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Indigenous Cartographies in the Covid-19 Pandemic

Paola Sartoretto [1] 🔘 **and Luana Martins** [2] 🔘

[1] School of Education and Communication, Jönköping University, Sweden
[2] Luiz de Queiroz College of Agriculture, University of São Paulo, Brazil

Correspondence: Paola Sartoretto (paola.sartoretto@ju.se)

Abstract

For Indigenous populations in Brazil, maps have long been instruments of invisibility. Official maps have historically misnamed and erased Indigenous territories and communities. At the same time, cartographic representations have been a tool of resistance for Indigenous activists. Indigenous communities and organisations have created their own maps identifying territories, peoples, languages, and cultures. These dynamics of contentious visibility intensified during the Covid-19 pandemic when the spread of the virus among Indigenous populations was poorly reported or even absent from hegemonic contagion maps. State negligence, intensified by an authoritarian government hostile to Indigenous populations, threatened the survival of communities around the country who organised collectively to create their own cartographic representations of the pandemic through resistant appropriations of media and data. This article draws on interviews with Indigenous leaders and media activists to discuss processes of data appropriation and resistant cartographies during the Covid-19 pandemic. Findings highlight the use of data and counter mapping strategies for self-representation and political action that must be understood through a non-media-centric perspective, drawing from conceptualisations at the intersection between human geography, communication, and post-colonial theory.

Keywords

Brazil; counter-mapping; Covid-19; data appropriation; Indigenous communication; resistant cartographies

1. Introduction

Disputes over territory have been the backbone of Indigenous resistance worldwide since the emergence of settler colonialism in the 1400s. Thus, knowledge and control over territories are crucial for Indigenous groups in Brazil and granted by the Brazilian constitution of 1988. Ownership and control over Indigenous lands is

crucial to the survival of Indigenous Peoples, which entails social and cultural reproduction. In this context, Indigenous cartography becomes an important counter-hegemonic communicative practice underpinned by ever-developing mapping technologies.

The advent of complex digital geolocation technologies and the datafication of demographic, biological, and geographical information has meant that control over the production and circulation of data is now as important for Indigenous Peoples as is the control of ancestral territories (Ricaurte, 2019). For Indigenous collectives, data is both knowledge and representation. In a continuum of Indigenous communication (Sartoretto & Caffagni, 2022), where Indigenous collectives struggle over self-representation and communicative protagonism, control over data and the practice of counter-mapping is a new frontier of media activism (Jeppesen & Sartoretto, 2023).

The Covid-19 pandemic that unfolded between 2020 and 2022 was particularly challenging for Indigenous populations in Brazil due to the lack of attention from the state to the special needs and rights of these populations in a situation of sanitary emergency. Under the presidency of extreme right politician Jair Bolsonaro, official contagion statistics published by the government were severely underestimated (Articulação dos Povos Indígenas do Brasil [APIB], 2020), not updated regularly, and were not useful for Indigenous populations living outside urban areas. Facing these challenges, the Articulation of Indigenous Peoples of Brazil started a data mapping project in 2021—Indigenous Emergency—to gain valuable knowledge about the spread of the virus among Indigenous communities in rural and urban areas in Brazil. The initiative aimed to map out the development of the pandemic among Indigenous communities in Brazil using a variety of data sources including publicly available official demographic data, geolocation data, as well as data produced by Indigenous collectives. With the support of civil society organisations and researchers, the compiled data could be visualised in maps to trace the spread of the virus among Indigenous areas and link it to the presence of meatpacking facilities. Figure 1 shows how these different datasets— Indigenous lands, meat processing facilities, and Covid-19 cases by municipality—could be plotted to show evidence that the meatpacking facilities were important vectors of contagion to Indigenous communities.

Another map (Figure 2) combines data, metadata, and information to spatialize knowledge about contagion and access to healthcare that could be used to direct specific and relevant efforts to the communities and areas where they were most needed. The map in Figure 1 was regularly updated during the pandemic, and both maps are part of a report available on the Indigenous Emergency website (https://emergenciaindigena. apiboficial.org).

In this article, we analyze and discuss the case of Indigenous Emergency to understand counter-mapping practices within the counter-hegemonic communication continuum (Sartoretto & Caffagni, 2022), aiming to avoid both technology presentism (Virilio, 2010) and one-medium bias (Mattoni & Treré, 2014). Drawing on data from six semi-structured interviews with expert interlocutors, we discuss the varied aspects of mediated visibility for Indigenous communities and their significance for community communication processes in Brazil.

