H Liao, **RE Roth**, and S Wang. 2014. Eye tracking to explore the potential of enhanced imagery basemaps in web mapping. *The Cartographic Journal*. 51(4): 313-329. doi:10.1179/1743277413Y.0000000071

23. Janicki J*, *G Guo, *M Conway, *R Donohue, and **RE Roth**. 2014. Weevil Viewer: An interactive mapping application for geographic and phenological exploration of Wisconsin's primitive weevils. *The Journal of Maps*. 10(2): 289-296. doi:10.1080/17445647.2014.891266

22. **Roth RE**. 2013. An empirically-derived taxonomy of interaction primitives for Interactive Cartography and Geovisualization. *Transactions on Visualization & Computer Graphics*. 19(12): 2356-2365. doi:10.1109/TVCG.2013.130

21. Robinson AC, S Pezanowski, S Troedson, R Bianchetti, J Blanford, J Stevens, E Guidero, **RE Roth**, and AM MacEachren. 2013. SymbolStore.org: A web-based platform for sharing map symbols. *Cartography and Geographic Information Science*. 40(5): 415-426. doi:10.1080/15230406.2013.803833

20. **Roth RE**. 2013. Interactive Maps: What we know and what we need to know. *The Journal of Spatial Information Science*. 6: 59-115. doi:10.5311/JOSIS.2013.6.105

19. **Roth RE**, KS Ross, BG Finch, W Luo, and AM MacEachren. 2013. Spatiotemporal crime analysis in U.S. law enforcement agencies: Current practices and unmet needs. *Government Information Quarterly*. 30(3): 226-240. doi:10.1016/j.giq.2013.02.001

18. MacEachren AM, **RE Roth**, J O'Brien, B Li, D Swingley, and M Gahegan. 2012. Visual semiotics & uncertainty visualization: An empirical study. *Transactions on Visualization & Computer Graphics*. 18(12): 2496-2505. doi:10.1109/TVCG.2012.279

17. **Roth RE**. 2012. Cartographic interaction primitives: Framework and synthesis. *The Cartographic Journal*. 49(4): 376-395. doi:10.1179/1743277412Y.0000000019

16. Robinson AC, **RE Roth**, J Blanford, S Pezanowski, and AM MacEachren. 2012. Developing map symbol standards through an iterative collaboration process. *Environment and Planning B*. 39(6): 1034-1048. doi:10.1068/b38026

15. Murdock MJ*, **RE Roth**, and *NV Maziekas. 2012. The Basic Ordnance Observational Management System: Geovisual analytics of improvised explosive device incidents. *The Journal of Maps* 8(1): 120-124. doi:10.1080/17445647.2012.668411

14. Robinson AC, **RE Roth**, and AM MacEachren. 2011. Designing a web-based learning portal for geographic visualization and analysis in public health. *Health Informatics* 17(3): 191-208. doi:10.1177/1460458211409718

13. **Roth RE**, CA Brewer, and MS Stryker. 2011. A typology of operators for maintaining legible map designs at multiple scales. *Cartographic Perspectives* 68: 29-64. doi:10.14714/CP68.7

12. Robinson AC, **RE Roth**, J Blanford, S Pezanowski, and AM MacEachren. 2011. A collaborative process for developing map symbol standards. *Procedia of Social and Behavioral Sciences* 21: 93-102. doi:10.1016/j.sbspro.2011.07.018

11. **Roth RE**, BG Finch, JI Blanford, A Klippel, AC Robinson, and AM MacEachren. 2011. Card sorting for cartographic research and practice**.** *Cartography and Geographic Information Science* 38(2): 89-99. doi:10.1559/1523040638289

10. Robinson AC, **RE Roth**, and AM MacEachren. 2011. Understanding user needs for map symbol

standards in emergency management. *Journal of Homeland Security and Emergency Management* 8(1): 33. [doi:10.2202/1547-7355.1811](doi:10.2202/1547-7355.1811)

9. Du P, A Lemkin, B Kluhsman, J Chen, **RE Roth**, AM MacEachren, C Meyers, JJ Zurlo, and EJ Lengerich. 2010. The roles of social domains, behavioral risk, health care resources, and chlamydia in spatial clusters of US cervical cancer mortality: Not all clusters are the same. *Cancer Causes and Control* 21(10): 1669-1683. [doi:10.1007/s10552-010-9596-4](doi:10.1007/s10552-010-9596-4)

8. **Roth RE**, AW Woodruff, and ZF Johnson. 2010. Value-by-alpha Maps: An alternative technique to the cartogram. *The Cartographic Journal* 47(2): 130-140. [doi:10.1179/000870409X12488753453372](doi:10.1179/000870409X12488753453372)

7. **Roth RE**. 2009. A qualitative approach for understanding the role of geographic information uncertainty during decision making. *Cartography and Geographic Information Science.* 36(4): 315-330. [doi:10.1559/152304009789786326](doi:10.1559/152304009789786326)

6. **Roth RE**, J Van Den Hoek, AW Woodruff, A Erkenswick, E McGlynn, and J Przybylowski. 2009. The 21st Century Campus Map: Mapping the University of Wisconsin–Madison. *The Journal of Maps* 5(1): 1-8. [doi:10.4113/jom.2009.1036](doi:10.4113/jom.2009.1036)

5. **Roth RE**. 2009. The impact of expertise on geographic risk assessment under uncertain conditions. *Cartography and Geographic Information Science* 36(1): 29-43. [doi:10.1559/152304009787340160](doi:10.1559/152304009787340160)

4. Chen J, **RE Roth**, AT Naito, EJ Lengerich, and AM MacEachren. 2008. Enhancing spatial scan statistic interpretation with geovisual analytics: An analysis of US cervical cancer mortality. *International Journal of Health Geographics* 7: 57. [doi:10.1186/1476-072X-7-57](doi:10.1186/1476-072X-7-57)

3. **Roth RE** and M Harrower. 2008. Addressing map interface usability: Learning from the Lakeshore Nature Preserve Interactive Map. *Cartographic Perspectives* 60: 46-66. [doi:10.14714/CP60.231](doi:10.14714/CP60.231)

2. **Roth RE**. 2007. The use of remotely sensed imagery and GIS analysis for the automated detection of water infiltration in residential structures. *AAG-Middle States Geographer* 40: 123-132.

1. **Roth RE**, AX Zhu, E Holbus, J Papez, and J Quan. 2006. An automated approach to site selection for ecological restoration in fragmented landscapes. *Journal of Geographic Information Sciences* 12(2): 98-105. [doi:10.1080/10824000609480623](doi:10.1080/10824000609480623)

REFEREED FULL CONFERENCE PAPERS

8. **RE Roth**. 2016. Rethinking cartography curriculum to train the contemporary cartographer. In: T Bandrova, M Konecny (eds) *Proceedings of the 6th International Conference on Cartography & GIS.* Albena, Bulgaria: June 14. 155-166.

7. **Roth RE**, D Hart, *R Mead, and *C Quinn. 2014. Design before you code: Using wireframes in support of interactive and web-based mapping. In: *Proceedings of the 2014 International Symposium on Automated Cartography*. Pittsburgh, PA: October 7.

6. **Roth RE** and AM MacEachren. 2014. Geovisual analytics & the science of interaction: A case study. In: *Proceedings of GIScience 2014, Workshop on Geovisual Analytics: Interactivity, Dynamics, and Scale*. Vienna, Austria: September 23.

5. **Roth RE**, *C Quinn, and D Hart. 2014. A competitive analysis of web-based water visualization tools. In: *Proceedings of CartoCon 2014*. Olomouc, Czech Republic: February 26.

4. **Roth RE**. 2013. An empirically-derived taxonomy of interaction primitives for Interactive Cartography and Geovisualization. In: *Proceedings of IEEE Information Visualization Conference*. Atlanta, GA: October 15.

3. MacEachren AM, **RE Roth**, J O'Brien, B Li, D Swingley, and M Gahegan. 2012. Visual semiotics & uncertainty visualization: An empirical study. In: *Proceedings of IEEE Information Visualization Conference*. Seattle, WA: October 16.

