



# De/colonizing OpenStreetMap? Local mappers, humanitarian and commercial actors and the changing modes of collaborative mapping

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**Abstract** In its early days, the geodata and mapping project OpenStreetMap (OSM) was widely celebrated for opening up and “democratizing” the production of geographic knowledge. However, critical research highlights that the new socio-technical practices of collaborative mapping often also produce or reproduce patterns of exclusion, not least in the area of relative data density between the Global South and North. These findings notwithstanding, we consider it important to acknowledge the increasing number of contributions of geodata from regions outside the old European core of OSM. This expansion of geodata production in OSM is related to a diversification of OSM actors and socio-technical practices. While OSM has often been described as a crowd-based project bringing together thousands of individual craft mappers, our analysis of OSM metadata indicates new institutional actors are gaining relevance. These developments have not only resulted in new collaborations but also conflicts between local mapping communities and institutional actors. We interpret these processes in two ways. First, the expansion of mapping activities can be viewed as a *decolonizing*

process, whereby quantitative differences in data density between the Global North and South are partly reduced and new groups of local mappers are empowered to produce geographic knowledge. Second, these new developments can also be understood as *colonizing* processes. The engagement of large commercial actors in OSM raises concerns that the project (and its local mappers) could be used as a new means of data extraction and that in particular new and diverse voices in the OSM community are marginalized by a fixation on economically exploitable, modernistic and universalistic epistemologies. However, this supposedly clear distinction should not obscure the fact that colonizing and decolonizing processes intertwine in complex ways.

**Keywords** Critical cartography · OpenStreetMap · Volunteered geographic information · Local knowledge · Geoweb · Data extractivism · Digital commons

**Introduction: “...in addition to privileged OSMers, there are others!”**

Late 2020 saw the proposed election of new members to the Foundation Board of the OpenStreetMap Foundation, an international, London-based “not-for-profit organization supporting, but not controlling,

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the OpenStreetMap (OSM) Project”. OSM is by far the most successful and extensive geodata and mapping project whose content is drawn from “volunteered geographic information” (VGI): between 5000 and 6000 users contribute to this global geographic database every day, forming the basis for the most extensive open-access global map to date. The OSM Foundation, established in 2006, defines its mission as “encouraging the growth, development and distribution of free geospatial data and [...] providing geospatial data for anyone to use and share” (OSM Foundation, 2020). For a long period, a general perception reigned of the Foundation’s work as centered on providing largely low-conflict technical and organizational support to OpenStreetMap; the 2020 election, however, revealed conflicts around which actors and which groups should be represented in the OpenStreetMap Foundation. One controversy revolved around the absence of voices from the Global South; several candidates positioned themselves as representing previously marginalized groups and places in OSM (see for example the citation in the headline from a Tweet of a Philippine based group called “Geoladies” (Geoladies, 2020) supporting a candidate who did present himself as representing communities from the Global South). Debates also emerged around the role (employees of) major tech companies should or should not play in OSM; as one candidate put it in during the election process: “My candidacy for the board is explicitly driven by a desire to see commercial and organizational use of OSM better represented in the OSM Foundation” (OSM talk, 2020).

This paper will argue that these struggles point toward conflicts around the current state and future of OSM and the production of geographic knowledge, and the roles of various actors therein. As well as providing background to these controversies, we will situate them within wider debates about inequalities in the production of geographic knowledge in OSM and within the critical work that has pointed to the social, political and economic dimensions of VGI; in this way, we propose to add to the discussion around the political economy of VGI and the geoweb (Leszczynski, 2012). Our principal focus in so doing is on the role of new and emerging commercial actors in OSM and of more recently formed local mapping communities from regions beyond the old Western European core of OSM contributors.

The emergence of new practices and techniques of map-making and of the processing of geographic information since the turn of the millennium has been widely lauded as opening up and “democratizing” the production of geographic knowledge (Gartner, 2009; Perkins & Dodge, 2008). New technologies and socio-technical practices around the emerging mobile internet and web 2.0 technologies have received acclamation as having liberated maps and geographic information from the erstwhile exclusive dominions of professional cartographers and state institutions. VGI projects such as OpenStreetMap promised to include people, experiences and knowledge from much wider and more diverse backgrounds than before. It seemed as if the processes of exclusion which critical cartographers, geographers and critical scholars of GIS have deplored since the late 1980s might be on the way out, rendered ineffective and obsolete by new socio-technical practices.

It was, however, not long before critical geographers pointed out the flaws in these promises of opening and democratization in the production of geographic knowledge through VGI. Indeed, rather than leveling the playing field, the new socio-technical practices often appeared to reproduce existing states of exclusion and sometimes to create new exclusivities. Numerous studies have demonstrated the persistence of inequalities in the production and distribution of and access to geographic data and information. Thus—very much like the debates around GIS and society since the late 1980s—there is a tension between moments of opening and closure.

The conflict around the OSM Foundation Board referenced at the outset of this paper calls for an exploration of the structural changes behind it and of the extent to which the debate might point toward new modes of knowledge production in OSM. After reviewing the current state of research on inequalities in knowledge production in OSM, we show that in recent years the production of geodata in OSM has become more dynamic, also in many previously underrepresented regions in the Global South. However, this development is not driven by local mapping communities alone; rather, institutional actors—both humanitarian organizations and commercial companies—play an important role. This changes the socioeconomic structures and actor constellations within OSM. On the basis of two brief episodes of interaction in Southeast Asia, we reconstruct

exemplarily which conflicts but also which collaborations can be observed between communities of local craft mappers and large economic and humanitarian actors. Finally, we ask how these changes in OSM can be interpreted and propose two ostensibly contradictory, but ultimately intertwined interpretations of the described processes.

### Geographic shifts in the production of geographic knowledge in OSM

#### Unequal geographies of knowledge production

Over the last 15 years, a wide range of research on VGI and its social and political implications has emerged from disciplines including geography, critical data studies, and cartography (Elwood, 2008, 2011; Goodchild, 2007; Sui et al., 2013; Turner, 2006). Critical scholars have denounced a simplistic “delusion of democratization” in “neogeography” (Haklay, 2013) and argued that this technocentric and apologetic literature drops behind from earlier discussions around participatory work in critical cartography and GIS that highlighted the contested and political nature of geographic information (Elwood, 2006; Verplanke et al., 2016).

