Social and Political Dimensions of the OpenStreetMap Project: Towards a Critical Geographical Research Agenda

Georg Glasze and Chris Perkins

Abstract Critical cartographic scholarship has demonstrated that maps (and geoinformation in general) can never be neutral or objective: maps are always embedded in specific social contexts of production and use and thus unavoidably reproduce social conventions and hierarchies. Furthermore, it has been argued that maps also (re)produce certain geographies and thus social realities. This argument shifts attention to the constitutive effects of maps and the ways in which they make the world. Within the discussion on neogeography and volunteered geographic information, it has been argued that crowd sourcing offers a radical alternative to conventional ways of map making, challenging the hegemony of official and commercial cartographies. In this view, crowd-sourced Web 2.0-mapping projects such as OpenStreetMap (OSM) might begin to offer a forum for different voices, mapping new things, enabling new ways of living. In our contribution, we frame a research agenda that draws upon critical cartography but widens the scope of analysis to the assemblages of practices, actors, technologies, and norms at work: an agenda which is inspired by the "critical GIS"-literature, to take the specific social contexts and effects of technologies into account, but which deploys a processual view of mapping. We recognize that a fundamental transition in mapping is taking

Part of this paper has been written while Georg Glasze was a visiting researcher at the Oxford Internet Institute (OII) in 2014. We want to thank Steve Chilton (London), Christian Bittner, Tim Elrick (both Erlangen), various colleagues from the OII and the three anonymous referees for their advices on aspects of this paper.

G. Glasze (✉)
Institute of Geography, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU),
91054 Erlangen, Germany
e-mail: georg.glasze@fau.de

C. Perkins
School of Environment, Education and Development (Geography),
The University of Manchester, Manchester M13 9PL, UK
e-mail: chris.perkins@manchester.ac.uk

J. Jokar Arsanjani et al. (eds.), *OpenStreetMap in GIScience*,
Lecture Notes in Geoinformation and Cartography,
DOI 10.1007/978-3-319-14280-7_8

place, and that OSM may well be of central importance in this process. However, we stress that social conventions, political hegemonies, unequal economic and technical resources etc. do not fade away with crowdsourced Web 2.0 projects, but rather transform themselves and impact upon mapping practices. Together these examples suggest that research into OSM might usefully reflect more critically on the contexts in which new geographic knowledge is being assembled.

Keywords Critical cartography · GIS and society · Geoweb and society · Volunteered geographic information · Social and cultural geography · OpenStreetMap

1 Introduction

OpenStreetMap (OSM) has repeatedly been described as "free" and as a "crowd-sourced map of the world" which enables an opening and democratization of hitherto elitist practices of cartographic (re)presentations and the collection of geodata (see, for example, Chilton 2011). Other chapters in this volume offer detailed descriptions of the project, and the varying functionalities it offers, detailing the complex variety of application areas for OSM data, but for the purposes of this chapter we focus upon the extent to which OSM delivers a radical change that is significantly different from other digital mapping projects. We are concerned here with the social and political dimensions of OpenStreetMap, and with the extent to which the much-trumpeted free and open nature of the project delivers a democratized and emancipatory mapping of the world. We sketch out a critical research agenda, exploring the fixations, hierarchies, conventions and exclusions, which almost inevitably become inscribed in projects like OSM. This agenda argues that researchers might attend more to mapping modes through which OSM is practiced, by focusing on authorship, technical infrastructure, and governance. We argue that researchers might also deploy mixed and ethnographic approaches, in order to learn more about particular moments of mapping practice and illustrate this with a small case study of "mapping mosques". In discussing these aspects, we aim to reflect on the dynamic, changeable, and thus "open" status of the project.

2 Geoinformation, Cartographic (Re)presentation and Society

Geoinformation and cartographic (re-)presentations categorize, define, arrange, locate, designate, and thereby (re)produce certain conceptions of the world. They powerfully affect our thinking and acting. Critical cartographic scholarship has

demonstrated that maps can never be neutral: they are always embedded in specific social contexts of production and use and thus unavoidably reproduce social conventions and hierarchies (see Harley 1989). Furthermore, it has been argued that maps also (re)produce geographies. This argument shifts attention to the ways in which maps make the world (e.g. Pickles 1992). For example, the projection used, what is shown on the map, what becomes silenced, what is emphasized, and where the map is centered on to construct a particular world-view. Critical engagement with the social contexts and implications of geoinformation and cartographic (re) presentation also has to consider technological changes and practices for the collection, organization, and use of geographic information—especially in the digital age.

2.1 Critical Cartography I: The Social Construction of Maps

From the 1980s a perspective that sees maps as socially constructed started to take form. In 1985 the Swiss geographer Raffestin proposed a "sociology of cartography" which asked why societies designed specific maps. In 1992, Denis Wood elaborated on the "power of maps" in bringing forward the argument that maps are always deployed to represent interests. The geographer and historian of cartography Brian Harley interpreted historic maps as documents, which have to be understood in particular social contexts. In his highly influential article "Deconstructing the map" (1989) he differentiates external and internal power in cartography. External power refers to the impact of social structures on the ways maps are produced: "Monarchs, ministers, state institutions, the Church, have all initiated programs of mapping for their own ends" (ibid: 12). The internal power of "cartographic processes" refers to the nexus of knowledge and power described by the French philosopher and historian Michel Foucault. Harley lays the basis for a social constructivist view of cartography. He suggested an approach inspired by text-based discourse analysis in order to analyze how maps tend to reproduce specific world views. In this view, regularities in the design of maps are seen as indices for the implicit and unstated rules of cartographic practice.

2.2 Critical Cartography II: Mapping as Socio-technical Practice

Since the 1990s a debate has developed amongst scholars of critical cartography, which focuses on the practices, conventions and techniques of map making and use and thus goes beyond former concerns with the visual design of the map. This

research perspective questions how mapping practices shape our social worlds (Pickles 2004) and often draws upon ideas from science and technology studies. Dodge et al. (2009b), for example, point to the writings of Latour who took modern cartography as an example to show how specific practices and techniques were used, to produce scientific knowledge and thus authority in European centers of power. Latour (1986) argued that these practices, conventions, and techniques worked to create the preconditions for international trade, territorial expansion, and global colonization and thus new geographies, and that maps served as immutable mobiles, circulating and reifying a particular way of knowing the world.

2.3 Social Science Perspectives on the Transformation of Geoinformation and Cartography in the Age of GIS and the Geoweb

Since the 1960s analogue print-based cartography has been rapidly and comprehensively replaced by digital cartography. From the 1960s, Geographic Information Systems (GIS) were progressively developed, to capture, process, analyze, and map digital geodata. The encounter of GIS and critical social and cultural geography triggered a discussion of the social implications of the widespread use of GIS (see for example Pickles 1995; Schuurman 2000, 2009; Harvey et al. 2005; O'Sullivan 2006). This debate on GIS and society not only focused on mapped displays, but also on the practices and technologies "beyond" and "behind" these representations. Three important aspects of this debate should be highlighted. The major influence of economic and military interests in the development of GIS was an important focus for research. A second theme concerned disparities over access to production and use of geographic information arising from the complexity and cost of GI systems. Finally, the focus of GI analyses was on quantifiable and metric information with a consequent danger of a marginalization of "qualitative" interpretation. Today, research into GIS and society analyzes the socio- and politico-economic contexts of GIS, as well as the impacts of GIS on social structures and processes (Pickles 2004; O'Sullivan 2006; Harris and Harrower 2006; Pavlovskaya 2006).