2. Robinson AC, **RE Roth**, J Blanford, S Pezanowski, and AM MacEachren. 2011. A collaborative process

for developing map symbol standards. In: *Proceedings of the International Conference on Spatial Thinking and Geographic Information Sciences.* Tokyo, Japan: September 16.

1. Robinson AC, **RE Roth**, and AM MacEachren. 2010. Challenges for map symbol standardization in crisis management. In: *Proceedings of the 7th International Conference on Information Systems for Crisis Response and Management (ISCRAM)*. Seattle, WA: May 4.

CONFERENCE PAPERS REFEREED ON EXTENDED ABSTRACTS

20. **Roth RE**, *CM Sack, *M Kelly, *N Lally, and KL Vincent. 2018. MapStudy: An open source survey tool for researching interactive web maps. In: *Proceedings of 2018 International Symposium on Automated Cartography (AutoCarto)*. Madison, WI: May 22.

19. **Roth RE**, A Çöltekin, L Delezari, HF Filho, A Griffin, A Hall, J Korpi, I Lokka, A Mendonça, K Ooms, and C van Elzakker. 2017. User studies in Cartography: A collaborative research agenda. In: *Proceedings of the 28th International Cartographic Conference*. Washington, DC: July 5.

18. Sack CM*, **RE Roth**, and *KL Vincent. 2017. Introducing MapStudy: An open-source cartographic research tool. In: *Proceedings of the 28th International Cartographic Conference*. Washington, DC: July 5.

17. Vincent K*, S Moore, and **RE Roth**. 2017. The role of cartographic interface complexity on decision-making: A preliminary hazardous waste trade case study. In: *Proceedings of the 28th International Cartographic Conference*. Washington, DC: July 4.

16. Severtson DJ, **RE Roth**, *CM Sack. 2016. The influence of interactivity and uncertainty on reasoning with maps that depict an environmental hazard. In: *Proceedings of Society for Risk Analysis*. San Diego, CA: December 11-15.

15. Severtson DJ, **RE Roth**, and *CM Sack. 2015. Does interactivity enhance reasoning with maps that visualize uncertain information? Preliminary results from an empirical study. In: *Proceedings of IEEE Information Visualization Conference*. Chicago, IL: October 25.

14. **Roth RE**, SJ Young, *C Nestel, *CM Sack, *B Davidson, *J Janicki, *V Knoppke-Wetzel, *F Ma, *R Mead, *C Rose, and *G Zhang. 2015. Global Madison: Usability evaluation of an adaptive mobile map supporting situated learning of globalization. In: *Proceedings of the 27th International Cartographic Conference*. Rio de Janiero, Brazil: August 27.

13. **Roth RE**. 2015. Challenges for human subjects research in Cartography. In: *Proceedings of the 27th International Cartographic Conference, Pre-conference Workshop on Envisioning the Future of Cartographic Research.* Curitiba, Brazil: August 21.

12. Severtson D, **RE Roth**, *CM Sack, and *R Mead. 2014. The influence of interactive maps and data sufficiency on risk beliefs, ambiguity, and behavioral intentions for maps depicting water test results for private residential wells*. In: *Proceedings of Society for Risk Analysis*. Denver, CO: December 10.

11. Donohue RG*, *CM Sack, *TR Wallace, **RE Roth**, and TMA Buckingham. 2013. A competitive analysis of open web mapping technologies. In: *Proceedings of the 26th International Cartographic Conference*. Dresden, Germany: August 27.

10. **Roth RE**, *RG Donohue, *CM Sack, *TR Wallace, and TMA Buckingham. 2013. A process for assessing emergent web mapping technologies. In: *Proceedings of the 26th International Cartographic Conference*. Dresden, Germany: August 26.

9. **Roth RE**. 2012. An empirically-derived taxonomy of cartographic interaction primitives. In: *Proceedings of GIScience 2012*. Columbus, Ohio: September 20.

8. **Roth RE**. 2012. The science and practice of cartographic interaction. In: *Proceedings of GeoInformatics*. Sha Tin, Hong Kong: June 15.

7. **Roth RE**. 2011. A comparison of methods for evaluating cartographic interfaces. In: *Proceedings of the 25th International Cartographic Conference*. Paris, France: July 5.

6. **Roth RE**, KS Ross, BG Finch, W Luo, and AM MacEachren. 2010. A user-centered approach for designing and developing spatiotemporal crime analysis tools. In: *Proceedings of GIScience 2010.* Zurich, Switzerland: September 15.

5. White JJD and **RE Roth**. 2010. TwitterHitter: Geovisual analytics for harvesting insight from volunteered geographic information. In: *Proceedings of GIScience 2010.* Zurich, Switzerland: September 15.

4. **Roth RE**, AM MacEachren, and CA McCabe. 2009. A workflow learning model to improve geovisual analytics utility. In: *Proceedings of the 24th International Cartographic Conference*. Santiago, Chile: November 18.

3. Ross KS, CA McCabe, and **RE Roth**. 2009. A near real-time visualization for understanding spatio-temporal patterns of violent crime in the District of Columbia. *Department of Homeland Security Summit*. Washington, DC: March 16.

2. **Roth RE** , M Stryker, and CA Brewer. 2008. A typology of multi-scale mapping operators. In: *Proceedings of GIScience 2008.* Park City, UT: September 25.

1. Stryker M, **RE Roth**, and CA Brewer. 2008. ScaleMaster.org: Illustrating and constructing the multi-scale mapping process. In: *Proceedings of GIScience 2008.* Park City, UT: September 24.

UNREVIEWED WORKSHOP PAPERS

6. Kelly M*, N Lally, and **RE Roth**. 2018. Humanizing interactive maps. *Proceedings of the ICA Commission on Atlases, ICA Commission on Cognitive Issues in Geovisualization, and ICA Commission Use, User, and Usability Issues Joint Workshop.* Olomouc, Czechia: April 28.

5. **Roth RE.** 2018. How can user-centered design studies contribute? *Proceedings of the ICA Commission on Atlases, ICA Commission on Cognitive Issues in Geovisualization, and ICA Commission Use, User, and Usability Issues Joint Workshop.* Olomouc, Czechia: April 28.

4. Sack CM* and **RE Roth**. 2016. Teaching open web mapping. In: *Proceedings of 2016 International Symposium on Automated Cartography (AutoCarto), ICA Commission on Open Source Geospatial Technologies*. Albuquerque, NM: September 14.

3. **Roth RE**. 2016. Qualitative versus Quantitative Research. In: *Proceedings of the 6th International Conference on Cartography and GIS, Interactive Workshop on Designing and Conducting User Studies*. Albena, Bulgaria: June 15.

2. **Roth RE**. 2012. Working with the card sorting method. In: *Proceedings of the 2012 International Symposium on Automated Cartography (AutoCarto), ICA Commission on Cognitive Visualization and ICA Commission on Use and User Issues Joint Workshop on Designing and Conducting User Studies*. Columbus, OH: September 16.

1. **Roth RE**, M Harrower, and JE Burt. 2006. Isoline Engine: A digital assistant for surface mapping. In: *Proceedings of the 2006 International Symposium on Automated Cartography (AutoCarto), ICA Commission on Visualization and Virtual Environments Workshop*. Vancouver, WA: June 26.

OTHER PUBLICATIONS

20. Griffin AL, AC Robinson, and **RE Roth**. 2017. Envisioning the future of cartographic research. *International Journal of Cartography*. 3(Supp 1): 1-8. [doi:10.1080/23729333.2017.1316466](doi:10.1080/23729333.2017.1316466)

19. **Roth RE.** 2017, May 9. Meaningful maps: Charting new frontiers with new tools. *Wisconsin State Journal, Fueling Discovery Special Insert.* 14.

18. **Roth RE**. 2017. Visual variables. In: D Richardson, N Castree, MF Goodchild, A Kobayashki, W Liu, and RA Marston (Eds) *The International Encyclopedia of Geography: People, The Earth, Environment, and Technology*. 1-11. doi:10.1002/9781118786352.wbieg0761

17. Rosenfeld H*, *M Kelly, and **RE Roth**. 2016. Learning Cartography; or, a gallery of awesome maps.

Edge Effects. (published online: http://edgeeffects.net/awesome-maps/).

16. **Roth RE**. 2015. Land, water, and climate change in five interactive maps. *Edge Effects*. (published online: http://edgeeffects.net/climate-interactive-maps/).