In the following sections, we present a conceptual mapping that includes Indigenous communication, communicative aspects of mapping and counter-mapping, and a discussion about the interplay between technologies, territories, and Indigenous resistance. The theoretical discussion is followed by a methodological overview, a subsequent discussion of findings, and concluding remarks.
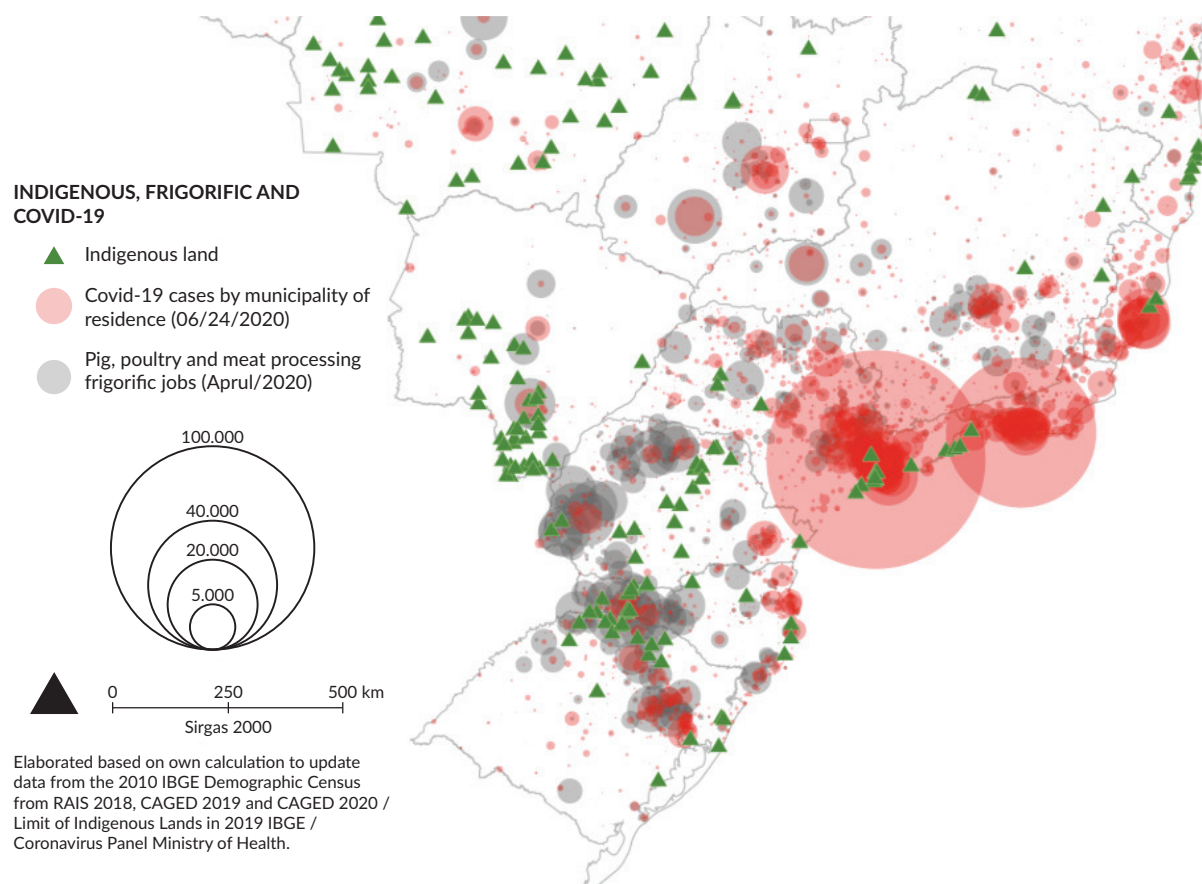
INDIGENOUS, FRIGORIFIC AND COVID-19

▲ Indigenous land

⬤ Covid-19 cases by municipality of residence (06/24/2020)

⬤ Pig, poultry and meat processing frigorific jobs (Aprul/2020)

100.000
40.000
20.000
5.000

0   250   500 km
Sirgas 2000

Elaborated based on own calculation to update data from the 2010 IBGE Demographic Census from RAIS 2018, CAGED 2019 and CAGED 2020 / Limit of Indigenous Lands in 2019 IBGE / Coronavirus Panel Ministry of Health.

Figure 1. Map of Indigenous populations and meatpacking facilities. Source: APIB (2020).

ALTO RIO SOLIMÕES (AM)
Médico da SESAI contamina população indígena da região, sendo hoje o território com maior quantidade de casos registrados.

VALE DO JAVARI (AM)
Equipes da SESAI contaminadas levam o vírus para região com maior número de indígenas em isolamento voluntário e de recente contato do mundo.

ALTO RIO PURUS (AC) TI MAMADATE
Equipe da SESAI leva o vírus para território com indígenas em isolamento voluntário e de recente contato.

PARQUE TUMUCUMAQUI (PA/AP)
Exército leva o vírus para um dos território mais isolados e de difícil acesso logístico do país.

REGIÃO NORDESTE, CENTRO-OESTE E SUDESTE
Falta de atendimento da SESAI aos indígenas que vivem em contexto urbano e fora de territórios que não são homologados.
Hospitais querem registrar indígenas que vivem em contexto urbano como pardos. Postura do governo tem aumentado os crimes de racismo contra comunidades indígenas em pequenas cidades. Muitos indígenas se negam a fazer teste ou a realizar tratamento devido ao racismo, que também tem aumentado os conflitos internos nas comunidades.

