Cartographic Perspectives

The Journal of **nacis**

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IN THIS ISSUE

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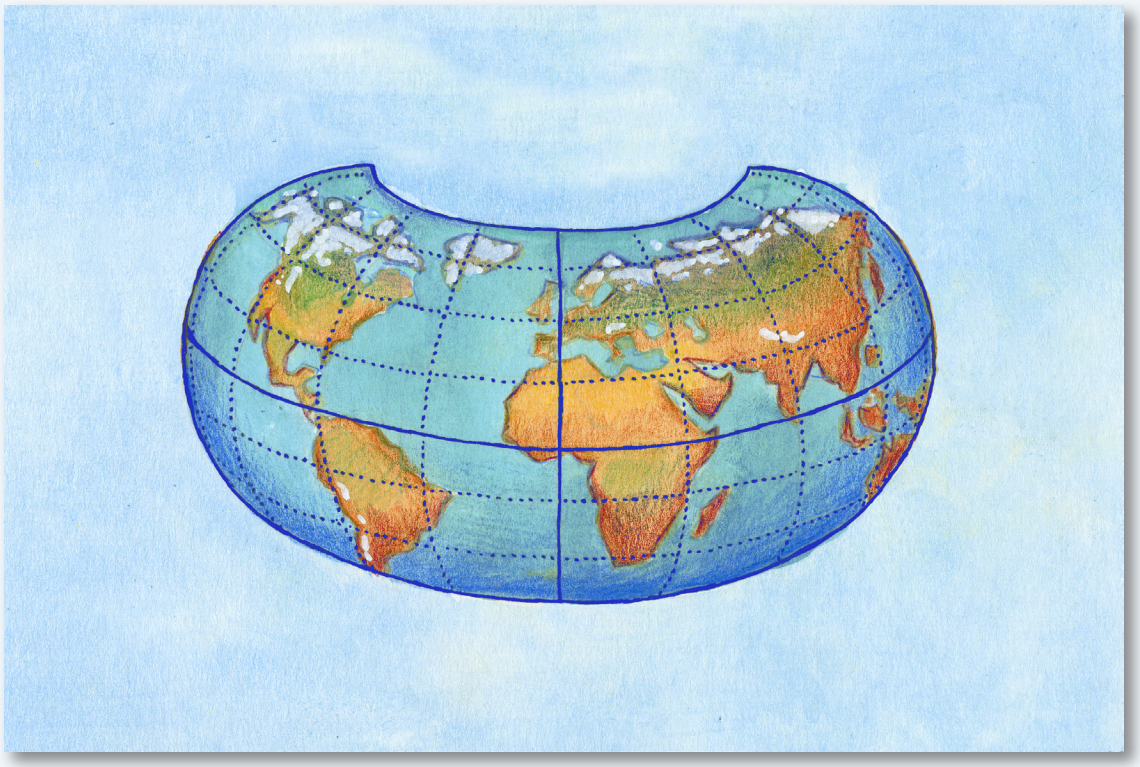
ABOUT THE COVER

The cover of this issue of *CP* features a hand-drawn world map in the Raisz Armadillo projection, created by Madeline Grubb. This piece was originally featured in The Projection Collection set of map trading cards. You can see more of Madeline's work at ***maddygrubbmaps.github.io***.



Cartographic Perspectives

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LETTER FROM THE EDITOR

The pieces that fall together in any given issue of *CP* can sometimes prompt me to think about unexpected cartographic connections. This issue includes a piece that focuses on contemporary mapping practices, in which many maps are born online and are ever-changing, while another piece examines maps that are fixed in time, published in the static archives of a scholarly journal. As a product of scholarship, a published article represents a snapshot of the authors' thinking about a problem at a particular point in time. But the fixity of knowledge is illusory: scholars are often engaged in debate around the validity of a theory or understanding of a problem, and what is accepted as fact can sometimes change as we develop new methods, data sources, or technologies for understanding the world. Perhaps, then, publishers should encourage authors to explore the affordances of online maps for capturing scholarly thinking, and consider how their publications can evolve to include such materials in a cohesive way that encourages readers to not just read the maps but also to interact with them.

In *CP 99*, you will find two PEER-REVIEWED ARTICLES. In the first, Sepideh Shahamati and colleagues present a critical reflection on the strengths and weaknesses of an open-source mapping tool, uMap, for online mapping projects. Their contribution explores how they used this tool for research, teaching, and community engagement purposes across six diverse projects. Readers who are considering what platform to use for their potential projects might find their piece and its linked maps to be of particular value. In the second article, Robert Hickey and Elvin Delgado discuss their analysis of the maps published in the *Annals of the American Association of Geographers* from 1950–2017. Their undertaking was prompted by an anecdotal observation that more than a few papers published in that journal were map-less. They sought to understand whether there were any temporal trends in how many articles included maps, and explored potential explanations for the trends they identified, including the impact of particular editors, the section in which the article was published, and wider changes in the discipline of geography and the nature of geographical inquiry.

In VISUAL FIELDS, Robert Hickey describes how he built a sculptural map of Australia that memorializes a field trip he took with his wife, an extremophile microbiologist. On the trip, they they sampled the microbiome of several lakes and visited sites of microbiological significance, such as Hamelin Pool in Western Australia, one of only two remaining sites world-wide where living stromatolites can be found. The map depicts characteristics of the sites as well as the route they traversed using natural materials such as wood, semi-precious gemstones, and copper wire.

CP99 includes four REVIEWS. In the first, Leo Dillon introduces readers to the charms of *An Atlas of Extinct Countries*, a small and humorous tome that profiles the borders that defined forty-eight places that once existed but have now been subsumed, subdivided, or otherwise erased from our political maps. Maya Daurio reviews a more serious treatment of borders and the work that maps do in defining them in her discussion of *The Power of Maps and the Politics of Borders*. Readers who have an interest in understanding the role that early American surveying and mapping practices played in dispossessing Indigenous peoples and in establishing the new republic's identity as a White, male American nation will want to explore her review, which traces how the contributions to this edited volume can help us to understand the history of early US mapping. Richard Bohannon's critique of Bertram Bruce's book, *Thinking with Maps: Understanding the World Through Spatialization*, invites us to remember that developing students' capacities to understand the power of maps is an ongoing project, relevant to contemporary maps and not limited to historical examples. Bohannon wishes there were more focus on this point in Bruce's book, seeing it as a missed opportunity. Finally, Daniel Cole's review of Kenneth Field's new volume, *Thematic Mapping: 101 Inspiring Ways to Visualise Empirical Data* describes a volume whose maps could be used as a sourcebook for learning to think critically about map design, through its presentation of some of the varied ways a mapmaker might represent a single dataset.

Amy Griffin (she/her)
Editor, *Cartographic Perspectives*

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PEER-REVIEWED ARTICLE

uMap: A Free, Open-Source Alternative to Google My Maps

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Since their release in 2005, Google Maps-based tools have become the de facto solutions for a variety of online cartographic projects. Their success has been accompanied by a range of critiques denouncing the individualistic market-based logic imposed by these mapping services. Alternative options to this dominant model have been released since then; uMap is one of them. uMap is a free, open-source online mapping platform that builds on OpenStreetMap to enable anyone to easily publish web maps individually or collaboratively. In this paper, we reflect on the potential and limits of uMap based on our own experiences of deploying it in six different mapping projects. Through these experiences, uMap appears particularly well-suited for collaborative mapping projects, due to its ease in connecting to remote data and its high level of interoperability with a range of other applications. On the other hand, uMap seems less relevant for crowdmapping projects, due to its lack of built-in options to manage and control public contributions. Finally, the open-source philosophy of uMap, combined with its simplicity of use and its strong collaborative capacity, make it a great option for activist mapping projects as well as for pedagogical purposes to teach a range of topics including online collaborative cartography.

KEYWORDS: uMap; open-source cartography; Google Maps; collaborative mapping; crowdmapping; activist mapping; teaching online cartography

INTRODUCTION

Since the release of Google Maps in 2005, the world of collaborative online cartography has changed radically. Any savvy Internet user can now set up a simple mapping platform, add placemarks, and invite contributors to participate by adding points, data, images, video, and text. These possibilities have dramatically modified the way spatial information is both produced and accessed. Collaborative online mapping platforms, epitomized by Google My Maps (the application that enables individuals to set up their own Google Maps project), have been praised for their capacity to support participatory democracy (Miller 2006; Haklay, Singleton, and Parker 2008; Warf and Sui 2010; Quinn and Yapa 2016), as well as criticized for reproducing and reinforcing existing racial, cultural, economic, technological, and digital divides (Crutcher and Zook 2009; Graham and Zook 2011; Blaschke et al. 2012). As Palmer puts it (2014, 347), there is a fundamental contradiction between the collaborative potential of Google Maps and its individualistic, market-based logic, which has led it to develop a map interface "that has been emptied of difference, contestation, and political action." Other collaborative mapping platforms have been released over the years to provide alternatives to the dominant Google mapping model. In this paper, we look carefully at the possibilities offered by one of these platforms: uMap.

Our interest in uMap started in 2017, when Nelly Markovsky, an undergraduate student at Concordia University, was asked by the Regional Program for the Settlement and Integration of Asylum Seekers (PRAIDA) in Québec to produce a collaborative online map of

services offered to asylum seekers in Montréal (Markovsky 2017). This online map was envisioned as a digital entry point for asylum seekers looking for services provided by different organizations across the city. Markovsky defined a set of criteria to select the relevant online mapping platform: (1) free or cheap; (2) easy to use for the end-user (i.e., asylum seekers); (3) easy to update and to maintain over time by different people/organizations without any mapping software expertise; and (4) open-source to remain as close as possible to the community-based philosophy of the project. Six online mapping applications were compared for this project at the time: Mapbox, Carto, Google My Maps, MangoMap, Zeemaps, and uMap. uMap was selected to produce "The Map of Services for Refugees and Asylum Seekers in Montréal" (see Figure 1) because it best suited these criteria (Markovsky 2017). We worked with Markovsky on the PRAIDA project, and the overall positive experience of using uMap led us to deploy it for three other collaborative mapping projects as well as in two university courses.

Through using uMap in these six different projects, we began to identify its strengths and limits in different contexts and to reflect on its potential for different types of online mapping projects. These experiences led us to identify and describe three main domains in which uMap could be an interesting alternative to Google Maps: collaborative mapping, crowdmapping, and teaching online cartography. Before introducing uMap in general terms and discussing its pros and cons within these domains, it is important to mention that none of the authors of this paper have any connections with the uMap project.

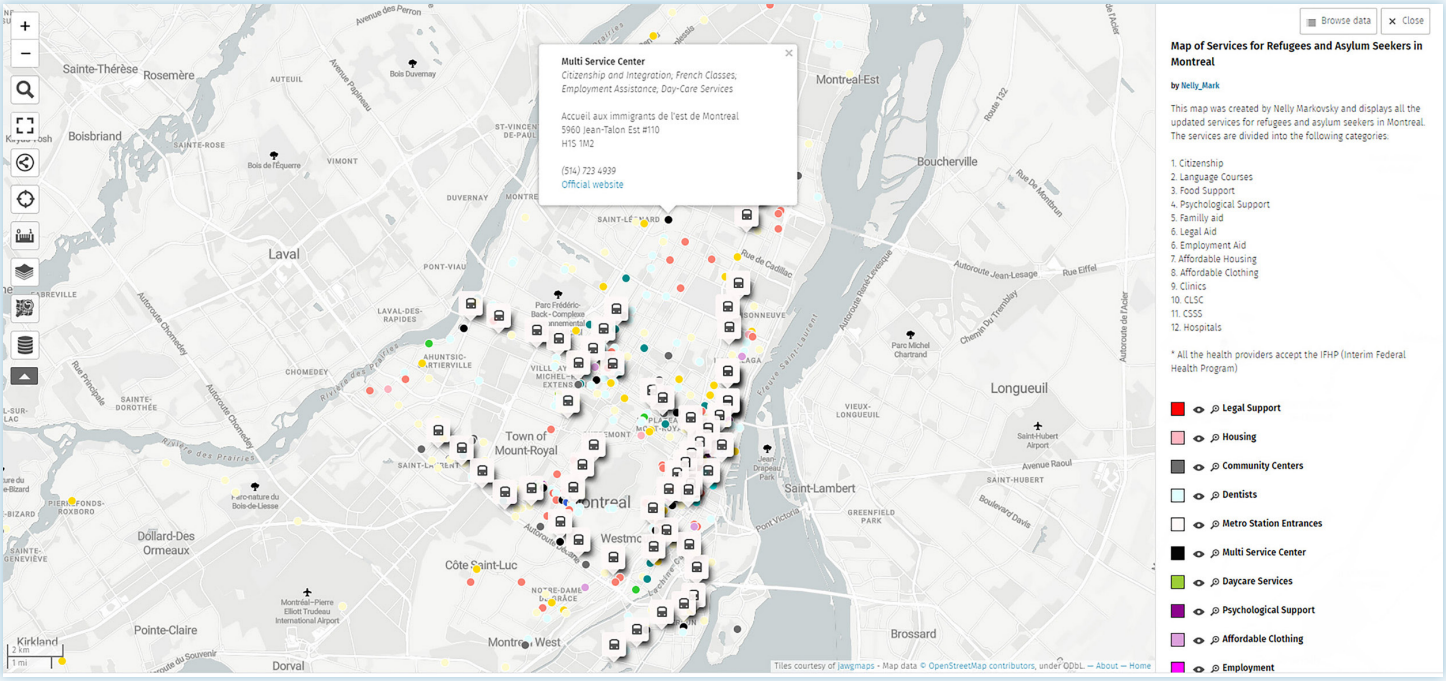

Figure 1. Map of services offered to asylum seekers in Montréal, created by Nelly Markovsky. Interactive version available at u.osmfr.org/m/132406.

WHAT IS UMAP?

Launched in 2013, uMap is a free/libre and open-source software (FLOSS/FOSS) platform offering an entirely web-based environment for interactive, multimedia mapmaking and publishing. The platform is built with the JavaScript web mapping library Leaflet and the Python web app infrastructure Django. uMap is primarily developed and managed by OpenStreetMap France, a non-profit organization that acts as a local, independent chapter of the UK-based OSM Foundation. uMap's source code is available on GitHub (**github.com/umap-project/umap**), enabling members to collaborate on its development or make suggestions for future updates.

The project is covered by the permissive WTFPL license, which makes the source code into free software for redistribution and modification. It can thus be freely accessed, downloaded, or modified to customize the application based on particular needs.

At a practical level, uMap is relatively simple to use. It allows users to quickly develop a map with points of interest and popup windows that can include text, images, and video. Existing geolocated data can also be imported in a variety of formats (e.g., geojson, osm, csv, gpx, kml, GeoRSS). Map geometries can be organized and styled by layers of points, lines, or polygons. Once finished, the map can then be shared on the web via a unique link or embedding into HTML using an iframe. The platform also allows users to import geotagged photos, create slide-based maps, and produce simple multimedia geographic tours. In this way, uMap can provide some of the basic feature characteristics of story-based map-making tools like Esri Story Maps, (formerly) Google Tour Builder, and Story Map JS (see Caquard and Dimitrovas 2017). Users can also modify data within, and export data from, uMap, making the platform interoperable and particularly easy to integrate into other workflows. The application manages data internally using GeoDjango, but can also map data managed by remote, third-party databases such as Google Sheets and Zoho Sheets.

Overall, uMap offers capabilities comparable to Google My Maps. The reasons usually emphasized by those opting to use the former over the latter are its richness in features, ease of implementation, and open-source philosophy (see for instance, Law and Ramos 2017; Rönneberg, Laakso, and Sarjakoski 2019). These advantages have led to the platform being used in numerous contexts, such as **activism**, **community mapping**, and **risk management**. Since its launch in 2013, uMap has remained free and open-source, while many other online mapping applications that may have begun as open-source and/or free tools have since moved toward for-profit business models by implementing enterprise pricing plans and limiting free services. These limitations can occur in many ways, whether by restricting data imports and exports (e.g., Scribblemaps), strictly limiting the number of views or visits a map can receive (e.g., Zeemaps, MangoMap), terminating the account after a given timespan (e.g., Carto), or imposing a watermark on all base maps (e.g., iMapBuilder). uMap stands out in its ongoing commitment to FOSS despite an increasing marketization of online mapping services in the previous decade.

The commercialization of other previously free online mapping applications brings into question the sustainability of FOSS tools such as uMap. Just like many other open-source software projects, 99% of uMap is developed by volunteers, according to its main developer, Yohan Boniface (personal communication with authors). Under the open-source model, a project is initially developed by a project "leader" and is maintained over time by volunteer contributors who, depending on their knowledge, "design, test, write, debug, distribute, and document" the project (von Krogh and Spaeth 2007, 237). Although this approach (like many others) does not guarantee sustainability of the software over time, which is a major drawback for the adoption for long-term projects, our experience with uMap reaffirms that "open source . . . has become robustly self-sustaining" (Asay 2013, 1). Indeed, all the maps we have produced so far with uMap since 2017 are still working without being maintained.

UMAP IN PRACTICE

Between 2017 and 2021, we deployed instances of uMap for four different mapping projects: (1) to produce a collaborative online map of services offered to asylum seekers in Montréal in collaboration with PRAIDA (Markovsky 2017); (2) to map sustainable resources offered to people living in Montréal, focusing on food security and community care; (3) to contribute to an anti-eviction project in the Parc-Extension neighborhood of Montréal; and (4) to collect and map circus-related stories from members of the international circus community, including stories related to how this community was impacted by the COVID-19 pandemic. We also used uMap for pedagogical purposes in two different university undergraduate classes: (5) one class dedicated to the Geoweb, which employed uMap to map Indigenous services in Montréal in collaboration with the municipality's Commissioner of Indigenous Relations; and (6) one human geography field course in Parc-Extension that included a community

mapping exercise (i.e., a mapathon) to map services available in the neighborhood.

These different projects all shared a common interest in using alternative online mapping technologies, a sensibility toward the open-source model, and a scarcity of financial resources. Beyond these commonalities, they were driven by different goals, such as serving the community, supporting activist campaigns, and collecting data for research as well as pedagogical purposes. Each of the authors of this paper has been in charge of implementing at least one of these online mapping projects in collaboration with a community or a group of individuals seeking support to deploy an online cartographic solution for their projects. Throughout a series of meetings and discussions with these individuals and communities, and through a series of reflective meetings among ourselves, we were able to identify the key possibilities and limitations of uMap in these particular contexts, and to reflect on the potential of uMap at a broader level. We have identified four domains in which uMap offers an interesting option, which we will further discuss in this section: (1) data management in the context of collaborative mapping; (2) data privacy in the context of activist mapping; (3) contributor management in the context of crowdmapping; and (4) open-source philosophy in the context of teaching online collaborative mapping.

COLLABORATIVE MAPPING AND DATA MANAGEMENT

Online collaborative mapping, or geocollaboration, enables different users to work on the same map either simultaneously (synchronously) or at different moments (asynchronously), by generating annotations that are "anchored to geographic locations on map-based displays" (Hopfer and MacEachren 2007, 924). Online collaborative maps provide opportunities for people to view, edit, and co-create geodatabases and their cartographic representations to address a range of issues such as disaster management (Meier 2011; Poiani et al. 2016), humanitarian work (Schörghofer et al. 2017; Gutiérrez 2018), and community engagement (Craig, Harris, and Weiner 2002).

In two of our four mapping projects (services offered to asylum seekers in Montréal and sustainable resources offered to residents of Montréal), uMap was chosen because of its particular appeal for collaborative mapping, given its ability to support different data formats and to map data stored in a variety of online data management systems (including third-party remote databases such as Google Sheets and Zoho Sheets). This flexibility is powerful for collaborative mapping projects, since it enables the plotting of different databases, managed by different collaborators, on a single map. Although these data need to follow strict standards to be mapped properly (e.g., they need to include geographic coordinates), they can all be maintained and managed independently by different groups and organizations according to their criteria and resources. This was one of the most important features for the PRAIDA project, since this project aimed to map services available for asylum seekers that were managed and maintained by different organizations. Instead of centralizing all these data into one common database, the data were organized in different spreadsheets in Zoho Sheets, each under the control of the organization that produced them (Markovsky 2017).

The capacity to call data on the fly from third-party data management services can also simplify the process of geocoding (turning addresses or placenames into geographic coordinates that can then be plotted on a map), which may otherwise be complicated for geospatial amateurs. Although uMap does not offer a geocoding option per se, it can map data from spreadsheets that do offer this service, such as Google Sheets. For instance, Google Sheets was used with uMap to geolocate and map the 270 addresses of sustainable resources collected as part of the sustainable resource map of Montréal (see Figure 2). It was also used to collaboratively geolocate and map the addresses of Indigenous services in the context of the Geoweb course (see below). For mapping projects that start with a list of addresses, Google Sheets offers an excellent geocoding option since it is free and simple to use.