15. Sack CM*, *RG Donohue, and **RE Roth**. 2014. Interactive and multivariate choropleth maps with D3. *Cartographic Perspectives*. 78: 57-76. doi:10.14714/CP78.1278

14. Robinson AC and **RE Roth**. 2014. Letter from the Guest Editors. *Cartographic Perspectives* 77: 3-5. doi:10.14714/CP77.1262

13. **Roth RE**. 2014. Review of "100 Ideas that Changed Graphic Design". *Cartography and Geographic Information Science* 41(1): 111-113. doi:10.1080/15230406.2013.843767

12. Donohue RG*, *CM Sack, and **RE Roth**. 2013. Time series proportional symbol maps with Leaflet and jQuery. *Cartographic Perspectives*. 76: 43-66. doi:10.14714/CP76.1248

11. **Roth RE.** 2010. Interview with a Celebrity Cartographer: Cindy Brewer. *Cartographic Perspectives* 66: 91-101. doi:10.14714/CP66.104

10. Buckingham TMA and **RE Roth**. 2010. Letter from the Guest Editors. *Cartographic Perspectives* 66: 3-6. doi:10.14714/CP66.91

9. **Roth RE**, BG Finch, JI Blanford, A Klippel, AC Robinson, and AM MacEachren. 2010. The card sorting method for map symbol design. In: *Proceedings of the 2010 International Symposium on Automated Cartography (AutoCarto)*. Orlando, FL: November 18.

8. **Roth RE**. 2010. Dot density maps. In: B Warf (ed) *The Encyclopedia of Geography*. Thousand Oaks, CA: SAGE Publications: 787-790. doi:10.4135/9781412939591.n303

7. Harrower MA, AC Robinson, **RE Roth**, and B Sheesley. 2009. Cartography 2.0: For people who make interactive maps. *Cartographic Perspectives* 64: 41-44. doi:10.14714/CP64.147

6. **Roth RE** and KS Ross. 2009. Extending the Google Maps API for Flash for event animation mashups. *Cartographic Perspectives* 64: 21-40*.* doi:10.14714/CP64.146

5. **Roth RE.** 2009. Overview: Interface Evaluation. In: MA Harrower (ed) *Cartography 2.0: Your guide to animated and interactive maps.* (published online)

4. **Roth RE.** 2009. Cartographic Interaction: Introduction and Overview. In: MA Harrower (ed) *Cartography 2.0: Your guide to animated and interactive maps*. (published online)

3. **Roth RE.** 2009. The nature of geospatial information uncertainty. In: MA Harrower (ed) *Cartography 2.0: Your guide to animated and interactive maps*. (published online)

2. **Roth RE**. 2008. The impact of expertise on geographic risk assessment under uncertain conditions. In: *Proceedings of the 2008 International Symposium on Automated Cartography (AutoCarto)*. Shepherdstown, WV: September 8.

1. **Roth RE**, A Robinson, M Stryker, AM MacEachren, EJ Lengerich, and E Koua. 2008. Web-based geovisualization and geocollaboration: Application to public health. In: *Proceedings of the 2008 Joint Statistical Meeting, Invited Session on Web Mapping*. Denver, CO: August 5.

PRESENTATIONS and LECTURES

student conducting research under my supervision

INVITED TALKS and KEYNOTES

21. **Roth RE.** 2018. Visual attention and multivariate mapping. *Masaryk University, Department of Geography.* Brno, Czechia: April 26.

20. **Roth RE.** 2018. How interactive maps work. *University of Zurich, Department of Geography.* Zurich, Switzerland: April 24.

19. **Roth RE.** 2017. How interactive maps work. *University of Muenster, Institute for Geoinformatics GI Forum.* Muenster, Germany: December 19.

18. **Roth RE**. 2017. User-centered Cartography: Concepts, case studies, and contributions. *Technical University Munich, Department of Civil, Geo, and Environmental Engineering*. Munich, Germany: December 6.

17. **Roth RE.** 2017. Making meaningful maps: Seeing geography through cartography. *Public Lecture organized jointly by Leibniz Institute for Regional Geography, the University of Leipzig, and the German Cartographic Society*. Leipzig, Germany: November 15.

16. **Roth RE**. 2017. UX for Maps*. Leibniz Institute for Regional Geography, Department of Cartography & Visual Communication*. Leipzig, Germany: November 15.

15. **Roth RE**. 2017. UX for Maps. *MapTime Amsterdam, Special University Program on Cartographic Research and Design*. Amsterdam, the Netherlands: November 8.

14. **Roth RE**. 2017. Taxonomies for interactive cartography & visualization: Invent!ory or Listless? *University of Twente, International Training Center (ITC) VISresearch Morning Series.* Enschede, the Netherlands: October 18.

13. **Roth RE**. 2017. Cartographic design as visual storytelling. *HAS Hogeschool, Geo Media & Design Program.* 's-Hertogenbosch, the Netherlands: October 3.

12. **Roth RE**. 2017. Towards a science of interaction: The case for empirical research on interaction design in cartography, visualization, and visual analytics. *City University of London, Department of Computer Science giCentre.* London, England: September 25.

11. **Roth RE**. 2017. How interactive maps work: Concepts, methods, and opportunities. *University of Twente, International Training Center (ITC) Department of Geo-Information Processing.* Enschede, the Netherlands: September 7.

10. **Roth RE**. 2016. Cartography in Science Hall: 75 Years of making maps that matter. *UW-Madison Department of Geography Yi-Fu Tuan Lecture Series*. Madison, WI: November 11.

9. **Roth RE.** 2016. Cartographic design as visual storytelling. *Esri & ICA co-sponsored Cartographic Summit*. Redlands, CA: February 8.

8. **Roth RE.** 2015. Useful and usable GIS and web mapping technologies. *National Park Service, NPMap Team*. Lakewood, CO: November 20.

7. **Roth RE.** 2015. Designing useful and usable GIS and mapping technologies. *Colorado State University GIS Day Keynote*. Fort Collins, CO: November 18.

6. **Roth RE** and T Buckingham**.** 2015. Cartography & Visualization. *UW-Madison New Scholars Network for Humanists and Social Scientists*. Madison, WI: October 23.

5. **Roth RE**. 2015. UI/UX design and maps: Theory, technology, and teaching. *University of Kentucky, Department of Geography*. Lexington, KY: April 6.

4. **Roth RE**. 2013. The New Cartography: The states of science and technology in Interactive Cartography and Geovisualization. *Department of Energy Workshop on Advances in Geospatial Technologies*. Argonne National Laboratory, Lemont, IL: May 22.

3. **Roth RE**. 2012. The science and practice of cartographic interaction*. Chinese Academy of Sciences*. Beijing, China: June 8.

2. **Roth RE**. 2012. Geovisual analytics for spatial criminology*. Beijing Normal University, Department of Geography*. Beijing, China: June 7.

1. **Roth RE**. 2011. Useful and usable geovisualization for crime analysis. *Penn State University,*

Department of Geography Coffee Hour Lecture Series. University Park, PA: March 18.

CONFERENCE PRESENTATIONS (NO PROCEEDINGS)

59. **Roth RE**. 2018. Reflections on the design of US climate change visualization tools. *The 113th Annual Meeting of the American Association of Geographers*. New Orleans, LA. April 11.

58. Loeffler S* (presenter), *R Thorn, A Myrbo, **RE Roth**, SJ Goring, and J Williams. 2017. Multivariate spatiotemporal visualizations for mobile devices in Flyover Country. *American Geophysical Union*. New Orleans, LA: December 13.

57. Arroyo-Cabrales J, AC Ashworth (presenter), J Betancourt, J Blois, RK Booth, BB Curry, P Buckland, D Charles, S Crawford, E Davis, T Giesecke, RW Graham, EC Grimm, SJ Goring, ST Jackson, C Latorre, J Nichols, T Purdum, **RE Roth**, A Smith, M Stryker, H Takahara, and JW Williams. The Neotoma Paleoecology Database: Future directions. *2nd International Conference on Quaternary and Future Earth*. Keelung, Taiwan: November 15.