RESERVA INDÍGENA DE DOURADOS (MS)
O principal responsável pela introdução do vírus em várias aldeias do Mato Grosso do Sul foi o Agronegócio. Na Reserva Indígena de Dourados – onde a primeira morte foi registrada por um Guarani Kaiowá – a doença foi transmitida por um funcionário da JBS Frigorific, segundo informações de um jornal local, o Repórter Brasil.

TI S EM PR, SC E RS
O padrão se repte no oeste do Paraná, nas terras indígenas de Santa Catarina e no Rio Grande do Sul. Os primeiros casos infectados dentro desses territórios foram registrados entre os povos indígenas dos povos Kaingang e Guarani Mbya. Esses indivíduos eram funcionários do sector frigorífico local.
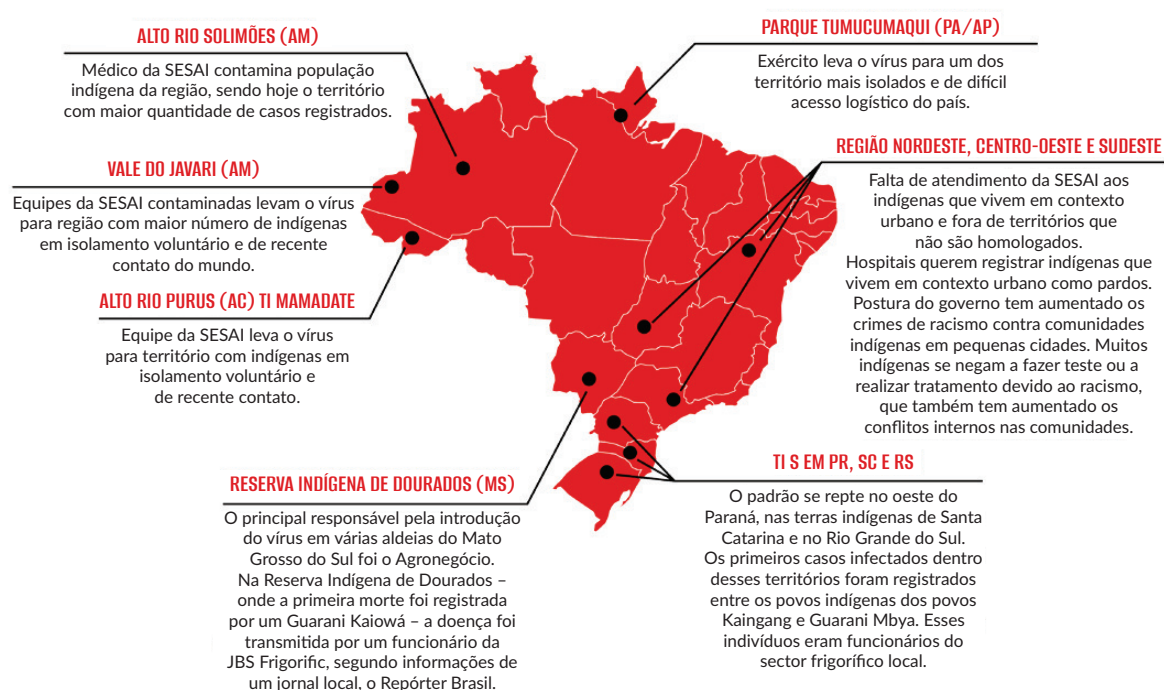
Figure 2. Map relating the contagion to Estate agencies. Source: APIB (2020).

2. Conceptual Mapping

We articulate the conceptual framework to discuss counter-mapping practices among Indigenous collective actors during the Covid-19 pandemic around three epistemological pillars: Indigenous communication; technologies, territories, and resistance; and communicative aspects of mapping and counter-mapping. These conceptual pillars encompass key aspects of Indigenous countermapping and allow us to highlight and discuss the resistance cartographies as a communicative practice of political mobilisation from an Indigenous perspective. Our goal is to highlight the interconnections between communication as a politico-representational practice through which Indigenous collective actors engage in resistance processes oriented toward cultural and territorial rights.

2.1. Indigenous Communication

To understand counter-mapping among Indigenous communities as a communicative practice in a continuum of counter-hegemonic Indigenous communications, it is crucial to sketch a brief map of research on Indigenous communication worldwide, zooming into Latin America and Brazil.

A recent, and somewhat contested (Pruulmann-Vengerfeldt et al., 2013), digital turn (Pandey, 2019; Sued, 2025) in media and communication studies in general and in studies of Indigenous communication in particular, often erases the decades long history of Indigenous media appropriation that intertwines with the consolidation of Indigenous movements as national and transnational political actors (see Salazar & Córdova, 2019). Research on Indigenous communication, including Indigenous media, emerged as a transdisciplinary field in communication research, drawing on disciplines such as anthropology, political science, and media studies. We engage particularly with the Latin American branch of Indigenous communication research and the understanding of Indigenous communication as both political participation and self-representation. While doing this, we acknowledge that the categories Indigenous communication and Indigenous media are not unproblematic, as they risk flattening out the ethnologic and ethnic variety of Indigenous Peoples worldwide. Nevertheless, for didactical purposes, we resort to the terms Indigenous communication and Indigenous media to refer to communication efforts and media artefacts collectively produced by Indigenous Peoples.

