Piloting a Sanborn Map Georef-a-thon for GIS Day 2023

By Joshua Sadvari and Michelle Hooper

The Ohio State University

Introduction

Like many other institutions, The Ohio State University hosts an annual GIS Day event to promote awareness of and engagement with geospatial data, methods, and technologies. The University Libraries is heavily involved in the organization of these GIS Day activities, in collaboration with various other campus units. The purpose of this article is to share information about a new activity that we piloted during our GIS Day 2023 program – the Columbus Sanborn Georef-a-thon – and to encourage map and geospatial library professionals at other institutions to explore how crowdsourced georeferencing activities could align with their education, outreach, research support, or collection development goals.

Rationale

Sanborn fire insurance maps can be found among the physical and digital collections of many academic and public libraries. These maps provide a wealth of information about the historical built environment across thousands of U.S. cities and towns, and recent examples of their use in historical research and reconstructions abound (e.g., Bonenberger 2020; Cowling 2023; Douglass et al. 2019; Huang et al. 2018; Lin et al. 2023; Parshina-Kottas and Singhvi 2022; Tollefson, Frickel, and Restrepo 2021). At the same time, the development of the OldInsuranceMaps.net platform offers librarians, academics, and enthusiasts new opportunities for engaging with Sanborn maps from the Library of Congress collections through crowdsourced georeferencing (see Cox 2022 for a detailed overview of the objectives, development, and early use of this platform).

The rationale for piloting a Sanborn map georef-a-thon included both education and

research support considerations. In terms of education, a georef-a-thon offers participants a hands-on opportunity to carry out processes through which static digital maps can be transformed into raster geospatial data, data which can be used as is or transformed into vector features through additional processes and used in different ways. Highlighting these processes provides insight into how geospatial data can be created and used and allows participants to engage with spatial and data literacy concepts, similar to ways that humanitarian map-a-thons have been used for education and outreach in other library contexts (McGowan 2020; Quill 2018). Furthermore, focusing on Sanborn maps provides an opportunity to introduce participants to a large collection of maps that may have previously been unknown to them and which might be useful for historical research projects across a variety of disciplines (whether georeferenced or not).

In terms of research support, another motivation for hosting a georef-a-thon was to explore the feasibility of using the OldInsuranceMaps.net platform and a crowdsourced georeferencing model for producing datasets that might one day be useful for the ongoing Ghost Neighborhoods of Columbus project led by Ohio State's Center for Urban and Regional Analysis (and see Lin et al. 2023). GIS Day was a natural fit for piloting the Sanborn map georef-a-thon as it is a time of year when we typically ramp up promotion of geospatial support on campus, facilitate hands-on educational activities as part of a larger program, and attract an audience with a wide range of disciplinary interests and varying GIS skill levels.

The Columbus Sanborn Georef-a-thon

The remainder of this article will focus on practical aspects of hosting the Columbus Sanborn Georef-a-thon event. We will briefly discuss the OldInsuranceMaps.net platform, event preparation, event facilitation, and next steps following the event in the subsequent sections.

The OldInsuranceMaps.net Platform

The ideas behind, development, and early use of the OldInsuranceMaps.net platform have been discussed in detail elsewhere (Cox 2022), so this section will offer a brief overview of aspects of the platform used as part of the georef-a-thon. Specific volumes of Sanborn maps can be loaded into the platform via the Library of Congress API, and these requests are mediated by the platform's developer. Once a volume is loaded, its associated information becomes visible on a volume summary

page, such as this one for Columbus, Ohio (1951, vol. 1). Registered users can then initiate a process to load the sheets contained within a volume, with each of the loaded sheets appearing as its own document in the “Unprepared” category of the volume summary page.

The next step in the workflow is to prepare these individual documents. Users examine the documents to determine if a map sheet depicts only one contiguous area, and if so, the “no split needed” option can be chosen, moving the document into the “Prepared” category and making it immediately available in the georeferencing interface. However, if a map sheet depicts multiple, non-contiguous areas (typically separated by thick black lines), users can draw “cut lines” across the image and split the original map sheet into separate documents, each of which will move into the “Prepared” category and be able to be separately georeferenced (Figure 1).