With the development of the interactive internet, the so-called Web 2.0, and the rapidly growing availability of online-geodata, geoinformation and cartography are undergoing another fundamental transformation (Haklay et al. 2008; O'Reilly 2005). Global corporations with no background in geoinformation are developing new Geoweb applications (on the history of Google Earth see, for example, Dalton 2013). With the proliferation of global positioning systems in smartphones and navigational devices, the Geoweb is part of mobile and ubiquitous practices. Alongside commercial players in this field there are a growing number of "open" Geoweb-projects based on crowdsourcing, with OpenStreetMap being the most

successful and prominent example. These projects involve thousands of volunteers in the creation, organization, and use of geoinformation, consequently described as "voluntary geographic information" or VGI (Goodchild 2007), leading to what has been labeled as a "neogeography" beyond the established academic field of geography (Goodchild 2009).

Research on the Geoweb in the social sciences can build on approaches developed in critical cartography and "GIS and society", but also profit from relations to the wider field of critical social and cultural geography and interdisciplinary internet studies (see Graham 2009; Caquard 2014). Sarah Elwood and her co-researchers have begun to research different aspects of collaborative and community-based mapping, to offer a critical interpretation of big data and the Geoweb, reorienting attention to the power of technical and political infrastructures in privileging certain kinds of information, moments, or affordances, and drawing attention to the exclusions that are normalized in the apparently neutral specifications of mapping projects on the Geoweb (see Elwood 2010a, b, 2011; Elwood and Leszczynski 2012). This kind of research also draws attention to the importance of the research discourse around Geoweb projects, that script a boosterist neogeographic agenda—in which VGI remains somehow separate from the powerful forces of commerce that maneuver around the technology, deploying it as part of their accumulation strategies (see Leszczynski and Elwood 2014). Technical research elides the social and political context of Geoweb projects and in so doing allows them to advance as "new", without having to think about why or how they are advancing. Other political economic research focuses on the relationship of depiction and inscription and the realpolitik of claims to space (see for example Burns 2014). Glasze (2014) suggests four main questions that might be answered in this kind of research:

(1) How are practices relating to compilation, processing, analysis, and presentation of geodata that were formerly the responsibilities of public organizations shifting to other actors? To what extent can this be interpreted as an "opening" of geoinformation or should these processes be seen more as a commodification and commercialization of geoinformation by means of a roll back of public services?
(2) What role do communities of collaborative internet activists play in this process?
(3) What are the consequences of this shift for the nature, quality, processing and presentation of geodata, and how do social (and spatial) inequalities become (re-)produced in this process?
(4) How does the growing extent of geodata enable new possibilities for (Geo-) surveillance and (Geo-)marketing? And what does this mean for questions of power, governance, resistance and privacy?

These issues can usefully be examined by focusing on OpenStreetMap, and we argue can most clearly be articulated if researchers adopt a concern with modes, moments and methods (see Dodge et al. 2009b) wrapped up in this project. By modes we mean the ways technologies, culture, and socio-economic organization

come together to influence mapping practices; by moments we mean the banal taken-for-granted instances of practice on the ground; and by methods we mean how researchers might investigate such issues.

3 OpenStreetMap: Opening and Democratizing Geoinformation and Cartography?

OpenStreetMap was founded in the UK in 2004 by software developer Steve Coast. It offers a collaborative geodata project and cartography in which users capture, upload, edit, and tag tracks and points of interest, progressively building a global open and free geodatabase and map. Within the discussion around neo-geography and volunteered geographic information (VGI) it has been argued that this kind of crowd-sourcing offers a radical alternative to conventional ways of geoinformation and map making (e.g. Goodchild 2007, 2009), challenging the hegemony of official and commercial cartographies. In this view, crowd-sourced Web 2.0-mapping projects such as OSM might "begin to offer a forum for different voices, mapping new things, enabling new ways of living" (Perkins 2013).

OSM's web-based architecture facilitates many different kinds of involvement (see Ramm and Topf 2010). Users can create data, enhancing and growing many aspects of the project, and, in so doing, build a collaborative geodata project. The different OSM wikis document established practices. Different rendering styles have been developed to map the database. Code is revised and the functionality of the interface changes over time. Tools have been created by the community, to check the quality, coverage, and veracity of mapped features. Tagging standards are debated in talk lists. A community of users progressively adds to the project and meets online and in fora such as annual conferences and Mapping Parties.

From the outset, OSM offered a wiki-based capacity to share tasks. The Project offered something new to users, and the novelty lay in the notion that OSM was *open* and *free*. Its culture of participation is a central feature. Any registered user has the capacity to overwrite other people's work. Throughout the documentation about the project it is frequently repeated that practical needs of "doing" the project take precedence over more hierarchical rules governing behavior. An early impetus to establishing OSM was the desire to challenge the corporate and proprietary monopoly of national mapping agencies. In the early days of OSM the Ordnance Survey (the official cartographic authority in the UK) operated cost-recovery policies, and protected its products by aggressive policing of copyright. By way of contrast, OSM initially ran under a Creative Commons licensing regime, and from September 2012, under an Open Data Commons Open Database license, that encourages reuse of OSM data (see Chilton 2011). In contrast to commercial VGI services, such as Google Mapmaker and Navteq Map Reporter, volunteers contributing data do not hand over ownership of the data to a profit-making corporation. Over the past decade the sophistication and coverage of OpenStreetMap has grown apace. As of July 2014 there were 1,699,115 registered users, with 2,425,437,945 nodes and 242,404,181 ways in the database.

4 Mapping Modes: The Social and Political Dimensions of OpenStreetMap

The idea of a mapping mode builds on work by historian of cartography Edney, who suggested in 1993 that mapping might best be seen as an assemblage in which technologies, people, knowledge, culture and politics come together, and through which particular ways of doing mapping are enrolled. A mapping mode is thus variegated and situated in a particular time and place. It is transitory and constantly changing. At any one time, different mapping modes might coexist; there is no inevitable progression from one mode to another. The paper map survives in the digital era; the national mapping agency continues to produce maps in the face of competition from crowd-sourced alternatives; the touchscreen-based mobile interface coexists with fixed desktop screen-based displays, etc. (Dodge et al. 2009b). Here we focus on three key influences upon contemporary mapping modes: authorship, infrastructure, and governance.

4.1 Authorship: The Socio-cultural Embeddedness of OSM Practices

Authorship of OSM is collaborative. The project celebrates its open and shared ethos and tools exist to allow potentially anyone to drill down to identify who has been responsible for the creation of which parts of the database (see for example Fig. 1).