56. Loeffler S* (co-presenter), *R Thorn (co-presenter), A Myrbo, SJ Goring, and **RE Roth**. 2017. Flyover Country: Mobile visualization of geoscience data. *North American Cartographic Information Society*. Montréal, QB: October 12.

55. Rosenfeld H* (presenter), SA Moore, *E Nost, **RE Roth**, *K Vincent. 2017. Chernoff zombies. *North American Cartographic Information Society*. Montréal, QB: October 12.

54. Kelly M* (co-presenter), *N Lally (co-presenter), and **RE Roth**. 2017. Humanizing maps. *North American Cartographic Information Society*. Montréal, QB: October 12.

53. **Roth RE.** 2017. A body of knowledge on Cartography & Visualization. *North American Cartographic Information Society*. Montréal, QB: October 12.

52. Song Z* (presenter) and **RE Roth**. 2017. Map-based visual storytelling: An assessment of emerging design considerations. *North American Cartographic Information Society*. Montréal, QB: October 11.

51. Buckingham TMA (co-presenter) and **RE Roth** (co-presenter). 2017. The Design Challenge: A day-long workshop for creativity and discovery. *Esri Education Conference.* San Diego, CA: July 8.

50. Rosenfeld H* (presenter), SA Moore, **RE Roth**, *K Vincent, and *E Nost. 2017. Burning 4000 liters of nail polish at American Drive: Challenging the aesthetics of hazardous waste. *Technical Landscapes: Aesthetics and the Environment in the History of Science and Art*. Cambridge, MA: April 7.

49. **Roth RE** (presenter), SA Moore, TMA Buckingham, *H Rosenfeld, *E Nost, *K Vincent, and *R Arefin. 2017. The Design Challenge: Interweaving critical geographic pedagogy, visual storytelling, and big data visualization in a day-long mapping workshop. *The 112th Annual Meeting of the American Association of Geographers*. Boston, MA: April 6.

48. Kelly M* (presenter), **RE Roth**, and *C Rose. 2017. Cartographic design and visual storytelling in the media. *The 112th Annual Meeting of the American Association of Geographers*. Boston, MA: April 6.

47. Sack CM (presenter), **RE Roth**, and *K Vincent. 2016. Introducing MapStudy. *North American Cartographic Information Society*. Colorado Springs, CO: October 21.

46. Nost, E* (presenter), *H Rosenfeld, *K Vincent, S Moore, T Buckingham, and **RE Roth**. 2016. Challenges and opportunities in mapping the North American hazardous waste trade. *North American Cartographic Information Society*. Colorado Springs, CO: October 20.

45. **Roth RE.** 2016. Reflections on five years teaching cartography. *North American Cartographic Information Society*. Colorado Springs, CO: October 20.

44. **Roth RE** (presenter), TMA Buckingham, *E Applegate, *K Kowalsky, *C Nestel, *CM Sack, and *R Tolochko. 2016. Teaching creativity: Blending graphic and web design for cartography. *Esri Education Conference.* San Diego, CA: June 26.

43. **Roth RE**. 2016. Cartographic design as visual storytelling. *The 111th Annual Meeting of the Association of American Geographers*. San Francisco, CA: March 31.

42. Kowalsky K* (presenter) and **RE Roth**. 2015. CartoCSS essentials. *Practical Cartography Day, North American Cartographic Information Society (NACIS) 2015*. Minneapolis, MN: October 14.

41. **Roth RE** (presenter), DJ Severtson, *CM Sack, and *R Mead. 2015. The influence of interactivity and uncertainty on health beliefs and decisions. *The 110th Annual Meeting of the Association of American Geographers*. Chicago, IL: April 21.

40. Hart D (presenter) and **RE Roth**. 2015. The benefits of a user-centered design process for the NOAA Lake Level Viewer. *Coastal Geotools*. Charleston, SC: April 1.

39. Nestel C* (co-presenter), *CM Sack (co-presenter), *J Janicki, *V Knoppke-Wetzel, *F Ma, *R Mead, *C Rose, **RE Roth**, and *G Zhang. 2014. Adaptive cartography for situated learning. *North American Cartographic Information Society (NACIS) 2014.* Pittsburgh, PA: October 10.

38. Sack CM* (co-presenter), *J Janicki (co-presenter), *M Bruzzone, *B Davidson, *V Knoppke-Wetzel, *F Ma, *R Mead, *C Nestel, *C Rose, *G Zhang, **RE Roth**, and SJ Young. 2014. A mobile situated learning module using open source geoweb technology. *Free and Open Source Software for Geospatial (FOSS4G).* Portland, OR: September 11.

37. **Roth RE** (presenter), L Severtson, *R Mead, and *CM Sack. 2014. Interactivity, privacy, and uncertainty: Mapping drinking water quality in Wisconsin. *The 109th Annual Meeting of the Association of American Geographers*. Tampa, FL: April 11.

35. **Roth RE**. 2013. Some principles of UI/UX design for Cartography. *North American Cartographic Information Society (NACIS) 2013*. Greenville, SC: October 10.

34. Sack CM* (presenter), *RG Donohue, **RE Roth**, *TR Wallace, and TMA Buckingham. 2013. Adapting web mapping curriculum to open source technologies. *Free and Open Source Software for Geospatial (FOSS4G) North America*. Minneapolis, MN: May 22.

33. **Roth RE**, *CM Sack (co-presenter), *RG Donohue (co-presenter), *TR Wallace, and TMA Buckingham. 2013. We mapping technology study update, or what you just learned now is obsolete. *UW–Madison Geospatial Summit*. Madison, WI: April 25.

32. **Roth RE** (presenter) and AM MacEachren. 2013. Design and use guidelines for interactive maps: A case study. *The 108th Annual Meeting of the Association of American Geographers*. Los Angeles, CA: April 12.

31. **Roth RE** (presenter), *RG Donohue, *TR Wallace, *CM Sack, and TMA Buckingham. 2013. Getting a handle on open source web mapping technologies. *Wisconsin Land Information Association (WLIA) 2013 Annual Conference*. Lake Geneva, WI: February 14.

30. Elmer ME* (presenter) and **RE Roth**. 2012 Symbol considerations for bivariate thematic maps. *North American Cartographic Information Society (NACIS) 2012*. Madison, WI: October 19.

29. Donohue RG* (presenter), *TR Wallace, *CM Sack, **RE Roth**, and TMA Buckingham. 2012. Keeping pace with emerging web mapping technologies. *North American Cartographic Information Society (NACIS) 2012*. Portland, OR: October 19.

28. Bianchetti RA (presenter), **RE Roth**, JI Blanford, AC Robinson, and AM MacEachren. 2012. Defining the typical DHS map. *North American Cartographic Information Society (NACIS) 2012*. Portland, OR: October 18.

27. **Roth RE**. 2012. Teaching Cartography during the Geospatial Revolution. *UW–Madison Geospatial Alliance Summit*. Madison, WI: April 26.

26. **Roth RE**. 2012. Towards a taxonomy of cartographic interaction primitives. *The 107th Annual Meeting of the Association of American Geographers*. New York, NY: February 25.

25. **Roth RE**. 2011. Interactive Cartography: What we know and what we need to know. *North American Cartographic Information Society (NACIS) 2011*. Madison, WI: October 13.

24. Guidero E (presenter), F Hardisty, **RE Roth**, A Klippel, AC Robinson, and AM MacEachren. 2011. Representing change using point symbols. *The 107th Annual Meeting of the Association of American Geographers*. Seattle, WA: April 15.

23. Pezanowski S (presenter), AC Robinson, E Guidero, R Bianchetti, F Hardisty, J Blanford, **RE Roth**, and AM MacEachren. 2011. An interactive, web-based tool for discovering and sharing map symbols. *The 107th Annual Meeting of the Association of American Geographers*. Seattle, WA: April 15.

22. Murdock MJ* (presenter), *BG Finch, *NV Maziekas, and **RE Roth**. 2010. The basic ordinance observational management system: Geovisual analytics of improvised explosive device incidents. *The Association of American Geographers, Middle States Division 2010 Meeting*. West Point, NY: October 23.

21. Robinson AC (presenter), S Pezanowski, F Hardisty, **RE Roth**, J Blanford, and AM MacEachren. 2010. A web-based symbol store for sharing map symbology. *North American Cartographic Information Society (NACIS) 2010*. St. Petersburg, FL: October 15.