In early work on unequal geographies of volunteered knowledge production in Wikipedia, for example, researchers showed that the most significant portion of geographic knowledge contained in this online encyclopedia was about places in Western Europe, with much less representation for the rest of the world (Graham et al., 2015). The work of Dittus and Graham highlighted both the overrepresentation of knowledge about places in Western Europe and, tellingly, the fact that knowledge production about places beyond the Global North is dominated by authors and languages from Europe and North America (Dittus & Graham, 2019).

This interest in unequal geographies inspired a broad range of research on OSM which cast light on inequalities in its production of geographic knowledge on the global (Glasze & Perkins, 2015; Graham & De Sabbata, 2015; Neis et al., 2013) and urban scale (Ballatore & De Sabbata, 2020; Bittner, 2014, 2017; Quattrone et al., 2014). Scholars also subjected the notion of participation and the concept of “the crowd” in OSM (Bittner et al., 2016; Neis & Zipf, 2012; Turk,

2020), alongside the gendered division of participation and representation therein (Gardner et al., 2019; Stephens, 2013), to critical examination. Recent years have seen calls for a more explicit policy of knowledge equity in OSM and a new decolonial sensitivity toward geospatial data (Dittus und Garcia, 2019). Taking this research as a starting point, we will proceed to interrogate the current OSM data and explore the changing landscape of the geographies it represents, arguing that, while inequalities remain, the geographies and social structures of knowledge production in OSM are changing in significant ways.

#### Method: metadata analysis of local mapping activities in OSM

Our research thus follows on from work that has found high levels of inequity in contributions to OSM but at the same time clearly remains sympathetic to OSM and its promises. Our first step in this context will be to work out whether and how the global geography of contributions to OSM has changed. A key point of interest here is the extent to which contributions are “local” and the places in which data is produced. Geospatial data in VGI projects often draws credibility from the assumption that, to a significant extent, it is local experts—that is, people “on the ground” that generate the geographic information (Barron et al., 2014). While OSM has a strong ethos of “local knowledge” and “ground truth”, the data itself has no clear geographic indicator for its place of origin. This means that, despite the broad acceptance of “localness” as a key characteristic of VGI’s quality, there is a tendency toward neglect of this factor in approaches to measuring that quality (for a review, see Senaratne et al., 2016). This circumstance notwithstanding, a number of authors have suggested ways of researching the localness of data production in OSM (Anderson, 2016; Napolitano & Mooney, 2012; Neis, 2013; Neis & Zipf, 2012; Quinn, 2016; Zielstra et al., 2014). We propose here to take up an argument presented by Neis and Zipf for an analysis of first changesets (Neis & Zipf, 2012), that is, the first edits a new user contributes to OSM. In their view, first changesets are indicative, perhaps not always of a user’s physical location, but at least of a sense of an attachment to a place, and thus might serve as indicators of localness of the produced geodata.

A user's addition of changes to the OSM database creates a changeset, via which a registered OSM member becomes an active one. A changeset contains all the edits from one editing session. More precisely, the changesets that were introduced to OSM in 2009 are all defined by a unique identification number, information on the user (username and user ID), the timeframe of the edits, and the spatial extent of the edits in the form of a bounding box. There exist some other commonly used tags for a changeset, which include for example information on satellite imagery used or the number of edits a user has made in this changeset (OSM Wiki, 2021a).

All changesets are retrievable via a changeset dump,<sup>1</sup> which is relatively easy to handle due to its manageable size. To locate a changeset, we used the centroid of its bounding box and determined its affiliation to a grid cell, using a global equal-area hexagonal grid to a scale of around 865 square kilometers per cell. We excluded all changesets with untypically large bounding boxes and very high numbers of edits from our analyses. When users make edits on OSM objects, such as the borders of a country, or make changes on objects from different parts of the world within one session, the bounding boxes they use may be bigger than the grid cells we later use in our analysis. Therefore, we excluded changesets of this type, likewise changesets by users who had more than 4000 edits in their first changesets, as it is likely that these changesets originated from bots or mass imports (Zielstra et al., 2014)<sup>2</sup>. The preprocessed dataset we used for our analysis consisted of approximately 84 million changesets from about 1.5 million unique users.

Analysis: OSM mapping becoming more global

Our analysis compares the number of centroids of first changesets per grid cell in four periods between 2009

and 2020. Comparison of these time periods reveals that, while Europe continues to dominate in terms of new contributions, emerging clusters of activity are forming in various regions of the world—not least in some regions in the Global South (Fig. 1). In the period 2009–2011, the focus of new contributions to OSM was clearly and predominantly in Europe; in the three subsequent timespans, by contrast, the geography of new contributions has become increasingly global. Initially, activities spread to other parts of the North, especially to North America; later, the spread extended to other world regions: New areas with a high density of first changesets have emerged, especially between 2015 and 2020, in parts of Southeast Asia, East and West Africa and South America (Fig. 1).

In a complementary analysis, we sought to identify the periods of highest activity in OSM per grid cell, meaning that a maximum number of created changesets was reached. This analysis enables us to pinpoint periods of particularly dynamic local activity in specific regions. The analysis showed that, in many regions in the Global South, the largest numbers of contributions to OSM took place in more recent periods, from 2015 onward. OSM appears to have evolved increasingly into a global project (Fig. 2).

The next section of this paper will explore the reasons for these changing patterns, demonstrating that, rather than being a representation exclusively of “trickle-down” or of a simple quantitative closing of gaps—as important as this is—the findings indicate that new forms of mapping are becoming more important in OSM. Our analysis suggests that, at least to some extent, it is not only individual, but also institutional engagement that is driving this development.