Empirical investigation of the OSM community suggests, however, that the nature of this collaboration is uneven, and that participation in OSM is, like all

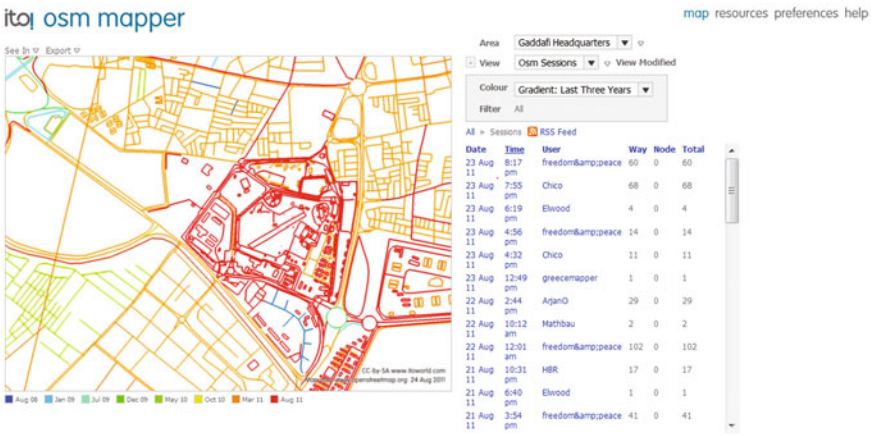

Fig. 1 The collaborative authorship of Tripoli Libya immediately after the overthrow of Colonel Gaddafi. Note mapping of the compound dates from 21st August 2011, and was mainly carried out by User IS Freedom and Peace and that almost all the immediate area has been mapped in the period since March 2011 (© ITO World, mapping data from © OpenStreetMap contributors, CC-BY-SA)

crowd-sourced projects, very unequal. A small and elite group end up taking most of the important decisions, which effectively determine project impetus and directions. The vast majority of OSM users do not register for the project. Of those who do register the majority does not stay with the project for long or contribute much to the database (Neis and Zipf 2012).

The overwhelming majority of users are male. Stephens (2013) compared gender participation in VGI projects and concluded that "Women are less aware of OSM… than their male counterparts, and those who are aware of OSM are significantly less likely to contribute spatial data. As a result of low female participation, the features and attributes on OSM reflect a male view of the landscape." She highlights the gendered nature of the tagging process that has allowed men to exercise their democratic rights to vote down a detailed classification of amenities that do not meet their immediate needs, such as childcare facilities, whilst supporting the inclusion of tags relating to stereotypically male sexualized spaces such as brothels (see also Steinmann et al. 2013).

Other inequalities are charted in empirical studies of participation such as Neis and Zipf (2012) and Budhathoki (2010). These reveal that most OSM users are wealthy and educated. Most come from the northern hemisphere (see Fig. 2).

Also within urban areas there are significant disparities of geodata-density. For example in the case of Jerusalem, Bittner (2014) shows that the data density is much higher in the neighborhoods mostly populated by secular Jews, compared to the quarters predominantly inhabited by Orthodox Jews and Palestinians (see Fig. 3).

The world mapped by the OSM community reflects its interests. Urban and wealthier areas tend to be more densely mapped (see Haklay 2010) Areas of rapid change or under crisis get mapped (see Bittner et al. 2013; Zook et al. 2010; Burns 2014) on emergency/crisis mapping.

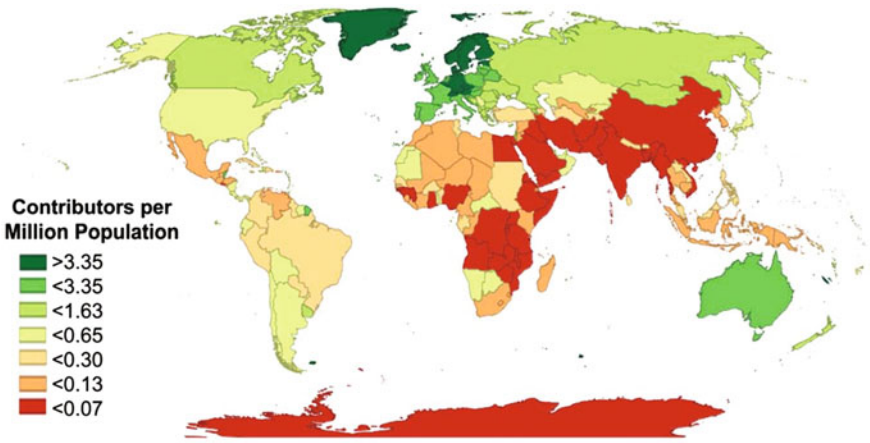

Fig. 2 Distribution of active OSM contributors per day and per population (1 August–31 October 2013) (*Source* Neils and Zielstra 2014)

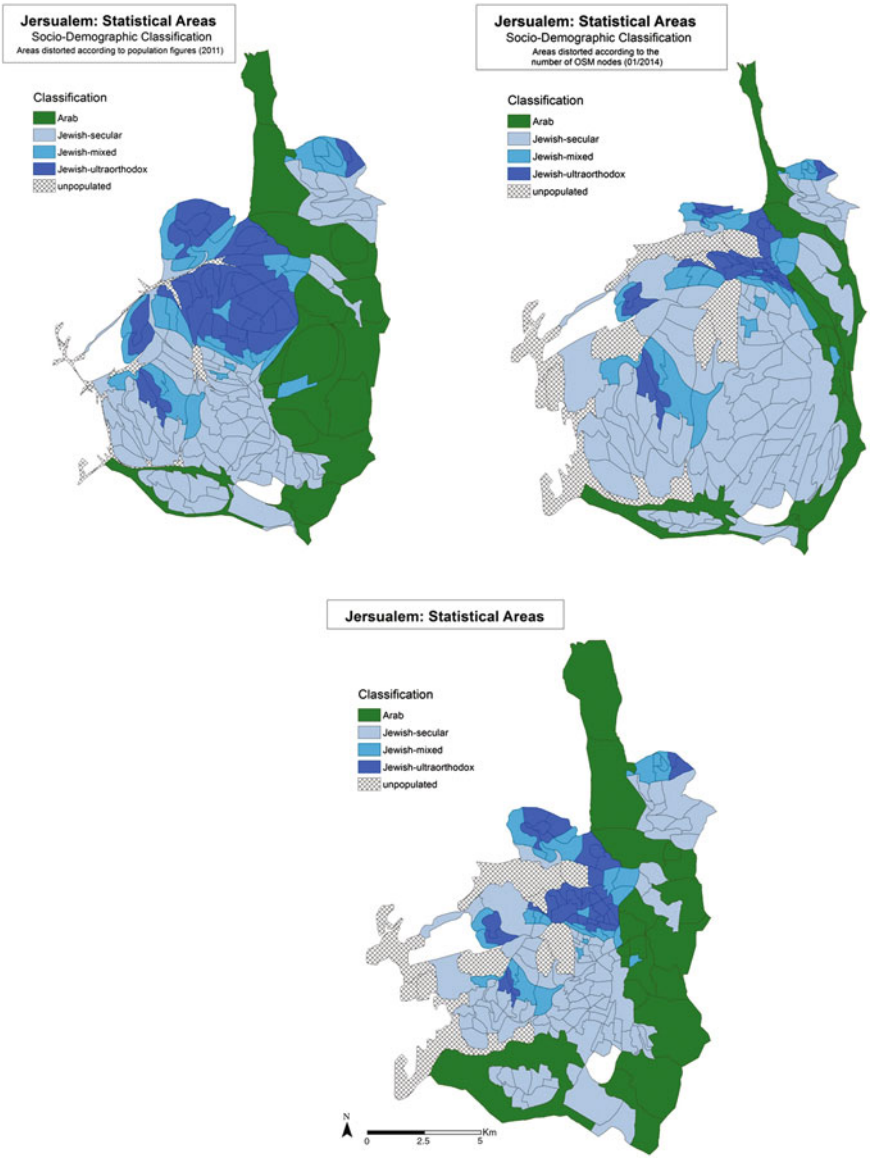

Fig. 3 Data density of OSM within different quarters of Jerusalem compared to demographic data (*Source* Bittner 2014)

Many of the mappers that stay with the project have specific technical skills. The majority of participants drift out of OSM instead of continuing to map. So, instead of becoming a genuine peoples' map it has been argued that the project represents a new kind of expert knowledge (Perkins 2013).