20. Robinson AC (presenter), **RE Roth**, CA McCabe, S Pezanowski, and AM MacEachren. 2010. Challenges to standardizing map symbology. *The 106th Annual Meeting of the Association of American Geographers*. Washington, DC: April 17.

19. **Roth RE** (presenter), KS Ross, W Luo, BJ Finch, and AM MacEachren. 2010. A user-centered approach to extending spatiotemporal crime analysis tools. *The 106th Annual Meeting of the Association of American Geographers*. Washington, DC: April 15.

18. Raposo P (presenter), **RE Roth**, and MJ Dawson. 2010. Online map of Penn State Geography travels. *No Boundaries: 2010 Graduate Student Conference*. University Park, PA: March 20.

17. Ross KS (presenter), **RE Roth**, BG Finch, W Luo, CA McCabe, and AM MacEachren. 2010. Web-based geovisualization and geovisual analytics to support crime analysis. *Department of Homeland Security Summit*. Washington, DC: March 9.

16. Robinson AC (presenter), **RE Roth**, and AM MacEachren. 2009. Developing standards for map symbology. *North American Cartographic Information Society (NACIS) 2009*. Sacramento, CA: October 9.

15. Woodruff AW (presenter), **RE Roth**, and ZF Johnson. 2009. Value-by-alpha maps: An alternative to cartograms. *North American Cartographic Information Society (NACIS) 2009*. Sacramento, CA: October 9.

14. **Roth RE** (presenter) and KS Ross. 2009. Extending the Google Maps API for event animation mashups. *Practical Cartography Day, North American Cartographic Information Society (NACIS) 2009*. Sacramento, CA: October 7.

13. Chen J (presenter), **RE Roth**, AT Naito, EL Lengerich, and AM MacEachren. 2009. Geovisual analytics for the detection of disease clusters. *The 105th Annual Meeting of the Association of American Geographers*. Las Vegas, NV: March 24.

12. **Roth RE** (presenter), M Stryker, C Fish, D Schoch, and CA Brewer. 2008. ScaleMaster.org: Multi-scale mapping made easy. *North American Cartographic Information Society (NACIS) 2008*. Missoula, MT: October 9.

11. **Roth RE.** 2008. Representing Uncertainty: A case study in categorizing uncertainty in support of decision making. *The 104th Annual Meeting of the Association of American Geographers*. Boston, MA: April 16.

10. **Roth RE.** 2008. The involvement of uncertainty in the creation, representation, and use of geospatial data in the domain of floodplain mapping. *No Boundaries: 2008 Graduate Student Conference*. University Park, PA: March 31.

9. **Roth RE.** 2007. The use of remotely sensed imagery and GIS analysis for the automated detection of water infiltration in residential structures. *Association of American Geographers, Middle States Division 2007 Meeting*. Reading, PA: November 17.

8. Johnson Z (presenter), M Harrower, E McGlynn, **RE Roth**, D Van Sickle, and A Woodruff. 2007. Development of an online visualization tool for the mapping and analysis of asthma exacerbations in space and time. *North American Cartographic Information Society (NACIS) 2007*. St. Louis, MO: October 11.

7. **Roth RE** (presenter), W Cronon, M Harrower, J Przybylowski, and A Woodruff. 2007. Addressing usability issues of web-based, interactive cartography: Learning from the Lakeshore Nature Preserve Interactive Map. *The 103rd Annual Meeting of the Association of American Geographers*. San Francisco, CA: April 21.

6. **Roth RE**. 2007. Transitioning geographic visualization from expert to public use: The Great Lakes Coastal Erosion Visualization Project. *Sixth Annual Geography Student Symposium.* Madison, WI: April 13.

5. **Roth RE** (presenter), M Harrower, and J Burt. 2006. An online tool for the visualization and education of isoline mapping. *North American Cartographic Information Society (NACIS) 2006*. Madison, WI: October 18.

4. **Roth RE**. 2006. Ground False: How inaccuracy enters into ground truth. *Fifth Annual Geography Student Symposium.* Madison, WI: April 7.

3 **Roth RE** (presenter) and J Papez. 2006. Ecological restoration in a GIS setting: The integration of domain knowledge into spatial analysis for restoration projects. *The 102nd Annual Meeting of the Association of American Geographers.* Chicago, IL: March 8.

2. **Roth RE**. 2005. Expanding the uses of convolution in GIS: A moving window analysis as the basis for a reforestation priority index. *First Annual Undergraduate Midwestern Geography Symposium*. Saint Paul, Minnesota: April 23.

1. **Roth RE**. 2005. Locating optimal lands for reforestation in the Baraboo Hills, Wisconsin. *Fourth Annual Geography Student Symposium*. Madison, WI: April 22.

PANELS

6. Charleux L, **RE Roth** (panelist), D Sinton, and J Wilson. 2018. The next generation of the GIS&T Body of Knowledge. *The 113th Annual Meeting of the Association of American Geographers*. New Orleans, LA: April 11.

5. Andrzejewski A, AC Arpaci-Dusseau, C Clark-Pujara CB Forest, and **RE Roth** (panelist). 2017. Fueling Discovery. *Alumni Event for Wisconsin State Journal Special Insert, UW-Madison College of Letters and Sciences.* Madison, WI: May 17.

4. Griffin A, M-J Kraak, SF Fabrikant, AC Robinson, and **RE Roth** (panelist). 2016. Cognition, Visualization, and User Issues. *The 111th Annual Meeting of the Association of American Geographers*. San Francisco, CA: March 31.

3. Gleicher M, B Marshall, and **RE Roth** (panelist). 2015. Exploring Data / Sharing Data/ Beautiful Data. *Going Public: Data in the Humanities + Art Symposium*. Madison, WI: April 17.

2. Crampton J, R Donohue, L Mogel, A Robinson, **RE Roth** (panelist), MW Wilson, and M Zook. 2014. Panel: Adventures in online mapping. *North American Cartographic Information Society (NACIS) 2014.* Pittsburgh, PA: October 9.

1. Zook M, MF Goodchild, MW Wilson, L Bergmann, S Elwood, W Kuhn, D O'Sullivan, AC Robinson, **RE Roth** (panelist), and N Schuurman. 2014. Panel: Visioning GIScience education. *The 109th Annual Meeting of the Association of American Geographers*. Tampa, FL: April 9.

CONFERENCE POSTERS (NO PROCEEDINGS)

11. Maziekas NV*, *MJ Murdock (presenter), and **RE Roth**. 2011. Geovisual analytics of improvised explosive device incidents. *The 107th Annual Meeting of the Association of American Geographers*. Seattle, WA: April 13.

10. Du P (presenter), A Lemkin, B Kluhsman, J Chen, **RE Roth**, AM MacEachren, C Meyers, J Zurlo, and EJ Lengerich. 2010. High chlamydia incidence rates associated with increased cervical cancer mortality rates in US counties: The potential role of HPV infection and implications for cancer prevention. *2010 National STD Prevention Conference.* Atlanta, GA: March 10.

9. MacEachren AM, AC Robinson, **RE Roth** (presenter), and KA Cook. 2010. Standardizing map symbology for critical incidents. *Technologies for Critical Incident Preparedness.* Philadelphia, PA: February 2.

8. **Roth RE** (presenter), KS Ross, and AM MacEachren. 2010. GeoVISTA CrimeViz. *Technologies for Critical Incident Preparedness*. Philadelphia, PA: February 2. (including interactive demo)

7. **Roth RE** (presenter) and J Chen. 2009. US cervical cancer mortality 2000-2004: New methods and new findings. *North American Cartographic Information Society (NACIS) 2009.* Sacramento, CA: October 7.

6. Johnson TJ* (presenter), *MM Smithgall, *AC Thomas, and **RE Roth**. 2009. From print to screen: Redesigning the Penn State University campus map. *North American Cartographic Information Society (NACIS) 2009.* Sacramento, CA: October 7.

5. MacEachren AM, AC Robinson, **RE Roth** (presenter), and KA Cook. 2009. Developing symbology standards for emergency mapping. *Visual Analytics Center Consortium Meeting.* Richland, WA: August 18.