However, relying on third-party proprietary data management systems such as Google Sheets has a major drawback, in that it renders a uMap project no longer completely open-source, and can be inappropriate for projects that involve sensitive data (see below). Another drawback is that Google, just like any other online service (including open-source services) can decide unilaterally to stop providing a service or to start charging for a service that was previously provided for at no cost. For instance, Google began requiring valid credit card information from every user of its Maps API in July 2018 (Griffiths 2018), and would otherwise display the text "For Development Only" on map tiles. One consequence of Google's new approach

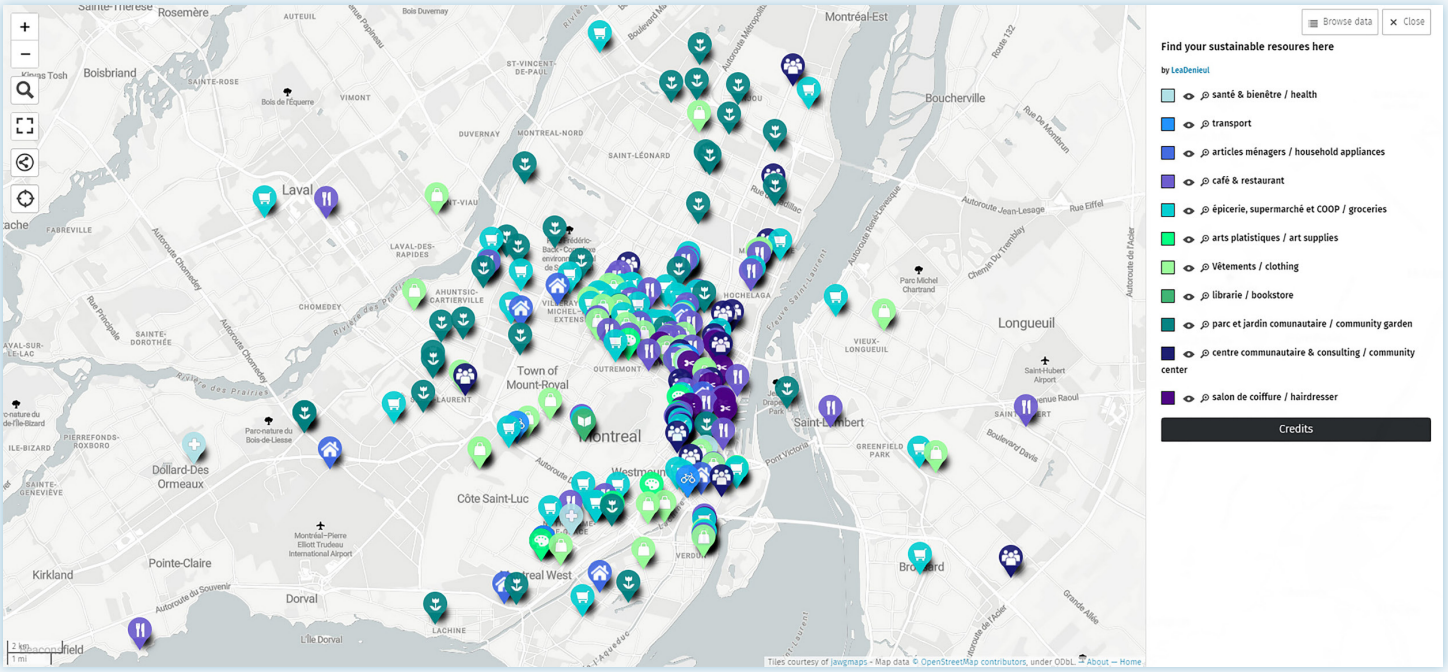

Figure 2. Map of Sustainable Resources around Montréal, created by Léa Denieul-Pinsky. Interactive version available at u.osmfr.org/m/556410.

was to incite some users to start looking for alternative online mapping options such as uMap.

Overall, our experiences of mobilizing uMap for collaborative mapping projects has shown us that there is a balance to be found between proprietary tools that are freely available and easy to use (e.g., Google Sheets) and platforms that benefit from the attributes of FOSS. For some of our mapping projects, Google Sheets was an asset due to its power and convenience, while for others it was an issue because of Google's terms and conditions related to data privacy, which we discuss further in the next section.

DATA PRIVACY AND ACTIVIST MAPPING PROJECTS

Although open-source software does not guarantee user privacy (such as by encryption), it guarantees the transparency of the entire infrastructure as well as the application of certain privacy policies (Hansen, Köhntopp, and Pfitzmann 2002; Swanlund and Schuurman 2019). On the other hand, proprietary applications that offer free services often reserve the right to use the data that are managed through these services. For instance, Google's Terms of Service make it clear that although "you retain any intellectual property rights that you have in your content," Google can "host, reproduce, distribute, communicate, and use your content" at will (Google Privacy & Terms 2021). This right to use your content for other purposes may not be an issue for projects that deal with public data, but it might be a major issue for projects dealing with sensitive information. This was the case of the Parc-Extension Anti-Eviction Mapping Project (PEAMP).

Parc-Extension, one of the most economically marginalized and ethnically diverse neighborhoods in Montréal and in Canada, has witnessed an unprecedented rise in evictions in recent years (Nicholas et al. 2019). Land speculation and housing struggles have become a major cause of concern for community groups in the neighborhood. To address these concerns, an anti-eviction mapping project was initiated in 2019 to advocate directly for housing rights in this area. This activist mapping project was inspired by the Anti-Eviction Mapping Project initiated in 2013 in San Francisco as a response to the growing human impacts of neoliberal politics and real estate speculation (Maharawel and McElroy 2018). This type of activist mapping project aims to make the landscapes of dispossession, struggle, and resistance visible (Maharawal and McElroy 2018; D'Ignazio and Klein 2020), and to stimulate reclaiming actions by consolidating solidarity and political collectivity among participants and citizens (Parker 2006).

The goal of the Parc-Extension Anti-Eviction Mapping Project was to cartographically represent recent housing

struggles, eviction narratives, and efforts carried out by community groups to defend their housing rights. Two sources of data were used for this project. One set was obtained from the Parc-Extension Action Committee (CAPE), our partner tenant association, and drew on tenants' dossiers. The other was provided by a team of researchers, community organizers, and activists using interviews and surveys. Data privacy and an open-source philosophy were the main criteria that led us to select uMap for this project.

Part of this project's data was coming from tenants' reports to CAPE regarding their evictions and cases of landlord abuses. To make sure that we protected the confidentiality of these residents, two major tradeoffs were made: (1) the location of the points shown in the public map could not be in the exact location of where the eviction took place; and (2) we had to eschew any applications that might retain the right to use the data stored on their servers (e.g., Google), or that might be accessible by government authorities (e.g., data on USA-based servers can be accessed by US federal authorities). The main instance of uMap (**umap.openstreetmap.fr**) is managed by OpenStreetMap France, which uses servers hosted by OVH in Roubaix, France. Thus, data in uMap falls legally under the European Union General Data Protection Regulation (GDPR), which is more restrictive in terms of access than the US legal context (Pernot-LePlay 2020). Although it is clear that the lack of data encryption does not prevent illegal access to such data, its storage in European servers makes legal access more complex than in US servers.

The Parc-Extension Anti-Eviction Mapping Project resulted in two maps: (1) eviction struggles of Parc-Extension residents, and (2) community assets in Parc-Extension. Both maps are available in two versions for privacy reasons: one includes all the data and is password protected and only accessible by the members of PEAMP and CAPE for internal purposes, and the second one includes a selection of data and is made available to the public through PEAMP's website (Figure 3).

UMAP FOR CROWDMAPPING

Online collaborative mapping can range from a simple project involving a couple of individuals working collaboratively on the same database, up to a vast, complex project that enables anyone to contribute geolocated data through different means such as clickable maps, text messages, or online forms. The latter is often called crowdmapping.

A crowdmapping project is potentially open to everyone (i.e., the crowd) to contribute. The potential (and limitation) of crowdmapping was first revealed in the context of major crises such as the 2005 aftermath of Hurricane Katrina in New Orleans (Miller 2006) and of the 2011 earthquake

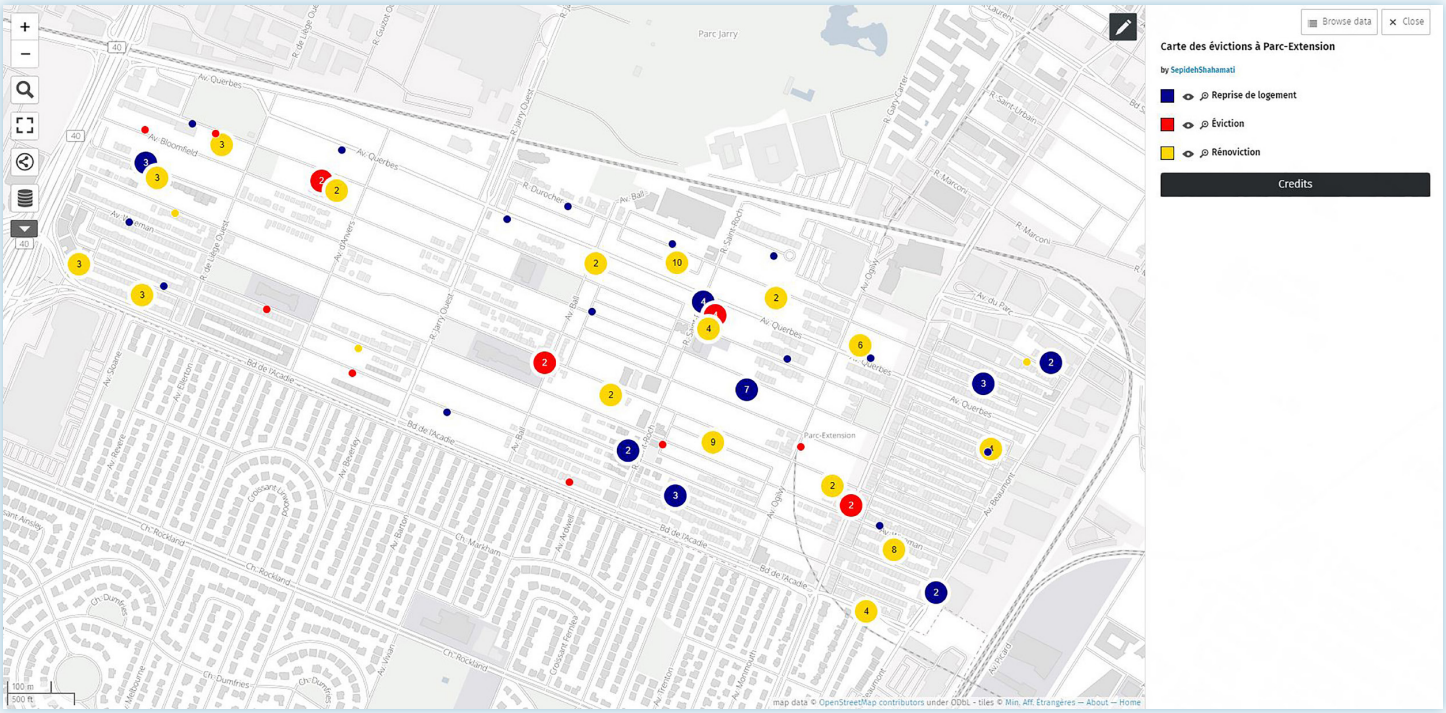

Figure 3. Eviction map of Parc-Extension by PEAMP. Full credits and interactive version available at u.osmfr.org/m/641974.

in Haiti (Zook et al. 2010; Meier 2011). Ushahidi, originally released in 2008 to monitor post-election violence in Kenya, was one of the first open-source crowdmapping platforms to become widely used (Okolloh 2009). While Ushahidi remains a powerful crowdmapping platform, it was also quite complex to run without technical support. To address this issue, Ushahidi released Crowdmap in 2010, a web application which aimed to make crowdmapping easier and more accessible (Ushahidi Staff 2015). However, it was shut down in 2021 due to insufficient resources to maintain it (Hinga 2020). Crowdspot is yet another crowdmapping platform, originally launched in 2015 to help the city of Melbourne become bike-friendly (Aisenberg 2016). Today, Crowdspot appears to be an interesting alternative to Ushahidi to set up crowdmapping projects (see for instance Tanner et al. 2020), but it is neither open-source nor free. Other JavaScript-based web-mapping libraries such as Mapbox, Leaflet, OpenLayers and even Google's Maps API have been mobilized by more tech-savvy individuals to design one-off online mapping applications with crowdmapping functions such as the Queering the Map project (LaRochelle 2020; Kirby et al. 2021). However, tailoring these applications often requires a certain level of technological expertise that makes them inappropriate for crowdmapping projects with low budgets and limited technological resources.

uMap offers one basic crowdmapping function, which is to give anyone the option to edit the map once they have the link. This openness is fully aligned with the open-source philosophy which, according to the OSM founder Steve Coast, "is key to putting as few barriers as possible between mallets and the map" (Coast 2011, 4). However, the options available to any anonymous public user are too powerful for most use-cases: most creators who make their maps public may want the public's contributions (e.g., adding new map markers), but don't want the public to be able to remove existing markers, modify data, edit a map's user interface or even to update user permissions. This feature could increase the risk of the map being hacked, which can actually have some positive consequences (McConchie 2015), but can also be highly damaging to a crowdmapping project. The Queering the Map project faced this very problem when it was hacked by Donald Trump's supporters on February 11, 2018 (LaRochelle 2020).

With uMap, this risk can be reduced by using a third-party survey questionnaire service to collect data, which we did with The World Circus and Stories Mapping project. This was an academic project developed at Concordia University under the direction of professor Patrick Leroux, for which uMap was used in combination with ArcGIS Survey123. It was conceived in collaboration with researchers studying contemporary circuses with two main objectives in mind: (1) to provide a virtual space for members of the international circus community to express their feelings about the impact of COVID-19 on their professional and personal lives; and (2) to collect oral and unwritten stories about contemporary and historical circus sites and venues for research purposes. This project ended up being more complex than originally expected. It required:

- a rigorous and lengthy process for ethics clearance, as it was a university-supported project;
- the design of a 10-question survey to collect the stories using ArcGIS Survey123;
- the preparation of the ethics agreement and the survey in five languages (French, English, Spanish, Brazilian Portuguese, and Simplified Chinese) to reach out to a large proportion of the circus community worldwide;
- a combination of "flows" available in the Power App library of Microsoft Office 365 to direct each submission to a moderator fluent in the language used by the storyteller; and finally
- another combination of data flows to transfer the data from Survey123 to Google Sheets, which could then be used to update the uMap automatically.

This crowdmapping project mobilized quite a bit of effort in terms of ethics, survey development, data flow management, translation, and moderation, without providing the expected results: only 27 stories have been mapped so far, and most of these stories were submitted within a couple of weeks of the project's launch in July 2020 during active promotion of the project (see Figure 4).

Reflecting on this experience led us to articulate three drawbacks of crowdmapping in general and crowdmapping with uMap in particular. First, crowdmapping projects, just like any collaborative mapping project, require ongoing attention: they are living entities that need regular maintenance, promotion, and updates in order to grow and evolve. The World Circus and Stories Mapping Project is emblematic of challenges faced by many crowdmapping and collaborative online mapping projects where

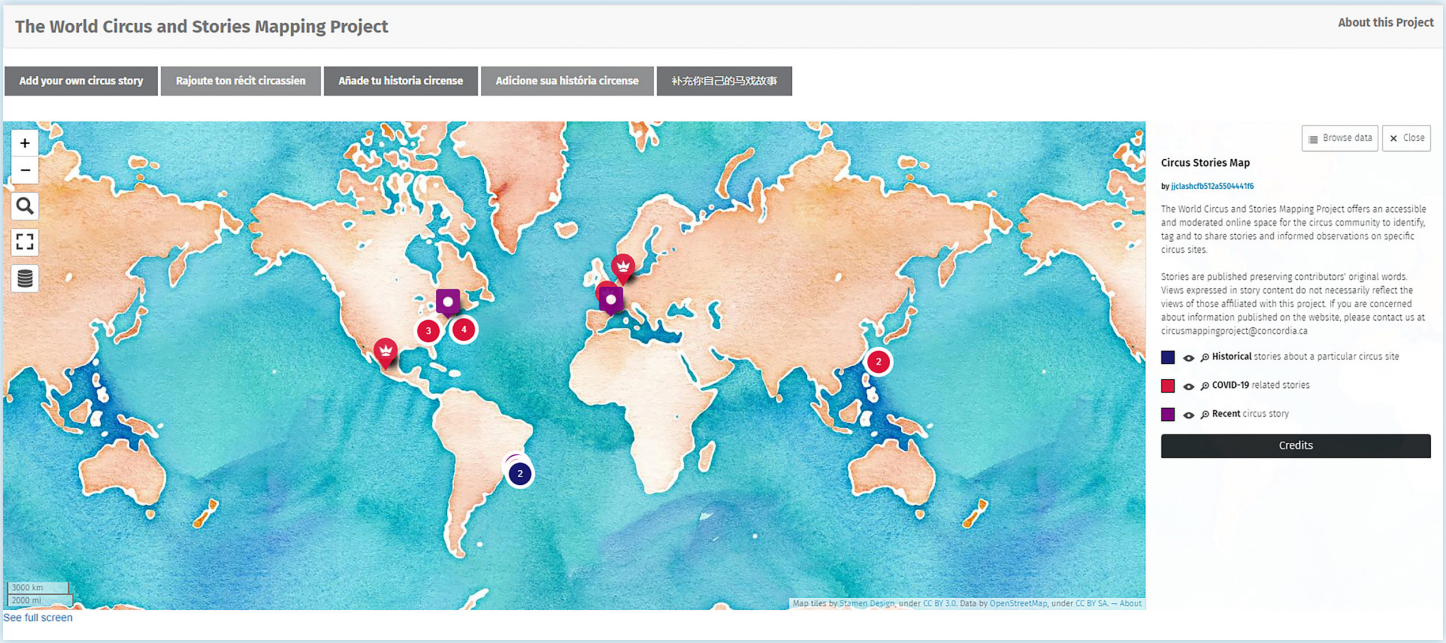

Figure 4. Screen capture of The World Circus and Stories Mapping Project. Full credits and interactive version available at geomedialab.org/circusmap.html.

a lot of energy, time, and resources were spent on setup, but not enough was budgeted to maintain and grow it over time. Second, the openness of uMap exposes crowdmapping projects to any kind of contribution, which can be challenging in cases of cartographic vandalism (Ballatore 2014) as well as inappropriate for a research project operating under a strict ethical protocol. This led us to deploy a third-party application (ArcGIS Survey123) to control and oversee each contribution. However, this made the process of contributing more convoluted than what would be ideal to appeal to a large audience (i.e., the crowd). Here we can see a clear tension between the ethics and data required by the research agenda and the simplicity required to attract a large number of individual contributors. Finally, it is important to mention once more that relying on third-party survey questionnaire services for data collection raises the question of data privacy. Although this was not a central issue in the context of The World Circus and Stories Mapping Project since all the stories were intended for the public, this crowdmapping infrastructure would not have been appropriate for the Parc-Extension Anti-Eviction Mapping Project as discussed previously, since the data were stored using two different pieces of proprietary software (ArcGIS Survey123 and Google Spreadsheets) and transferred via a third one (Power App library of Microsoft Office 365). Indeed, a fully open-source crowdmapping project with uMap could be possible, but might require constant monitoring to ensure that the new contributions are appropriate and that previous contributions are not altered (voluntarily or involuntarily).

UMAP IN AND OUT OF THE CLASSROOM

The last domain in which we deployed uMap was pedagogical. Geospatial education has been (and still is) dominated in the Western world by Esri and its suite of proprietary software such as ArcView, ArcMap, and ArcGIS Pro/Online. However, the success of Google's products in the first decade of the twenty-first century has shaken the foundations of Esri's dominance, particularly in academia (Joliveau et al. 2018). Although university teachers and departments have remained largely faithful to Esri products and standards, they have also opened their classrooms and labs to Google Maps/Earth as well as to open-source applications such as QGIS. This diversification of geospatial tools in education has been accompanied by students' growing exposure to critical GIS theories that deconstruct and reveal the power structure, political economy, and cultural norms imposed by geospatial industry standards (Elwood and Wilson 2017; Gieseking 2018). This illustrates a major point of tension in geospatial education: preparing students for professional practice, while encouraging them to change it fundamentally. In this context, we have chosen uMap because it is a relevant pedagogical tool to touch on these two domains, and it expands the online mapping options currently available to teachers and

students. Since 2018, we have replaced Google Maps with uMap to teach online collaborative mapping practices and concepts in an undergraduate course entitled "Geomedia and the Geoweb" at Concordia University. We also used uMap in the 2019 version of a human geography field course at Université de Montréal to organize a mapathon to collaboratively map community services in the Parc-Extension neighborhood in Montréal (see Figure 5).

In practical terms, teaching online collaborative mapping with uMap requires introducing students to the entire mapping pipeline, from data collection to map publication. While simple to use and easy to grasp for most of the students, uMap also provides enough options for more adventurous students interested in exploring symbology customization and data management (e.g., data flow process, data control, remote database management, and security access).