4.2 Algorithms and Other Blackboxes: Unpacking the Technical Infrastructure of OSM

The infrastructure of OSM is of central influence for the performance and development of OSM. Dodge et al. (2009b) use the term to highlight the role played by underlying social foundations: the often unseen and taken for granted structures through which work is done. They observe that "critical studies of infrastructures are made more difficult because of the ways in which institutions deliberately structure them as 'black-boxed' systems to keep people from easily observing (and questioning) their design and operational logic" (ibid: 227).

People interacting with OSM infrastructures mostly do so via interfaces. "Interfaces en-frame and exclude, working as mediating windows onto the world" (Dodge et al. 2009b, p. 222) They deliver different mapping functionalities. These screen spaces usually hide the apparatuses and processes through which online navigation takes place. Their layered potential confers a navigational logic that is usually unquestioned by users (Verhoeff 2012). The default OSM interface strongly impacts on affordances.

The operation of OSM depends upon the operation of algorithms and code that come together to make the map and its interfaces possible. Algorithms are hidden and often inaccessible in geoinformation and mapping systems. Although OSM makes its API freely available and the OSM wikis help to access algorithms as well as codes and, last but not least, the codes underpinning OSM are there to be shared or changed by community members, the required technical expertise limits the ability to change and redirect the algorithms and codes of OSM to a small but influential group of people [see the discussion on levels of hacking in Haklay (2013)]. Here we highlight three examples of code and draw out some of the ways in which they impact mapping practice.

Firstly, the project rests upon editing software, which allows users to amend or extend mapping coverage. Editing software suggests classifications of the world to users, implicitly encouraging "things" that might be included into the OSM database or excluded. Its form and configuration arguably influences whether a user actually changes the database and channels day-to-day mapping practices (Weber and Jones 2011).

Secondly, rendering software allows features tagged in the database to be symbolized. It structures the world, leaving many tags un-rendered, and through a visual display enables or disables different uses and evokes different feelings for the map. Chilton (2011) documents the development of the default and widely praised Mapnik style, showing how a meeting between a single coder, two cartographers, and the project founder led to a style that has impacted beyond OSM and which incorporated subsequent community enhancement of the data.

Thirdly, software to check the "quality" of the database has also proliferated as the project matures (see the Wiki-page: http://wiki.openstreetmap.org/wiki/Quality_Assurance). This tends to focus attention upon coverage and standardization, by highlighting inconsistencies and directing attention to "faults" that might be rectified in the database and thus risks blocking from view more fundamental questions.

4.3 Governance of OSM: Doocracy—Meritocracy—Technocracy—Bureaucracy

It is difficult to specify who actually 'runs' OSM. Ramm (2013) examined the question of "who the boss of the project actually is", and rejected any simple answer. However, a rich documentation of infrastructure exists on the OSM wiki, and is also described by Eckert (2010). The project employs no staff. It is answerable to the OSM Foundation, which currently has 480 members: anyone can pay to join this group, which is "dedicated to encouraging the growth, development and distribution of free geospatial data and to providing geospatial data for anybody to use and share" (OpenStreetMap Foundation 2013). Foundation members elect a Board that currently includes six members. There are also eight Working Groups focusing upon: communications, data, licensing, operations, local chapters, engineering, the State of the Map Conference, and strategy. A management team implements day-to-day decisions.

In addition, OSMappers come together in various State of the Map conferences and in Mapping Parties. Their ideas for project trajectories are played out online in blogs and user diaries and in the project wiki, and ideas are debated in numerous discussion lists. Spinoff consultancies progress the project whilst also deriving profit from the crowd.

The implicit ethos of OSM is frequently described as open, democratic, and anti-establishment. In practice, however, new mappers are encouraged to follow established ways of doing the project. Ways of doing OSM impact significantly on progress, and whilst the culture of OSM delivers what has been described as a 'do-ocracy' (see for, example, Perkins 2013), in practice the project works as a mixture of a do-ocracy, meritocracy, technocracy, and bureaucracy (see Fig. 4). The governance is meritocratic in the sense that voluntary work is rewarded by community esteem, or by external financial reward. It is technocratic in the sense that technical coding skills are most valued. These skills fix and "blackbox" classifications and practices in editing and rendering software and strongly influence the development of the project. The bureaucratic aspect of governing is less significant in OSM—compared, for example, with Wikipedia (see Ramm 2012 and several contributions in Lovink and Tkacz 2011). The OSM Foundation tends to enable rather than steer and the OSM community itself has few formalized organizational structures; there is no official and formalized hierarchy of users as, for example, in Wikipedia. There are some mechanisms for building a consensual view, with procedures for voting about the creation of new tags, for example. In comparison to Wikipedia, however, these mechanisms are much less formalized and used.

As in all collaborative projects "edit wars" can take place. For example, in contentious areas such as Cyprus, Jerusalem, or Crimea different place names and borderlines have been recorded, and overwritten.[1] It is, however, interesting that in

[1] http://wiki.openstreetmap.org/wiki/Data_working_group/Disputes (23.07.2014).

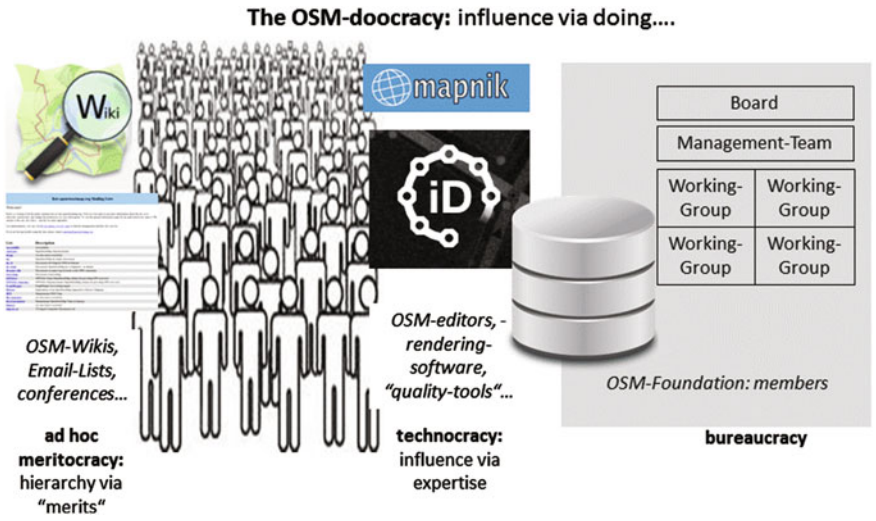

Fig. 4 Governance of OSM [based on an idea of Ramm (2013), supplemented and changed by Glasze/Perkins]

contrast to text-based open projects, such as Wikipedia, there seems to be much less interaction between different editors (Mooney and Corcoran 2013) and much less controversy over the status of objects (Wroclawski 2014). This may be attributed to the ethos of an "on the ground truth" with the basic idea of OSM representing an objectively verifiable, and knowable world.

So falsifying is strongly discouraged. Vandalism, whether for artistic or commercial purposes, is carefully policed (see Ballatore 2014).