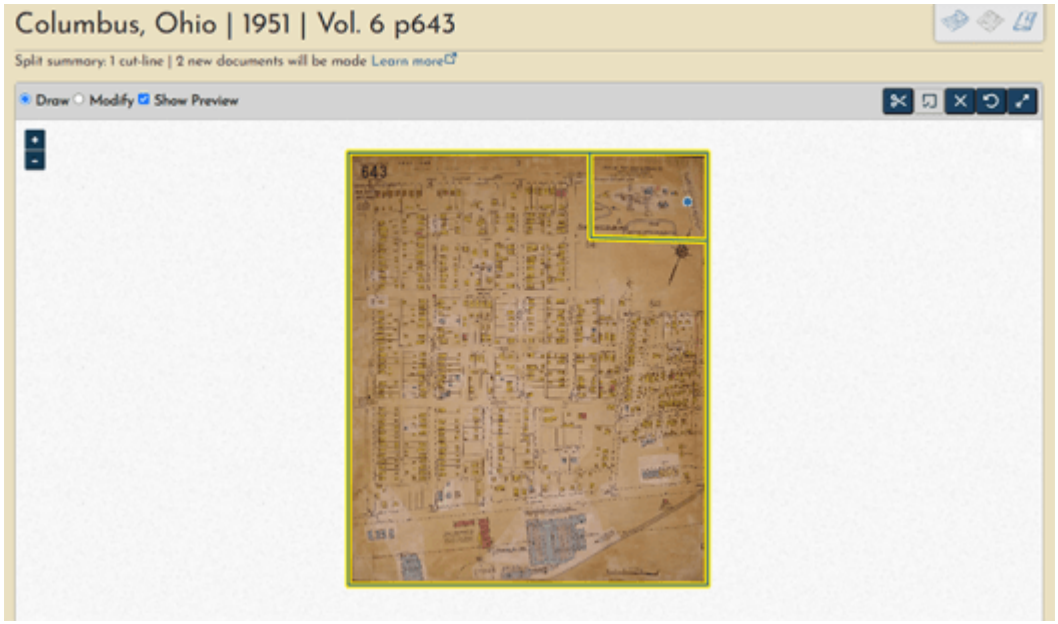

Figure 1: In this example of the preparation step, the above map sheet (#643) will be divided into two separate and mutually exclusive documents bounded by the yellow lines.

Prepared documents can be opened in the georeferencing interface with the map sheet displaying in the left pane and reference layers and basemaps displaying in the right pane (Figure 2). If the key map for a volume has been prepared and georeferenced first, it will display as a helpful reference layer. Users can pan and

zoom the key map to orient themselves to the location of their map sheet and then toggle it off to begin georeferencing against the modern basemap (Adam Cox, email to authors, November 8, 2023).