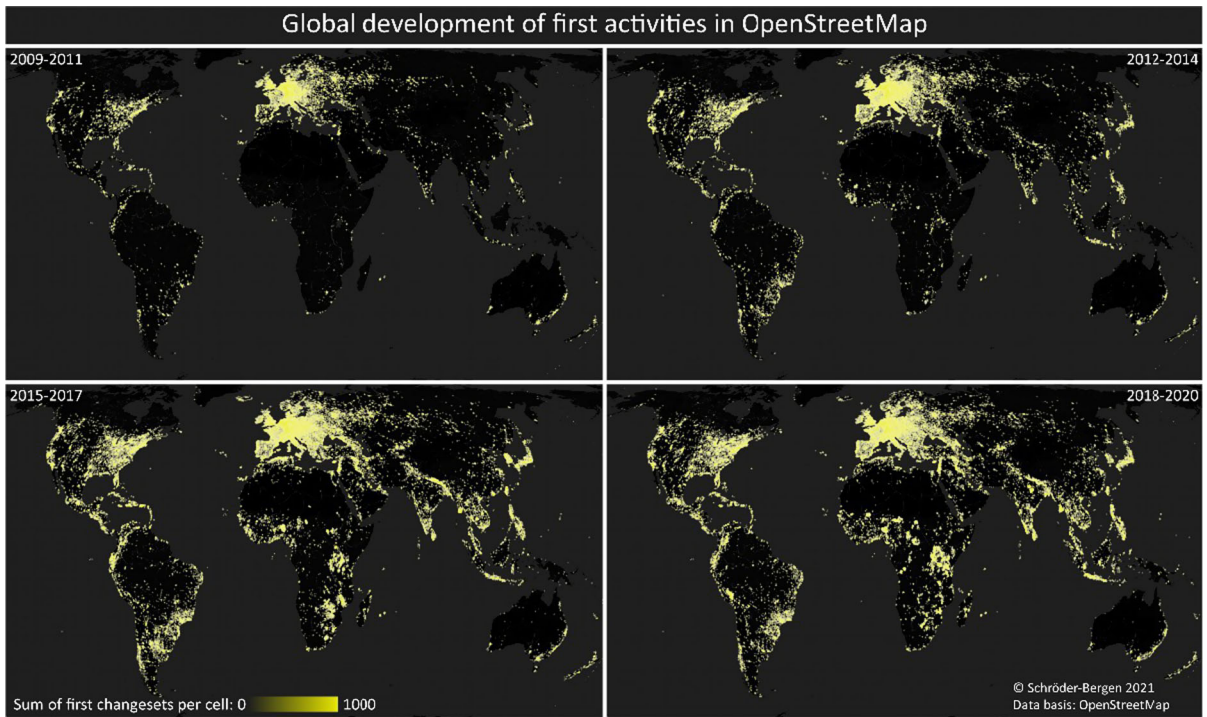
## Changing socio-institutional arrangements in OSM

### Institutional actors in OpenStreetMap

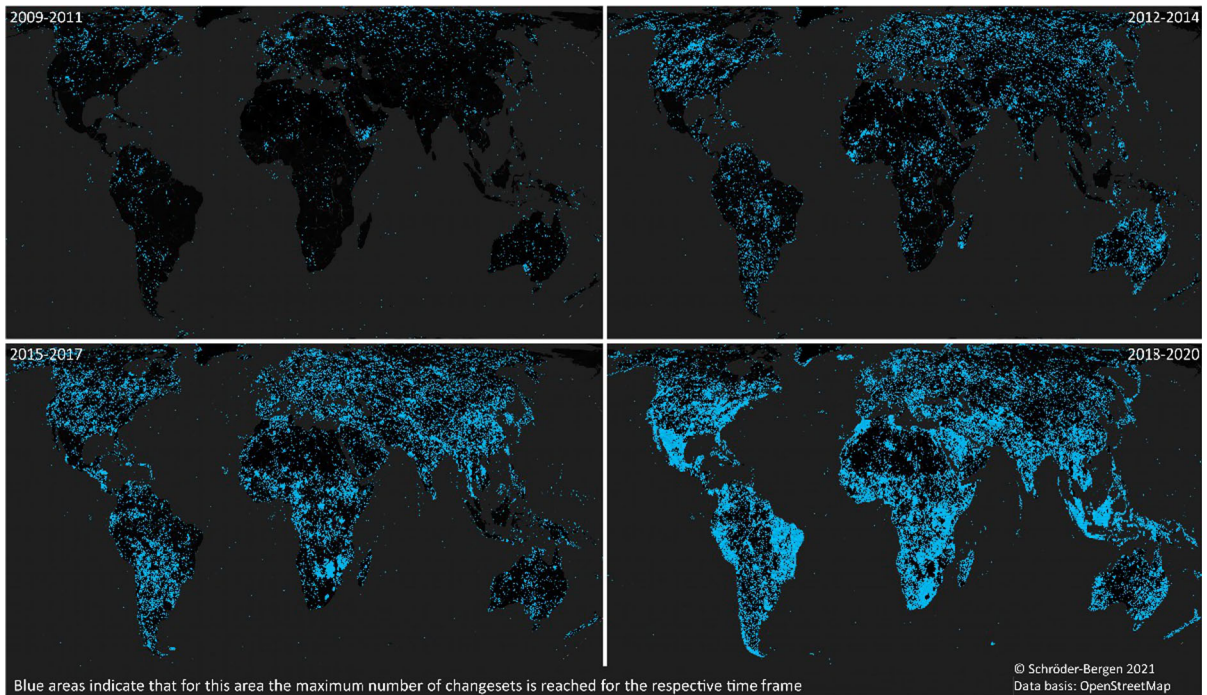
OpenStreetMap has been regularly described and analyzed as a crowd-based mapping project (Barron et al., 2014; Bittner et al., 2016; Chilton, 2009): To a considerable extent, the idea of thousands of individual mappers working together as a crowd to create an open map of the world has dominated and directed both the project's representations of itself and the

<sup>1</sup> We retrieved the full OSM changeset dump from the homepage (<https://planet.openstreetmap.org/>, 07/20/2020). It is created fully every week and currently contains more than 90 million changesets from around 1.5 million distinct users.

<sup>2</sup> Additionally, some changesets have creation dates prior to 2009: These are grouped edits by the same user that were created before the introduction of changesets. We also excluded these from our analyses. <https://help.openstreetmap.org/questions/65652/how-to-get-osm-history-from-beginning-of-times> (01/21).



**Fig. 1** Global development of first activities of mappers in OpenStreetMap. Shading ranges from transparent to yellow to indicate the amount of first changesets per cell



**Fig. 2** Highest OSM activity per time frame and cell. For each grid cell was determined, in which year the most changesets were created

academic study of OSMs socio-institutional arrangements. In recent years, a greater research focus has come to bear on the role of larger, institutional actors in OSM, an issue under intense discussion within the OSM community itself. Several studies have turned to the growing phenomenon of institutional humanitarian mapping activities in OSM and its role for a digital humanitarianism (Burns, 2015; Hagen, 2019; Ker et al., 2020; Sheller, 2021; Specht, 2020). Whereas volunteers from initiatives organized by the Humanitarian OpenStreetMap Team (HOT) primarily carry out mapping in response to crises, the Missing Maps initiative, a collaboration between HOT and other partner agencies, promotes and supports the mapping process as a preventive tool against crises in vulnerable places that are not yet on the map.