5 Methods: Analyzing OSM

A shift towards a research focusing on social and political dimension as highlighted in our introduction has clear methodological implications. Dodge et al. (2009a) suggested that approaches drawn from Actor-Network Theory, Science and Technology Studies (STS), ethno-methodology, and non-progressive genealogy might usefully be adopted to advance our explanations of these social and political dimensions of geoinformation and cartography.

5.1 Data-Driven Research on OSM

Almost all the research on OSM reported in the meta study carried out by Neis and Zielstra (2014) deploys data-driven tools to answer practical questions about OSM.

The remit and format of the project delivers data to the research community in a much more transparent fashion than in other proprietary databases. "The crowd" leaves traces behind, that reveal things about mapping, in ways that are hidden in projects such as Google.

Neis and Zielstra (2014) highlight research into OSM that largely relies upon archived tracks and traces. This research predominantly adopts progressive scientific ways of knowing the world. Data quality analysis inevitably looms large in this field. Road networks have received significant attention and there has also been a focus on the quality of different points of interests (POIs) in the database. This kind of research inevitably compares OSM to other proprietary databases. Recent attention has also begun to focus on questions of trust and vandalism, but again largely as practical measures to investigate quality.

A second trend has been an increase in the amount of research investigating contributors, in terms of temporal trends, areal distribution, and gender balance. Methodologies deployed to chart differences depend upon large-scale generalization from big data sets, instead of detailed processual investigation of individual and qualitative data. Haklay's (2010) influential investigation of the social composition of the database is typical and foundational here. Neis and Zielstra (2014) also designate a final category of research, focusing upon other work, that does not fit into quality evaluation or participation studies, and highlight work on routing packages, 3D mapping, and application areas relating to access mapping and disaster management.

The implication from this meta-study is that the shift towards a crowd-sourced model has not so far encouraged the kinds of methodological shifts signaled by Dodge et al. (2009a). However, a careful analysis of the published literature reveals work that is beginning to approach OSM in different ways, and focusing in particular on ethnographic work on mapping practices, and on the application of multiple methods to case evidence.

5.2 Ethnography and Auto-ethnography

There has also been an increasing interest in using anthropological approaches to mapping, and in phenomenological ways of understanding mapping practice. Long-established ethno-methodological tools have begun to be applied to people deploying OSM in real-world contexts, to code up apparently banal day-to-day mapping. This kind of focus on everyday politics with a small 'p' underpins for example Hind's (forthcoming) work on OSM and protest mapping. Other ethnographic work has been carried out in spaces where OSM has been deployed, and explicitly stresses the performativity of mapping, instead of any inherent meaning [see, for example, Gerlach (2014) on everyday mapping practices]. Kitchin and Dodge (2013) draw upon these kinds of ideas in their analysis of OSM as emergent processual knowledge. Other examples of research also focus on the contexts in which the map is situated. For example, Lin (2011) attended State of the Map

Conferences in order to understand and explain how open source communities function. Perkins (2013) reports on various spaces where OSM is deployed, highlighting the differences that emerge according to sociality, and Perkins and Dodge (2008) report an ethnography of an early Mapping Party.

5.3 The Need for Mixed Methods Approaches

Different insights flow from direct participation in an event, to those that can be inferred from quantitative analysis. For example, Hristova et al. (2013) also focus on mapping parties, but deploy data sourced from the OSM web site to explore the effectiveness of the party as a device for encouraging participation. By way of contrast, Budhathoki and Haythornthwaite (2013) rely upon questionnaires in their analysis of motivations of individual OSM participants, but neither of these sources provides case evidence about cultural practice.

In the first decade of the new millennium, scholars concerned with critical approaches to GIS and the Geoweb increasingly came to realize that a mixture of qualitative and quantitative evidence can be important and can document general patterns as well as individual processes (see Kwan and Schwanen 2009). Projects like OSM offer huge potential for such mixed methods approaches (see Elwood 2010b; Elwood et al. 2013; DeLyser and Sui 2012; Crampton et al. 2013). In OSM all edits in the database and the wiki, and all discussion in the email-lists are recorded and can be traced back to individual participants.[2] This enables analysis of mapping practices and collaboration within the community (see, for example, Kremer and Stein 2014; Elrick 2014). OSM databases make it easy to combine quantitative approaches with qualitative interviews (see, for example, Bittner 2014). Individual tracks can be documented and the history of the unfolding map can be unpacked. Big data can actually greatly facilitate critical multi-method approaches to the project.

6 Maps and Mosques: A Case Study on the Transformation of Techniques, Practices, and Conventions Within OSM

The tension between openness and fixation revealed in OSM practices will be exemplified by a short case study on the depiction and non-depiction of mosques in OSM.

[2] See for example the "How Did You Contribute to OpenStreetMap tool" available at http://hdyc.neis-one.org/ deploys charting and tabulation and mapping to document individual user name participation in the project, and the user diaries attached to the site.

6.1 Concealed Mosques in State-Based Cartography

In the late 1980s, Brian Harley charted what he described as silences, highlighting many of the social reasons why maps omit, simplify, and homogenies landscapes (Harley 1988). The social context of map making establishes accepted ways of fixing what is included or left out (Harley 1989). A striking example of such impacts is how maps choose to depict and include (or not include) places of worships (Glasze 2009). A quick overview of the topographic maps currently produced by state-run cartographic organizations in France, Germany, and the United Kingdom reveals, for example, that none of the topographic map-styles offers a symbol for mosques. However, all of these topographic maps include symbols for "places of worship", and in the whole of Western Europe the iconography of a Christian tradition is deployed for these sites (Kent and Vujakovic 2009). The religious tradition in Western Europe normalizes current cultural diversity, and mapping styles respond only very slowly to social and cultural change, leading to an effective cartographic concealment of mosques (see the example of a cartographically concealed purpose-built mosque in Mannheim, Germany; Fig. 5).

Fig. 5 The Yavuz Sultan Selim Mosque and the Liebfrauenkirche in Mannheim (Germany) as (not) shown in the official topographic map, in Google Streetview and in different OSM rendering styles (*Sources* Landesamt für Vermessung Baden Württemberg; Google, OSMcontributors/Geofabrik)

The interesting question is whether this silencing of Muslim sites of worship continues in the crowdsourced world of VGI—and whether the possibilities of OpenStreetMap enable new mapping moments.

6.2 Newly Open but Fixed Practices in OSM

OSM's database structure enables some practices, and limits others. Open questions and conflicts are discussed within the community; results of such discussions are codified in the OSM Wiki. With the success of the project more and more applications interpret and use OSM data (e.g. software for rendering and for routing), other applications try to facilitate and analyze mapping practices (e.g. software for editing and analyzing OSM data). As an inevitable consequence, OSM mapping practices become conventionalized and fixed.

In order to understand these processes and moments we take the example of "mapping Mosques" and highlight four themes that contribute to openness or fixation.

6.2.1 Data Structure and the Wiki

The OSM Wiki suggests tagging "places of worship" in the database as nodes with the amenity value "place of worship", and to further differentiate "religion" and "denomination". The respective Wiki-page was set up as early as in 2007 by one of the key figures in the OSM community (Fig. 6).