In the 2019 version of the class "Geomedia and the Geoweb," we asked students to collaboratively enter a list of addresses of services potentially relevant for Indigenous people in Montréal into Google Sheets, in order to geocode them and then to map them with uMap. This exercise was developed in collaboration with the Commissioner of Indigenous Relations at the City of Montréal, who provided us with public data they wanted to be mapped. Students were also asked to explore the symbology used to represent this data and to design a web page in which to embed the map and contextualize it for a broad audience. One of the maps designed by the students was selected and presented during a showcase event organized in collaboration between Concordia University and the City of Montréal and was given to representatives of the municipality along with the necessary credentials to modify and maintain it over time (see Figure 6).

Students were then invited to reflect on whether the map was accessible by the individuals who could benefit from these services, and to propose concepts to make it available offline to members of Indigenous communities living in Montréal. Students developed a range of creative solutions, such as printed poster maps to display in bus shelters, and painted maps of nearby services on sidewalks or as murals. This activity helped to make students more aware of certain limitations of online mapping options such as accessibility, searchability, language restrictions and cultural disconnection. It resonated with the necessity of inviting students to become more aware of the ways that socio-technological shifts embodied and supported by online mapping applications "condition knowledge, knowing, power, and impact" (Elwood and Wilson 2017, 2102).

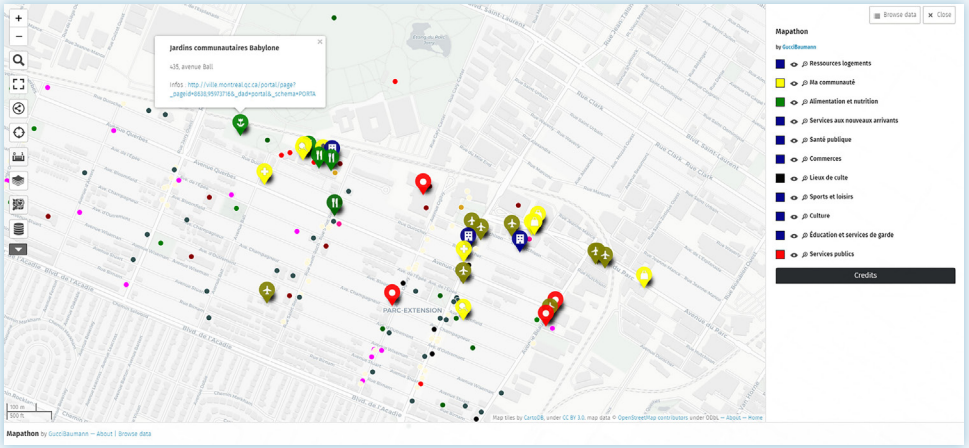

Figure 5. Screen capture of the collaborative map of services available in the Parc-Extension neighborhood, compiled during a field course in human geography. Designed by Yaya Baumann. Interactive version available at u.osmfr.org/m/356298.

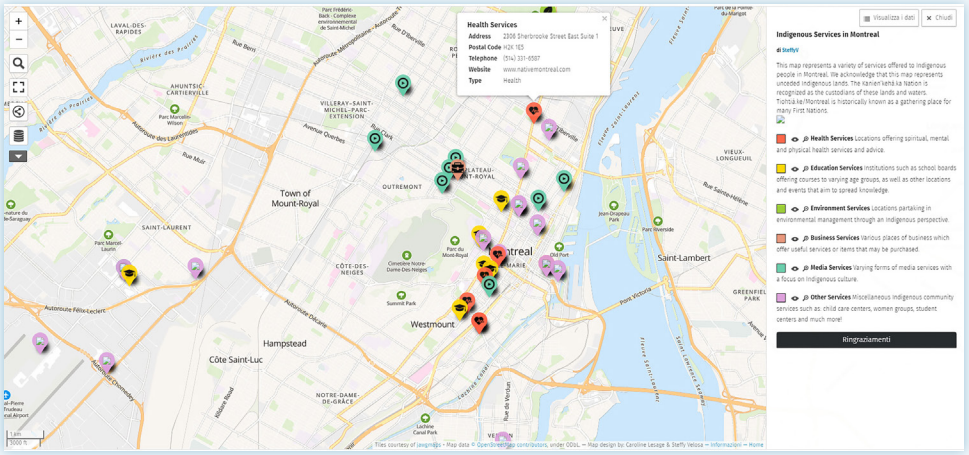

Figure 6. Screen capture of the collaborative map of Indigenous services offered throughout the city of Montréal. Designed by Caroline Lesage & Steffy Velosa. Interactive version available at: u.osmfr.org/m/382794.

It led to engaging discussions about the pros and cons between proprietary / for-profit applications such as Google Maps and FOSS applications such as uMap in this broader socio-technological context.

Working with FOSS such as uMap offers a relevant environment to discuss the more conceptual aspects of online mapping, which most undergraduate students are not familiar with: namely, the value and the limits of collaborative software development, the ethics of data ownership and data sharing, and the influence of dominant corporate mapping tools on our ways of envisioning the world.

Using uMap in the classroom becomes an invitation to not only use mapping tools, but to reflect on mapping practices and their implications. The open-source philosophy of uMap, combined with its simplicity of use, collaborative dimension, and reliability, makes it a great candidate to address pedagogical challenges raised by teaching critical GIScience. Approaching maps "as a form of social engagement" (Elwood and Wilson 2017, 2108) requires looking beyond the map's surface and interface to dissect and scrutinize its multiple components. In this way, the entire mapping apparatus, agency, intentions, and potential consequences become more tangible and understandable.

CONCLUSION

uMap is a simple but versatile free/libre open-source online mapping application that complements the open-source geospatial family by offering a compelling alternative to Google (My) Maps. Drawing on our own experiences of using uMap in six different contexts, we found it particularly well-suited for deploying and maintaining collaborative online mapping projects, suggesting that uMap is a solid FOSS alternative to the dominant for-profit mapping model. For people and organizations working remotely with different datasets on a shared map, uMap offers valuable options such as its ease in connecting remote data and its high level of interoperability with a range of other applications. For activist mapping projects, uMap offers an alternative model to dominant systems and worldviews. Its open-source model supports the idea of data sharing and collaborative knowledge production for the common good, as well as some level of data privacy and data control. The simplicity of using uMap, its collaborative capacity and its open-source philosophy, make it a great option to use in teaching mapping practices and concepts associated to online collaborative mapping.

Obviously uMap is far from perfect. Its cartographic design options are limited (e.g., no proportional symbol options), and it lacks refined, built-in options to control contributions, which makes it challenging to use for crowdmapping projects. Another issue that we identified throughout these projects was the lack of engagement and ownership that the different partners demonstrated towards the maps themselves. Although projects carried out with PRAIDA, the City of Montréal, or circus researchers were designed with the intention of transferring oversight to them for ongoing maintenance and data collection, none of these collaborators have since appropriated these tools. This probably speaks to the gap that might remain between mapmakers (i.e., us) that see uMap as a simple tool to operate and users that might not have the time, resources, or the interest to maintain a project over time. Such issues of maintenance and ownership are not new and extend beyond collaborative work on uMap to broader discussions that aim to make mapping processes with community partners more participatory (for instance see Johnson et al. 2015). uMap is thus a great tool for collaborative mapping projects as long as data providers are committed to updating the data and maintaining the map over time.

Overall, uMap offers an open-source and feature-rich alternative to dominant proprietary online mapping applications. Like Gieseking (2018) and Pavlovskaya (2018), we believe that researchers, teachers, community workers, and activists should be responsible when choosing mapping software to use in their respective projects. The use and promotion of free, open-source systems is politically important because it provides interesting alternatives for projects committed to collective knowledge production dissociated from economic incentives and resisting collecting data for purposes beyond the project at hand or tracking users. Moreover, it keeps online mapping as open as possible to projects with little financial support and technological expertise. It is for these reasons that we believe uMap should be seriously considered as an option when starting any collaborative or educational online mapping project.

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PEER-REVIEWED ARTICLE

Geography, Maps, and the *Annals*: 67 Years of History

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Geographers are often asked "what is geography?", and the number of answers to this question nearly equals the number of geographers. We (and others) argue that it is the spatial dimension that makes geography different, and that to do geography, one must communicate spatial information. Cartography is one of the key forms of spatial communication. However, the geographic literature often lacks maps. To examine this, we reviewed 67 years of the Annals of the American Association of Geographers *to test any trends in the presence/absence of maps, the influence of editors, and how any trends related to changes in the field of geography. On average, 24% of the papers published did not contain maps. Roughly speaking, papers from the 1950s, mid-1970s through the 1980s, and from 2000–present were the least likely to contain maps. Papers in the 1960s, early 1970s, and mid-1990s contained the most. The influence of editors on the percentage of papers published without maps was significant, but weak. We found a relationship between the changes in numbers of papers with maps and broad changes in the field of geography. There was a slight increase in the number of publications that included maps during the quantitative revolution after World War II, which declined during the discipline's shift toward social and critical geography in the 1960s and 1970s. In 2001, the format of the* Annals *changed from publishing all the articles in one section to dividing the publications in four thematic sections with different editors. From 2001–2017, the Physical Geography and Environmental Sciences section was the most likely to have maps (11.9% of articles without maps) while the People, Place, and Regions section was the least likely (47.7% without maps). Overall, the changes in the percentage of articles without maps can largely be explained by changes in the fields of geography and cartography—up to about the year 2000.*

KEYWORDS: geography; cartography; mapping; Annals of the American Association of Geographers

> *"May a preselective bent toward geography be recognized before it asserts itself as deliberate election? The first, let me say most primitive and persistent trait, is liking maps and thinking by means of them. We are empty handed without them in lecture room, in study, in the field. Show me a geographer who does not need them constantly and want them about him, and I shall have my doubts as to whether he has made the right choice of life."* (Sauer 1956, 288–289)

INTRODUCTION

Cartography can be viewed as simply another language, a construct designed to communicate ideas from one person to another—in this case, spatial information (Silayo 2002). Thus, it would seem that cartography is a necessary tool for any geographer. Geography's spatial tradition (Pattison 1964) and emphasis on spatial thinking pervades the field's literature, and provides ample evidence for mapping being integral to geography (Beck 1967; Borchert 1987; Wheeler 1998; Goodchild and Anselin 2000; Golledge 2002). Muehrcke goes further by saying: "Geographers who avoid maps needlessly limit their ability to conduct geographical research and communicate geographical information . . . Indeed, if geography as a university discipline survives intact into the next century, it is more likely to be through closer association than through further disassociation with modern methods of geographic

cartography" (1981, 404). He further contended that with the vast improvements being made in software and available data, maps had more to offer the geographer.

In our personal observation, cartography is considered by some to be simply a technical skill, and, more recently, one that anyone with some GIS skills will pick up. However, this was not always the case, as Moriarty (1965) described a cartographer as someone between a draftsman (pure technique) and a communicator (to the near exclusion of technical skills). More recently, however, the International Cartographic Association defines cartography as "the discipline dealing with the art, science and technology of making and using maps" (International Cartographic Association 2021). For a detailed historical account of the changing definitions of maps and cartography see Kraak and Fabrikant (2017) or Monmonier (2015). Certainly, the highly technical requirements of pen-and-ink cartography tended to drive people away (Muehrcke 1981). Similarly, early GIS imposed a high technical bar upon users. Today, though, GIS is relatively user friendly, and online mapping services put cartography within the grasp of almost everyone with internet/computer access and some spare time. Along these lines, Robinson, Robinson, and Muerhcke (1977) argued that cartography had changed from a technique to an identifiable scholarly and scientific field. They made predictions related to both an increase in computer techniques and an increase in demand for maps—particularly temporary, computer-based maps (examples include the use of Google Earth or the route maps we all use to get from place to place).

While we, the authors, have anecdotally noticed that a considerable number of "geography" papers in the literature lack maps, are there any trends? To answer this question, we reviewed sixty-seven years of the premier US geography journal, the *Annals of the American Association of Geographers* (*Annals*), which we selected as the most representative of the discipline, at least within the US. Our review sought to test the hypothesis that there is a dearth of maps within published geographic literature and that the presence of maps is declining. Thus, the goal of this article is to answer three inter-related research questions: (1) what is the incidence of maps in the *Annals*?, (2) has the presence/absence of maps changed over time?, and (3) if so, why do these trends exist?

In the context of this paper, we will use the ICA's definition of cartography: "the discipline dealing with the art, science and technology of making and using maps" (International Cartographic Association 2021). We are also specifically focused on academic cartography (Edney 2015) as it is represented in the *Annals*.

In the next section we discuss the historical context for our research, followed by the methods used. The fourth section presents our results in four sub-sections. First, we discuss the overall patterns in the use of maps in the *Annals*. Second, using Chi-square and Cramer's V statistical tests, we analyze the relationship between editorship and the number of articles published without maps. Third, we explore the number of publications by section after the *Annals* changed its format in 2001. Finally, we discuss the potential relationships that exist between the trends of map presence in the *Annals* and the historical trends in the discipline. The fifth and last section concludes with a reflection on the patterns that emerged from this analysis and suggestions for lines of future inquiry.

HISTORICAL CONTEXT

The development of the history and philosophy of geographic thought is rich and complex, and a detailed description is beyond the scope of this paper (see Livingstone 1992; Martin and James 1993; Johnston 2004; Martin 2000; Holt-Jensen 2009; Cox 2014). However, for the purpose of this exercise, we will focus on three important paradigm shifts: regional geography, the quantitative revolution, and critical geography. We will connect these with McMaster and McMaster's (2002) four periods of cartographic development: incipient period, the building of a discipline, diffusion of cartographic programs, and the transition period.

Over the study period (1951–2017), geography transitioned from a regional geographical study of landscape characteristics, as it had been in the first half of the twentieth century, to a spatial analysis approach shaped by the quantitative revolution of the 1950s. Regional geography was originally focused on the idea of areal differentiation of the world (Hartshorne 1939) and later concerned with a qualitative description of the cultural landscape. The cultural landscape was the result of the interaction with and transformation of the natural characteristics of the landscape by a culture group (Sauer 1925). Maps were an important tool used by regional geographers. Nevertheless,

the development of academic cartography during this time was known as the "incipient period" (McMaster and McMaster 2002, 306) because it was characterized by a handful of geography departments offering a couple of cartography courses and faculty focused mostly on thematic cartography.

The quantitative revolution emerged in response to criticism towards regional geography's descriptive nature and lack of scientific rigor. Peet (2001, 19) explains that after World War II "frustration grew with geography, as it had been, in several senses: the emphasis on regions; the lack of modern, scientific methodologies; the remoteness of the discipline from practical and social utility; thus the lack of prestige on campus and in governments and industry." Thus, quantitative geographers focused on the importance of method and theory to develop models that would help explain "spatial organization or order, spatial interaction, and spatial pattern" (Cox 2014, 28). The use of maps to depict spatial relationships was an important technique used by quantitative geographers. Wheeler (1998, 2) states that "the geographic mapping tradition was generally accepted if not enhanced by the so-called quantifiers of the late 1950s and the 1960s, one of the few elements the quantifiers willingly embraced from the regionalists they otherwise dismissed." During this time, the discipline of geography expanded to many universities in the United States, and this expansion allowed cartography to gain a foothold with the development of core programs (McMaster and McMaster 2002). The development of cartography continued its trajectory and was galvanized as a formal discipline within geography departments between the 1960s and 1980s, when institutions began to specialize in different areas of cartography such as cognitive or analytical cartography, numerical cartography and statistical mapping, animated cartography, and history of cartography (McMaster and McMaster 2002).

Quantitative geographers' search for objectivism, methodological rigor, and theoretical complexity opened the door for criticisms. Cox (2014, 42) summarizes them as follows: "the findings of the new geography often amounted to little more than statements of the obvious"; "methods were being put ahead of theory and findings of real substance"; and "the real point of research was to explain, not to generalize; a generalization in the form of a correlation or regression coefficient. . . was only specifying what had to be explained." Quantitative geographers were also criticized for the lack of social relevance in the research they pursued (Peet 2001). This criticism extended to cartography as well. For instance, in his discussion of the dilemma of cartographic ethics, Harley (1990, 6) argues that "there has to be a place in cartographic theory for interpretations that embrace a social dimension." He further contends that "the ethical failings in the way maps mediate between society and the world . . . is related both to cartography's theoretical isolationism behind disciplinary barriers and to its lack of social relevance in a practical sense" (1). Along these lines, Dorling (1998, 277) points out that a group of cartographers in the late 1980s and 1990s stated that "many of the assertions made for mapping by quantitative geographers are a smokescreen for the actual process and origins of most maps." He further contended that "maps are about social control and are usually created to serve the design of their creators rather than to inform the public" (277).

The social issues of the late 1960s and early 1970s in the United States, such as the Vietnam War, the Civil Rights Movement, and the environmental movement, highlighted the theoretical and methodological shortcomings of quantitative geographers. A new group of social and critical geographers linked the spatially deterministic and positivist approach of quantitative geographers to their inability or unwillingness to analyze and explain social issues such as environmental pollution, social marginalization, and inequality (see Wolpert 1970; Harvey 1973; Peet 1977). Thus, a new generation of critical geographers focused their attention on these issues, moving geographic inquiry away from a spatial-quantitative focus toward a radical approach with more socially relevant research agendas such as examining imperialism (Blaut 1970) and using feminist theory to understand the invisibility of women in the field (Burnett 1973; Hayford 1974). One common theoretical approach used to address social issues at the time was Marxism, which allowed social and critical geographers to develop a theory of society that was ingrained in an economic system based on a capitalist mode of production and accumulation—a system ridden with intrinsic crises and contradiction (Harvey 1982). Not only did this line of inquiry place humans at the center of analysis, but it also allowed geographers to understand and explain issues related to uneven spatial relations (Harvey 1973), socio-environmental issues tied to political-economic processes through the lens of political ecology (Watts 1983), uneven development and the production of nature (Smith 1984), and the production of space (Lefebvre 1991), among others. The development of critical geographical

thought mirrored a decline in the use of maps after the 1970s. Muehrcke attributed this decline to "methodological changes and ideological shifts" in the discipline (1981, 2). Wheeler (1998, 2) labeled Marxist geographers as being "mapphobic" because they "had little need for maps to communicate their narrative perspectives." He extends this view to all social theorists and some feminists, stating that they "seem to find maps peripheral and irrelevant, and postmodern geographers often find maps, with their categories and symbols, downright inimical to their core agendas" (2).

In the late 1960s and the 1970s, geographic information systems (GIS) and computer cartography made their advent. They were powerful new tools, but the cartographic output was exceedingly crude (especially compared to the many beautiful pen-and-ink maps that were the standard at the time). It was not until the mid-1980s and the invention of both the laser and inkjet printer that quality hardcopy map output became readily available. This time marked the beginning of what McMaster and McMaster (2002) refers to as the transition period, where cartography reached its peak and "became increasingly integrated within GIS curricula" (306).

Nonetheless, cartography as an institutional practice has been in decline over the past few decades (Millington 1999; Kain and Delano-Smith 2003; Dodge and Perkins, 2008), despite an exponential increase in map use and creation, brought on not only via GIS but also the rise of the internet, allowing for even easier distribution and use of cartographic products (e.g., Google Earth). This decline is evidenced by a significant reduction in maps in articles published by professional geographers in scientific journals (Wheeler 1998; Martin 2000; Dodge and Perkins 2008). Dodge and Perkins (2008, 1271) describe three wider issues confronting academic cartography in the UK: "first, the ambivalent relations between mapping and the work of geographers in the UK of the last decade; second, a continuing disregard for professional cartographic practice; and third, British geography's disassociation from newly significant approaches to the visual representation of space, and spatial practices, that are blossoming in wider social contexts and particularly on the web." When considering quality rather than quantity, a study by Kessler and Slocum (2011) examined changes in the design quality of thematic maps found in the *Annals* and *The Geographical Journal*. The authors made fine distinctions between map types and collected data back to 1900 (in the case of *The Geographical Journal*), though for only one year out of every 20. Overall, they found a gradual, but statistically significant improvement in map design over time—though they were disappointed in the overall quality of maps within these journals.

The increasing use of GIS in the 1990s and 2000s was also criticized by social geographers. In his elucidation of geography, computing, and the humanities, for example, Gilbert (1995, 4) argues that applications of GIS have demonstrated "insensitivity to the social construction of data (particularly an over willingness to take official sources of information at face value), lack of concern for meaning and interpretation (particularly for the problematic relationship between GIS-image and reality), and little concern for the political context of geographical information (particularly the relationship between the information generated and its uses)." Others encouraged GIS researchers to consider the ethical responsibilities of their work (e.g., Crampton 1999). It is important to note that the slight downswing in cartography students and classes at this time was accompanied by a surge in GIS student numbers (Fryman 1996; Tyner 2001). However, GIS is primarily concerned with analysis, not representation (Silayo 2002)—though more recently, the cartographic capabilities of GIS have become both more user friendly and capable.