For a long period, the role of commercial actors in OSM received scant attention, despite the fact that for-profit companies have been associated with the OpenStreetMap project since its inception, an involvement taking various forms including donations of remote sensing data and use of OSM as a stepping stone for new commercial projects. In recent years, debates at conferences and meetings of the OSM community have indicated a concern—reflected in the controversies surrounding the 2020 Foundation Board election with which we opened the paper—that large commercial companies are gaining influence in the project and ultimately may change the character of OSM (cf., for example, Delattre & Singh, 2019; Maron, 2020; Mustard, 2020). Anderson et al. (2019) authored the first studies to explicitly explore the influence of commercial companies within the OSM community and on the development of the OSM project. Their work points to a growing role, in recent years, of some large commercial companies in the development of the OSM database, especially in some regions.

#### Method and analysis: tracing institutional actors through hashtags

Commencing around 2014, it has become good practice for mappers to indicate their affiliation to institutions, mapping events or regions using hashtag comments in the metadata of their OSM changes. Our analysis uses these hashtags as proxy data for analyzing the role of institutional mappers in OSM, tying in with earlier research that has shown the relevance of

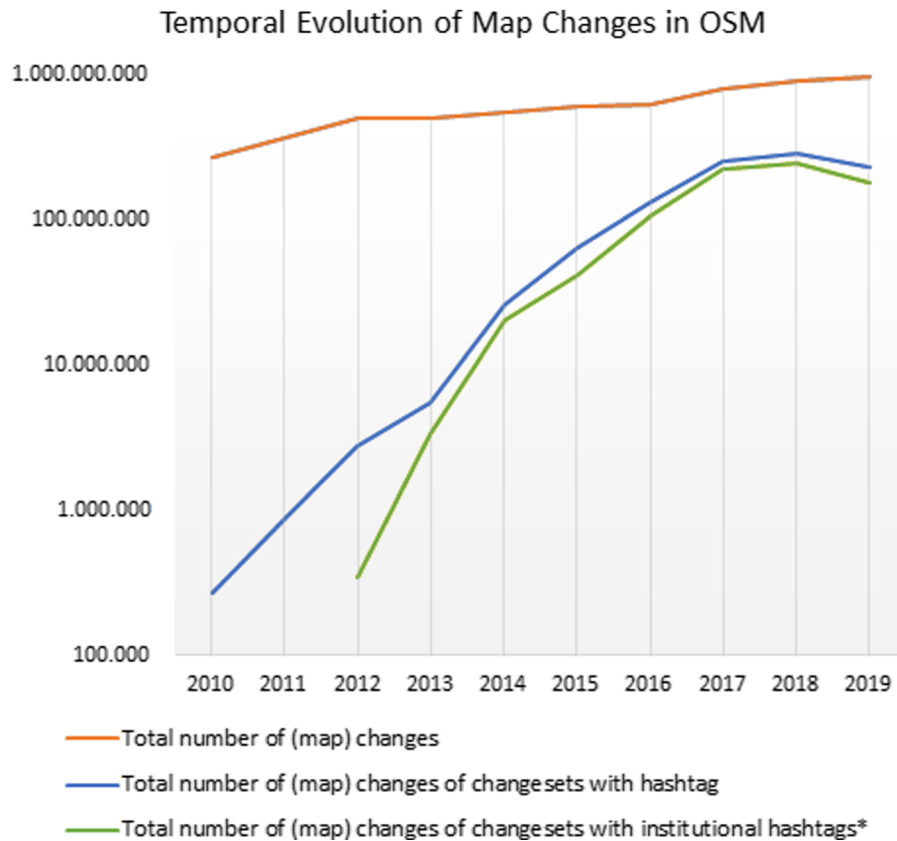
corporatist activities in OSM (e.g. Anderson et al., 2019).

Since the introduction of hashtags to OSM in the 2010s, the number of hashtags in OSM has increased significantly and the practice has become mainstream. In 2020,<sup>3</sup> 98.8% of all changesets featured comments, and almost a quarter of these contained hashtags. About three-quarters of all hashtags can be attributed to the six most important institutional actors. Of all changesets in 2020, just under 20 percent have a hashtag with this institutional content. Also, in total, almost 10 percent of all changesets contain hashtags of the six most important institutional players—though it is hard to estimate the amount of non-tagged data by institutional actors.<sup>4</sup> In recent years, the proportion is increasing, although it should be noted that this increase is spatially very unevenly distributed and the share is much higher in some places than in others. The increasing significance of hashtags and institutional hashtags is also reflected in the growing share of map changes and distinct OSM users contributing with (institutional) hashtags. In 2010, the share of distinct users of changesets with hashtags and the share of map changes with hashtags were only less than one percent and one per mill, respectively. The use of changesets with hashtags of the six major institutional players did not begin until 2012, when map changes and distinct users of changesets with institutional hashtags also accounted for less than one per mill of all map changes and of all distinct users. Since around 2016, however, the corresponding numbers have exceeded one-tenth of all map changes or of distinct users (Fig. 3 and 4).

Closer analysis of the hashtags shows that among the most frequently occurring hashtags many relate directly to institutional mapping actors (Table 1). Some of these are institutions with a humanitarian mission, such as the particularly prolific Humanitarian OpenStreetMap Team “hotosm” with which the most hashtags by far were associated—and the Missing Maps project. Others are commercial enterprises, such as the U.S.-based geodata service provider Kaart, the Apple data team “adt,” and the Facebook-funded project “Map With AI,” that develops machine learning algorithms to predict map patterns such as roads from remote sensing data which human mappers

<sup>3</sup> We derived data up to 07/20/2020.

<sup>4</sup> Amazon Logistics, for instance only uses its hashtag #amap sporadically.



**Fig. 3** Temporal evolution of map changes in OSM in total, for hashtag changesets and for changesets with hashtags of the six most important institutional players (\* relates to the six

institutional actors HOT, Missing Maps, Map With AI/ Facebook, Kaart, Grab and Apple)

can subsequently use. Further hashtags focus on the act of mapping itself—an example is the hashtag “#teachosm”—or on the place mapped, such as “#IndonesiaRoadMapping”.<sup>5</sup>

An analysis of distinct users per hashtag presents a similar picture, with still greater representation of humanitarian actors. This indicates that hashtags from commercial institutions arise from a lower number of mappers who contribute an above-average number of changesets.