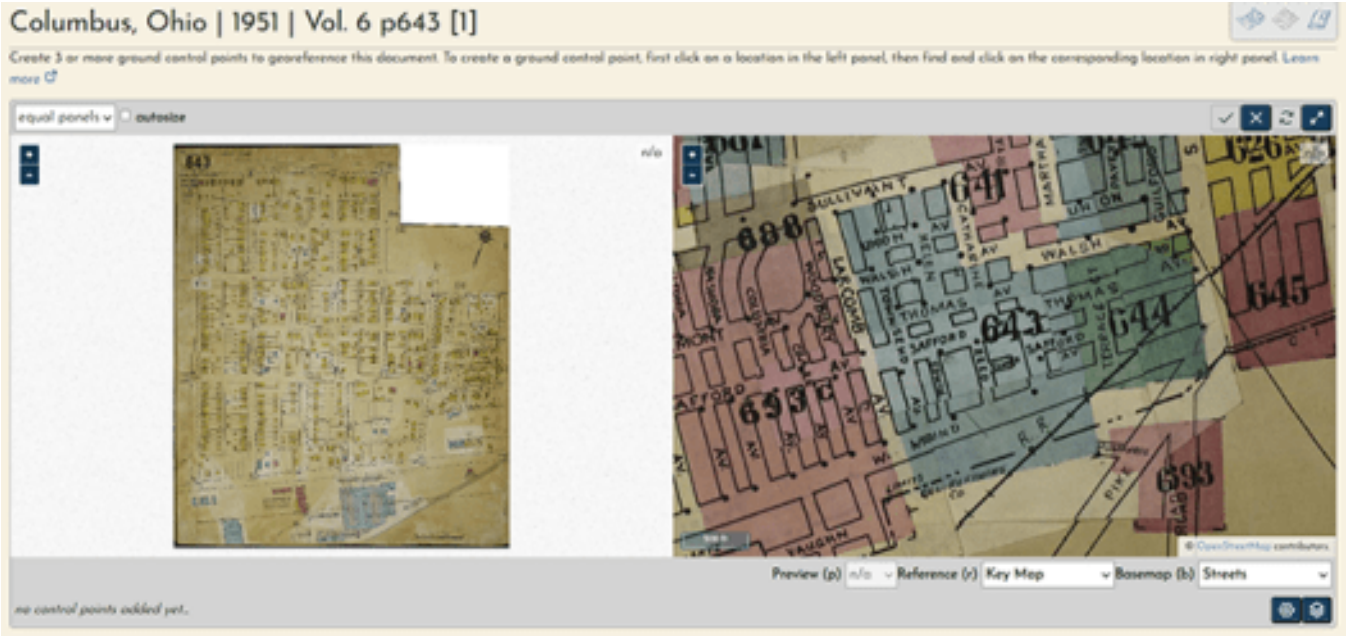

Figure 2: In the georeferencing interface, a prepared document derived from map sheet #643 displays in the left pane, and the key map has been zoomed to the approximate location of this same sheet in the reference/basemap pane on the right.

After toggling off the key map, a user can begin adding control points for georeferencing by first adding a point to the map document in the left pane and then adding a point to the corresponding real-world location on the basemap in the right pane. Once three control points have been added, the map document appears as a semi-transparent overlay on the basemap (Figure 3). This makes the identification of additional control point locations easier for users. When a user is satisfied with the georeferencing results, the control points can be submitted, and the document moves into the “Georeferenced” category. The user can then move on to preparing and/or georeferencing other documents in the volume.

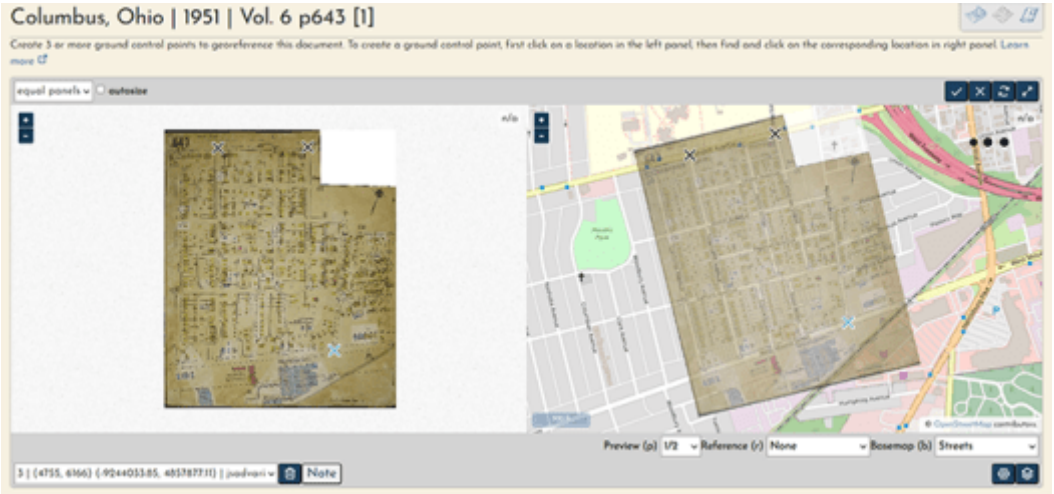

Figure 3: The key map has been toggled off in the georeferencing interface, and three control points have been added, resulting in a semi-transparent overlay of the map document on the basemap in the right pane.