Technology has also changed the nature of cartography (Allan 1996; Fryman 1996; Keller 1996; Perkins 2008). Perhaps the most obvious way is in the proliferation of maps: they now appear everywhere: nightly news, websites, newspapers, billboards, in nearly every news venue, social media posts, on our phones, and in our cars (Robinson et al. 2017; Robinson 2019; Harrower 2004). Griffin, Robinson, and Roth (2017, 1) contend that "the nexus of social and technological change now makes maps and geographic data visible and useful for the most serious as well as the most mundane problems." As a result, we have seen an increase in the production of online maps by individuals who have not been trained in cartographic design. In their work on maps as landmarks of cartographic innovation, Kraak and Fabrikant (2017, 18) argue that "not only researchers in the geographic sciences with an increased incentive for visualizing and sharing their complex datasets, but also the general public have seized the opportunity for do-it-yourself map making." Indeed, software has made map production easier for a wider variety of people, and as a result, lower quality maps have become

more common (Silayo 2002; Plewe 2007) and "their communicative quality is not always convincing" (Kraak and Fabrikant 2017, 18). In addition, the many print and online sites that exist today make it extremely easy to access geospatial data and distribute maps to an ever-increasing audience. Even GIS is becoming more ubiquitous, as user-friendly and capable open source programs (e.g., QGIS) become available. Consequently, there is a need for cartographers to better influence software development (Buckley and Hardy 2007; Plewe 2007; Poorthuis et al. 2020; Roth et al. 2017). In the end, "as maps and mapmaking come increasingly into mainstream society, quality design is needed more now than ever. Design is more than aesthetics; quality yields accuracy, clarity, and persuasion" (Plewe 2007, 136).

METHODS

As stated, the *Annals* was selected as the journal of choice for a number of reasons. First is its premier status as a general geography journal within the US. The study period (1951–2017) covered the discipline from its change from classic regional/landscape geography through the quantitative revolution and into different types of critical geography. Further, this history covers the spectrum of computer use—from computers being unavailable for mapping, to a time when computer analysis and mapping was readily available on desktop computers, tablets, and smartphones.

As the structure of the *Annals* evolved during the study period, the selection of material is critical. Only refereed papers were evaluated, not presidential addresses, review papers, map supplements, abstracts, or forum papers. This was done to ensure a degree of uniformity in comparison, as the definition of a peer-reviewed paper remained consistent, while other materials such as presidential addresses, varied widely. The overall pattern analysis includes the annual special editions (2009–2017); however, they are not included in the section analysis. The quality of maps was not assessed; see Kessler and Slocum (2011) for more information regarding assessing map quality.

Defining the different categories of maps was largely an exercise in elimination. This process started ambitiously with the following categories of maps initially collected for each paper: no maps, basic location maps (Figure 1), cartoon maps (schematics showing spatial relationships,

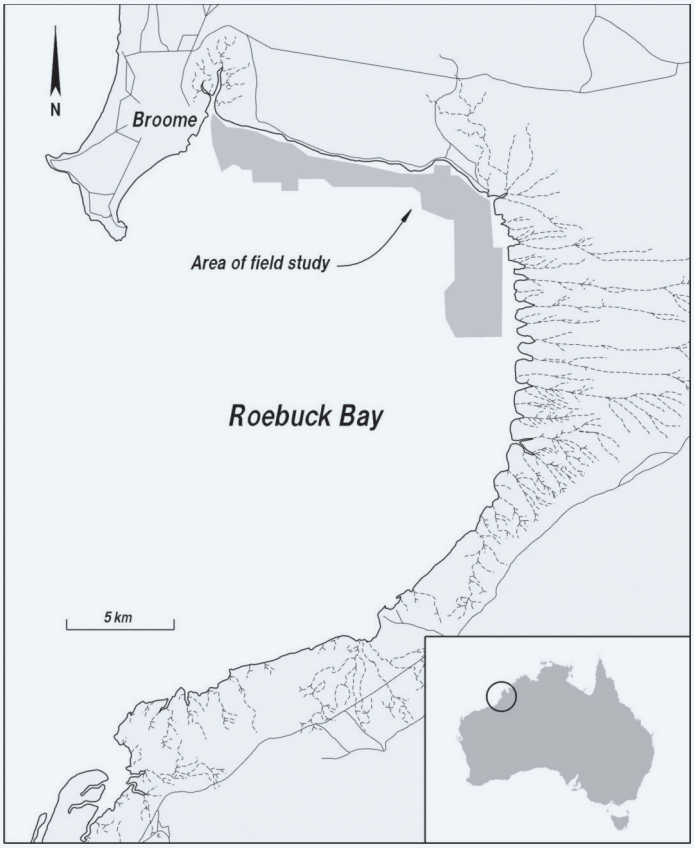

Figure 1. Sample basic location map (Carew and Hickey 2000).

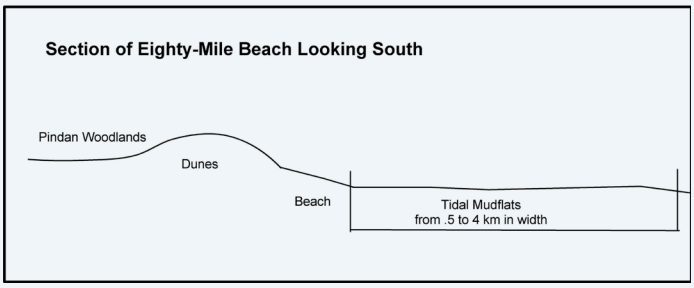

Figure 2. Sample cartoon map (Wade and Hickey 2008).

but not necessarily tied to a particular location in the real world; Figure 2), analysis results maps (Figure 3), airphotos/imagery as location maps (Figure 4), and airphoto/imagery analysis results (Figure 5). In the end, not only were some of these relatively rare (e.g., cartoon), but distinguishing among the different types was sometimes difficult. For simplicity's sake and consistency of data collection, these groups were collapsed into three categories: no maps, location maps, and analysis maps. The guiding principle applied to differentiate between the second two categories was: are maps integral to the analysis and presentation of results, or are they present only to communicate

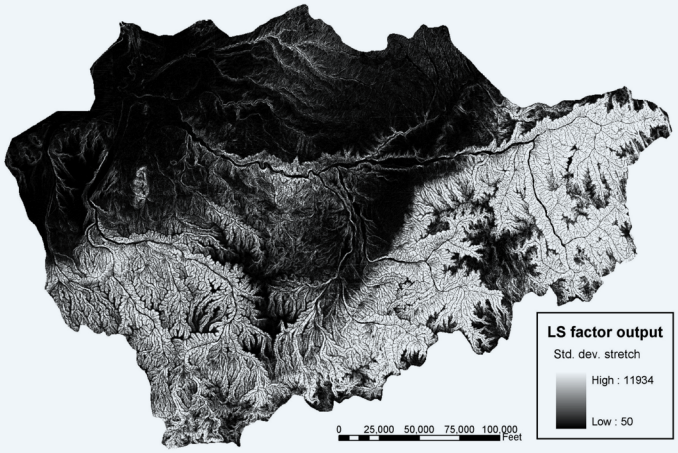

Figure 3. Sample analysis results map (Hickey et al. 2005).

basic location information? If the paper had both location and analysis maps, it was assigned to the analysis maps category.

Having defined the scope of data collection, we then reviewed 67 years of peer-reviewed articles (an interesting exercise in itself), counted the number of papers, and assigned each to a map category. The data was aggregated by year, by editor (1950–2000), and by section (2001–2017).

RESULTS

This section begins with a discussion of the overall patterns shown by the data between 1951 and 2017. We then quantify the relationship between the editors and the number of articles published without maps under their tenure, before reviewing the percentage of publications by sections in the *Annals* between 2001 and 2017. Finally, we analyze the potential relationships between the presence of maps in articles published by professional geographers, changes in cartographic methods, and the historical development of geography as a field of study.

OVERALL PATTERNS

There are definite trends in the number of refereed articles per year, and the percentage without maps. In the 1950s, ~15–20 papers were published per year; this grew to ~40 in the late 1960s and early 1970s (Figure 6). The number then steadily declined to ~20 in 2000. In recent years, the number of papers has skyrocketed to over 70 and as many as 93 annually, primarily driven by the introduction of an annual "special issue" in 2009. Overall, 24% of the

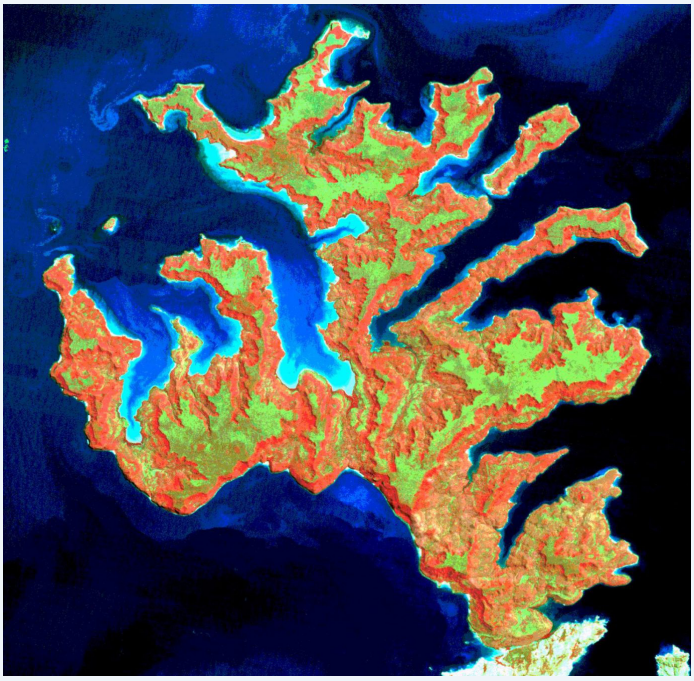

Figure 4. Sample airphoto/imagery as location map (Hickey 2005).

Figure 5. Sample imagery as analysis map (Hickey 2005).

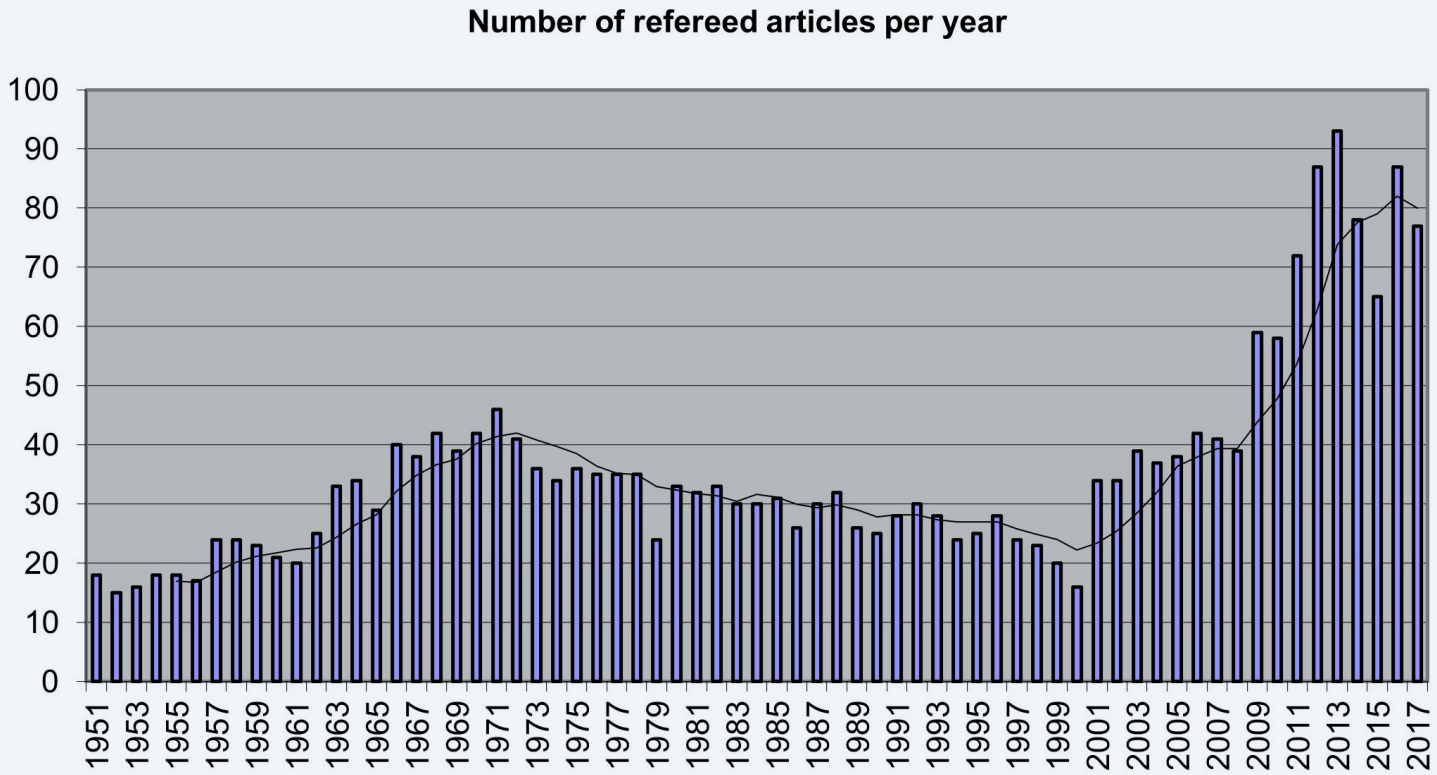

Figure 6. Chart illustrating the number of refereed papers published per year. Five-year moving average trend line included.

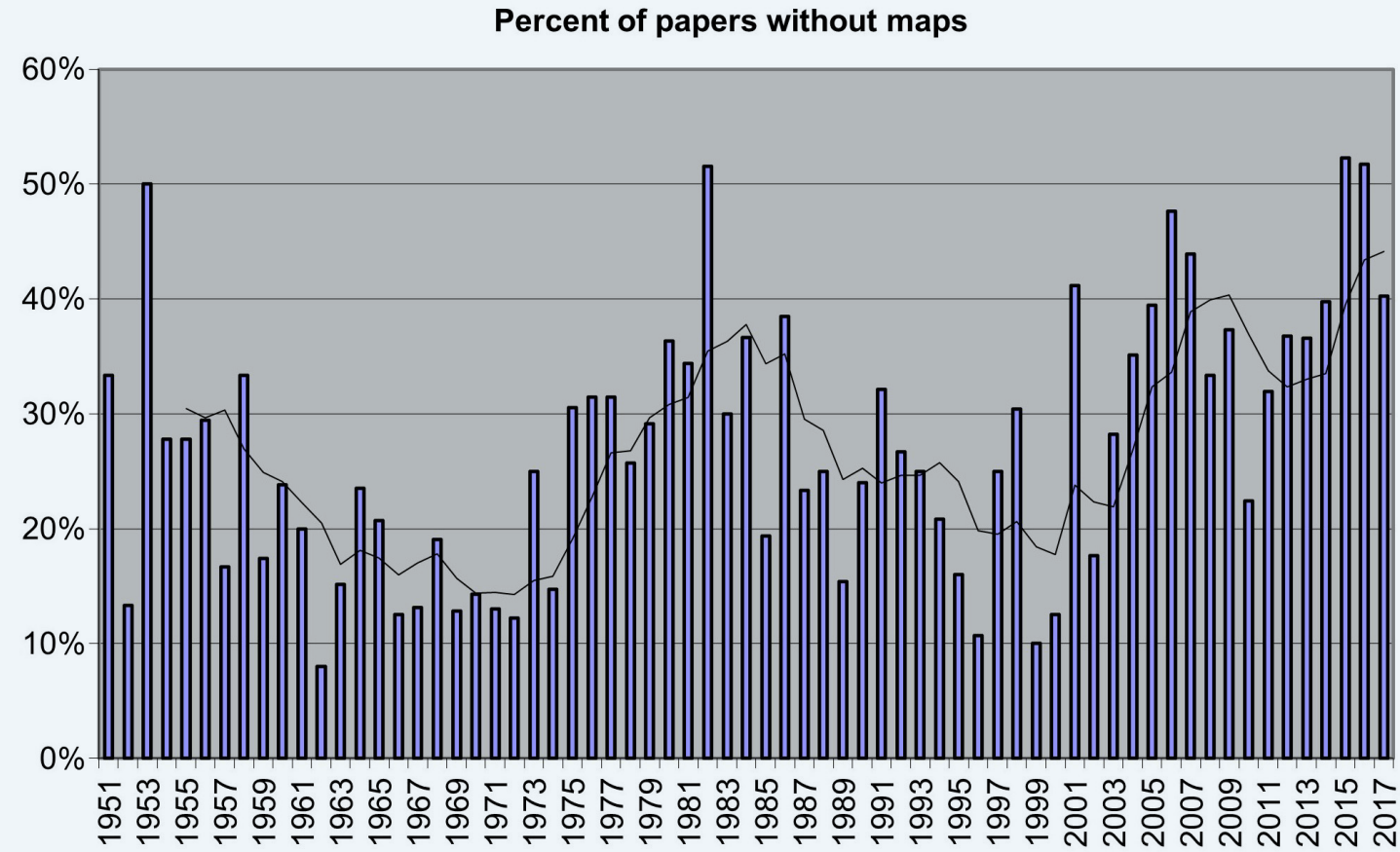

Figure 7. Chart illustrating the percentage of papers published without maps. Five-year moving average trend line included.

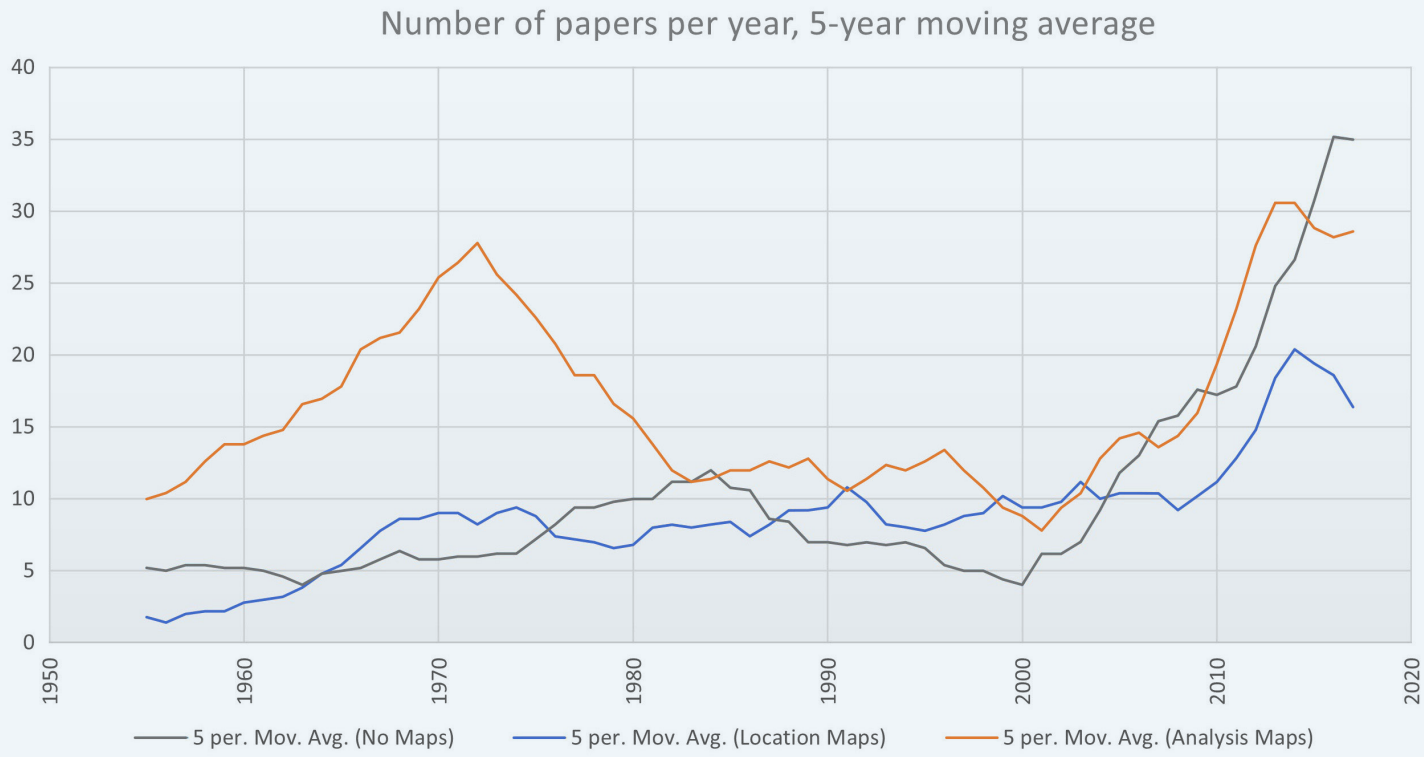

Figure 8. Chart illustrating the number of papers published per year by map category.

papers published did not contain any maps (Figure 7). There was a steady decrease in the perentage of articles without maps from 1950 to the mid-1960s, reaching a low point the 1960s to mid-1970s, when the percentage of articles without maps was only ~15%. The mid-1970s through the mid-1980s saw an increase in articles without maps, ranging from 30–40% of the published papers. From the mid-1980s to about 2000, the percentage of papers without maps in the *Annals* steadily declined to about 20%. Since then, the presence of maps in the *Annals* has declined, with the percentage of articles without maps sometimes exceeding 40%.