Research on Indigenous communication in Latin America has been growing recently after having been overlooked for decades (see Costa, 2010; Pereira, 2010), but it is mostly focused on uses and affordances of media, rarely engaging with social movement scholarship. The emergence of systematically produced Indigenous media and artefacts—which function as community media content—relates to the development and widespread use of audiovisual technologies that facilitate amateur production, dating back to the 1980s (see Ginsburg, 1991, p. 92). Over 30 years ago, Faye Ginsburg (1991, p. 95) argued that due to its small-scale and localised character, the existence of Indigenous media was "politically and economically fragile." She highlighted the absence of a more robust theoretical development about Indigenous audiovisual practices connecting it to a positivist anthropological view of the camera as a "window on the world" instead of a creative tool in "the service of a new signifying practice" (Ginsburg, 1991, p. 93) and pointed out that Indigenous communities in Australia were interested in issues of power regarding who controls the production and distribution of imagery (p. 96).

In line with this culture centred and politically conscious understanding of Indigenous media, Magallanes-Blanco (2015, p. 201) argues that Indigenous video is "an instrument for cultural and political activism, articulating alternative perspectives on the relationship between humans and nature and highlighting exploitation that leads to land dispossession and environmental degradation." Reflecting about the development of Indigenous filmmaking since the 1980s, Salazar and Córdova (2019, p. 141) see Indigenous media as a "project of world making" through which communities articulate ancestral knowledge to imagine planetary futures which relates to Ana Suzina's (2023) argument about the circularity of Indigenous communication in which future imaginaries are constantly constructing in a dialogue with the past.

Indigenous media is often discussed in terms of a Faustian dilemma (Ginsburg, 1991; Rodríguez & El Gazi, 2007) that contraposes the possibility of new ways of expression afforded by technologies with the threat of assault on culture and ancestral knowledge. In short, this is a dilemma between cultural life and epistemicide which has sparked much discussion beyond disciplinary boundaries. In this sense, Ginsburg (1991, p. 104) argues that Indigenous filmmaking are practices of cultural mediation "across boundaries" directed to the "mediation of ruptures of time and history, taking of lands, political violence, introduced diseases, expansion of capitalist interest and tourism, and unemployment coupled with loss of traditional bases of subsistence."

Later, the appropriation of ICTs by Indigenous communities resulted in a strong field of practice and production of situated knowledge, particularly by Indigenous activists, scholars, and thinkers (Duarte, 2017; Pereira, 2010). Rodríguez and El Gazi (2007, p. 460) also reject the Faustian dilemma as an analytical category to think about Indigenous Peoples' appropriation of ICTs. The authors propose a twofold argument: Considering first that Indigenous People's should not be equated with a singular subject that either adopts or rejects technologies in order to make generalisable claims about all Indigenous communities, they suggest instead Salazar's (2004) concept of media poetics as an analytical tool to examine how ICTs are re-created in their interaction with specific social and cultural relations.

A process of adaptive resistance is observed beyond digital technologies and is also applied to social technologies in a broader sense such as in the adaptation of decision-making structures to Indigenous communities' horizontal convivial relations (Santi & Araújo, 2022, p. 100). Also relating to the Faustian dilemma, Sartoretto and Caffagni (2022) argue that Indigenous communication in Brazil operates with dual goals of cultural representation and structural change and it is not possible to ignore or isolate any of these aspects. These long-standing discussions about Indigenous communication that include the inception of media among Indigenous Peoples converge in the argument that technological appropriation cannot be dislocated from the cultural, social, political, historical, and geographical context in which it happens.

Indigenous visibility is another significant field of research the intersects with Indigenous communication, with a particular interest in processes of recognition and representation (Fraser, 2009) articulated through varied media including literature (Feroz, 2024), cinema (Hearne, 2012), journalism (Ryan, 2016), and social media (Farrell, 2021). These discussions have a non-media centric perspective (Morley, 2009), attending to Morley's call to place "technological changes in historical perspective" (Morley, 2009, p. 114). With Morley, we argue that Indigenous visibility cannot be separated from its material dimension which includes territories and social reproduction.

Considering this international trajectory of research on Indigenous communication, it is possible to position contemporary discussions (Cantley, 2025; Duarte et al., 2019; Kukutai & Taylor, 2016; Walter, 2018) in a historical continuum of varied practices and processes of Indigenous resistance and political protagonism. Not ignoring or obscuring the diversity and particularities of Indigenous Peoples worldwide, as argued by Rodríguez and El Gazi (2007), we can highlight the continuities in the ways in which Indigenous Peoples become the protagonists in the process of technology appropriation in varied ways as practices of representation and political participation that aim for collective action and political autonomy.