There is an optional trimming step in the workflow, in which overlapping margins of georeferenced maps can be removed to create a seamless mosaic. However, as this step may be more appropriately completed after most of the map sheets in a volume have been georeferenced, we decided not to include it as part of the georef-a-thon and will not discuss it further here. Georeferenced map sheets and mosaics deriving from these processes are available via web services and can be downloaded in several formats for use in other contexts.

Preparing for the Event

A meeting with Adam Cox, the developer of OldInsuranceMaps.net, took place via Zoom on September 14, 2023, approximately two months before GIS Day (November 15, 2023). In this meeting, we discussed ways we might engage with the platform in the short- and long-term and outlined our plans for a georef-a-thon activity. Adam graciously agreed to load seven volumes for Columbus, Ohio dated to 1950-1951 into OldInsuranceMaps.net. Four volumes were loaded shortly after the meeting so that we could familiarize ourselves with the platform. The three largest volumes were then added a week before GIS Day to ensure there would be plenty of sheets available for participants to prepare and georeference. Two georef-a-thon sessions were planned as part of the GIS Day 2023 program, one in the morning and one in the afternoon, to allow more people to participate. The content and structure were the same for both sessions.

In the weeks leading up to the georef-a-thon sessions, one of the authors (Sadvari) loaded the sheets for these seven volumes. This process could take up to an hour for each volume depending on the number of sheets included, but because it runs in the background, a user does not have to wait for an entire volume to load to start working on the sheets. As the sheets were loaded, Sadvari georeferenced each of the key maps for these volumes and used the “Classify Layers” functionality in the volume summary pages to mark them as such so that they would be available to participants as reference layers (Adam Cox, email to authors, November 8, 2023). Facilitators of the georef-a-thon familiarized themselves with the very useful documentation linked via the OldInsuranceMaps.net site, particularly the sections on preparing sheets, georeferencing the documents, and the tutorial. This ensured there was a group available to answer participant questions about the platform and process on the day of the event. In addition, participants were informed that they should plan to bring a laptop to the georef-a-thon and that tasks within OldInsuranceMaps.net would likely be easier for most users to accomplish with a mouse than with a touchpad.

Facilitating the Event

Across the two georef-a-thon sessions, 30 unique users (including facilitators) participated in the document preparation and georeferencing steps, and several attendees in the morning session returned to continue this work during the afternoon session. The sessions were scheduled for two hours each, with the first 30 minutes being an introductory presentation. In this presentation, facilitators covered basic information about Sanborn maps, described the georeferencing process generally (including tips for selecting control points), and discussed an example of how georeferenced Sanborn maps can be used for research (i.e., the Ghost Neighborhoods of Columbus project). Facilitators then introduced attendees to the OldInsuranceMaps.net platform by demonstrating the preparation and georeferencing steps, providing links to the documentation for their reference, and helping with account registration. Participants had the remaining 90 minutes to explore the Sanborn map volumes loaded for Columbus and carry out preparation and georeferencing tasks, while facilitators roamed the room and answered questions.

Overall, the georef-a-thon sessions went smoothly and participants were very engaged. As a group, we focused our work on map sheets in 1951 volumes 1-3. During the three hours available for participants to carry out georef-a-thon tasks,

233 out of the 313 loaded map sheets were prepared and georeferenced, while another 53 documents were prepared but not georeferenced. The amount of work the group was able to accomplish, despite only being introduced to the platform that day, was very impressive, and Figure 4 depicts the results of our activities in the platform's mosaic viewer. The most challenging map sheets to georeference (and most gratifying, in our opinion) were those in which north was not at the top, causing a visual mismatch between the map sheet and the basemap and testing the spatial awareness of participants. The only minor issue encountered was that the semi-transparent overlay would fail to load in the right pane of the georeferencing interface in certain instances, making it a bit more difficult for users to add subsequent control points (a known bug which the developer is working to resolve; Adam Cox, email to authors, November 16, 2023).