Breaking these down by map type (analysis vs. location maps) shows some interesting patterns (Figures 8 and 9). There was a steadily increasing percentage of

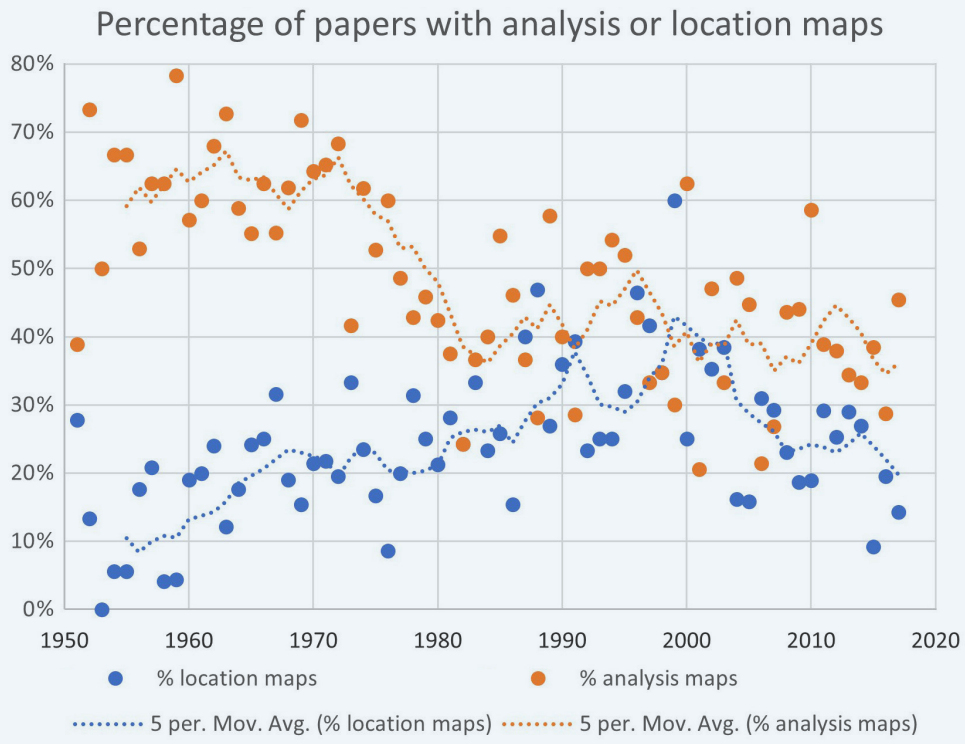

Figure 9. Chart illustrating the percentage of papers with analysis or location maps. Five-year moving average trend lines included.

Editor(s)	Dates	Years	Papers without maps	Papers with location maps	Papers with analysis maps	Total Papers
Kendall	1951–1954	4	21	8	38	67
Kollmorgen	1955–1960	6	31	15	81	127
Platt	1961–1963	3	11	14	53	78
Spencer	1964–1969	6	37	49	136	222
Hart	1970–1975	6	42	53	140	235
Hudson	1976–1981	6	61	43	90	194
Conkling & Hanson	1982–1984	3	37	25	31	93
Hanson	1985–1987	3	23	24	40	87
Brunn	1988–1993	6	42	56	71	169
Earle	1994–1996	3	12	27	38	77
Jones	1997–1999	3	15	30	22	67
Kasperson & Kasperson	2000	1	2	4	10	16
totals		50	334	348	750	1432

Table 1. Table showing the different *Annals* editors and the categories of papers published during their editorships.

papers with only location maps, from ~10% in the 1950s to ~40% in the early 2000s. Since then, this percentage has decreased to about 20%. Over the same time, there has been a drop in the number of papers which contained analysis maps. However, it was not a steady decline. About 63% of the papers had analysis maps in the 1950s and 1960s. This number then dropped to ~40% by 1980, where it has remained.

IMPACT OF EDITORS

The *Annals* had 12 different editors (or pairs of editors) during the years 1951 through 2000 (Table 1); their terms ranged from 1 to 6 years. The format of the journal changed in 2001, with each section now having separate editors, thereby reducing the overall impacts of individual editors. As a result, this analysis was not done post-2001. The distribution of papers by type is shown in Table 1, while Figure 10 illustrates the percentage of papers without maps by editor. As can be seen, this percentage varies

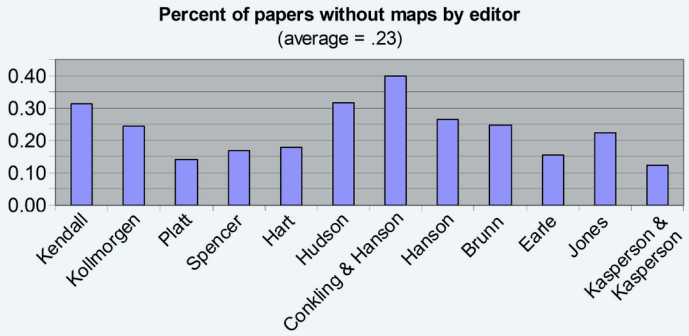

Figure 10. Chart illustrating the percentage of papers without maps by editor.

from 12.5% (Kasperson & Kasperson) to 39.8% (Conkling & Hanson).

To test the relationship between editorship and the number of papers published without maps, Chi-square and Cramer's V statistical tests were used. Both tests work with categorical data; the Cramer's V is used to determine the strength of association of any significance measured

by the Chi-square test. Because there is often a lag between papers being accepted and published, this analysis was run twice. The first time assumed no lag—that the editors were fully responsible for the papers published under their watch. In the first case (Table 2), the Chi-square value was 41.2; the Cramer's V was 0.17. The combination of these two values indicates that there is a significant, but weak, relationship between the editorship and the number of papers published without maps. The second analysis assumed a one-year lag between papers being accepted and then published (Table 3). For this analysis, the Chi-square value was 33.4; the Cramer's V was 0.16. Again, the combination of these two values indicates that there is a significant, but weak, relationship between the editorship and the number of papers published without maps.

The difference between using one year of lag or not is largely explained by 1982, a year in which an anomalously large number of papers without maps were published (17 of 33). This difference is because the editorship switched in 1982, moving that year of few maps from Hudson's data to Conkling & Hanson's.

It is important to note that while there is a statistically significant relationship between editorship and the number of papers published without maps, whether or not that relationship is causal is unknown. Simply put, the only way to test the influence of editors would be to have data regarding all submitted papers and some systematic background information on the editors themselves. As neither dataset is available, it is impossible to fully test the relationship between editorship and publications.

Editor	Years	Papers without maps	Papers with maps	Total papers
Kendall	1951–1954	21 (15.6)	46 (51.4)	67
Kollmorgen	1955–1960	31 (29.6)	96 (97.4)	127
Platt	1961–1963	11 (18.2)	67 (59.8)	78
Spencer	1964–1969	37 (51.8)	185 (170.2)	222
Hart	1970–1975	42 (54.8)	193 (180.2)	235
Hudson	1976–1981	61 (45.2)	133 (148.8)	194
Conkling & Hanson	1982–1984	37 (21.7)	56 (71.3)	93
Hanson	1985–1987	23 (20.3)	64 (66.7)	87
Brunn	1988–1993	42 (39.4)	127 (129.6)	169
Earle	1994–1996	12 (18.0)	65 (59.0)	77
Jones	1997–1999	15 (15.6)	52 (51.4)	67
Kasperson & Kasperson	2000	2 (3.7)	14 (12.3)	16
total		334	1098	1432

Table 2. Table illustrating the relationship between editors and the papers published during their tenure. Numbers in parentheses are the expected value (calculated as part of the Chi-square analysis).

Editor	Years*	Papers without maps	Papers with maps	Total papers
Kendall	1952–1955	20 (15.7)	47 (51.3)	67
Kollmorgen	1956–1961	30 (30.1)	99 (98.9)	129
Platt	1962–1964	15 (21.3)	76 (69.7)	91
Spencer	1965–1970	35 (53.7)	195 (176.3)	230
Hart	1971–1976	47 (53.3)	181 (174.7)	228
Hudson	1977–1982	67 (44.9)	125 (147.1)	192
Conkling & Hanson	1983–1985	26 (21.3)	65 (69.7)	91
Hanson	1986–1988	25 (20.6)	63 (67.4)	88
Brunn	1989–1994	35 (31.5)	100 (103.5)	135
Earle	1995–1997	13 (18.0)	64 (59.0)	77
Jones	1998–2001	11 (13.8)	48 (45.2)	59
totals		324	1063	1387

Table 3. Table illustrating the relationship between editors and the papers published during their tenure—assuming a one year lag between acceptance and publication. Numbers in parentheses are the expected value (calculated as part of the Chi-square analysis).

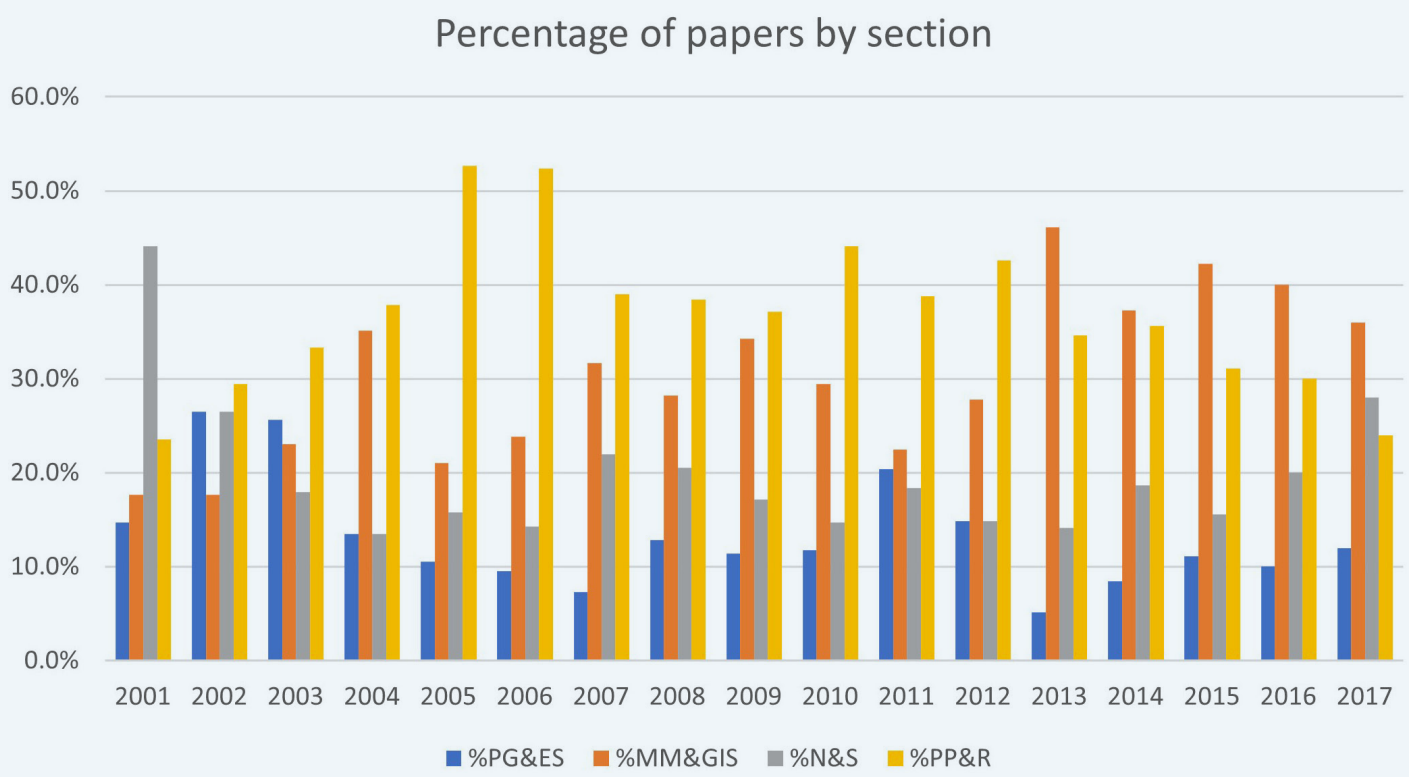

Figure 11. Chart illustrating the percentage of papers by section (2001–2017). Sections are: Physical Geography and Environmental Sciences (PG&ES); Methods, Models, and GIS (MM&GIS); Nature and Society (N&S); and People, Place, and Regions (PP&R). Special editions are excluded from this figure.

MAPPING BY SECTION

From 1951 until 2000, the *Annals* published all the articles under one section titled either "Articles" or "Original Articles." However, the journal changed its format in 2001 and adopted four main sections, titled: (1) Physical Geography and Environmental Sciences (PG&ES); (2) Methods, Models, and GIS (MM&GIS); (3) Nature and Society (N&S); and (4) People, Place, and Regions (PP&R). For the purpose of this research, we analyzed the presence or absence of maps in articles published in each one of these sections from 2001 through 2017.

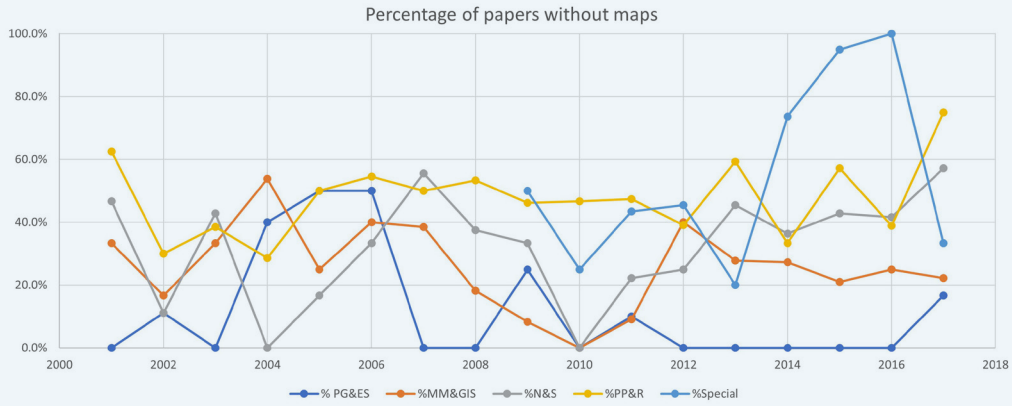

Figure 12. Chart illustrating the percentage of papers without maps by section (2001–2017).

The total number of articles published by section during this time period was: 97 in PG&ES, 148 in N&S, 253 in MM&GIS, and 280 in PP&R. Figure 11 shows the percentage of papers published per year by section.

When examining the trends by section, some interesting patterns appear (Figure 12). Overall, PG&ES consistently had the lowest percentage of papers without maps—for ten of the 19 years, that percentage was zero. PP&R had the highest percentage of papers without maps at around 48%. Both MM&GIS (surprisingly) and N&S fell somewhere in between. Interestingly, 2010 was anomalous: PG&ES, N&S, and MM&GIS had maps in all of their papers, though overall, 22% of all papers published did not

contain maps. The special editions (2009–2018) had relatively low percentages of papers with maps, comparable to PP&R, though more variable. Chi-square and Cramer's V tests (53.7 and 19, respectively) were run on the numbers of papers with and without maps by section. This indicates that there is a significant relationship between the section and the presence or absence of maps.

RELATIONSHIP TO THE DISCIPLINE

> *"For the heart of my argument is simply that geography changes as society changes, and that the best way to understand the tradition to which geographers belong is to get a handle on the different social and intellectual environments within which geography has been practiced" (Livingstone 1992, 347).*

As stated earlier, the trends discussed in this paper need to be understood in the context of the development of cartography and the history and philosophy of geographic thought in the twentieth century. We understand that the data discussed in this paper relates specifically to the *Annals* and is not necessarily representative of the use of maps in scientific articles published in other peer-reviewed professional journals in the discipline. The transition from regional geography to the quantitative revolution after World War II yielded a moderate increase of total articles published from 15–20 per year in the early 1950s to about 40 per year in the late 1960s and 1970s. One interesting trend observed in the data during this time period is that the slight increase in total yearly publications coincides with a decrease in the percentage of papers that did not include maps between 1951 until 1972. For instance, 50% of the 16 articles published in 1953 did not include maps. This percentage decreased to 8% of the 25 articles published in 1962. It is not surprising to see an increase in the number of publications that included maps during the quantitative revolution, when quantitative geographers were using maps to show spatial patterns and diffusion trends.

Another expected trend that we observed is the second spike in the percentage of publications that did not include maps in the 1970s and 1980s, coinciding with the advent of critical geography and its criticism of the positivist and deterministic approach in the use of maps by quantitative geographers in the 1950s. While approximately 12% of the 41 articles published in 1972 had no maps, that increased to 52% of the 33 articles published in 1982. The percentage of articles published without maps began a somewhat consistent decline in the 1990s reaching its lowest percentage in 1999 with 10% of the 20 articles published this year. This can be explained by increasing numbers of geographers trained in GIS and computer cartography, along with improvements in software and hardware.

However, an unexpected trend in the data can be seen from the year 2000 until the end of the study period in 2017. During this time, the number of articles published per year increased from 16 in 2000 to 93 in 2013. Surprisingly, the percentage of articles published without maps increased, too, from 13% in 2000 to 52% of the 65 articles published in 2015. We would have expected an increase in the percentage of publications with maps during the development and galvanization of GIS as one of the main tools used by geographers in the United States. However, the opposite is true for the *Annals*.

Fluctuation in the number of maps in the *Annals* could be due to the availability of staff cartographers at universities, specialists who assisted with map creation. These individuals are uncommon now, as any program offering GIS classes has faculty and students who are more than capable of making maps, especially basic location maps. We offer the possibility that the increase in the number of papers without maps in the 1970s and 1980s could be because of a decrease in the number of staff cartographers available to academic geographers. Further, the decrease in numbers of articles without maps in the late 1980s and 1990s could be because of increasing numbers of GIS/computer mapping experts among faculty/students. However, since 2000, the rapid increase in the number of articles without maps, despite easier software, more data, and more trained individuals, cannot be explained by changes within the field of cartography.

If Openshaw (1991, 626) was correct when he stated that "geography needs GIS as a form of elemental super-glue in order to put the pieces of geography back together again to form a coherent scientific discipline" why, then, is there an increase in publications without maps in the period when GIS was supposed to become one of the most important tools used by geographers? This question begs for the formulation of further research to identify the specific objectives and theoretical frameworks used in the papers published in the *Annals* during this time period. Is it possible

that more critical and social geographers increased their publications in comparison to their counterparts during this period in the *Annals*? Or, perhaps, have the more spatially oriented authors chosen to publish in more specialized journals (e.g., *Transactions in GIS*, *Photogrammetric Engineering and Remote Sensing*, *Cartographic Perspectives*).

CONCLUSIONS

In this article, we analyzed 67 years of the *Annals* to identify the historical trend of publications by professional geographers that did not include maps. In doing so, we hypothesized that there is a lack of maps in geography journals, and that the number of maps has been declining. To test this hypothesis, we analyzed the incidence of maps, identified whether there was a change in the number of published articles with maps, and then offered an explanation for the change that we found. The data shows interesting results.

Given geography's well-established spatial tradition, the record of mapping in the profession's premier journal was not as notable as might be expected. A large number of published papers do not contain even simple location maps: on average, 24% of the papers published between 1951 and 2017 did not contain maps at all. Annually, this percentage ranged from 8% to 52%, with the 1960s and early 1970s, and the late 1990s, being the two periods in which articles were most likely to contain maps. Since the shift in the format of the *Annals* in 2001, there has been a steady increase in the number of papers which do not include maps. Of the sections, articles in PG&ES were most likely to contain a map; those in PP&R, the least.

Overall, the patterns of map presence/absence roughly follow different historical trends in theoretical and methodological shifts in geography. For example, the data shows that the highest percentage of publications without maps coincides with the humanistic and cultural approach of the 1970s as well as the cultural turn and the emergence of critical geography in the 1980s. The emergence of better and simpler technology (i.e., GIS, graphic design software packages, printers, and computers) in the 1990s is shown in the increasing number of papers with maps. However, post-2000, the continued improvements in technology do not explain the consistent increase in the number of papers without maps.

Finally, this article opens the door for new potential lines of inquiry. For example, future work should consider comparing the results presented here with data analyzed from premier geography journals in Europe and Latin America to determine whether different trends exist. Another line of inquiry could focus on whether or not this decline of maps in the *Annals* represents a fundamental shift in geography away from our spatial tradition? Or is it because of the plethora of more specialized journals in which geographers publish? Finally, a comprehensive survey of academic geographers could be conducted which directly asks questions about map use and geography's spatial tradition—and how those answers translate to different specialties and publication venues within geography.