2.2. Technologies, Territories, and Resistance

Indigenous struggle for culture and territory is a prominent topic in the contemporary political agenda in Latin America largely due to the articulations and political mobilisation of Indigenous Peoples in several Latin American countries and regions. Conceptions and understandings of progress and development are constantly imposed on Indigenous Peoples and their territories, which includes using and trespassing on Indigenous lands for mining, building infrastructures such as dams and roads, and gaining access to rivers often showing disregard for Indigenous cosmovisions about the inseparability between humans and the territories where they live.

Indigenous knowledge production is anchored in multifaceted Indigenous cosmovisions (Milhomens, 2022, p. 26) that converge in an intrinsic relation between knowledge and territory. Current research highlights the collective appropriation of communication technologies, including audiovisual production and social media platforms as instruments for political organization and strengthening of the Indigenous movement (Macedo Nunes & Campos, 2022, pp. 79–80) and the Amazonian culture as an underpinning factor configuring the use of the internet with focus on mutual help (Neves, 2022, p. 182). In this context, the appropriation of data becomes a new frontier of media activism (F. Milan & Beraldo, 2019) in which communicative processes are politically articulated in support of Indigenous demands for rights to culture and territory. In the particular case of Indigenous Peoples, data appropriation for political struggles is located at the intersection between territory and culture, exemplified in the cases of data about deforestation in the Amazonian region, the presence of rare earth metals in Indigenous lands, and historical data about land occupation that can be used to claim protected status of Indigenous territories (Duarte, 2017).

Ruppert et al. (2017) argue that data has become a political issue because it "reconfigures the relations between citizens and states" (p. 1) and we argue further that, in the case of Indigenous communities, data politics unveil the limitations of liberal citizenship that does not recognise the existence of ways of living outside the standards of Western civilisations. This includes, for instance, the reluctance of the Brazilian government to document deforestation in Indigenous areas or even to demarcate these areas that should be spared from industrial agriculture (APIB, 2020, p. 19). State information and data policies belie the danger of using technologies to construct Indigenous communities as a threat to national security and development (Proulx, 2014). Kukutai and Taylor (2016) argue that, as well as having sovereign rights to territory, Indigenous Peoples must also have sovereign rights to data. These arguments resonate with the idea of communication rights as the autonomy of collectives and individuals over decision-making processes related to the social and political management of communication (Mata, 2006; Peruzzo, 2011). One of the main claims of the Covid-19 action plan (APIB, 2020, p. 34) is precisely access to communication

technologies (radio, digital, satellite, and telephone services) in remote Indigenous communities to facilitate communication between remotely situated Indigenous communities and their diverse interlocutors.

The interplay between technologies, territories, and processes of political resistance to the continuous threat to Indigenous cosmologies and cultures posed by so-called Western civilisation has several practical dimensions identified in current research such as connection, sovereignty, and participation. Communication technologies can disrupt time and space dimensions and they have played a relevant and contentious role in connecting Indigenous Peoples and territories with each other and with societies and peoples beyond these territories. Since the emergence of settler colonialism, sovereignty has been a crucial value for Indigenous Peoples. The capacity to collective self-determination over culture, knowledge, and territory is paramount for the survival of Indigenous Peoples and, as it has been acknowledged recently, for environmental sustainability and regeneration that can help us mitigate the consequences of climate change. In consequence, sovereignty also applies to communicative processes and the technologies (digital or social) that underpin them. Several researchers have been calling attention in recent years to Indigenous struggles over the data that can provide information, counter-narratives, representation, as well as support claims for rights (Kukutai & Taylor, 2016; Proulx, 2014). Finally, Indigenous Peoples incorporate communication technologies into political processes through which they resist threats to their existence, thus participating as collective actors in policy-making processes that have an impact on their territories and on their lives.

2.3. Communicative Aspects of Mapping and Counter-Mapping as Data-Driven Practices

Cartography as a representation of the lived space, including human settlement and action, is an instrument of power and the subject of tensions. Maps have "played a role in communicating spatiotemporal information to mass audiences" during crises since the Spanish flu pandemic in 1918–1919 (Kent, 2020, p. 187). Kidd (2019, p. 955) argues that "the contest over maps, and other cartographic visualizations, is one of the longest-running examples of data activism." However, overreliance and unrealistic assumptions about the representational capacities of maps may overlook local needs and knowledge (Calvo, 2025, p. 302).

Lived territories are crucial for Indigenous communities because they are the material basis of Indigenous commons. This intrinsic relation between society and territory has been extensively documented and analysed in the field of critical geography with important contributions from decolonial perspectives. For instance, Hunt and Stevenson (2016, p. 372) argue that Indigenous counter-mapping is "an assertion of political and intellectual sovereignty" and Wainwright and Bryan (2009, p. 153) note that participatory mapping technologies and the popularisation of cartographic technologies such as geographic information systems have allowed Indigenous Peoples to map their lands and claim legal rights. Oslender (2021, p. 10) has analysed social cartography initiatives among Indigenous and Black communities in Colombia and concluded that, beyond legal and communicational aspects, Indigenous cartographies also materialise decolonial visions and reflect ontological conflicts over various ways of being in the world. Syme (2020) warns about the danger that digital "deep cognitive" mapping platforms replace the "context-rich" and "place-powerful" traditional mapping practices enacted by Indigenous Peoples, reinstating the Faustian bargain between traditional cultural practices and the informational benefits of datafied technologies.