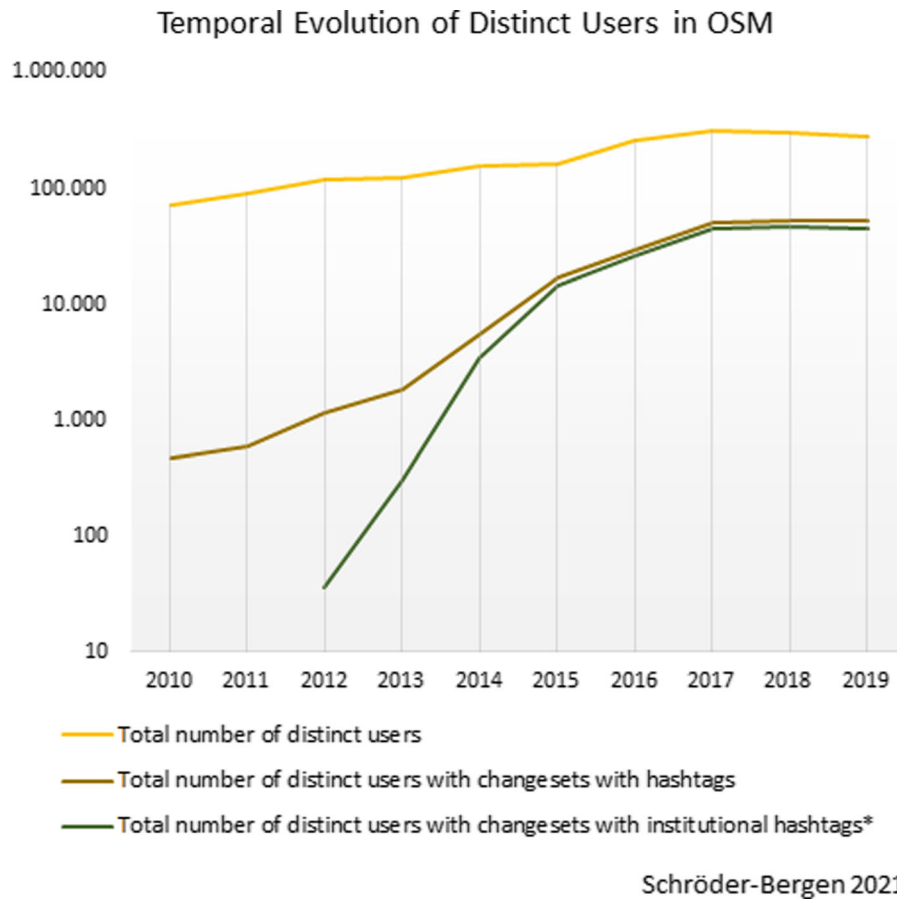
A global geographic analysis of occurrences of hashtags per tile revealed distinct patterns of regional

activity. Our selection of large institutional mappers<sup>6</sup> shows specific regional foci also often outside of the old European core of OSM (Fig. 5).<sup>7</sup> Occurrences of the hashtags #hotsm and #MissingMaps, which reference humanitarian activities, center on sub-Saharan Africa and Southeast Asia. While the hashtag #MapWithAI finds wide use in the U.S. and U.K., it

<sup>5</sup> For the analysis, hashtags were filtered out of the changeset comments, including all changesets without untypically large bounding boxes and with not more than 4000 edits. All strings commencing with a “#” followed by any number of alphanumeric characters and underscores were deemed to constitute hashtags.

<sup>6</sup> Our analysis included the top five institutional mappers from Table 1, HOT OSM, Kaart, Map With AI, Apple, and Missing Maps, alongside the Singaporean multinational service company Grab, which does not use one significant hashtag, instead varying hashtags—all commencing “#grap”—in accordance with the project at hand. The total number of edits of all changesets with Grab-related hashtags is among the top 25 worldwide. For Map With AI we included the hashtag “#nsroadimport” as this was used to mark AI-assisted contributions in Thailand and Indonesia.

<sup>7</sup> Fig. 3 shows, in color, all grid cells in which hashtags associated with the specific institutional player in question appear at least twice.