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Australia in Oak, Copper, and Quartz

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This article describes a map I made based on a trip to Western Australia I took with my wife in 2014. The map is sculptural, constructed using a combination of wood, metal, and semi-precious gemstones. For the base of the map, I used a 44.5 × 40.5 in (113 × 103 cm) piece of quarter-sawn white oak veneer plywood. Guided by a 1-inch (2.54 cm) grid system, I drilled 773 holes of four different diameters to show the land area and general shape of the continent. I chose two different gauges of copper wire to represent driving and train routes. Amethyst stones represent alkaline saline lakes that Holly—an extremophile microbiologist—sampled for resident microbiota. For the one acidic saline lake she sampled (pH 3.5), I used rose quartz instead of amethyst. I highlighted the stromatolites we observed at Shark Bay (Western Australia) with a green diopside mineral. Finally, anywhere we stayed of note is represented with one (or more) red map pins. The final product is 44.5 × 40.5 in (113 × 103 cm) at a scale of 1:4,118,400 (1 in = 65 mi; 1 cm = 41.2 km).

KEYWORDS: map; cartography; woodworking; metal; gemstones; sculpture; Australia; limnology; microbiology; tourism

INTRODUCTION

The goal of this project was to make a sculptural map of Australia, illustrating a trip my wife Holly and I took to study microbiology and vacation together. Combining two of my passions—woodworking and cartography—the map was a Christmas present for her. I wanted the map to show the lakes we sampled for their microbiome composition (she is an extremophile microbiologist), the places we stayed, the car and train routes we took, and to include a special nod to the stromatolites of Shark Bay. I started with a half sheet (4 × 4 ft, or 122 × 122 cm) of quarter-sawn white oak plywood, chosen because it's my wife's favorite wood. I was inspired by two projects posted to Imgur in 2014: "**Plywood map of New Zealand**" and "**Map art project**," both of which I found to be aesthetically pleasing and interesting representations of the continents. More specifically, I thought the design (different sized holes) combined with the natural wood grain looked spectacular as wall hangings. After seeing these works, I was eager to personalize and enrich the basic concept with my own story and materials.

METHODS

Given that my goal was a map made to-scale, the first step was building a digital base map of Australia and our travels. Using a Lambert conformal conic projection in ArcGIS Pro, I downloaded a shapefile of the outline of Australia and then used Google Earth to digitize line and point files of the routes we traveled, lakes we sampled, and places where we stayed, all of which I then imported back into ArcGIS Pro. I added a 1-inch grid to the final output and printed the results on a piece of Arch E (36 × 48 in, 91 × 122 cm) paper.

In the area around the coastline, I then manually labeled (values 1–4) every intersection on the paper grid based upon the percentage of the neighboring cells that were within the land borders of Australia:

- ½ to 1½ surrounding squares were land: labeled 1
- 1½ to 2½ surrounding squares were land: labeled 2
- 2½ to 3½ surrounding squares were land: labeled 3
- 3½ to 4 surrounding squares were land: labeled 4

Ultimately, this technique gives a tapering visual effect where land meets water and helps preserve shoreline detail more than uniform hole diameters would.

This map was then taped to the half-sheet of quarter-sawn white oak plywood. As reference and starter points, every intersection labeled 1–4 was drilled with a ⅛-inch (0.32 cm) bit (see Figure 1). The paper map was then removed, and each of these holes was then drilled out depending on the label:

- ¼-inch (0.64 cm) drill bit (labeled 1): 21 holes
- ⅜-inch (0.95 cm) drill bit (labeled 2): 68 holes
- ½-inch (1.27 cm) drill bit (labeled 3): 63 holes
- ⅝-inch (1.59 cm) drill bit (labeled 4): 621 holes

The holes were first partially drilled from the back in an attempt to eliminate tearout. To further reduce tearout, I

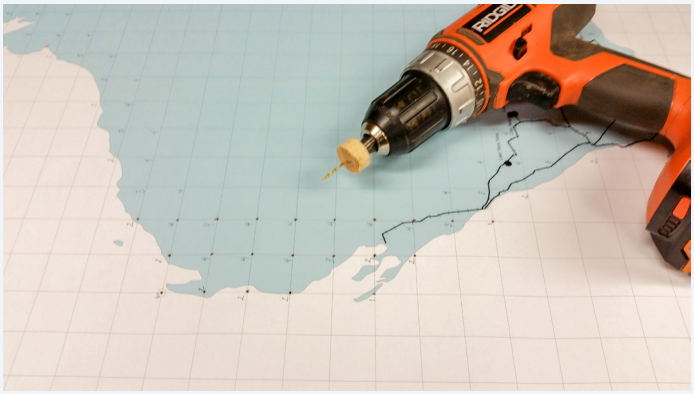

Figure 1. Map showing labeled intersections and ⅛-inch (0.32 cm) drill setup for starter points.

used Forstner bits (instead of spade or pilot point bits) and padded them with wine corks to protect the wood from being hit by the drill once the wood was completely penetrated. The 773 total holes were cleaned up using a Dremel sander (Figure 2).

To simulate a cartographic neatline and provide visual contrast, I added a 9/16-inch (1.43 cm) walnut border, completing the woodworking phase of the map sculpture. I

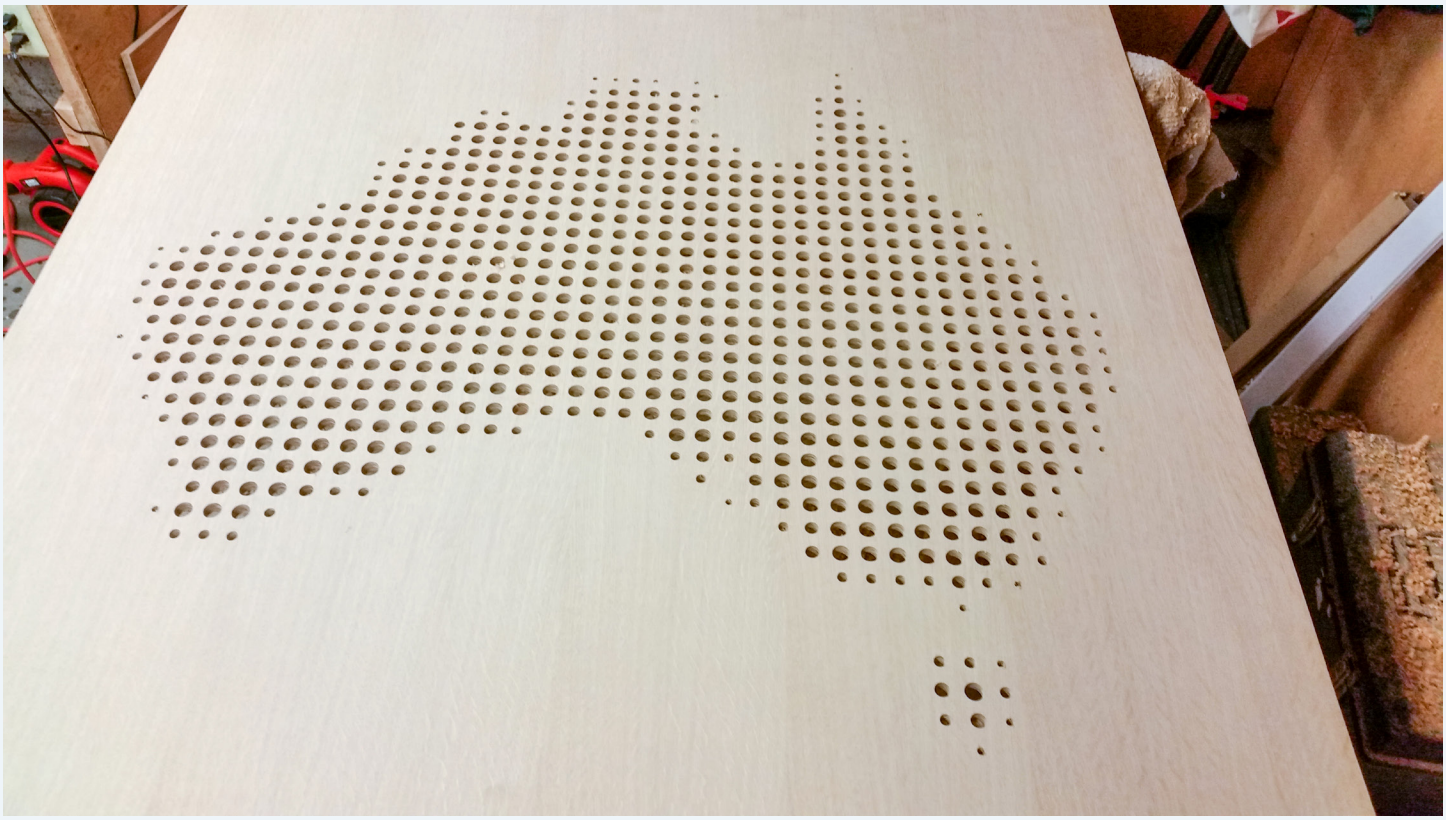

Figure 2. Map with all holes drilled, and after sanding with 120 and 220 grit sandpaper.

Figure 3. Back of map showing French cleat mount system.

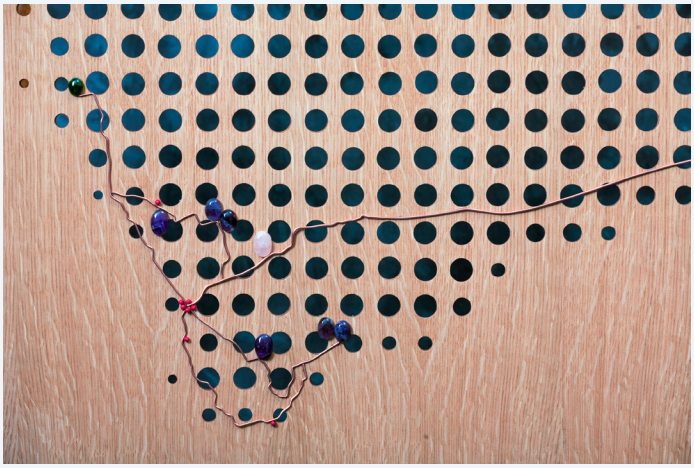

Figure 4. Closeup of the Western Australia portion of the trip.

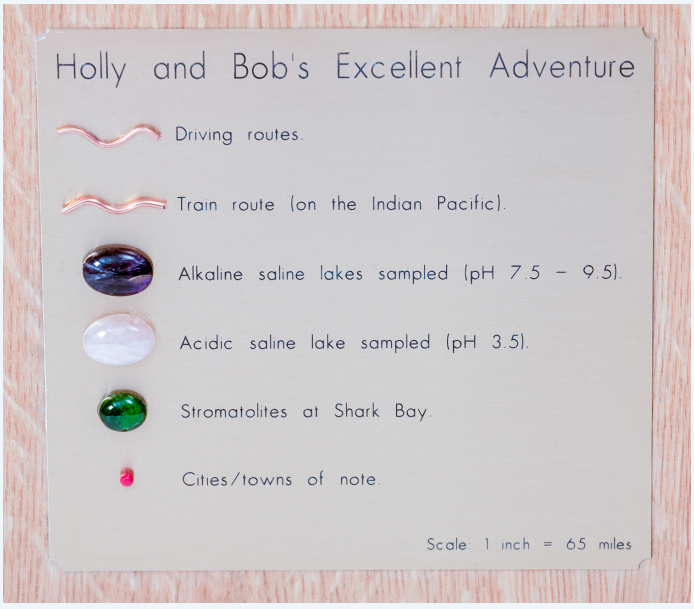

Figure 5. Legend.

installed French cleats on the back to serve as wall mounts (Figure 3). Everything was finished with three coats of OSMO oil/wax finish.

With the base map complete, I moved on to the symbology. We spent most of our time in Western Australia, acting both as tourists and sampling the microbiomes of a number of saline lakes for my wife's research. Western Australia wasn't enough, though, and we took a train to Adelaide, rented a car, and drove to Melbourne, sampling along the way. I used the following to depict the routes and stops:

- Copper wire for the routes driven, with a larger gauge for the train portion of the trip.
    + If I were to do this again, I would use a different colored wire, perhaps aluminum, for the train segment to provide better contrast.
- Different semi-precious stones for the sampling locations. My choices were dependent on what was available as a cabochon from eBay at a reasonable price and with sufficient contrast.
    + Rose quartz for the acidic saline lake (because I mentally associate acids with red).
    + Amethyst for the alkaline saline lakes (because I mentally associate alkalinity with blue).
    + Diopside for the stromatolites (because it provided sufficient contrast to the above and was readily available). This particular stop was included on the map because a trip to visit stromatolites is something of a career pilgrimage for microbiologists.
- Red-tipped map pins for locations where we stayed, chosen because they were easy to obtain, high contrast, and not overwhelming.

I bent the copper wire to shape, then added earring posts to the wire. Small holes were drilled into the map, and the posts were epoxied in. All the gemstones were epoxied onto the map; the red pins were simply driven into the map (Figure 4). A legend with a verbal scale was included to complete the cartography (Figure 5).

CONCLUSION

The final product combines aspects of traditional (pen and ink and/or digital) cartography with woodworking and jewelry smithing, giving a unique end product. I gave this to my wife on Christmas in 2014, and she was thrilled to receive it and look back at the wonderful trip. It also serves to help educate students, both in the biology and geography departments, as we talk about the cartography, geography, and ecology depicted on the map.

ACKNOWLEDGEMENTS

I would like to thank my wife for an excellent trip to Australia! Further, thank you to Keith Lewis, professor of Art at CWU who bent and installed the wire routes. Finally, thanks to individuals at the Department of Parks and Wildlife, Western Australia for permission to visit some of the lakes.

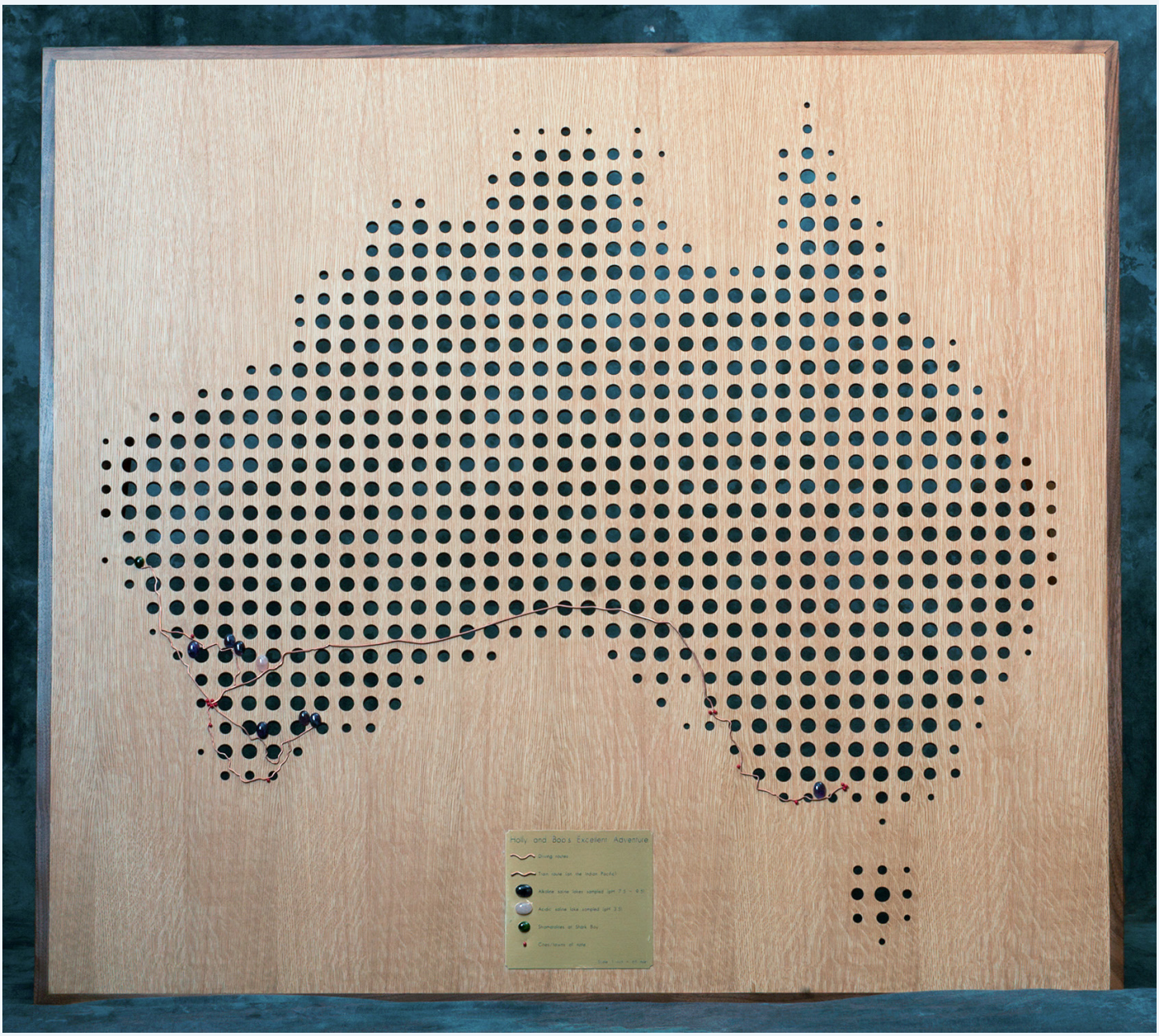

Figure 6. The final map.

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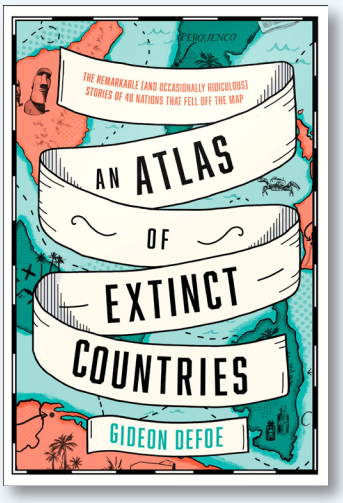

AN ATLAS OF EXTINCT COUNTRIES

By Gideon Defoe

Europa Editions, 2021

245 pages

Hardcover: $26.00, ISBN 978-1-60945-680-1

Review by: Leo Dillon

Let's begin with the title. *An Atlas of Extinct Countries* is not an atlas, at least not by any definition that likely readers of this journal would accept. The small maps contained in the book cartoonishly illustrate the text they support, but are not its main element. It's also a stretch to describe some of the territorial entities included in this collection as countries. As the author cheerfully warns the reader in his introduction, if you "want a book that sticks to a firm definition of what a country is, you are owed an apology" (15–16). He admits that one of the places he describes, Libertalia, "is (*almost* certainly) a flat-out lie" (144). But it's at least true that these entities are all extinct—or at least not currently breathing.

An Atlas of Extinct Countries is a humorous take on forty-eight places that at some time in history were considered by at least someone to be independent or autonomous. The author, Gideon Defoe, summarizes this work as "the obituaries of the nations that fell off the map" (15), but don't expect a serious exposition or a comprehensive history of these lost places. Beginning with the subtitle of his introduction, "Generous to a Fault, They Died Doing What They Loved: Exporting Tin," Defoe sets the tone of irreverent, Monty Pythonesque humor that pervades what follows.

Everything about this smallish book (245 8½ × 5½-inch pages) is brief. It contains an introduction, forty-eight descriptions of extinct entities that form the main part of the book, a chapter on flags and another on anthems, a select bibliography, and some acknowledgments. Each of these parts contains only two or three pages of text, except for the chapter on flags, whose interspersed illustrations expand it to four pages. There is a lot of blank space; some pages have only an illustration in the corner, such as an orangutan, a burning sailing ship, or a unicorn, superfluously lifted from the map that accompanies that section.

The forty-eight entities of the main part of the book are divided among four sections: "Chancers and Crackpots," "Mistakes and Micronations," "Lies and Lost Kingdoms," and "Puppets and Political Footballs." The alliteration of these titles, and a lack of any further explanation on what they mean, are likely clues that one should not take them too seriously. For instance, "The Kingdom of Sikkim, 1642–1975" is listed under "Lies and Lost Kingdoms." Yes, it was a kingdom that is now lost, but the same could be said of the Kingdom of Bavaria or the Kingdom of Sarawak, both listed under "Chancers and Crackpots." That is also where "Easter Island (Rapa Nui), 1200–1888" is placed, presumably in reference to the rapacious settler Jean-Baptiste Dutrou-Bournier who appeared on the island in 1866, five hundred and fifty years into the era described in the title, and was killed there eight years later. It feels as if Defoe put it in this section because he had no better place for it.