Since 2008, there have been distinct Wiki pages to explain "religion" and "denomination", which recommend increasingly detailed categorization of religions and religious denominations. However, these lists are not the only way to classify religious affiliations.[3] There have been lively discussions in the OSM community on the attribution, acceptance, and integration of different categories.[4] While the majority of the tag values follow the categorization suggested in the Wiki, the OSM database (still) includes other tags. The wiki offers guidance, but ethnographic work suggests practice by individual mappers does not always follow these procedures (Perkins 2014).

[3] As an example the Wiki suggests to classify "druse" as a denomination of "religion = muslim"—a classification which is contested for example by many Druze living in Israel who see themselves not as Muslims but as a proper religious group.

[4] See for example the broad discussion on places of worship in OSM triggered by the debate on the Pastafarians (https://lists.openstreetmap.org/pipermail/talk/2010-January/046620.html; 10.07.2014).

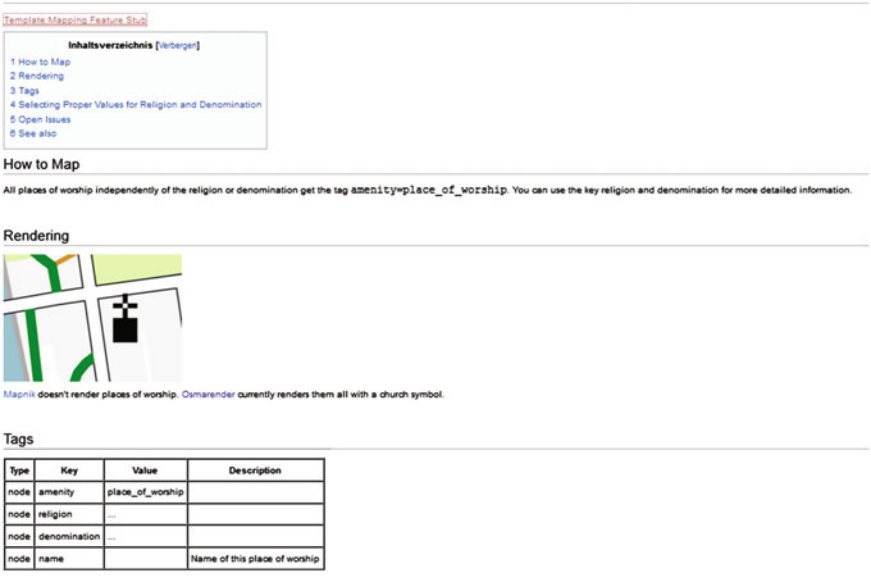

Fig. 6 First version of the OSM Wiki on places of worship in 2007 (*Source* OSM Wiki; 20.07.2014)

6.2.2 Rendering and Editing Software

The OSM database becomes "visible" in cartographic presentations through rendering software. There have been discussions in the OSM community since 2007 regarding appropriate rendering of places of worship and the respective symbology. Until 2007/2008 the most important renderers (OSMarender and Mapnik) translated all places of worship as a cross, which triggered several critical statements in the OSM discussion lists—especially with regard to the rendering of mosques with a cross.[5] As a direct reaction to this discussion one of the central actors of the British OSM community added specific symbols for religion = muslim, = jewish and = sikh to the current default renderer Mapnik in 2008. New symbols have been suggested since, for example for Buddhist or Hindu places of worship, but these have not been integrated into the rendering software (see Fig. 7).

Most OSM mappers do not deal directly with the database, but use editing software. The classifications offered by these tools are often not completely in accordance with the categorizations in the Wiki, and largely structure mapping practices, which gives developers of successful editors enormous influence (see the classifications proposed by the new ID editor, Fig. 8).

[5] See for example: http://gis.19327.n5.nabble.com/Rendering-places-of-worship-in-Mapnik-td5379077.html (10.07.2010).

Religion	proposed rendering	current rendering
religion=animist		
religion=bahai (Baha'i)		
religion=buddhist		
religion=christian		
religion=hindu		
religion=IglesiaNiCristo		
religion=jain		
religion=jewish		
religion=multifaith		
religion=muslim		
religion=pagan		
religion=pastafarian		
religion=scientologist		
religion=shinto		
religion=sikh		
religion=spiritualist		
religion=taoist		
religion=unitarian		
religion=yazidi		
religion=zoroastrian		
default symbol		

Fig. 7 OSM Wiki on key-religion (http://wiki.openstreetmap.org/wiki/Key:religion; 16.07.2014)

6.2.3 Community Practices

A case study of places of worship within OSM for the federal state of Bavaria reveals that OSM contains several non-Christian places of worship (see Fig. 9)—in contrast to the official governmental geodatabase, which lists only Christian places of worship.

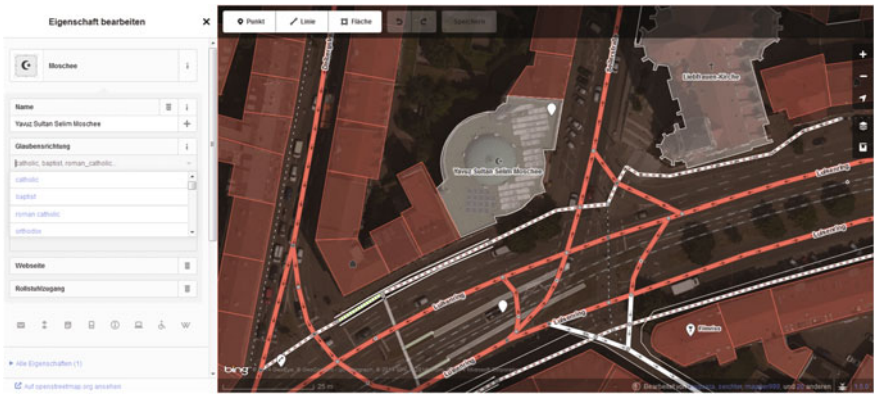

Fig. 8 Online editing of OSM

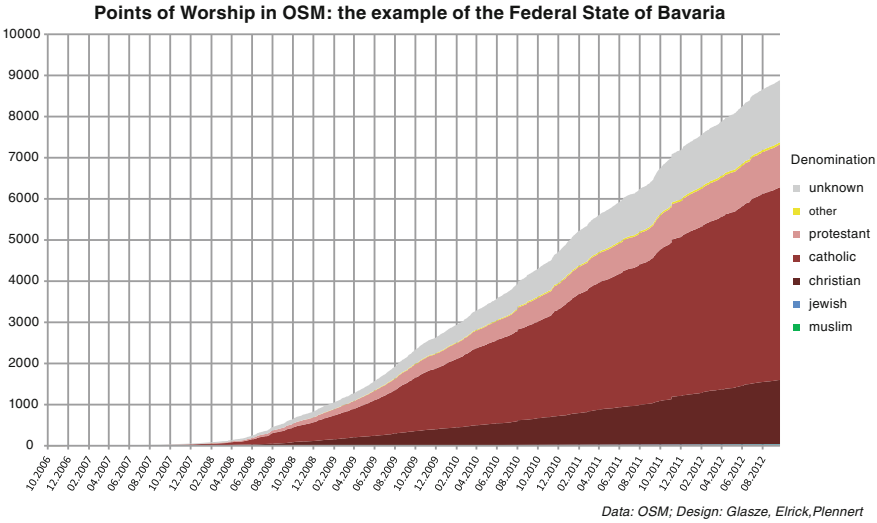

Fig. 9 Places of worship in Bavaria in the OSM database until 12/2012

A more detailed look at OSM data in Nuremberg reveals that by the end of 2012 the OSM database contained almost as many Christian places of worship as the governmental geodatabase[6], as well as two mosques. However, the German map mashup "Moscheesuche" (an application intended to help practicing Muslims to find mosques) listed 10 mosques in Nuremberg. There appears to be systematic

[6] The governmental database contains 124 places of worship—all Christian. OSM contains 119, the biggest part with 106 being qualified as Christian (mostly protestant and catholic), 8 unknown, 2 other, 2 Muslim, and 1 Jewish.

under-representation of mosques in the database: smaller and non-purpose-built mosques are often missing. The classification systems in the Wiki, the rendering and editing software each support inclusion of Muslim sites, so the difference stems from everyday mapping practices and cultural preferences of OSM mappers.