At the same time, official and hegemonic cartographies that represent, and often invisibilize, Indigenous territories and communities exert power over these groups (Lowan-Trudeau, 2021). Consequently,

cartographic mapping can be understood as a communicative process and maps as media in the sense of "standing between" (Couldry, 2012) senders and receivers of information and as instruments to create shared understandings about the lived space. The development of data production technologies has meant that data is generated from the most mundane activities, such as using public transportation, opening a door with a card, and, of course, using mobile telephones and computers (see da Silveira, 2017), all of which have turned cartography into a highly datafied process. However, data is not produced and distributed in equal conditions (Lucas et al., 2020), and the Covid-19 pandemic exacerbated and intensified these inequalities (S. Milan & Treré, 2022). In this sense, Jeppesen and Sartoretto (2023, p. 152) argue that hegemonic maps reinforce communicative dynamics that "render intersectional inequalities immobile and invisible."

For Indigenous communities in Brazil, data poverty hits harder because although much data about the territories where they live is produced by corporations and state bodies, they do not have control over this data and cannot put it to use. Political conjunctures can be another complicating factor. During the Covid-19 pandemic, the extreme right government of President Jair Bolsonaro neglected Indigenous territories and communities, which resulted in a lack of trustworthy information about contagion and spread of the virus among Indigenous communities (Jeppesen & Sartoretto, 2023). As Seto et al. (2025) point out, the official production of data is a component of the representation of peripheral territories by corporate and state platforms that, through their biases, contribute to perpetuating social inequalities.

Indigenous communities in Brazil have a long history of resistance to threats from both the state and private actors, which lays the basis for the awareness of the role of communication and media technologies for the self-determination of these communities. This process can also be seen as a long struggle of Indigenous communities to become the subjects of their own communication which is a precondition for the exercise of communicative citizenship (Mata, 2002, 2006). Communicative citizenship can be understood as the agency over communication and presupposes access to information and the material means to exercise this agency. Indigenous counter-data mapping should thus be understood in this context of communicative struggle that challenges hegemonic narratives through social cartography (Vaughan, 2018), "providing specificity and nuance regarding the communities and territories mapped" (Jeppesen & Sartoretto, 2023, p. 152).

The struggle becomes twofold for these communities who need to gain access to information and technologies while they develop a collective understanding of the policies that regulate communication. Indigenous communities and organisations must use these technologies and knowledge to claim their agency over the communication policies, including data production and management, that affect them. We argue, therefore, that data-driven mapping and counter-mapping must be understood as a communicative process, as stated by Ruppert et al. (2017, p. 1) who claim that the many ways in which we deal with data bring "objects and subjects that data speaks of into being." Data production and circulation can thus be considered communicative processes that cannot be separated from the media that store and transmit data, so it follows that data flows cannot be analysed separately from the communicative processes of which they are a part. Or, as Silverstone (1999, p. 173) reminds us, "media technologies, like all other technologies, have the social behind them, the social in front of them and the social embedded in them." Consequently, the intersection of data practices with cartographic practices characterises communicative processes enacted by collective actors such as Indigenous organisations, civil society organisations, universities, and state authorities.

3. Methodology

3.1. Study Design

This study was conducted as part of the research project Countermapping Covid-19—Visualisations of Data on the Margins which analysed data-driven counter-mapping initiatives to understand data imaginaries articulated in the conception, production, and reception of counter-hegemonic maps among marginalised communities. The international project included counter-mapping projects among LGBTQIAPN and Black communities in the US, low socio-economic status communities in Spain and Latin America, and Indigenous communities in Brazil, which was our focus. The Brazilian branch of the project focused on the initiative *Emergência Indígena* (Indigenous Emergency) led by the APIB between 2020 and 2021 in response to the challenges faced by Indigenous communities due to the Covid-19 pandemic. APIB is an umbrella organization created in 2005 during the Free Land Encampment which is an annual demonstration that has run since 2002 to call attention to Indigenous rights in Brazil.

Here, we focus the discussion on semi-structured interviews with six interlocutors who were involved in different aspects of the implementation and operationalisation of Indigenous Emergency in 2021 and 2022. The interviews were akin to expert interviews in which our interlocutors were considered experts in different areas of data mapping among Indigenous communities and integrated in the project not as single cases but as a group (see Flick, 2009, p. 165). The interview guide was developed to be employed throughout the project to address counter mapping practice. The guide was structured in thematic blocks focusing on specific aspects of mapping practices including experiences, practices, and rationales related to map-making among each community in the pandemic context. The authors then adapted the questions to reflect cultural specificities of Indigenous political mobilisation in Brazil, incorporating questions about challenges in mapping Indigenous territories and obtaining official data during President Jair Bolsonaro's government which covered the whole pandemic period (2019–2022).