Each of the forty-eight entity sections begins with a summary page, followed by a page with a map, and then a two- to three-page description. The summary page contains the years or dates that the entity existed, or the period as described in the book, some applicable facts—such

as population, capital, currency, cause of death (usually sarcastic, sometimes hilarious), its current political status—and an introductory paragraph that's often a conversational tangent rather than a summary of the subject entity. "The Kingdom of Corsica, March–November 1736," for example, is summarized thus:

> Theodore Stephan Freiherr von Neuhoff—of "fine form and handsome face"—left a trail of debts, inspired an opera and a couple of novels, got punched by jealous husbands, and basically did all the eighteenth-century Errol Flynn stuff you could hope for. (36)

While this is an amusing introduction to the chancer or crackpot von Neuhoff (both apply) who "founded" the "Kingdom," it is not very relevant to the entity itself.

Fitting the mood of the book, the maps are playful. Drawn by illustrator Joy Gosney, they are highly generalized but appear spatially accurate, and, in lieu of geographic detail, they include drawings that illustrate points made in the text. My favorite, from the map of "The Free State of Bottleneck, 1919–23," on page 115, is an image of the Archbishop of Mainz with mice crawling over him (Intrigued? You'll have to read the book). There is neither scale, nor latitude and longitude on the maps. Instead of the latter, the entities are located using the what3words geocoding system, a set of three random words that identifies a three-square-meter piece of the Earth's surface, an area about the size of a big truck. Defoe writes that "One of the benefits of this is that it's much easier to remember three words than a string of numbers" (18). Fair enough, but even the smallest of his chosen territories–a maternity ward in a hospital in Ottawa, Canada–consists of hundreds of these three-word units, and the larger ones contain hundreds of millions of them. How, I wonder, does he choose which one to use?

The descriptions of the territorial entities are often anecdotal, meant as much to amuse as to inform. The narrative style is akin to listening to a knowledgeable raconteur who can't help wandering into his own stream of consciousness and then ends his tale abruptly, leaving you wanting more. After reading many of these narratives, I found myself searching the internet for articles on these places, both to verify the more ludicrous claims presented in Defoe's writing (they all check out) and to satisfy an itch to know more than he was giving me in his all-too short vignettes.

The footnotes often don't help in this sense; rather than the traditional usage of adding detail to a point in the text or citing references, they most often go off on a marginally-related tangent, like this sentence and corresponding footnote from "The Kingdom of Bavaria, 1805–1918":

> Ludwig I was both a patron of the arts and a notorious lothario[5] (he commissioned a series of portraits of "famous beauties of the day") but the old letch ([age] 61) met his match in Lola Montez ([age] 28). (28)
>
> [5]Ludwig I's wedding was the first Oktoberfest. Bavaria would later make the adoption of its beer purity law a condition of joining the German Empire. (28)

Or this one, from "The Republic of Vemerana, May–September 1980":

> Third time's a charm, so they [the Phoenix Foundation] tried again in 1980, now targeting the island of Espiritu Santo.[46] (96)
>
> [46] A cult on one of the islands today worships Prince Philip, which suggests a shortage of decent stuff to worship. (96)

Besides having nothing to do with Espiritu Santo, or the organization that's the subject of the sentence, the phrase "one of the islands" is unexplained (it refers to the islands that make up modern-day Vanuatu, which is not mentioned by this point in the narrative).

Defoe's style is distinctively British, and some of his cultural references were lost on this American reviewer, who had to look up Father Ted, Bear Grylls, and Mills & Boon to understand the narrative point being made. Those who enjoy British-English terminology are in for a treat here, with descriptive phrases such as "pointless juicers," "swish outfits," "imperialistic git," and "swank about." But while he sincerely derides the racism, greed, and other horrors of colonialism and imperialism that launched many of these territories, Defoe's sarcasm can verge on tone deaf, as in the following from "The Fiume Endeavor, 1919–1920":

> If you could ignore the occasional lynching and didn't mind the endless speeches crammed with those rhetorical flourishes that dictators

everywhere would soon adopt as their own, life in Fiume was a party. (68–69)

The concluding chapters on flags and anthems are amusing but unnecessary afterthoughts, written in the same style as the rest of the book. There are five flags briefly discussed, and one of them lists the wrong entity (the Free State of Fiume of 1920–1924, as opposed to The Fiume Endeavor of 1919–1920) and names the wrong constellation on the flag, calling it Orion instead of the Big Dipper, in Ursa Major. The two-page chapter on anthems starts with a few droll observations, such as "For hardcore masochists, the Greek anthem goes on for 158 verses. Japan gets it done in four lines" (241). It goes on to discuss one anthem each under five "approaches": Emo (Kingdom of Corsica), Boastful (Kingdom of Araucanía & Patagonia), Boastful Yet Also Underwhelming (People's Republic of Tannu Tuva), Lazy (Neutral Moresnet), and Tardy (Yugoslavia).

It would be churlish not to point out that, with all its academic faults, this book can be both informative and a real hoot. If you can overlook the occasional whimsical treatment of real-world misery and the marginal relevance of some of the content, Defoe's narrative is often laugh-out-loud funny and his idiosyncratic perspective can be astute. For instance, in describing the formation of Yugoslavia as a socialist state after the internecine Balkan warfare of the early twentieth century, he writes: "Mutual war crimes aren't the most solid basis for a nation, but over the next 20 years Tito managed to wodge everything back together" (234).

You will likely be introduced to fascinating places. I had never heard of the Republic of Cospaia, a tiny independent state born of a territorial dispute between the Grand Duchy of Tuscany and the Papal States. Legally autonomous and free from the Pope's authority, this village and its farmland throve for almost 400 years, partly as a free trade zone but mostly through the production and sale of tobacco, a crop prohibited by the Vatican. I'm grateful to the author for introducing this captivating political anomaly to me in such a humorous and interesting way.

If I criticize the sections for being too brief and often incomplete, well, that's not always a bad thing; sometimes a short read is what you're after. And while the what3words classification system may not make much practical sense in this context, it yields such results as swinging.melon.widest or whimpered.harder.geek, toponymic handles perfectly in keeping with the flippant tone of the book.

I cannot recommend *An Atlas of Extinct Countries* to those hoping to pore over detailed maps of bygone political entities, or to those seeking a complete or scholarly account of the same—but if you have an interest in geopolitical history and want it served in short bursts of intelligently crafted, irreverent humor, then this book could be well worth your consideration.

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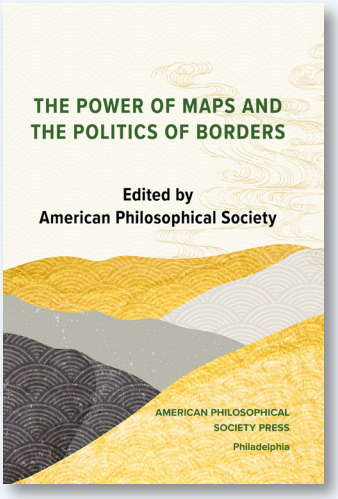

THE POWER OF MAPS AND THE POLITICS OF BORDERS

Edited by the American Philosophical Society

The American Philosophical Society, 2019

242 pages

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Review by: Maya Daurio (she/her), University of British Columbia

This collection of papers was edited and published by the American Philosophical Society and grew out of a 2019 conference and exhibition exploring maps and mapping in relation to the production of political and ideological borders in the early American republic. For the purposes of the exhibition, this era was defined as being between 1780–1816, although certain chapters of the book encompass maps and events significantly before and after those dates. Both the exhibition and the book illustrate how maps can be used to understand the structures of meaning and ways of knowing contemporary to this particular historical period. Together, the collected papers convey the power bestowed upon physical and cartographic boundary-making as it was mobilized in treaty negotiations between sovereign nations, in disputes between territorial governments, or in classifying the natural environment for the purpose of administering tracts of land. While the significance of maps in shaping narratives and abetting the goals of colonial powers is not a new subject, the twelve authors in this collection offer fresh perspectives on the cartographic delineation of space during a period of frenetic territorial expansion in early America.

Most of the authors are historians, and each situates a particular cartographic project—whether a specific map, a surveying expedition, or a boundary negotiation—within a specific spatiotemporal and historical context. In so doing, they shed new light on historical events and relations or previously under-examined archival materials in order to derive broader insights about territoriality, sovereignty, and equality, and to expand earlier understandings about spatial knowledge production, both colonial and Indigenous. This approach provides a valuable contribution to our knowledge of cartographic epistemologies in relation to the formation of the American republic, and illuminates how maps wield uneven power, based both on the authority bestowed upon them and on the ways in which they are used to harness control.

The general role of maps and mapping in the early American republic is framed in the Introduction: "Unpacking the Meaning of Maps, Power, and Boundaries," by independent scholar Nicholas Gliserman, who describes how important maps were in the social, cultural, and political formation of the nation. Gliserman highlights how this volume uniquely illustrates the ways maps can be used to address spatially oriented questions in the early life of the nation, such as "what would the shape of the nation be, or what was America's place in the world" (1), underscoring their value in understanding the history of this period. Derek Kane O'Leary, of the University of South Carolina, offers a particularly illustrative example of the way that maps were mobilized to legitimate certain territorial claims and discount others in his chapter "Archival Lines, Historical Practice, and the Atlantic Geopolitics behind the 1842 Webster–Ashburton Treaty." In it, he describes the way a map uncovered from French archives was imbued with historical significance during negotiations for the 1842 Treaty (which settled several disputes along the US-Canadian border) to justify the Americans' position,

and was subsequently dehistoricized by treaty negotiator and US Secretary of State Daniel Webster to downplay its role once negotiations were completed (186). In her chapter, "'Suitable for the Parlor of an American': The Legacy of Major Sebastian Bauman's Map of the Siege of Yorktown," Kate McKinney, assistant curator of maps and prints at Colonial Williamsburg, discusses a map used to convey a particular narrative of American nationhood. This 1782 map depicted a glorified version of the battle between the British and American colonists at Yorktown: one which served to legitimize American statehood and to symbolize a distinct White American identity—an identity inaccessible to those Black Virginians who fought on the British side and who were left to fend for themselves after British surrender (18). One persistently recurring theme throughout the book is the intimate connection between the American colonists' desire to be free from British rule and the colonial project's attachment to the financial security afforded by institutional slavery, which further encouraged appropriation of Indigenous lands.

The linkage between slavery and land acquisition is explored in George Gallwey's "Mapping New Empires and Old: Albert Gallatin and the Cartographic Infrastructure of the Early Republic," in which he examines the career of the Geneva-born surveyor and diplomat to frame a clear analysis of the intersection of finance, territory, and the colonial project (47). Gallwey, of Harvard University, references Gallatin's 1836 Map of the Indian Tribes of North America, illustrating the chronology of territorial expansion across the continent by simultaneously depicting languages spoken on the east coast from the 1600s and on the west coast from the 1800s, respectively. Gallatin intended the map to help preserve knowledge about so-called "ancient cultures" (51), with the implication that Indigenous languages would soon be extinct.

In contrast to other maps of this era, Gallatin's acknowledges the presence of Indigenous peoples, however problematically. Julie Reed, of The Pennsylvania State University, in her chapter, "Thinking Multidimensionally: Cherokee Boundaries Above, Below, and Beyond," demonstrates that other Euro-American cartographers in the eighteenth and nineteenth centuries expediently represented Indigenous spaces as unoccupied wilderness landscapes open for settlement (59). Reed distinguishes between the conceptual limitations of the two-dimensional maps produced by Euro-Americans and the multidimensional Cherokee mapping and iconography located in caves across the southeast, places which figure prominently in Cherokee cosmology. Reed's chapter demonstrates the need to consider how Cherokee geographies can help us understand Cherokee place-making before, during, and after European settlement in the Native South.

The appetite for land characterized the relationships between American and European colonizers with competing territorial interests and their interactions with the various Indigenous nations, including the Osage, Chickasaw, and Cherokee. The Cherokee are the focus of three chapters in this collection that provide refreshing historical analyses of Indigenous conceptualizations of space and these groups' various strategies of resistance to colonial settlement and expansion. Reed observes that European settlers in what is today the American South failed to account for the multidimensional conceptual constructions of space held by that region's Cherokee inhabitants, and that our understanding of that historical moment is limited by a dearth of Indigenous accounts in the historical record (66). Austin Stewart, of Lehigh University, draws attention to the development over time of Cherokee cartographic epistemologies in his chapter "Wielding the Power of Mapping: Cherokee Territoriality, Anglo-American Surveying, and the Creation of Borders in the Early Nineteenth-Century West." Early Cherokee maps, such as the Catawba Deerskin Map of 1721, centered on social and political relationships between places and the trade routes connecting them, rather than depicting boundaries differentiating occupied territories (75). Western Cherokee emigrants to the Arkansas Valley later appropriated both the techniques and aims of Anglo-American surveying and cartography to resist colonization of their lands and, in turn, to stake land claims that would lead to the dispossession of other Indigenous nations, specifically the Osage. Similarly, Lucas Kelley, of Valparaiso University, describes the various manifestations of Cherokee and Chickasaw resistance to colonial land grabs in his chapter "Clear Boundaries or Shared Territory: Chickasaw and Cherokee Resistance to American Colonization, 1792-1816." These included not only acts of force but also ideas and deployments of both colonial and Indigenous legal frameworks, including land demarcation through surveys (95).

While some of the chapters illuminate underexplored—to the non-historian at least—episodes of, or characters in, early American mapmaking, land administration, or surveying expeditions (see, for example, the chapters by Spanagel, Hardy, and Smith), other chapters uncover the

stories behind familiar delimitations of nationhood and American geography. For example, the Mason-Dixon line is today simply understood as the line between those states in the South which allowed slavery and those in the North which did not, but its geographic history reveals a more complex story. Agnès Trouillet, of the Université Paris 10 Nanterre, expands our understanding of the history behind this dividing line in "Elusive Hinlopen, or the Cape's role in Protracting the Boundary Dispute Between Pennsylvania and Maryland." Trouillet highlights how early British conceptions of, and rule over, its colonial territory in North America in the seventeenth century were ill-defined on the ground, leading to territorial disputes between provinces. The proprietors for Pennsylvania and Maryland, in this example, disagreed over the boundaries between their provinces—and thus the geographic limits of their authority and the proper allocation of tax revenue to each. The dispute arose due to various British (mis) understandings about the geography of North America, whereby they defined jurisdictions by lines of latitude, often without reference to neighbouring grants, and not infrequently resulting in overlapping boundaries (133). The Mason-Dixon line was named after the two astronomers who were eventually hired to resolve the eight-decade long dispute between the families of the original proprietors William Penn and Lord Baltimore by surveying the line that ultimately divided not only Pennsylvania and Maryland, but also the North from the South (147).

In a departure from the approach employed by the authors of the other chapters—that is, of analyzing a map or a surveying expedition in order to contextualize a certain historical period—Billy Smith and a team of researchers at Montana State University mobilized GIS and historical records to reimagine a 1797 map of Philadelphia. Their map included the presence of women and of enslaved people—both typically absent from maps and censuses of that period. Smith uses the revamped map to contrast the route of a hypothetical carriage journey taken by Martha Washington through the streets of that city, with the more circuitous one required of Ona—a person enslaved by Martha—who accompanied her on foot. Mapping the differentiated mobility of these two women highlights Philadelphia's role in growing emancipatory movements and the critical role of Black residents during the yellow fever epidemic of 1793—during which they became defacto caretakers and administrators of a city abandoned by Whites who could afford to leave. Smith's chapter, "Mapping Inequality, Resistance, and Solutions in Early National Philadelphia," is also unique in its narrower geographic focus on the historical and unequal settlement patterns in one city, in a book largely expressive of colonial reach over extensive tracts of land.

This collection illustrates the high stakes involved in early American colonial government claims to land. Federal authorities encountered resistance from the many Indigenous nations whose lands they coopted, and competed with the colonizing endeavours of multiple European countries, including the British, Dutch, Spanish, and French. As David Spanagel, of Worcester Polytechnic Institute, explains in "Putting Science to the Test: Initiating the World's Longest Unfortified Boundary," this competition erupted in three boundary dispute wars between the United States and the United Kingdom between 1754 and 1814. Following the 1814 Treaty of Ghent—which ended the War of 1812 and affirmed the United States and British North American borders as those of the Treaty of 1793—America and Great Britain undertook to discover and mark where their allocated territories actually lay in space. These efforts disrupted Indigenous sovereignty and a period of relatively peaceful cohabitation between Indigenous and non-Indigenous peoples in the Great Lakes region (192). Although decades had elapsed since the 1793 treaty had established that a border existed, it had never been physically measured and was therefore poorly administered. Spanagel is among several contributors—including Pearson and Reed—who highlight how the physical measurement and division of land between the claims of colonizing governments was particularly effective in undermining Indigenous authority, even where those governments had declared their claim to that same land long before.

How cartography, and, more broadly, scientific endeavors such as land surveying and geological expeditions, lent authority to geopolitical claims over territory and legitimized the representation of rights to the land emerges as a key theme in many chapters. The assembly, archiving, and categorization of information about flora and fauna, geographic features, waterways, and even the ocean floor, rendered land knowable to its colonial administrators. Penelope Hardy, of the University of Wisconsin–La Crosse, in "Finding the History of the World at the Bottom of the Ocean: Hydrography, Natural History, and the Sea in the Nineteenth Century," details the interdisciplinary and transnational research by zoologists, naturalists, and chemists on ocean bottom deposits during

the remarkable voyage of the Royal Navy vessel HMS Challenger in its circumnavigation of the world between 1872 and 1876 (123). Evolving sounding technology in the mid-1800s enabled the scientists to collect flora, fauna, and sediment from the ocean floor, from which to derive hypotheses about terrestrial geology and with which to chart the geographies of ocean depths, particularly in the Atlantic Ocean between North America and Europe (120).

The production of maps and reports which emerged from the frenetic collection of information during surveying and geological expeditions sometimes strategically depicted lands as uninhabited as the basis for territorial claims of legitimacy. These documents could then be used to assert jurisdiction in international land claim disputes, to administer taxes, to facilitate further land settlement, and to diminish Indigenous sovereignty. Jackson Pearson, of Texas Christian University, describes the production of such a map in "William Darby's Map of Louisiana and the Extension of American Sovereignty over the 'Neutral Ground' in the Louisiana-Texas Borderland, 1806-1821." From 1812 to 1815, Darby undertook two surveying expeditions to the contested Louisiana-Texas borderlands, an area classified by the United States and Spain as neutral ground belonging to neither government. His detailed attribution of the physical landscape lent validity to the map he would eventually publish, which was referenced in negotiations allowing American officials to exercise authority over the "Neutral Ground" and facilitate the project of American expansionism.

The Power of Maps and The Politics of Borders will engage a range of disciplinary audiences, including historians, geographers, cartographers, and anthropologists. Those interested in historical maps will enjoy its diverse examples of early American cartography, ranging from a map depicting the territories defined in the 1808 Treaty of Fort Clark (80) to a map of the Cherokee Nation by one of its delegates in 1785 (97). With the exception of a few, most of the maps are small and hard to see, which is unfortunate for a book that so eloquently traces the essential role of mapping and charting in the formation of the early American republic. The contributors to the collection offer compelling examples of how cartography, technologies, and archives were wielded to advance early American colonial expansion and served to normalize "the assumption that political space should be tightly defined and delineated" (6).

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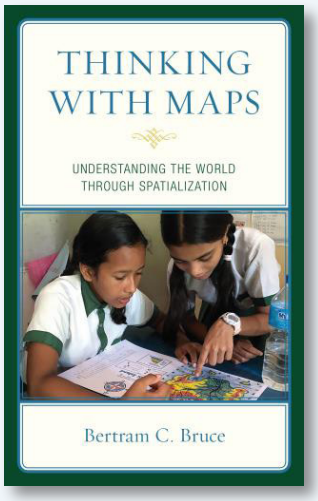


THINKING WITH MAPS: UNDERSTANDING THE WORLD THROUGH SPATIALIZATION

By Bertram C. Bruce

Roman & Littlefield, 2021

174 pages

Softcover: $40, ISBN 978-1-4758-5929-4

Review by: Richard Bohannon (he/him), Metropolitan State University

Bertram Bruce is a multidisciplinary scholar with a background in computer science, whose work has more recently focused especially on teaching and learning. As its title implies, maps are the primary concern of his new book, *Thinking with Maps: Understanding the World Through Spatialization*, which looks at education and the role of maps in how we learn about the world, both inside and outside of the classroom. This book is not written with cartographers and geographers as the primary audience, but for a broader audience less familiar with maps.

In the Introduction, Bruce outlines a basic and useful insight that he repeats in various ways throughout the volume: humans have developed three systems of symbols to understand the world and communicate with each other. Written language comprises the first, and mathematics the second. Modern educational systems revolve around these two symbol systems, and for good and obvious reasons; reading, writing, and arithmetic are foundational skills.

But Bruce argues that a third system of symbols—spatialization—has become increasingly essential "as the world becomes more interconnected, and as our understanding of ecological, political, and cultural interconnections grows" (xxvii). The use of the term "spatialization" here is apt, for while Bruce does write about traditional maps throughout the book, he means something broader—including not just geographic maps but concept maps, charts, histograms, and the like. His use of the term "map" is intentionally expansive and meant to cover this wide array of visualizations. While this would, arguably, be too broad of a definition for some cartographers, it's an understandable rubric given the book's aim. The author wants us to consider spatialization as a way of understanding the world, on par with both writing and math. Maps can be used not just to learn the basics of geography or for memorizing the names and location of countries, cities, and rivers, but to understand spatial relationships more broadly, perform basic spatial analysis, and understand how things connect to each other.