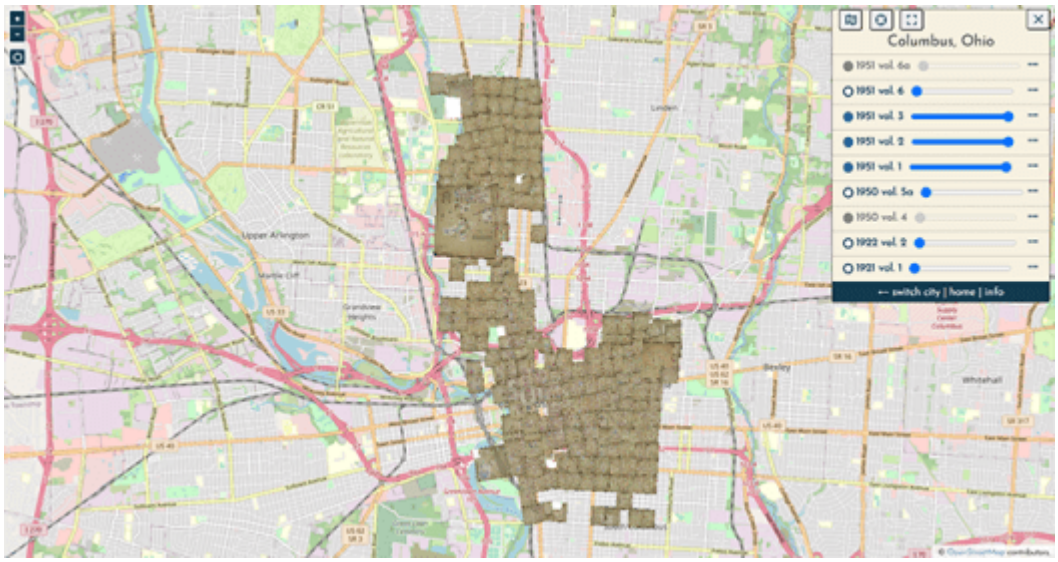

Figure 4: Sanborn map sheets for 1951 volumes 1-3 for Columbus, Ohio that were prepared and georeferenced during our GIS Day 2023 program.

Very few georef-a-thon participants indicated they had previously used or even heard of Sanborn maps when asked this question during the introduction, which reinforces how such an activity can help in creating awareness of the potential uses of this collection. Furthermore, one of the authors (Sadvari) had an impromptu consultation with a participant during the afternoon session about how they could use a desktop GIS to georeference a different scanned map directly related to their graduate research (and a similar consultation with another participant took place two weeks after the event). In this way, the event helped participants to see how scanned maps can be transformed into geospatial data in ways they connected with

their own research, even if they would not be using Sanborn maps or OldInsuranceMaps.net specifically in that work.

After the Event

At the time of writing, the number of georeferenced maps for 1951 volumes 1-3 has risen from 233 to 299, indicating users have continued work started during the Columbus Sanborn Georef-a-thon on their own. Shortly after the event, facilitators received an email from one such user noting that they were also adjusting control points for some maps where it appeared participants had georeferenced map sheets to the key map rather than the modern basemap (despite our instructions), and they wanted to alert us for quality control purposes. This interaction and the consultations mentioned previously illustrate some important points that relate back to educational and research support considerations for piloting the georef-a-thon.

First, attendees may take away different things from participating in a georef-a-thon, but awareness of historical map collections, basic georeferencing principles, and crowdsourced georeferencing opportunities can allow for a level of future engagement that is most appropriate for a given participant. For map and geospatial library professionals, there is an educational value in this by highlighting spatial and data literacy concepts (such as geospatial data creation workflows and data quality considerations) and helping participants to see potential connections to their own work. The OldInsuranceMaps.net platform provides a low barrier entry point for teaching spatial and data literacy concepts through georeferencing and engaging students in the “process” of geospatial data, illustrating a standalone educational value that was perhaps not envisioned as a specific outcome during the platform’s conceptualization and development but could be one nonetheless (see Cox 2022).