Mosques can be contentious features in Western European urban life (e.g. Schmitt 2004). They are frequently opposed by Islamophobic and right-wing groups who exploit "Not in My Backyard"-like opposition to projects. Many of the mosques that appear in the "Moschee Suche" are visually less prominent than huge recently constructed, purpose-built central mosques. They may share functions with other elements of Islamic life that fit uneasily into OSM classifications, such as Cultural Centers or Madrassars. They are also often transitory, occupying temporary spaces converted from buildings with a previously secular function and have been designated "backyard mosques". These sites play an important role in the life of the faith community, but may be less significant to mappers who tend to tag prominent POIs or follow up the detail of something that is of direct relevance to their interests. We might further speculate that in Western Europe few members of the Islamic faith community are actively involved with OSM.

6.2.4 New Openings and Fixations

Our example shows that OSM offers openings and fixations. There are certainly new voices being articulated in the project, with evidence of open and transparent discussions, and rapid and self-evident change in the urban fabric gets mapped by the grass roots OSM community. Places of worship are separated out in feature classifications and symbolic rendering attached to buildings offers a more timely and appropriate depiction of these sites than that still delivered by official state mapping.

However, the case also reveals newly fixed codification in the wiki, and standardization in editing and rendering software, as well as cultural biases of the OSM community. The "on the ground" mapping rule[7] tends to emphasize physical structures, and under-represents practices of faith communities using mosques. This leads to a reproduction of traditional cartographic patterns—favoring concrete and other physical structures over use and meaning. As a consequence, less prominent "backyard mosques" quite often still wait to be integrated into the OSM database.[8] Last but not least, mapping practices are heavily influenced by personal preferences, knowledge, and habits—leading in the case study on Nuremberg to an under-representation of mosques in OSM, compared to Christian places of worship.

[7] See: http://wiki.openstreetmap.org/wiki/Map_Features (20.07.2014).

[8] The tagging structure with its separation of use (e.g. amenity = place of worship > religion = *) and building = * in principle enables the separation of use and physical structure and thus is more sophisticated than many tagging schemes in state-based topographic cartography.

7 Conclusions

This chapter offers a critical angle supplementing other work in this volume. It argues that mapping is a socio-technical practice—a socio-technical practice which is embedded in specific and often unequal socio-spatial structures, and which runs the risk of reproducing old and producing new inequalities. These social and also political dimensions of mapping need to be studied in novel ways. We have suggested a research agenda that addresses these concerns by focusing on aspects of the mapping modes through which OSM is practiced, highlighting the importance of authorship, technical infrastructure, and governance. Methods for analyzing these modes have so far largely relied upon quantitative analysis of data relating to the project. We suggest that research might profitably deploy more mixed approaches to data, incorporating case evidence into analyses, and also placing a greater emphasis on ethnographic studies of mapping practice. We illustrate the potential of this agenda with a limited case study of the mapping of mosques and suggest that this broadening of research interests might help OpenStreetMap to deliver the promise offered in its free and open ethos.

References

Ballatore A (2014) Defacing the map: cartographic vandalism in the digital commons. Cartographic J 5:1–24

Bittner C (2014) Reproduktion sozialräumlicher Differenzierungen in OpenStreetMap: das Beispiel Jerusalems. Kartographische Nachrichten 64(3):136–144

Bittner C, Glasze G, Turk C (2013) Tracing contingencies: analyzing the political in assemblages of web 2.0 cartographies. GeoJournal 78:935–948. doi:10.1007/s10708-013-9488-8

Budhathoki N (2010) Participant's motivations to contribute geographic information in an online community. Dissertation, University of Illinois at Urbana-Champaign

Budhathoki NR, Haythornthwaite C (2013) Motivation for open collaboration crowd and community models and the case of OpenStreetMap. Am Behav Sci 57(5):548–575

Burns R (2014) Moments of closure in the knowledge politics of digital humanitarianism. Geoforum 53:51–62. doi:10.1016/j.geoforum.2014.02.002

Caquard S (2014) Cartography II: collective cartographies in the social media era. Prog Hum Geogr 38(1):141–150. doi:10.1177/0309132513514005

Chilton S (2011) OS and OpenStreetMap. Sheetlines 91:20–27

Crampton JW, Graham M, Poorthuis A, Shelton T, Stephens M, Wilson MW, Zook M (2013) Beyond the geotag: situating 'big data' and leveraging the potential of the geoweb. Cartography Geogr Inf Sci 40(2):130–139

Dalton CM (2013) Sovereigns, Spooks, and Hackers: an early history of google geo services and map mashups. Cartographica Int J Geogr Inf Geovisualization 48(4):261–274. doi:10.3138/carto.48.4.1621

DeLyser D, Sui D (2012) Crossing the qualitative-quantitative chasm I: hybrid geographies, the spatial turn, and volunteered geographic information (VGI). Prog Hum Geogr 36(1):111–124

Dodge M, Kitchin R (2013) Crowdsourced cartography: mapping experience and knowledge. Environ Plann A 45(1):19–36. doi:10.1068/a44484

Dodge M, Kitchin R, Perkins C (eds) (2009a) Rethinking maps. New frontiers in cartographic theory. Routledge, London