Bruce structures the book around different maps uses, ending with a reflection on what counts as a map. The first chapter starts with the basics: using maps to navigate and find directions. Much of the chapter is very simple—several pages are spent explaining how road and trail maps are used, for example—before arguing that maps help us understand where we are not only practically, but existentially, as "the means we employ to make sense of our life in context" (19).

Chapter Two further explores the ways that maps construct the world around us, with the role of maps in drawing political boundaries serving as a clear example. Most of the chapter revolves around the city of Paris, and especially the history of street names across different neighborhoods and *arrondissements*, before moving to hermeneutics and the way maps are always up for interpretation and consequently interpreted differently from different perspectives. While Bruce shows a detailed knowledge of Parisian street names, his broad understanding of what counts as a map—here the city itself is construed "as a map of Parisian history" (37)—misses an opportunity to draw on the work

of the many geographers (such as Denis Wood or John Pickles) who have written on similar themes.

While the third chapter is titled "Learning," it dwells more on role of maps (again, broadly construed) and science. "Maps can make data come alive," Bruce writes. "One's capacity to do science is defined, to a large extent, by the ability to read and create maps and to move between visual and conceptual modes of understanding" (44). Most of the chapter is filled with examples of how maps can be used to explore and make sense of data, but the more interesting contribution comes toward the end, where he provides several examples of how maps can be used in educational settings to promote learning. At a grade school in Nepal, for instance, students use maps to explore their local environment and culture as well as to record what they have learned, and children at a school in Tucson, Arizona, use maps of real and imaginary gardens to help learn geometry.

This educational theme continues through subsequent chapters. Chapter Four is a brief exploration of maps as artistic expression, as a way for people to learn by being "actively engaged in making meaning for themselves" (80). Once again, the idea of a "map" here is often quite expansive—including, for example, several pages on musical scores and notation, or "maps of music" (76). The focus is less on maps themselves, and more on how the artistic use and creation of maps "can be a major factor in enlarging civic intelligence and promoting democratic society" (80).

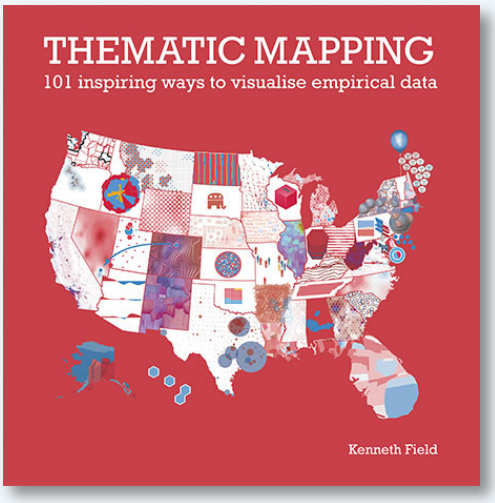
Chapter Five begins with three nineteenth-century examples, well known to many cartographers, that are used to briefly describe how maps can be used to solve problems: John Snow's cholera maps, Charles Booth's poverty maps, and Florence Kelley's Hull-House maps. These early thematic maps exemplify one of the core educational advantages of modern GIS data, which allows mapmakers to discover connections between different data layers (of poverty levels, for example, or public health data). In making such connections, Bruce argues that maps become "performative utterances," a term borrowed from the philosophy of language that refers to words "that change social reality rather than describe a pre-existing reality" (91). He points out that maps such as those by Snow, Booth, and Kelley not only describe a place, but change how their audiences perceive that place; they create a *new* sense of place.

The sixth and seventh chapters pick up on this theme, providing examples of learning through the mapmaking process. In a discussion of a map exercise for students learning about early US history, for instance, Bruce writes that "the idea is to encourage students to use map reading and mapmaking as tools for thinking. Rather than memorizing dates for significant events, they make visual and tangible the story they are learning" (104). This is the heart of Bruce's argument: that maps and spatial thinking are critical across the school curriculum, beyond their more obvious role in learning geography.

The eighth and final chapter revisits the question of how we define the term "map" through an evolving parade of quite diverse examples, ranging from cladograms (phylogenetic charts demonstrating the relationships between groups of organisms) to the stick charts traditionally used for ocean navigation in the Marshall Islands. Bruce ultimately argues a map is "a story the author expresses or the reader infers, built upon a spatialized representation of the relations among elements of some system" (159). Again, this definition encompasses a wide range of visualizations; while it can lead to some interesting examples, it also dilutes the distinctiveness of the more traditional, geographic map.

Many readers of this journal might wish Bruce had expanded more on the book's core ideas about education, and spent less time providing introductory overviews of maps and other visualizations. While he does offer several examples of students learning through making maps, they are always brief, and he quickly moves along to another topic that often seems unrelated. A more systematic exploration of the pedagogical possibilities and limitations of mapping outside of the geography classroom would have been enlightening.

Thinking with Maps also stems from the author's broader interest in "democratic education," or an education guided by values and ethics. Especially given the historic (and contemporary) role of maps and GIS in colonization and ecologically destructive industries, which Bruce himself discusses briefly in several chapters, a more thorough and rigorous discussion of how maps can inform a democratic education would be welcome. Nonetheless, this book leaves cartographers, professional or otherwise, with an important question: in what ways do our maps help or hinder the development of "an enlarged capacity to critique, participate in, and sustain a flourishing society," (168) for which Bruce calls?



THEMATIC MAPPING: 101 INSPIRING WAYS TO VISUALISE EMPIRICAL DATA

By Kenneth Field

Esri Press, 2022

273 pages, maps, diagrams, charts

Softcover: $59.99, ISBN 978-1-58948-557-0

Review by: Daniel G. Cole, Smithsonian Institution

This book starts with a foreword by Alberto Cairo, who states: "Most of the maps in *Thematic Mapping* are indeed clear, enabling insights and permitting exploration of data, but others are playful or quirky experiments, and they aren't lesser works because of that; they are experimental wanderings" (xi). Following that, Field notes in his preface that he considers his work to be complimentary to, and an update of, that of Cuff and Mattson (*Thematic Maps* 1982), Monkhouse and Wilkinson (*Maps and Diagrams* 1971), Dent et al. (*Thematic Map Design* 2008), and Bertin (*Semiology of Graphics* 2010). Further, Field states that "this book focuses more on portrayals that apply to data of different types. . . . The intent is not to set out detailed layout, design and production content," as those will vary due to software constraints and different tastes (xii). He provides one hundred and one cartographic examples in the hope "that this book will support not only everyday mapmakers . . . but [that] it also might be useful to those specifically making political maps" (xiii). This review will evaluate whether he succeeds in this goal.

In the eight page "Prologue," Field presents a contemporary and historical cartographic overview wherein he warns that "Maps are designed to make lies appear truthful, misinformation respectable, and to give an appearance of fact to pure illusion" (xv). His first illustration, the choropleth map Donald Trump used to show how decisively he had won the (then recent) 2016 election, serves as a case in point. It's not that the data was incorrect, but that its aggregation (by county) implied that voting was by acreage rather than by suffrage. That is followed by discussions on thirty-six small-multiple maps of spatial data by E. P. Herman (*Maps and Sales Visualization* 1922; some of these Herman himself identified as examples of what not to do); a further sixteen small-multiples of statistical data by Jacques Bertin in 1983; a Census Bureau choropleth map of the 1890 presidential popular vote election results; an 1895 cartogram of election results in the British Isles; and finishes with eighteen of Field's own maps dealing with the 2016 election, as a preview to the rest of the book. All of these maps are given as examples of different ways to visualize a given dataset.

Chapter 1, "Preparation," concerns the base map, and how choices of projection, color palette, typeface, page layout, etc., affects a map's message. In an unsurprising move, Field rejects the use of the Mercator projection for "any small- or medium-scale thematic map" (2), and instead advocates the use of equal-area projections; however, the one that he chooses to use is not identified. Although he recognizes that projections exist that preserve other properties, Field deems that "the property you must preserve for thematic mapping is area" (4). While he doesn't draw much attention to them, the author has made a whole set of such standardizing decisions for the maps in this book. For example, the book's maps are uniformly scaled at 1:13 million, and his decisions on the generalization of the linework, standardization of the color schemes, and the

uniformity of typefaces and type sizes makes for a recognizably consistent map series design despite the widely varied individual maps.

In order to illustrate fair versus unfair representation, and to make the point that redistricting is not necessarily the same as gerrymandering, Field uses both the real-world example of the 4th Congressional District of Illinois and an abstract redistricting example. He notes that coloring political maps like these, at least in the US, almost invariably involves the use of red/blue divergent schemes, and that such schemes can cause problems for readers with color vision deficiencies. For example, viewers unable to see green will perceive a red/blue color range as brown/blue instead. The related symbol dimensions of contrast and transparency are considered next, and Field provides four examples of how they affect detail on maps, showing, for example, that adding transparency to the thematic layer of the sample map only lowers the overall contrast, muddying identification of the data classes, and it is rightly labeled a poor choice. It is better, we are told, to dispense with transparency for the thematic data. Conversely, hard knock-out halos on feature labels (such as state names) can be harsh and jarring, and softening these non-data masks with transparency is tipped as being a best solution for print—and maybe for a web map too, with the addition of scale-sensitive labeling. The author ends the chapter describing static (print) versus dynamic (web) maps, with the latter allowing the display of state- and/or county-level data when zooming in or on mouse roll-over.

With a few exceptions, Chapter 2, "Area maps," deals with choropleth maps. There are seventeen large maps that spread across the binding gutter, as well as two sets of small multiples. One set presents a single dataset (the Republican vote share from the 2016 presidential election) using different classing systems (23), and the other set shows presidential vote counts for elections from 1920 to 2016 (48–49). Overall, some of the chapter's maps deal with state-wide statistics, while others present county-level data; some deal with the popular vote and others present the electoral college votes. Most of these maps are reasonably straightforward and easy to read with red (Republican) and blue (Democratic) diverging color schemes, or blended schemes resulting in shades of purple. One value-by-alpha choropleth map successfully de-emphasizes the land mass by using the alpha channel of the thematic image to provide a color saturation dimension symbolizing population (30–31). Occasionally, Field adds an extra feature—such as what he calls shaded-relief, but which is really a pseudo-raised choropleth, for counties that have higher population density (32–33)—that likely would confuse the map reader, but in most cases he is doing it to show that tactic's shortcomings. His "All the colours" map on pages 42–43, for example, is an unclassed trivariate choropleth of turnout, population, and margin of victory, and although he does remark that this map is "a challenge for the map reader to relate colours from the legend to areas on the map," that is clearly a bit of an understatement. Furthermore, Field does not mention that unclassed trivariates are best suited for showing the variation of continuous values over space, as opposed to identifying specific values, even when classed or binned. The next map (44–45), one with vertical bar fills, is where I have to disagree with Field, who says in bold type that "it's interesting, and makes you stop and look." On the contrary, it makes me want to look away.

Chapter 3, "Point maps," consists of sixteen maps with a variety of both conventional and novel symbol schemes, ranging from dot maps to proportional and graduated symbols. Most of these maps are relatively easy to read, with some exceptions: the paint splat symbol map on "Painting the town red" (60–61) may be informative, but it's ugly and confusing—why, for example, did he randomly rotate the splatter symbols? Curiously, Field notes only that the symbols are "more attractive and engaging relative to the more conventional symbol treatment but they are harder to read." A few pages later, the author is more critical of this sort of information overload when discussing a multivariate proportional symbol map (64–65). Later, on, he demonstrates a map that combines a choropleth with colored dots (74–75), and remarks on how this particular combination addresses a problem of misinterpreted population maps. Field ends the chapter with several examples of what not to do: on pages 76–79, he presents a pair of maps with a six-by-six legend (share of votes vs. relative number of voters) using equal-area, binned gridded symbols—one with a hole and the other without—both of which made my eyes vibrate. Similarly, the map of numbers on pages 82–83 ("Let the data speak for itself") is a good example of when a table works better than a map, and, lastly, the "map stack" example (84–85) of two maps in one (proportional white line circles over a 10-class choropleth) proves that sometimes two maps are better than one.

There are nine maps in Chapter 4, "Line maps," the first three of which are contour maps: simple lines ("Data as a fluid surface"), filled contours ("Colouring between the lines"), and shaded contours ("Throwing shade"). After those, Field illustrates an "alpha-blended" boundary line map for counties that constitute voting enclaves, with color showing the winning party and opacity indicating the vote margin in neighboring counties. Next are two maps peppered with directional arrows, one with the arrows all pointing in southerly directions, and the other with left- and right-facing proportional arrows. While both indicate political swings, the latter map is a bit more convincing. A flow map of Clinton and Trump campaign trips graphically displays the portions of the country that were important to either or both, as well as the twenty-two states that were simply fly-overs. The last two maps include a strip map of (the historic path of) Route 66 showing which roadside counties favored which candidate, and a map with nineteen transect cross-sectional graph lines indicative of vote share; the author states that this last one would look very different had it shown vote totals, which may have been a good idea for him to show.

The nine cartograms in Chapter 5 include a non-contiguous state map; a hard to read county-level map that equalizes population density; a tessellated hexagon map of electoral votes with margin of victory; a non-contiguous hexagon map of electoral votes; a Dorling cartogram of counties with proportional circles of victory margins; a Demers cartogram with proportional squares for states; a pseudo-3D hexagonal mosaic; a compromise map in which the number of dots for each state simply equals the number of electoral votes; and another Dorling cartogram, this time showing states with embedded pie charts. This last one requires lots of study. The idiomatic *faux pas* on the non-contiguous cartogram that refers to Montana as lying in the "northern Midwest" (108) should be noted, if only as an aside.

Unsurprisingly, Chapter 6, "Graphs, charts, and plots," begins with a table of popular and electoral votes, "Let[ting] the numbers tell the story" (130–131) of Trump's loss of the former while winning the latter. This is followed by a pair of horizontal bar charts of votes: one with stacked bars and a smaller one with centered bars. Unfortunately, the small chart is also centered in the book's binding, thus rendering it practically unreadable. Several informative graphics inhabit the right-hand page: a scatter plot of counties won by each candidate; pie charts of popular and electoral votes; and a line graph of election swings from the 2012 to 2016 elections. On the following ten pages are a variety of data visualizations that are playful, but provide questionable information value: repeatable pictures in an Isotype style chart; a sinuous line graph, two tree maps; violin and beeswarm plots of counties won with voter turnouts; and balloons of electoral votes. The chapter ends with histograms of Obama's and Trump's electoral votes, followed by a confusing series of space-time cubes of electoral trends from 1920–2020.

Like the previous chapter, Chapter 7, "Chartmaps," focuses on data at the expense of topology. The series begins with a vote count waffle grid by state, and continues with five-by-five waffles of pie charts, and another of unique values. In the next examples, charting votes over the past twenty-five election cycles, the fifty squares are filled with line graphs and with stacked bar charts. Small Sankey diagrams for each state appear next, and although Field draws a parallel between these and Minard's flow map of Napoleon's Russian campaign of 1812, his Sankeys are much harder to decipher than Minard's flow map. At least the author admits that "it is up to the reader to interpret any relationship among the lines" (160). The next three maps, still all on the states-as-square-blocks base and using the 1920–2016 results, include radar charts, polar area charts, and tree-ring charts. The final four maps of this chapter include Chernoff(-esque) caricature faces (with four variables); a Chernoff face Dorling cartogram in which Field admits that "it's almost impossible to disentangle the data from the symbol to work out exactly what's going on" (170); minimalist sparklines; and dials as a Dorling cartogram.

Chapter 8, "3D Maps," rounds up all sorts of three-dimensional margin-of-victory visualizations. Included in the grab bag are: extruded prism on a digital globe (which the author does not recommend); extruded prisms on a flat surface (that, he notes, has problems with occlusion); extruded prisms in an axonometric view (which lessens the occlusion); extruded filled contours; a 3D block diagram with a draped surface; a triangulated irregular network of the states (that probably would have worked better if he had used the same county data as was used for the previous maps); chromastereoscopic color encoding (the sort of 3D that requires prismatic glasses, not the more common red/blue anaglyph type); illuminated transparent 3D columns by number of votes; stacked poker chips of electoral votes; dasymetrically distributed 3D people (although the

random rotations Field applies to the figures are likely to confuse the map reader); an extruded waffle grid for percentage share of the vote over twenty-five election cycles (which is too hard to decipher); stratified areal space-time cubes (an approach that is admittedly more useful in an interactive digital environment); data spikes (which makes the Trump win look like a landslide); and a 3D gridded chartmap over twenty-four election years (which is best viewed one state at a time). One statement that Field makes in this chapter caused me to sit up and take notice: "The whole purpose of this book is to showcase the good—and ignore the bad and ugly" (202). Really? My impression is that, while much that is good is showcased, the bad and the ugly gets a great deal of sympathetic notice as well.

Chapter 9, "Curiosities," includes a dozen map examples that may or may not be worthwhile. The first—a pair of US maps, one solidly red and the other solidly blue, labelled "Winner" and "Loser," respectively—is a bit too simplistic. The next map, with its hard-to-distinguish pattern fills, goes against basic map design principles and is just ugly. The third is a map of bipartisan county "islands" scattered across the page in their correct relative geographic positions, but without even an outline to provide locational context. The islands are depicted using satellite imagery and surrounded with a light blue vignette suggesting a sea (of partisanship?), but this tactic, given the scale of the map, is largely wasted because nearly all these islands are too small to see the details. The "Pop art carte" map employs a grid of semi-transparent red and blue size-graduated dots that coalesce in populated areas to show how purple the country is. A multivariate symbol landscape follows with lightly toned red/blue states and use of a circumflex-like mountain symbol (^) in red or blue, in different sizes and thicknesses based on votes. The next map is a joy plot (a graph type named, apparently, after the cover Peter Saville designed for Joy Division's 1979 album *Unknown Pleasures*) of lines stretching across the country that vary in hue by majority party, by apparent height for vote share, and in opacity for voter density. It can be compared with the basically similar map that follows; this one of stark horizontal lines with thicknesses proportional to vote share. A dot density Dorling cartogram follows; and while on this map it is easy to see differences between the states, patterns within any one are indistinguishable. The next exhibit is an abstract, tessellated cartogram (or "Presidential puzzle") that playfully makes use of Escheresque interlocking blue Clinton and red Trump cartoon figures. Once again, hues indicate party and saturation shows vote share. "Requiring study" is an alternative name that I would give to Field's gridded cartogram using dark brown hexagonal cells emulating steam (punk) pressure gauges with very thin needles to indicate voter participation and a closeness ratio of victory margin—plus a little badge with a tiny (winning) party logo. Next is a value-by-alpha dasymetrically equalized hexagon map meant to be compared to the value-by-alpha choropleth map on pages 30–31. The chapter finishes with a modified pictorial map of Trump in the Oval Office overlaid by white counties that Clinton won.

Field's "Epilogue" discuses a nation-wide dasymetric dot density map that should have been displayed at a larger scale, although it is available for download at esriurl.com/election2016. With over 128 million dots, it's worth comparing to the map on pages 68–69: while they appear different due to scale and dot size, they are essentially the same. The author also points out the differences between, and advantages of using, either choropleth or dasymetric dot density for the two political parties.

He then has "One more map" illustrating Biden's win over Trump via a ring chartmap with ring sizes being defined by the number of votes. The winner's votes define the outer edge of the ring and the loser's votes the inner edge, to create a variable ring thickness.

Field finishes the book with "Prior Carte," a cartographic glossary with sixty-nine verbal descriptions (and cross-references to items in the book) and forty-eight historical visual examples of different map types.

It is unfortunate that the page size and layout of this book do not do justice to its contents, with so many maps spread across the binding gutter, and so much map that gets lost down there. Many of the maps deserve, or at times need, to be viewed more closely than the printing allows; though some are available online at the aforementioned URL, *all* of the maps really should be offered online in one easily accessed place. Another issue is that the time-series maps are not consistent in date span: most are 1920–2020 but some are 1920–2016. Hopefully, a second edition of this book will take care of these minor problems.

Overall, although I would encourage cartographers to be more critical than Field in their choice of visualizations, this is a very good book illustrating a wide range

of ways to approach one spatial dataset. It is a useful text but not a complete one. As noted above, Field himself remarks in his "Preface" that he sees this book as a complement to various other thematic cartography textbooks. I note that the fourth edition of *Thematic Cartography and Geovisualization* (Slocum et al. 2022) came out from CRC Press in August, and I predict that book will be the prime candidate, with books like Field's serving as extra reading along with peer-reviewed articles.

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Danzer, Gerald. 1990. "Bird's-Eye Views of Towns and Cities." In *From Sea Charts to Satellite Images: Interpreting North American History through Maps*, edited by David Buisseret, 143–163. Chicago: University of Chicago Press.

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