Second, crowdsourced georeferencing activities like the one described in this article also result in a “product” of geospatial data, one that could be of varying or questionable quality. Therefore, assessing the feasibility of using the maps georeferenced during this event for research purposes (e.g., Ghost Neighborhoods of Columbus) remains an unresolved question. However, we intend to explore a model in which library student employees and/or student research assistants in the Center for Urban and Regional Analysis can receive training on the OldInsuranceMaps.net platform to carry out a workflow for evaluating the quality of georeferenced sheets, editing control points as needed, and trimming the sheets

into a seamless mosaic. Such a model was envisioned by Cox (2022, 86) when he noted that “one could imagine an administrative or staff user performing corrective updates on existing crowdsourced [ground control points].” This model may also be particularly appropriate for libraries or other academic units seeking to utilize this platform to georeference Sanborn maps for research or collection development purposes. Though OldInsuranceMaps.net does not currently include such functionality, any future enhancements that would allow for assessing and reporting the accuracy of the georeferencing process with the map sheet or mosaic metadata would aid these efforts and bring the platform’s products into closer alignment with recommended best practices for georeferencing Sanborn maps (Piekielek 2017).

Conclusion

In this article, we have shared our motivations and experiences piloting a Sanborn map georef-a-thon activity during GIS Day 2023. In doing so, we hope we have also demonstrated the value such activities can bring to the education and outreach strategies used by map and geospatial library professionals on GIS Day and beyond. While we have focused on how the OldInsuranceMaps.net platform enabled us to facilitate this event, there is no particular need to limit such activities to this platform or to Sanborn maps depending on the map collections and georeferencing technologies available in a given context. Other examples of approaches to crowdsourced georeferencing in libraries can be found in the literature (Knutzen 2013; Kowal and Přidal 2012; Storms 2017), and a recent National Endowment for the Humanities award for continued enhancement of the Allmaps platform is an exciting development (Appel and Spangler 2023). Nevertheless, we hope that we have also inspired map and geospatial library professionals who may be less familiar with OldInsuranceMaps.net to explore its potential value in advancing their own education, research support, or collection development goals, or just to enjoy it as part of the “crowd.”

Acknowledgments

We thank Adam Cox for generously offering his support, time, and expertise during the planning stages of the Columbus Sanborn Georef-a-thon and for providing feedback on an earlier version of this paper. We thank Harvey Miller for planting the seed of this program in our minds and for providing feedback on an earlier version of this paper. We also thank Treavon Clark, Larisa Kruger, Katie Phillips, Brian Frueh, Kristin Henkaline, and Jarod Ogier for their various contributions in planning,

promoting, participating in, and handling the logistics of portions of the GIS Day 2023 event.

Disclosure Statement

The Ohio State University Libraries has contributed funding to the OldInsuranceMaps.net platform for cloud storage/maintenance costs for 56 Sanborn map volumes providing coverage of cities with an Ohio State campus (Columbus, Lima, Mansfield, Marion, Newark, and Wooster) and for software enhancements to support institutionally-sponsored volume additions and georeferencing projects.

References

Appel, Stephen and Ian Spangler. 2023. “Making Open-Source Georeferencing Technology Collections-Ready with the Allmaps Platform.” Lightning talk presented at the *Big Ten Academic Alliance GIS Conference, Online, November 8, 2023.* https://gin.btaa.org/conference/2023/.

Bonenberger, Dan. 2020. “Historical GIS for Vernacular Architecture Surveys & Virtual Reconstruction of Urban Cultural Landscapes: A Case Study in 1850s Wheeling, (West) Virginia.” *Material Culture* 52 (1): 43–62.

Cowling, Bob. 2023. “Time Traveler’s Companion: Discovering Keweenaw’s Heritage through a Mobile App.” *WAML Information Bulletin* 54 (3). https://waml.org/waml-information-bulletin/volume-54-number-3/time-travelers-companion/.