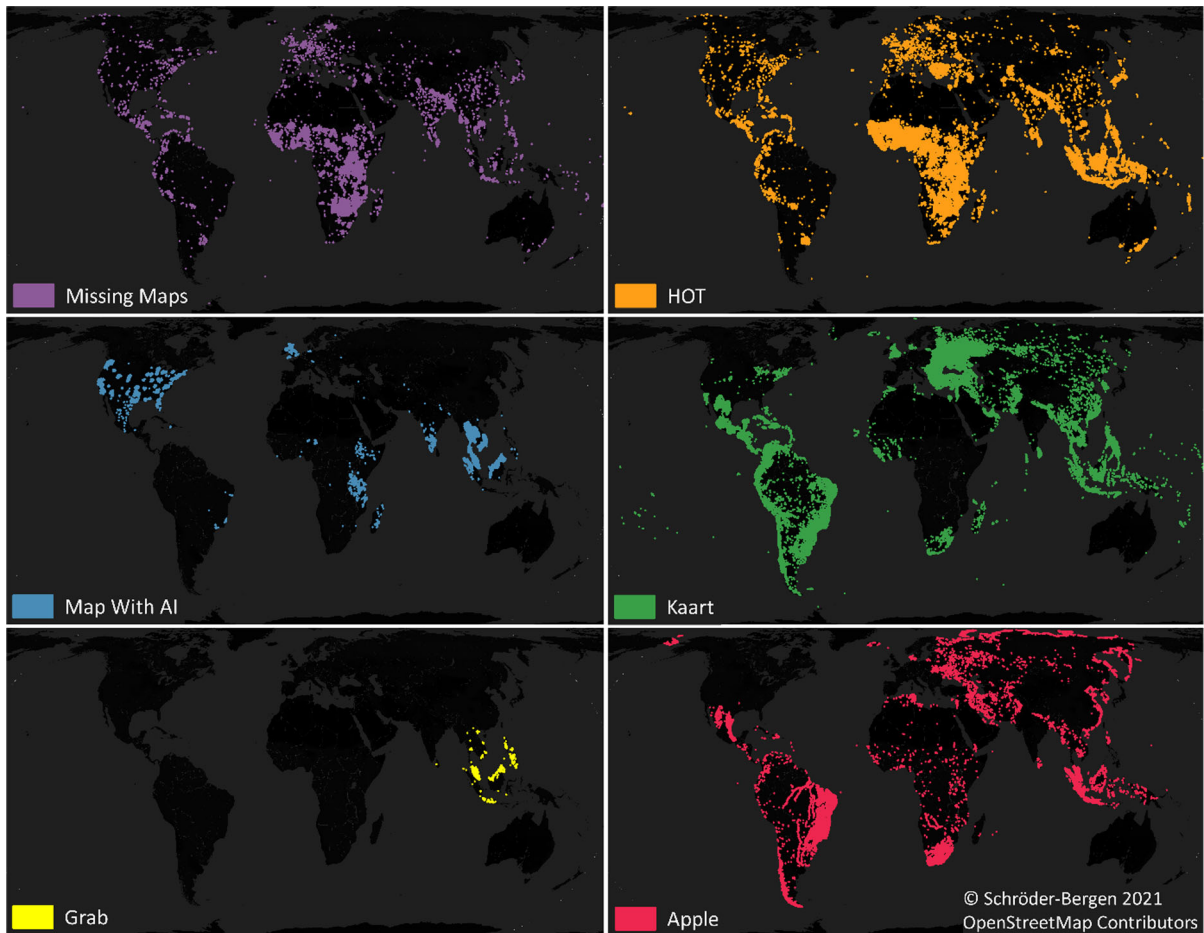


**Fig. 4** Temporal evolution of distinct users in OSM in total, for hashtag changesets and for changesets with hashtags of the six most important institutional players

**Table 1** Top 10 most frequently used hashtags in OpenStreetMap (those that indicate institutional actors are in bold)

Rank	Hashtag	Total sum of edits of all changesets featuring this hashtag
1	<b>#hotosm</b>	719,487,718
2	<b>#Kaat</b>	42,010,265
3	<b>#mapwithai and #MapWithAI</b>	29,881,148
4	<b>#adt</b>	28,507,195
5	#IndonesiaRoadMapping	28,040,838
6	<b>#MissingMaps and #missingmaps</b>	21,426,809
7	<b>#TanzaniaDevelopmentTrust</b>	17,061,892
8	#teachosm	12,308,433
9	<b>#ProjectNOAH</b>	12,166,075
10	#maproulette	11,807,954





**Fig. 5** Activities of large organizations and corporations in OpenStreetMap. Grid cells shown in color indicate occurrence of at least two hashtags linked to the organization in question

also appears frequently in parts of Asia and Africa, for instance in India, Vietnam, Indonesia, Tanzania, and Uganda. The hashtags for Kaart, Grab and Apple, which refer to commercial actors, reveal a somewhat different picture. Whereas hashtags pertaining to the multinational service company Grab occur primarily in Southeast Asia, where the company's activities are concentrated, the tech businesses Apple and Kaart show global activity patterns, with focal areas in South America, Eastern Europe, Russia, South Africa and the Middle East. Thus, the activities of the major institutional actors show a highly uneven geography but one that—with the exception of HOT and Missing Maps—is often less driven by a North–South divide but by the respective or anticipated markets of those companies (Fig. 2).

### Emerging collaboration and conflicts between local mapping communities and institutional actors

One could argue that more data simply makes for a better OSM and that there is nothing problematic with institutional actors and AI-supported practices contributing to OSM. However, in the following section, we describe several conflicts that reveal what might lie behind the debate with which we started this paper. To this end, we present two brief episodes of interaction between commercial actors and local mapping communities in Thailand and the Philippines that reflect conflicts and interaction between the logics of institutional actors and local mapping communities. Our presentation makes evident that the boundaries between the two groups are anything but clear.

Our first example concerns Facebook's engagement with OSM in Thailand. As a major platform, Facebook is in need of geodata to offer its services to customers. Among other sources, it draws on data from OpenStreetMap (Patel, 2018). Because the quality and coverage of geospatial data was considered lacking in areas in which the company was strongly interested, Facebook started sponsoring OSM in 2015 (OSM Wiki, 2021b) and began to participate in OSM in 2016 by contributing data (Walsh, 2018). Not only is a data team from Facebook actively engaged within OSM, but the company has also developed machine learning algorithms to predict map features, such as roads, from remote sensing data that can then be included in OSM. The company has also introduced its semi-automatic mapping program, the so-called "Map With AI" project, which focuses primarily on road detection and mapping.

One country in which Facebook introduced "Map With AI" and where this led to some upset among the local OSM community was Thailand. Considering the fact that the OSM project in Thailand had a rather low data density and timeliness compared to other regions of the world and that Thailand is an important market for Facebook, it is not surprising that Facebook very early chose Thailand for the deployment of its semi-automated road detection. With Thailand, however, the introduction of "Map With AI" occurred in a country in which there had been previous controversies between different mapping groups, which could be described in a simplified way as between a local, Thai-speaking community and an English-speaking expat community (OSM Wiki, 2021e). In this context, questions concerning local knowledge and ground truthing have been debated since the earlier days of OSM (OSM Forum, 2020).

Against this backdrop, Facebook began mapping roads in all provinces of Thailand with its external data team (OSM Facebook, 2019). Although Facebook promised to remain in close contact with the local community, the local mappers felt Facebook did not honor this commitment. Mappers complained, for example, that they could no longer use OSM data for routing because Facebook's edits "have completely bolloxed our navigation in Thailand" (OSM Forum, 2018). The engagement of Facebook's mapping team was occasionally even criticized as "data vandalism" and the team as being "more interested in checking out

their abilities to add roads in an automated fashion" than in contributing to OSM (OSM Forum, 2018).

This episode triggered and subsequently deepened a controversial debate in the OSM community in Thailand regarding the value of local data and the difficulties of automated or paid mapping. As a result of these conflicts, local mappers in Thailand approached Facebook, and a meeting was held to discuss the issues (interview, March 2020; Mapwith.ai, 2019). Eventually, it was determined that all changes made by Facebook's data team in Thailand would be tagged as imports and provided a special hashtag (OSM Wiki, 2021c). Facebook's cooperation in OSM in later projects in other countries was less conflictual, and Facebook cooperated more closely with existing OSM projects, such as projects initiated by HOT (Mapwith.ai, 2019). Facebook has since expanded its activities by providing editor software that builds on its machine learning algorithms to predict road data for global use. The popularity of the "RapiD" editor is quickly increasing, prompting continued consideration of the implications of a massive use of AI-assisted OSM contributions.<sup>8</sup>

Another interesting example of a commercial institutional player that has been playing an increasingly important role in OSM for several years is Grab. Grab is a mobility and services platform based in Singapore that is now widespread in Southeast Asia. Like many "lean platforms" (Srnicek, 2017), Grab relies on geodata to organize its services in urban space, and OSM provides a useful supplement to commercial geodata and to the company's own proprietary geodata (Foffia & Bulusu, 2019). Grab's commitment to OSM is also reflected in the fact that the company has been a corporate member of the OSM Foundation since 2019 (OSM Foundation, 2019).