4. **Roth RE** (presenter), KS Ross, and CA McCabe. 2009. CrimeViz: Near real-time visualization for understanding spatio-temporal patterns of violent crime in the District of Columbia. *Visual Analytics Center Consortium Meeting.* Richland, WA: August 18.

3. **Roth RE** (presenter) and J Chen. 2009. US cervical cancer mortality 2000-2004: New methods and new findings. *The 105th Annual Meeting of the Association of American Geographers*. Las Vegas, NV: March 24.

2. **Roth RE** (presenter) and J Chen. 2009. US cervical cancer mortality 2000-2004: New methods and new findings. *No Boundaries: 2008 Graduate Student Conference*. University Park, PA: February 28.

1. **Roth RE** (presenter) and J Papez. 2007. An automated approach to site selection for restoration in fragmented landscapes. *Wisconsin Land Information Association (WLIA) 2007 Annual Conference*. Appleton, WI: March 8.

OTHER PRESENTATIONS (EXTERNAL)

13. **Roth RE**. 2017. Mixed-method user studies for cartography. *Technical University Munich*. Munich, Germany: December 8.

12. **Roth RE**. 2017. Principles of user experience design for cartography. *Technical University Munich*. Munich, Germany: December 4.

11. **Roth RE**. 2017. Cartography at UW–Madison. *Leibniz Institute for Regional Geography.* Leipzig, Germany: November 15.

10. **Roth RE**. 2015. Cartographic design tips and tricks. *Colorado University Geospatial Centroid*. Fort Collins, CO: November 18.

9. **Roth RE**. 2015. Cartography: Design + Critique. *Geography 309: Introduction to GIS* (Guest Lecture), *University of Kentucky*. Lexington, KY: April 7.

8. **Roth RE** (discussant) and MW Wilson. 2015. A conversation with Robert Roth. *Geography 109: Digital Mapping* (Guest Discussant), *University of Kentucky*. Lexington, KY: April 7.

7. **Roth RE**. 2011. Harrisburg CrimeViz: Geovisual analytics for crime analysis. *City of Harrisburg Bureau of Police*. Harrisburg, PA: April 27.

6. **Roth RE**. 2010. Geovisual analytics for crime analysis and homeland security. *VACCINE Consortium Technology Demo Day*. West Lafayette, IN: July 14.

5. Blanford J (presenter), AC Robinson, **RE Roth**, S Pezanowski, B Finch, and AM MacEachren. 2010. Categorization of map symbol standards. *Department of Homeland Security Geospatial Working Group*. University Park, PA (web-presentation): May 26.

4. Robinson AC (presenter), **RE Roth**, and AM MacEachren. 2009. Progress on developing standards for Department of Homeland Security map symbology. *Department of Homeland Security Geospatial Working Group*. University Park, PA (web-presentation): December 16.

3. MacEachren AM, AC Robinson, **RE Roth**, and K Cook (presenter). 2009. Introduction to the symbology standardization support project. *Federal Geographic Data Committee Homeland Security Working Group*. University Park, PA (web-presentation): June 4.

2. **Roth RE** and D Saab (co-presentation). 2008. A concept map of geocollaborative crisis management. *US-China Digital Government Collaboration Workshop on GeoCollaborative Crisis Management*. University Park, PA: December 4.

1. **Roth RE** (presenter), E Holbus, N Najarian, J Papez, and J Quan. 2005. Locating optimal lands for reforestation in the Baraboo Hills, Wisconsin. *The Nature Conservancy.* Madison, WI: October 24.

OTHER PRESENTATIONS (INTERNAL)

27. **Roth RE**. 2018. Cartography & Visualization (Guest Lecture). *Geography 765:* Madison, WI: November 2.

26. **Roth RE**. 2017. Polishing your map design (Guest Lecture). *Geography 500:* Madison, WI: May 2.

25. **Roth RE**. 2017. Mixed methods. *China Workshop on Research Innovation and Scientific Writing*. Madison, WI: April 15.

24. **Roth RE**. 2016. Design and use guidelines for interactive maps (Guest Lecture). *Geography 765: Geographic Inquiry and Analysis Introduction*. Madison, WI: September 23.

23. Moore SA, **RE Roth** (panelist), M Robertson, *E Nost, *H Rosenfeld, and *K Vincent. 2015. Geographic collaboration in action. *Special Event Panel Cosponsored by UW-Madison Geography Co-Lab Group and Yi-Fu Tuan Lecture Series*. Madison, WI: November 6.

22. Severtson DJ, **RE Roth** (presenter), and *CM Sack. 2015. Making better health decisions: The impact of interactive mapping of uncertainty on environmental risk beliefs and decision making. *90th Anniversary Celebration of the Wisconsin Alumni Research Foundation (WARF)*. Madison, WI: September 28.

21. **Roth RE**. 2015. Design and use guidelines for interactive maps (Guest Lecture). *Geography 765: Geographic Inquiry and Analysis Introduction*. Madison, WI: September 18.

20. **Roth RE**. 2015. Introduction to Cartography. *Grandparents University, Cartography Major*. Madison, WI: July 9.

19. **Roth RE**. 2015. Mixed methods for cartographic and geographic research (Guest Lecture). *Geography 766: Geographical Inquiry and Analysis Techniques*. Madison, WI: April 15.

18. **Roth RE**. 2015. Survey design (Guest Lecture). *Geography 475: Research Design for Geographers*. Madison, WI: March 26.

17. **Roth RE**. 2015. Colorful Cartography (Guest Lecture). *Geography 370: Introduction to Cartography*. Madison, WI: March 3.

16. **Roth RE**. 2014. Cartographic Design: An insanely brief introduction (Guest Lecture). *Journalism 676: Information Landscapes & Data Cultures*. Madison, WI: November 9.

15. **Roth RE**. 2014. Design and use guidelines for interactive maps (Guest Lecture). *Geography 765: Geographic Inquiry and Analysis Introduction*. Madison, WI: September 26.

14. **Roth RE**. 2014. Introduction to Cartography. *Grandparents University, Cartography Major*. Madison, WI: July 24.

13. **Roth RE**. 2014. Mixed methods for cartographic and geographic research (Guest Lecture). *Geography 766: Geographical Inquiry and Analysis Techniques*. Madison, WI: March 26.

12. **Roth RE**. 2013. Introduction to Cartography. *Grandparents University, Cartography Major*. Madison, WI: July 25.

11. **Roth RE**. 2013. Advanced cartographic techniques (Guest Lecture). *Geography 370: Introduction to Cartography*. Madison, WI: April 30.

10. **Roth RE**. 2013. Mixed methods for cartographic and geographic research (Guest Lecture). *Geography 766: Geographical Inquiry and Analysis Techniques*. Madison, WI: April 17.

9. **Roth RE**. 2012. Welcome. *UW–Madison Workshop in Cartography*. Madison, WI: October 13.

8. **Roth RE**. 2012. seeing Geography through Cartography. *UW–Madison Science Expeditions: Science Hall*. Madison, WI: April 14.

7. **Roth RE**. 2008. A synoptic view of multi-scale mapping operators. *Madison Area Cartographic Design and Debate Spring Lecture Series*. Madison, WI: March 14.

6. **Roth RE**. 2007. Methods for usability testing of interactive and web-based mapping applications. *Penn State Information Visualization Subgroup*. University Park, PA: October 23.

5. **Roth RE**. 2007. Rethinking the role of the cartographer in the age of democratized cartography: Education of mapping principles through the map brewer. *Spatial Information and Analysis Consortium (SIAC) Seminar Series.* Madison, WI: April 27.

4. **Roth RE**. 2006. Exploring the categorical differences of geospatial data uncertainty. *Madison Area Cartographic Design and Debate Fall Lecture Series.* Madison, WI: November 17.

3. **Roth RE**. 2006. An automated approach to site selection for restoration in fragmented landscapes. *Spatial Information and Analysis Consortium (SIAC) Seminar Series*. Madison, WI: April 12.

2. **Roth RE**. 2006. Is Cartography Dead? *Madison Area Cartographic Design and Debate Spring Lecture Series*. Madison, WI: February 10.

1. **Roth RE**. 2005. Making GIScience profitable: A case study in applied geography. *Spatial Information and Analysis Consortium (SIAC) Seminar Series.* Madison, WI: April 8.