A total of six interviews were conducted via video call in September 2022. The interviews lasted between 20 and 55 minutes. Luana Martins conducted five interviews alone and one with Paola Sartoretto. Video calls were considered the best possible alternative considering the geographical distance between our interlocutors, who were in different parts of Brazil, and the researchers, who were in Canada and Sweden, especially given the travel restrictions still in place due to the pandemic. Concerns regarding the quality of technology-mediated interviews have been raised since the advent of the telephone (Flick, 2009), as any medium used to enable interactions between physically distant individuals may negatively impact the spontaneity of the interaction (Flick, 2009) and, in turn, have an impact on research quality. In video calls, it is possible to see each other and experience facial expressions and body language to a certain extent. In this case, the restrictions imposed during the Covid-19 pandemic meant that people had to rely heavily on video calls, which contributed to naturalise this form of interaction. To prevent distractions, all interviews were booked in advance and interlocutors were informed about the duration of the interview so they could have time to find an adequate space for the interviews. All interviews were conducted, recorded, and transcribed without major technical problems.

The interview interlocutors were selected purposefully due to their participation in different aspects of the project. The selection process started with contacts that were publicly available on the Indigenous

Emergency website, following recommendations from the Indigenous Emergency leadership board with a view to: (a) geographical spread (considered Brazil's five geographical regions: south, southeast, centre-west, northeast, and north); and (b) age and gender diversity (see Table 1). With six interviews, we considered that we reached theoretical saturation as well as satisfactory variation among our interlocutors, i.e., other potential interlocutors would have very similar profiles to those we had already interviewed. All interviews were recorded and manually transcribed with the consent of the interlocutors who received the transcripts for comments, although we did not receive any comments. The interviews were conducted in Portuguese, and relevant excerpts cited in publications were translated into English by the authors.

Table 1. Overview of interviews.

Role	Region	Occupation/Education	Gender	Age	Alias
Member of APIB leadership	Center-West	Teacher/Pedagogy	Male	over 50	Ali
Communications specialist Indigenous organisation	Northeast	Filmmaker/Communication	Male	over 30	Jorge
Member of APIB leadership	South	Politician/Environmental Management	Female	over 40	Teresa
Regional coordinator of an Indigenous organisation	Northeast	Not disclosed	Male	over 40	Elio
Communications advisor APIB	Southeast	Communicator/journalism	Female	over 40	Regina
Research consultant APIB	Southeast	Researcher/Anthropology	Male	over 30	Luis

3.2. Ethical Considerations

The project within which we conducted this study was approved by the Ethical Review Board of the project's institutional host and the study was considered low risk for both participants and researchers. Following standard ethical best practice in social sciences research, all interlocutors received information about the project, how interview data would be used, where it would be stored, and about their ability to withdraw at any point. Even though the interviews addressed activities that our interlocutors performed publicly and they would be talking about their area of expertise, we opted to anonymise our interlocutors to emphasise the collective aspects of Indigenous counter-mapping. After the interviews, all interlocutors had the opportunity to read and comment on the transcripts, but we did not receive any comments.

We must further reflect on the specific ethical implications of researching with Indigenous Peoples about themes that are relevant for them without ignoring that this is a political activity (Blanco, 2020, p. 72). In this sense, beyond avoiding that research with Indigenous communities causes any kind of harm, it is also important to conduct research in dialogue with these communities without objectifying or exoticising collective Indigenous knowledge and practices as research objects. The interlocutors were selected in their capacity as experts in the areas addressed by the project, following the project's standpoint that considers activists and other politically engaged individuals and collectives as legitimate producers of knowledge.

3.3. Interview Analysis

We conducted a thematic analysis of the interviews following the guidelines developed by Braun and Clarke (2017) and using qualitative data analysis software. Thematic analysis was chosen due to its theoretical flexibility, given the transdisciplinary approach of the project, which makes the use of a strictly theoretically informed methodology difficult. Furthermore, thematic analysis allowed us to systematically organise the rationales, experiences, and practices of counter-mapping among Indigenous communities to understand how they relate to broader Indigenous communication and political mobilisation. We performed an abductive analysis as a middle-ground between deductive and inductive research (Thompson, 2022). We did not depart from pre-determined hypotheses, but the analysis was informed by the conceptual map outlined above; thus, it was not entirely data-driven. While we wanted to remain epistemologically close to the interplay between communication, political mobilisation, resistant cartographies, and technological appropriation, we consciously avoid bracketing out datafied mapping practices in time and from the communication ecology experienced. Thus, we consciously avoid technology presentism (Virilio, 2010) and one-medium bias (Mattoni & Treré, 2014).