For some time now, Grab has also been actively contributing data to OSM, which includes GPS data from its drivers. Currently, Grab employs several hundred individuals in its local mapping teams, of which the vast majority of employees are located in two teams in Hyderabad. According to Grab, the company cooperates closely with local mappers in

<sup>8</sup> According to our analysis, the "RapiD" editor became the editor contributing the third-most number of map changes to OSM in the short period from 2019, when it was launched, to 2020. "RapiD"'s edits have even surpassed the amount of all data produced for OSM by Mobile Maps.

their mapping efforts: Fofia and Bulusu, two Grab employees, point out, “We have worked closely with the different corporates, partners and the communities in the South East Asia region to support, build, guide, and empower ourselves and the community in contributing to improving OpenStreetMap” (Fofia & Bulusu, 2019). There are also Grab-led projects at universities although these are not yet directly linked to OSM projects (OSM Wiki, 2021d). Additionally, for several years, Grab has been active at OSM conferences in the region and at the global State of the Map conference. In the early 2020s, Grab became particularly active in the Philippines. It is revealing to examine how the local OSM community there and Grab interact. Unlike in Thailand, where Grab experienced a difficult OSM episode in 2018 (Russell, 2018), Grab’s engagement in the Philippines fell on fertile ground.

Similar to Haiti in the wake of the 2010 earthquake, the Philippines are often mentioned in discourses regarding OSM in the context of crisis mapping and digital humanitarianism. In fact, the mapping of the catastrophic Typhoon Yolanda (or Typhoon Haiyan) in 2013 led to a rapid increase in OSM data and mapped infrastructure (Turk, 2020). Although the episode is often portrayed as one in which international humanitarianism initiated and nurtured OSM—an account that was portrayed in 2020 in a blatant ‘white savior’ narrative in a subsequently retracted episode of Amazon’s “Now go build” series<sup>9</sup>—the Philippines are home to an active and diverse mapping community with interests that far surpass a narrow focus on “crisis mapping” and developmentalism.

Therefore, while institutional humanitarian mapping in general and HOT in particular play an important role in today’s OSM in the Philippines, in recent years, an increasing prominence of corporate mappers, such as Grab, could be observed in the country. Grab’s activity in the Philippines is closely intertwined with that of the local mapping community—at times some of latter’s members are employed by Grab or organize mapathons for them<sup>10</sup>—and thus

blurs the line between corporate and individual mappers. At the same time, the relation between corporate mappers from Grab and the local OSM community is often one of “housekeeping”, whereby local OSM mappers are responsible for negotiations and upholding the foundations and ethos of OSM as well as the technical and sometimes also legal standards OSM support, which are frequently challenged by the mapping practices of corporate mappers.

Thus, Grab’s activity in the Philippines shows that cooperation with the local mapping community can be productive and that local mapping communities may be strengthened through the involvement of large platform companies. However, as the clash of the local OSM community with Facebook in Thailand demonstrates, there is also a potential for conflicts over the value of local knowledge and of the labor the OSM project involves.

### Discussion: geographic shifts and socio-institutional changes in OSM

The geographies, actors, and social modes of knowledge production in OSM are undergoing change. Despite persistent differences in data densities, particularly between regions in the often intensely mapped Global North and many areas in the Global South, our analysis reveals an increase in mapping activities in certain regions outside the old European core of OSM. These geographic shifts in OSM have been accompanied by changes in OSM’s social composition, with institutional actors playing an increasing role. Here, institutional actors in the humanitarian field are important factors (Hagen, 2019); the formation of the Humanitarian OpenStreetMap Team (HOT) marked a key moment in OSM’s incorporation into a cartographic, technocratic and digital turn in humanitarianism (Burns, 2014, 2018; Givoni, 2016; Greenwood, 2020; Specht, 2020). In addition to humanitarian institutions, major commercial enterprises, such as Facebook, Kaart, Grab and Apple, have increasingly been taking a prominent role in OSM (see Anderson et al., 2019; Cinnamon, 2015; Morrison, 2020). In many cases on the initiative and with the support of institutional actors, new semi-automated mapping practices based on machine learning are also being introduced (Vargas Muñoz et al., 2020).

<sup>9</sup> For a statement by the OpenStreetMap Philippines community, see: [https://wiki.openstreetmap.org/w/images/a/aa/A\\_Call\\_to\\_Correct\\_Narratives\\_about\\_Geospatial\\_Work.pdf](https://wiki.openstreetmap.org/w/images/a/aa/A_Call_to_Correct_Narratives_about_Geospatial_Work.pdf)

<sup>10</sup> The following Telegram group provides a forum for discussion of events and other topics in the OSM Philippines mapping community: [t.me/OSMph](https://t.me/OSMph)

As our research shows, these changes have resulted in numerous new forms of cooperation between institutional actors and local mappers. However, we have also identified new areas of conflict. How can these geographic shifts and socio-institutional changes in OSM be interpreted and evaluated? We argue that in OSM there is a dual dynamic at play between colonizing and decolonizing processes (Table 2).