TEACHING and ADVISING EXPERIENCE

TEACHING EXPERIENCE

2011– **Course Instructor**
Department of Geography, University of Wisconsin–Madison
- **Geography 370**: Introduction to Cartography (seven semesters)
- **Geography 572**: Graphic Design in Cartography (five semesters)
- **Geography 575**: Interactive Cartography & Geovisualization (five semesters)
- **Geography 970**: Seminar in Cartography (two semesters)

2009–2011   **Laboratory Teaching Assistant**
Department of Geography, Penn State University
- **Geography 461**: Dynamic Cartographic Representation (three semesters)

2005–2007   **Laboratory Teaching Assistant**
Department of Geography, University of Wisconsin–Madison
- **Geography 370**: Introduction to Cartography (three semesters)
- **Geography 575**: Animated and Web-based Mapping (one semester)

2003–2006   **Tutor and Academic Coach**
TRIO Student Support Services, University of Wisconsin–Madison
- **Geography 170**: Map Reading and Interpretation (one semester)
- **Geography 360**: Quantitative Methods in Geographical Analysis (one semester)
- **Mathematics 210**: Finite Mathematics (two semesters)
- **Statistics 301**: Introduction to Statistics (two semesters)

DISSERTATIONS ADVISED

2. Carl Sack. 2018. *Curriculum development and pedagogy for teaching web mapping.*

1. Richard Donohue. 2014. *Web cartography with web standards: Teaching, learning, and using open source web mapping technologies.*

Committees: Danielle Albers Szafir (2015; Computer Science), Michael Correll (2015: Computer Science), Fei Du (2017, Geography), Sarah Bennett (2017, Geography), Alper Sarikaya (2017, Computer Science), Eric Nost (2018, Geography), Nick Lally (2018, Geography)

MASTERS THESES ADVISED

11. Ross Thorn. 2018. *How to play with maps.*

10. Zihan Song. 2017. *Map-based visual storytelling: An assessment of emerging genres and tropes.*

9. Kristen Vincent. 2017. *The role of cartographic interface complexity on spatial decision making: A case study in the North American hazardous waste trade.*

8. Chelsea Nestel. 2016. *~~De~~signing an experience: Maps and signs at the archaeological site of Troy.*

7. Robin Tolochko. 2016. *Contemporary professional practices in interactive web map design.*

6. Caroline Rose. 2015. *Mapping technology in wilderness search and rescue.*

5. Rashauna Mead. 2014. *Expert perspectives on the design and use of learning materials for neocartographic interfaces.*

4. Brian Davidson. 2014. *Cartographic design for mobile devices: A case study using the UW-Madison Interactive Campus Map.*

3. Vanessa Knoppke-Wetzel. 2014. *How technological changes aesthetically defined pre-1900s maps: A stylistic look at woodblock, copperplate, & lithograph print maps.*

2. Carl Sack. 2013. *Mapmaking for change: Online participatory mapping tools for revealing ecological landscape values in the Bad River Watershed.*

1. Martin Elmer. 2012. *Symbol considerations for bivariate thematic mapping.*

Committees: Chris Gavin (2012, Cartography/GIS), Maia Donohue (2013, Energy & Resources), Chris Cantey (2013, Cartography/GIS), Evan Applegate (2016, Cartography/GIS), Scott Farley (2017, Cartography/GIS)

GIS CERTIFICATES ADVISED (DEPRECATED 2017)

21. Cody Schmitt. 2017. *Effigy mound LiDAR in the South Fork of the Bad Axe River Valley.*

20. Shelley Witte. 2017. *Exploring correlations between home owners' loan corporation neighborhood appraisals and block-level spatial clustering of demographic variables in Wisconsin cities.*

19. Natalee Robson. 2016. *Making antibiograms more readable: The creation of an interactive web map of Wisconsin's antibiogram data.*

18. Alex Zarley. 2016. *Detecting spatial patterns of genetic variation in* mycobacterium tuberculosis *isolates along the Silk Road and other ancient trade routes.*

17. Matthew Bougie. 2016. *Updating the State Cartographer's Office (SCO) ControlFinder/PLSSFinder applications using the latest advances in web-based technologies.*

16. Dylan Moriarty. 2016. *Find Your Park, Love Your Park: Making a basemap for National Geographic.*

15. Kristen Vincent. 2015. *New city stadium site selection in 1956.*

14. Dean Olson. 2015. *Interactive maps of a French experimental novel.*

13. Constanza Bravo. 2015. *Walkability index for Dane County, WI*

12. Michelle Hu. 2015. *Visualizing lake level rise: Green Bay, WI.*

11. Andrew Umentum. 2015. *News maps at National Geographic Magazine.*

10. Chloë Quinn. 2015. *Editorial cartography: Experiences as a National Geographic Magazine intern.*

9. Peter Bauknecht. 2015. *'Tri City Volunteers': GIS and cartographic work.*

8. Caitlin McKown. 2014. *Primary care access in Wisconsin: A preliminary study.*

7. David Vogel. 2014. '*County High Points of Wisconsin' interactive map.*

6. Laura Poplett. 2014. *Lake Michigan shoreline change: Approaches for analysis.*

5. Katie Ginther. 2013. *National Geographic 10th Edition Atlas thematic spreads.*

4. Andrew Wentworth. 2013. *B-Cycle bike sharing: GPS big data to quantitative use maps.*

3. Dan Hudec. 2013. *Analysis of tourist capacity and boater accessibility of primary tourism destinations in Door County, Wisconsin.*

2. John Czaplewski. 2012. *The building of 'Pronounce Wisconsin'.*

1. Sam Matthews. 2012. *Changing Borders: Understanding international boundaries through GIS.*

AWARDS/SCHOLARSHIPS RECEIVED BY STUDENTS

- **AAG-Cartography Specialty Group Honors Student Paper Competition:** Carl Sack (2013: 1st, $255), Meghan Kelly (2016: Finalist)
- **AAG-Cartography Specialty Group Masters Research Grant:** Carl Sack (2012: $250), Zihan Song (2016: $250), Kristen Vincent (2016: $250)
- **CaGIS Arthur Robinson Award for Best Printed Map:** Jon Koser (2013: 1st Place, Robinson Award), Katie Kowalsky (2013: Honorable Mention), Dean Olsen (2013: Honorable Mention), Andrew Umentum (2013: Honorable Mention), Ross Thorn (2016: Honorable Mention)
- **CaGIS David Woodward Award for Best Electronic Map:** Katie Kowalsky, Dylan Moriarty, Robin Tolochko (2014: Honorable Mention), Scott Farley, Meghan Kelly, Starr Moss (2016: 1st Place, Group, $500)
- **CAGIS Masters Scholarship Award:** Kristen Vincent (2017: $750)
- **NACIS Student Dynamic Map Competition**: Madeline Emde, Danielle Lee, and Chris Long (2012: 1st Place, Interactive, $500); Chris Cantey, Morgan Jarocki, and Caroline Rose (2013: 1st Place, Interactive, $500); Erin Hamilton, Rashauna Mead, and Vanessa Knoppke-Wetzel (2013: 1st Place,

Narrative, $500); Scott Farley, Meghan Kelly, Starr Moss (2016: 1st Place, Group, $500); Leanne Abraham, Alicia Iverson, Ross Thorn (2017: 1st Place, Group, $500)

- **NACIS Student Print Map Competition**: Evan Applegate (2015: 1st Place, Narrative, $500)
- **National Geographic Award in Mapping (discontinued 2016):** Sarah Graves (2012: 1st Place, $900), Katie Ginther (2013: 1st Place Tie, $600), Morgan Jarocki (2013: 1st Place Tie, $600), Andrew Umentum (2014: 2nd Place, $300), Dean Olsen (2014: Honorable Mention), Mark Harris (2014: Honorable Mention), Michelle Hu (2015: Honorable Mention), Kristen Vincent (2015: Honorable Mention)
- **UW-Madison Campus-Wide TA Innovation in Teaching Award:** Carl Sack (2015: $500)
- **WLIA Damon Anderson Memorial Scholarship**: Carl Sack (2012: $1000), Chloe Quinn (2013: $1000), Kristen Vincent (2015: $1000)

AWARDS and HONORS

12 **The *Journal of Maps* Best Map Award: Finalist**. 2017. Nominated with E Nost, H Rosenfeld, K Vincent, and SA Moore for title "HazMatMapper: An online and interactive geographic visualization tool for exploring transnational flows of hazardous waste and environmental justice."