Cox, Adam. 2022. “Creating a Public Space for Georeferencing Sanborn Maps: A Louisiana Case Study.” Master’s thesis, Louisiana State University. https://doi.org/10.31390/gradschool_theses.5641.

Douglass, Matthew J., Zachary R. Day, Jeremy C. Brunette, Peter Bleed, and Douglas Scott. 2019. “Virtual Reconstruction as Archaeological Observation: Embracing New Ways of Treating Sites, Places and Landscapes.” *Advances in Archaeological Practice* 7 (2): 127-139. https://doi.org/10.1017/aap.2018.49.

Huang, Jiawei, Mahda M. Bagher, Heather Dohn Ross, Nathan Piekielek, Jan Oliver Wallgrün, Jiayan Zhao, and Alexander Klippel. 2018. “From Archive, to Access, to Experience –– Historical Documents as a Basis for Immersive Experiences.” *Journal*

of Map & Geography Libraries 14 (1): 40-63. https://doi.org/10.1080/15420353.2018.1498427.

Knutzen, Matthew A. 2013. “Unbinding the Atlas: Moving the NYPL Map Collection Beyond Digitization.” *Journal of Map & Geography Libraries* 9 (1-2): 8-24. https://doi.org/10.1080/15420353.2012.726204.

Kowal, Kimberly C. and Petr Přidal. 2012. “Online Georeferencing for Libraries: The British Library Implementation of Georeferencer for Spatial Metadata Enhancement and Public Engagement.” *Journal of Map & Geography Libraries* 8 (3): 276-289. https://doi.org/10.1080/15420353.2012.700914.

Lin, Yue, Jialin Li, Adam Porr, Gerika Logan, Ningchuan Xiao, and Harvey J. Miller. 2023. “Creating Building-Level, Three-Dimensional Digital Models of Historic Urban Neighborhoods from Sanborn Fire Insurance Maps Using Machine Learning.” *PLoS ONE* 18 (6): e0286340. https://doi.org/10.1371/journal.pone.0286340.

McGowan, Bethany S. 2020. “Measuring Student Motivation for Participation in GIS Data Activities.” *portal: Libraries and the Academy* 20 (3): 475-494. https://doi.org/10.1353/pla.2020.0026.

Parshina-Kottas, Yuliya and Anjali Singhvi. 2022. “How We Reconstructed the Neighborhood Destroyed by the Tulsa Race Massacre.” In *SIGGRAPH ’22: Special Interest Group on Computer Graphics and Interactive Techniques Conference, Vancouver, BC, Canada, August 7-11, 2022*. New York: Association for Computing Machinery. https://doi.org/10.1145/3532836.3536282.

Piekielek, Nathan B. 2017. “Best Practices for Georeferencing Large Scale Historical Fire Insurance Maps of the USA.” *e-Perimetron* 12 (2): 84-94. https://www.e-perimetron.org/Vol_12_2/Piekielek.pdf.

Quill, Theresa M. 2018. “Humanitarian Mapping as Library Outreach: A Case for Community-Oriented Mapathons.” *Journal of Web Librarianship* 12 (3): 160-168. https://doi.org/10.1080/19322909.2018.1463585.

Storms, Martijn. 2017. “Maps in the Crowd: Results of a Map Georeferencing Crowdsourcing Pilot Project.” *e-Perimetron* 12 (3): 109-118. https://www.e-perimetron.org/Vol_12_3/Storms.pdf.

Tollefson, Jonathan, Scott Frickel, and Maria I. Restrepo. 2021. “Feature Extraction

and Machine Learning Techniques for Identifying Historic Urban Environmental Hazards: New Methods to Locate Lost Fossil Fuel Infrastructure in US Cities." *PLoS ONE* 16 (8): e0255507. https://doi.org/10.1371/journal.pone.0255507.

Authors

Joshua Sadvari, Assistant Professor, Geospatial Information Librarian, sadvari.1@osu.edu

Michelle Hooper, GIS Administrator, Department of Geography & Center for Urban and Regional Analysis, hooper.85@osu.edu

< issue toc next >>