On the one hand, our results suggest that in many regions of the Global South the production of new geodata in OSM is becoming more dynamic. While Europe continues to dominate in terms of new contributions, emerging clusters of activity are forming in various regions of the world, reducing digital divides. In addition, as the experience of Grab in the Philippines shows, despite the commercial valorization of the OSM project, local communities become empowered when they are incentivized to participate in and “care for” the OSM project (see Dittus & Garcia, 2019) often with the support of institutional actors. We can thus observe that the polyphony of voices and worldviews in the OSM project is increasing. As such, these decolonizing processes reinforce OSM’s status as a digital commons project that is “cared for” by a community. Against this background, a one-sidedly critical perspective on institutional and, in particular, the commercial actors in OSM runs the risk of projecting a Western, Eurocentric understanding of VGI onto contexts in which the conditions and practices of mapping and map activism differ vastly from this conception. Cinnamon (2015), for example, notes that the supposedly unambiguous categories of “craft” or “local” versus “commercial” mappers often fail to adequately describe a social reality of multilayered and hybrid identities. Furthermore, humanitarian and commercial actors are often interconnected with local OSM communities—as our two brief examples have illustrated. Especially in contexts of socioeconomic precariousness, in which financial and temporal resources for leisure-time mapping are scarce, institutional actors may enable and strengthen communities of local mappers, particularly those new to the practice (see Ménard et al., 2019). Finally, it must be noted that OSM has never been a pure VGI project exclusively pursued by individual volunteers. Different institutional actors have been involved since OSM’s beginnings, and there has always been interplay between different mapping groups. What is new is the presence of large technical and institutional

players that are becoming more visible and powerful in the OSM ecosystem.

On the other hand, from the perspective of advocacy for an open-source project with a free geodatabase, the increasing involvement of commercial companies in OSM, particularly in the mapping of regions in the Global South, might appear concerning. Such concerns have in fact arisen in parts of the community (as we noted in the opposition triggered by the Facebook’s engagement in Thailand; for further examples, cf. Maron, 2020; Mustard, 2020). Questions being posed include whether commercial businesses might be using OSM to exploit mappers as low-cost geodata producers, placing OSM at risk of becoming a building block in a new “data extractivism” (Morozov, 2018; Nosthoff & Maschewski, 2020; Thatcher et al., 2016). The worry here is that crowdsourced mapping might be losing its synonymity with communities of voluntary, often leisure-time mappers and the digital commons, becoming instead a new form of exploited labor<sup>11</sup> (Young et al., 2020). This concern raises again the question of who uses the geodata in OSM and thus, in a sense, appropriates the work of the volunteers. Perceiving the mapper in this context as reduced to a clickworker reveals this development as a challenge to the ethos of individual and local mappers. Ultimately, there is a danger that the emerging multiplicity of mapping practices and the growing polyphony of diverse mapping communities in OSM will be suppressed in favor of modernist and universalistic, economically exploitable epistemologies (for a wider decolonial critique of the nexus of universalistic, Western and modernistic epistemologies with colonialism, capitalism and neo-colonialism, see Mouton & Burns, 2021; Radcliffe, 2017; Radcliffe and Radhuber, 2020; Ricaurte, 2019). Bittner and Glasze (2018) have noted that the epistemology inscribed in OSM software and practices tends to reproduce principles of modern Western cartography, which, while doubtless useful for navigation, are barely compatible with many other forms of geographic knowledge. Thus, there is a possibility that OSM will effectively overwrite local geographic knowledge and thus marginalize it in a new way (Bellone et al., 2020; Specht, 2020). At the least, the

<sup>11</sup> The value of crowdsourced mapping is connected with Jarrett’s (2015) principle of unpaid care work in the production of digital content on social media.

**Table 2** Intertwinement of colonizing and decolonizing processes in the new modes of collaborative mapping in OSM

Decolonizing processes in OSM	⇔	Colonizing processes in OSM
Reducing digital divides		Integration of OSM in data-extractive logics of an emerging digital capitalism
Empowering local mapping communities not least in marginalized regions		Fixation and reinforcement of modernist and universalist epistemologies
Expansion of the polyphony of different worldviews		Economic exploitation and epistemological marginalization of local knowledge
Strengthening a digital commons project		

engagement of commercial players and the new AI-based mapping practices run the risk of reinforcing this tendency. In recent years, many discussions in the OSM community,<sup>12</sup> such as the criticism of Facebook’s AI-based mapping in Thailand, have placed the issue of the dominant epistemologies in OSM on the agenda. As Garcia states from a Philippine perspective, “We lost knowledge, and now, we cannot even write the stories;” with Dittus, he poses the question of how to “diversify, democratise, denaturalise, and decolonise open mapping” (Dittus & Garcia, 2019).

In summary, first, our research points to the emergence of new mapping activities, which are also arising in regions outside the old European core of OpenStreetMap and in many areas of the Global South. This is a remarkable shift, albeit severely limited in its capacity to compensate for OSM’s current overrepresentation of European regions. OSM is increasingly becoming a global project. Second, our analysis turns a spotlight on the activities of new institutional actors as key drivers of this geographic shift, with leading roles for both humanitarian organizations and large commercial tech companies. As we demonstrate, it is inevitable—and here we can return full circle to the controversies surrounding the recent election of the OSM Foundation Board—that such shifts will engender conflict. Various candidates for the Board explicitly presented themselves as, for example, preservers of the OSM ethos of the individual craft mapper,<sup>13</sup> while others positioned themselves as long-marginalized mappers of the Global South or

as representatives of OSM’s increasingly important institutional actors.<sup>14</sup> To conceptualize these changes in OSM, we propose a differentiation of decolonizing and colonizing processes. On the one hand, the OpenStreetMap project is being decolonized by empowering new local communities and thus more diverse voices, which reinforces the logic of OSM as a digital commons project. On the other hand, there are legitimate concerns that OSM is being colonized by institutional actors and used as a source for data extractivism. Finally, it is to be feared that the new polyphony in OSM will be suppressed again in favor of a fixation on established modernist and universalist epistemologies. However, as polarized as this dichotomy and the clear distinctions between the different categories of actors may seem; these actors actually often collaborate and intersect in multiple ways, and the described logics in OSM are complexly intertwined.

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<sup>12</sup> A recent example is a webinar hosted by the Humanitarian OSM Team in early 2021 on the subject of coloniality in open data and mapping <https://www.eventbrite.com/e/colonialism-in-open-data-and-mapping-tickets-141256414739#> (03/21))

<sup>13</sup> <https://lists.openstreetmap.org/pipermail/talk/2020-December/085692.html> (01/21).

<sup>14</sup> [https://wiki.openstreetmap.org/wiki/Foundation/AGM20/Election\\_to\\_Board/Answers\\_and\\_manifestos#Answers\\_and\\_manifesto\\_per\\_candidate](https://wiki.openstreetmap.org/wiki/Foundation/AGM20/Election_to_Board/Answers_and_manifestos#Answers_and_manifesto_per_candidate) (03/21).

**Data availability** Analyses were performed using publicly available datasets from OSM. The analysis scripts can be obtained from the corresponding author.

## Declarations

**Conflict of interest** The authors have no conflicts of interest to declare that are relevant to the content of this article.

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