11. **NSF CAREER Grant Recipient.** 2016. ($454,264)

10. **Welton Honors Summer Sophomore Apprenticeship: Faculty Mentor**. 2013. Received along with Kelly Abplanalp (Cart/GIS major) for summer support on a faculty-guided internship in Cartography. ($2000)

9. **University Housing Honored Instructor**. 2013.

8. **The *Journal of Maps* Best Map Award: Finalist**. 2012. Nominated with MJ Murdock and NV Maziekas for the title "The Basic Ordnance Observational Management System: Geovisual analytics of improvised explosive device incidents."

7. **Wisconsin Idea Seminar: Participant.** 2012.

6. **Information Visualization 2012 Best Paper Award: Honorable Mention**. 2012. Awarded along with AM MacEachren, J O'Brien, B Li, D Swingley, and M Gahegan for the title "Visual semiotics & uncertainty visualization: An empirical study."

5. **GIScience 2010 Best Paper Award: Finalist, Extended Abstract Category.** 2010. Nominated with KS Ross, BG Finch, W Luo, and AM MacEachren for the title "A user-centered approach for designing and developing spatiotemporal crime analysis tools."

4. **The *Journal of Maps* Best Map Award: Finalist**. 2009. Nominated with J Van Den Hoek, AW Woodruff, A Erkenswick, E McGlynn, and J Przybylowski for the title "The 21st Century Campus Map: Mapping the University of Wisconsin-Madison."

2. **Association of American Geographers (AAG) 2007 Best Website Award**. 2007. Received along with W Cronon, T Dresser, D Einstein, M Harrower, M McCalmont, J Przybylowski, and A Woodruff for "The Lakeshore Nature Preserve Website."

1. **The 34th Annual ACSM-CaGIS Map Design Competition: Best of Category– Interactive/Digital, Professional Division**. 2006. Received along with A Woodruff, J Przybylowski, M McCalmont, W Cronon, and M Harrower for "The Lakeshore Nature Preserve Interactive Map."

ACADEMIC SERVICE

EXTERNAL SERVICE

2018–   **Chair (US Delegate):** Commission on Use, Users, and Usability, International Cartography Association

2018–	**Judge**: AAG Cartography Specialty Group Student Illustrated Paper Competition
2018	**Program Committee:** GIScience 2018, Workshop on New Directions in Geovisual Analytics Visualization, Computation, and Evaluation.
2016–	**Editorial Board & Knowledge Area Editor for Cartography & Visualization:** Geographic Information Science & Technology Body of Knowledge
2016–2017	**International Scientific Program Committee:** 28th International Cartographic Conference (ICC)
2016	**Participant:** Cartographic Summit of the International Cartography Association (invitation only)
2015–2018	**Vice Chair (US Delegate):** Commission on Use, Users, and Usability, International Cartography Association
2014–	**Editorial Board:** *Cartographic Perspectives*
2014–	**Judge:** *Atlas of Design*, Volumes II, III, and IV
2014–2015	**International Scientific Program Committee:** 27th International Cartographic Conference (ICC)
2014	**Program Committee:** AutoCarto 2014 Research Symposium
2014	**Co-Organizer:** AAG-CSG Special Sessions on Cognition, Behavior, and Representation
2013–2014	**Program Committee**: CartoCON 2014
2013–	**Editorial Board:** *Cartography and Geographic Information Science*
2012–2015	**Competition Organizer:** National Geographic Award in Mapping
2012–2015	**Competition Organizer:** AAG–CSG Honors Student Paper Competition
2012–2014	**Cartographic Editor:** *The Journal of Maps*
2012	**Organizer:** UW–Madison Workshop on Cartography
2012	**Program Committee:** AutoCarto 2012 Research Symposium
2011–2015	**Academic Director:** Cartography Specialty Group of the Association of American Geographers (AAG–CSG)
2011–2014	**Assistant Editor:** *Cartographic Perspectives*
2011–2013	**Secretary:** North American Cartographic Information Society (NACIS)
2010	**Judge:** GIScience 2010 Poster Award
2009–2010	**Chair:** *Cartographic Perspectives* Digital Transition Committee, NACIS
2009–2010	**Student Board Member:** North American Cartographic Information Society (NACIS)
2009	**Contributor:** Cartography 2.0
2008	**Organizing Committee:** US/China Digital Government Collaboration Workshop on GeoCollaborative Crisis Management
2007	**Judge:** Student Illustrated Paper Competition sponsored by the AAG–RSSG/GISSG/CSG
2006–2007	**Student Director:** Cartography Specialty Group of the Association of American Geographers (AAG–CSG)

REVIEWED FOR (~12 PAPERS PER YEAR):

- *ACM SIGCHI*

- *Annals of the Association of American Geographers*
- *Cartography and Geographic Information Science*
- *Cartographic Perspectives*
- *The Cartographic Journal*
- *Cartographica*
- *Computers and Geosciences*
- *Geomatica*
- *Hawaii International Conference on System Sciences*
- *IEEE Computer Graphics and Applications*
- *IEEE Symposium on Information Visualization*
- *IEEE Symposium on Visual Analytics Science and Technology*
- *IEEE Transactions on Visualization and Computer Graphics*
- *International Conference on Geographic Information Science*
- *International Journal of Digital Earth*
- *International Journal of Geo-Information*
- *International Journal of Geographic Information Science*
- *International Journal of Geography in Higher Education*
- *International Journal of Health Geographics*
- *International Journal of Human-Computer Studies*
- *International Symposium on Automated Cartography (AutoCarto)*
- *Journal of Location Based Services*
- *Journal of Maps*
- *Journal of Spatial Information Science*
- *The National Science Foundation*
- *PacificVis*
- *Physical Geography*
- *Professional Geographer*
- *Transactions in GIS*

INTERNAL SERVICE

2018–   **Faculty Representative:** GISPP Oversight Committee

2017–2018   **Faculty Representative:** Advisory Board for the History of Cartography Project

2016–2017   **Chair:** Departmental Services Committee

2016– 2017   **Committee Member:** Faculty and Staff Development

2016– 2017   **Committee Member:** Geocomputing Committee

2016–2017   **Committee Member:** Speakers Committee

2015–   **Co-Organizer:** UW Cartography Lab Annual Design Challenge

2015–   **Curriculum Design & Course Oversight Faculty:** UW-Madison Online Professional Masters in GIS and Web Map Programming

2015–2016   **Committee Member:** Professional MSc in GIS Development Committee

2015   **Chair:** UW–Madison Geography Undergraduate Affairs Committee

2013–2015   **Committee Member:** UW–Madison Geography Future Directions Committee

2013   **Alternate:** UW–Madison Faculty Senate, Geography Representative

2012–2013   **Committee Member:** UW–Madison Geography Geocomputing Committee

2012–2013   **Committee Member:** UW–Madison Geography Ad-hoc Committee on Chinese Affairs

2012–2013	**Committee Member:** UW–Madison Search Committee for Hire in Cartography/GIS
2012	**Organizer:** UW–Madison Workshop in Cartography
2011–2015	**Committee Member:** UW–Madison Geography Undergraduate Affairs Committee
2011–2015	**Chair:** UW–Madison Committee on State Cartography
2011–2015	**Undergraduate Advisor:** UW–Madison Major in Cartography/GIS
2011–2012	**Secretary:** UW–Madison Department of Geography
2008–2009	**Coordinator:** Penn State Geography Graduate School Mentor Program
2006–2007	**Coordinator:** UW–Madison Geography Graduate School Mentor Program
2006–2007	**Student Director:** Madison Area Cartographic Design and Debate

PROFESSIONAL MEMBERSHIPS

2006–	Cartography and Geographic Information Society (CaGIS)
2005–	Cartography Specialty Group of the Association of American Geographers (AAG–CSG)
2005–	Association of American Geographers (AAG)
2005–	North American Cartographic Information Society (NACIS)