Dodge M, Perkins C, Kitchin R (2009b) Mapping modes, methods and moments: a manifesto for map studies. In: Dodge M, Kitchin R, Perkins C (eds) Rethinking maps. New frontiers in cartographic theory. Routledge, London, pp 311–341
Eckert J (2010) Tropes 2.0: mobilization in OpenStreet-Map. Unpublished Master thesis, University of Washington
Edney MH (1993) Cartography without progress: reinterpreting the nature and historical development of mapmaking. Cartographica Int J Geogr Inf Geovisualization 30(2):54–68. doi:10.3138/D13V-8318-8632-18K6
Elrick T (2014) Sozialwissenschaftliche tag-Analyse mit OpenStreetMap-Daten am Beispiel religiöser Andachtsstätten in Deutschland. Kartographische Nachrichten 64(3):152–156
Elwood S (2010a) Geographic information science: emerging research on the societal implications of the geospatial web. Prog Hum Geogr 34(3):349–357
Elwood S (2010b) Mixed methods: thinking, doing, and asking in multiple ways. In: DeLyser D (ed) The SAGE handbook of qualitative geography. ausgewählte Kapitel, Sage, Los Angeles pp 94–113
Elwood S (2011) Geographic information science: visualization, visual methods, and the geoweb. Prog Hum Geogr 35(3):401–408. doi:10.1177/0309132510374250
Elwood S, Leszczynski A (2012) New spatial media, new knowledge politics. Trans Inst British Geogr. doi:10.1111/j.1475-5661.2012.00543.x
Elwood S, Goodchild MF, Sui D (2013) Prospects for VGI research and the emerging fourth paradigm. In: Sui D, Elwood S, Goodchild MF (eds) Crowdsourcing geographic knowledge. Volunteered geographic information (VGI) in theory and practice. Springer, New York, pp 361–375
Gerlach J (2014) Lines, contours and legends: coordinates for vernacular mapping. Prog Hum Geogr 38(1):22–39
Glasze G (2009) Kritische Kartographie. Geographische Zeitschrift 97(4):181–191
Glasze G (2014) Sozialwissenschaftliche Kartographie-. GIS- und Geoweb-Forschung. Kartographische Nachrichten 64(3):123–129
Goodchild MF (2007) Citizens as sensors: the world of volunteered geography. GeoJournal 69:211–221
Goodchild M (2009) First law of geography. In: Kitchin R, Thrift N (eds) International encyclopedia of human geography. Elsevier, Oxford
Graham M (2009) Neogeography and the palimpsests of place: web 2.0 and the construction of a virtual earth. Tijdschrift voor Economische en Sociale Geografie, pp 1–15 (online)
Haklay M (2010) How good is volunteered geographical information? a comparative study of OpenStreetMap and ordnance survey datasets. Env Plann B 37(4):682–703
Haklay M (2013) Neogeography and the delusion of democratisation. Env Plann A 45(1):55–69. doi:10.1068/a45184
Haklay M, Singleton A, Parker C (2008) Web mapping 2.0: the neogeography of the GeoWeb. Geogr Compass 2(6):2011–2039
Harley JB (1988) Maps, knowledge and power. In: Cosgrove D, Daniels S (eds) The iconography of landscape: essays on the symbolic representation, design and use of past environments, vol 9. Cambridge University Press, Cambridge, pp 277–312
Harley JB (1989) Deconstructing the map. Cartographica 26(2):1–20
Harris LM, Harrower M (2006) Introduction. Critical interventions and lingering concerns: critical cartography/GISci, social theory, and alternative possible futures. ACME Int E-Journal Crit Geographies 4(1):1–10
Harvey F, Kwan M, Pavlovskaya M (2005) Introduction: critical GIS. Cartographica 40(4):1–3
Hristova D, Quattrone G, Mashhadi A, Capra L (2013) The life of the party: impact of social mapping on OpenStreetMap. In: Proceedings of the AAAI international conference on weblogs and social media
Kent AJ, Vujakovic P (2009) Stylistic diversity in European State 1:50,000 topographic maps. Geogr J 46(3):179–213

Kremer D, Stein K (2014) Ein Analyseansatz für Nutzerverhalten auf Basis von OSM-Daten. User analysis methods for OSM. Kartographische Nachrichten 64(3):144–152
Kwan M, Schwanen T (2009) Quantitative revolution 2: the critical (Re)turn. Prof Geogr 61 (3):284–291
Latour B (1986) The powers of association. In: Law J (ed) Power, action and belief. A new sociology of knowledge?. Routledge and Kegan Paul, Boston, pp 264–280
Leszczynski A, Elwood S (2014) Feminist geographies of new spatial media. Can Geogr, pp 1–17. doi: 10.1111/cag.12093
Lin YW (2011) A qualitative enquiry into OpenStreetMap making. New Rev Hypermedia Multimedia 17(1):53–71
Lovink G, Tkacz N (eds) (2011) A wikipedia reader critical point of view INC reader, vol 7. Institute of Network Cultures, Amsterdam
Mooney P, Corcoran P (2013) Analysis of interaction and co-editing patterns amongst OpenStreetMap contributors. Trans GIS:n/a. doi:10.1111/tgis.12051
Neis P, Zielstra D (2014) Recent developments and future trends in volunteered geographic information research: the case of OpenStreetMap. Future Internet 6(1):76–106. doi:10.3390/fi6010076
Neis P, Zipf A (2012) Analyzing the contributor activity of a volunteered geographic information project—the case of OpenStreetMap. IJGI 1(2):146–165. doi:10.3390/ijgi1020146
O'Reilly T (2005) What is web 2.0. http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
OpenStreetMap Foundation (2013) OpenStreetMap foundation 2011. http://www.osmfoundation.org/wiki/Main_Page
O'Sullivan D (2006) Geographical information science: critical GIS. Prog Hum Geogr 30(6): 783–791
Pavlovskaya M (2006) Theorizing with GIS: a tool for critical geographies? Env Plann A 38 (11):2003–2020
Perkins C (2013) Plotting practices and politics: (im)mutable narratives in OpenStreetMap. Trans Inst Br Geogr:n/a. doi:10.1111/tran.12022
Perkins C (2014) Plotting practices and politics: (im)mutable narratives in OpenStreetMap. Trans Inst Br Geogr 39(2):304–317. doi:10.1111/tran.12022
Perkins C, Dodge M (2008) The potential of user-generated cartography: a case study of the OpenStreetMap project and mapchester mapping party. NW Geogr 8(1):19–32
Pickles J (1992) Texts, hermeneutics and propaganda maps. In: Barnes TJ, Duncan J (eds) Writing worlds discourse. Text and metaphor in the representation of landscape. Routledge, London, pp 193–230
Pickles J (1995) Ground truth: the social implications of geographic information systems, mappings, vol 1. Guilford, New York
Pickles J (2004) A history of spaces: cartographic reason, mapping, and the geo-coded world. Routledge, London
Ramm F (2012) What we can learn from wikipedia. http://osm.gryph.de/2012/04/learn-from-wikipedia/#more-95
Ramm F (2013) Wer ist der Boss bei OpenStreetMap? http://wiki.openstreetmap.org/wiki/FOSSGIS_2013/Videomitschnitte
Ramm F, Topf J (2010) Open Street Map. Die freie Weltkarte nutzen und mitgestalten, 3rd edn. Lehmanns Media, Berlin
Schmitt T (2004) Religion, Raum und Konflikt. Lokale Konflikte um Moscheen in Deutschland. Das Beispiel Duisburg. Berichte zur deutschen Landeskunde 78(2):193–212
Schuurman N (2000) Trouble in the heartland: GIS and its critics in the 1990s. Prog Hum Geogr 24(4):569–590
Schuurman N (2009) Critical GIS. In: Kitchin R, Thrift N (eds) International encyclopedia of humang geography, vol 2. Elsevier, Oxford, pp 363–368
Steinmann R, Häusler E, Klettner S, Schmidt M, Lin Y (2013) Gender dimensions in UGC and VGI—a desk-based study. AGIT 2013, Salzburg

Stephens M (2013) Gender and the GeoWeb: divisions in the production of user-generated cartographic information. GeoJournal 78(6):981–996. doi:10.1007/s10708-013-9492-z

Verhoeff N (2012) Mobile screens. The visual regime of navigation. Amsterdam University Press, Amsterdam

Weber P, Jones CE (2011) Usability of editors: what to improve. In: Schmidt M, Gartner G (eds) Proceedings of the 1st European state of the map conference, Wien, pp 14–33

Wroclawski (2014) Edit wars in OpenStreetMap. http://blog.emacsen.net/blog/2014/01/17/edit-wars-in-openstreetmap/ 23 July 2014

Zook MA, Graham M, Shelton T, Gorman S (2010) Volunteered geographic information and crowdsourcing disaster relief: a case study of the Haitian Earthquake. World Med Health Policy 2(2):7. doi:10.2202/1948-4682.1069