We conducted the analysis following the traditional six-step process devised by Braun and Clarke (2017) which includes the five operational steps below, plus writing up:

1. Familiarisation with the data: Author 2 transcribed the interviews, and both authors read the transcriptions to obtain an overview of the data.
2. Generation of initial codes: Author 2 coded the transcripts, informed by the research questions, to grasp rationales, experiences, and practices related to countermapping during the Covid-19 pandemic. Author 1 reviewed the codes. During this step, both authors met to resolve discrepancies and discuss the applicability of the codes generated by Author 2.
3. Generating themes: Author 2 generated overarching themes from the identified codes.
4. Reviewing themes: Both authors discussed the themes generated by Author 2 to ensure thematic saturation and the stringency of the themes in relation to the initial codes.
5. Defining and naming themes: Authors 1 and 2 jointly defined and named the themes that are discussed below.

4. Indigenous Emergency: Counter-Mapping, Communication, and Resistance

We set off this analysis with the aim of understanding counter-mapping practices among Indigenous communities in Brazil in the context of a global sanitary crisis (the Covid-19 pandemic), placing these practices in a continuum of Indigenous communication and within a spatial-temporal communication ecology. In the following sub-sections, we present the four themes that articulate the discussion about counter-mapping practices generated in the analysis of the six interviews: antagonism to the government, collective action, knowledge appropriation, and visibility.

4.1. Antagonism to the Government

During the Covid-19 pandemic, Indigenous collective organisations engaged in counter-mapping practices primarily to protect Indigenous communities from the consequences of the pandemic in a reaction to the

omissions of Jair Bolsonaro's government. In this thematic cluster, data-driven counter-mapping practices are explained in their tactical potential as tools to face an extremist government that has strongly antagonised Indigenous Peoples in Brazil. This antagonist position goes beyond political agonism (Mouffe, 2014) because the government at the time opposed the existence of Indigenous Peoples. During previous governments, Indigenous organisations experienced tensions and disagreements with the federal government, for instance, when President Dilma Rousseff approved the construction of several hydroelectric plants in Indigenous territories as part of a national programme for the acceleration of economic growth. This sparked a wave of protests and digital mobilisation at the time; however, open threats in words and actions were a particular trait of Jair Bolsonaro's government. In the words of Elio: "Indigenous healthcare has 1,46 million reais to work with, and that is not enough. Even so, the government cuts more than half of the resources. I think the intention of this government is really to exterminate Indigenous people!". He also describes the hostility faced by Indigenous organisations during a demonstration:

> FUNAI's [Fundação Nacional dos Povos Índigenas] president...ordered [the police] to shoot the Indigenous people who were demonstrating with rubber bullets, and left many people injured. So, in Bolsonaro's government, we did not have a good relationship with any of the public authorities dealing with Indigenous causes.

Mentioning the pandemic specifically, Regina points out that:

> It is such an exceptional case, because the role of the state is to do it [map out the contagion among Indigenous Peoples], and what happened was the opposite, the state took the virus into the territories. The first cases, for instance, were doctors or someone from SESAI [Secretaria Especial de Saúde Indígena] who had contact with an Indigenous person, that is, a federal government employee who was infected and contaminated the territory.

Furthermore, the collective organisations needed to constantly respond to hostile actions and statements from the government. For instance, Teresa argued that the governance constituted by the Indigenous collective organisations was intended to confront the federal government's denial of Indigenous communities' rights. She even alludes to experiencing physical discomfort when discussing pandemic measures with the government: "We were discussing the emergency plan with the government, and I felt sick when I had to stand face to face with those who want to exterminate us."

In this conjuncture of stark hostility, there is a continuation of the communicative struggle (Vaughan, 2018) with a new narrative object during the pandemic, which is the consequences faced by Indigenous Peoples and the government's (in)action regarding these consequences. Faced with such dire conditions, Indigenous collectives have started to strategically use mapping to represent their territories and communities with increased specificity and nuance, corroborating Jeppesen and Sartoretto's (2023, p. 152) argument. However, in the context of an antagonistic relationship with the government, Indigenous collectives faced yet another challenge when engaging in counter-mapping practices: The withholding of access to official data about the impact of the virus on Indigenous populations. Teresa affirms that "the government refused to keep statistics over the victims [among Indigenous populations] so they could deny what we said was happening."

Elio explained the situation: "There was a period when SESAI told us that they could not provide us with information because it was confidential." Due to its strong organic mobilisation and articulation that tapped into established Indigenous collective organisations, Indigenous Emergency succeeded in its data appropriation efforts to construct a representation of the impact of Covid-19 on Indigenous communities that could substantiate demands for support from civil society and action from state authorities (Kukutai & Taylor, 2016; Proulx, 2014).

Two of our interlocutors who integrated the leadership in Indigenous collective organisations highlighted this political character of counter-mapping. Ali says that the maps produced during Indigenous Emergency could "force something to happen from the government's side." Ali explains that "APIB created the project to have trustworthy figures and to form the basis to prosecute SESAI in the Supreme Court. In the end, Minister Barroso ordered SESAI and FUNAI to provide assistance to Indigenous communities."

These dialogues show that there is a collective appropriation of data as a strategy to respond to an antagonistic government that has weaponised data within a logic of political hostility and ethnic discrimination. The struggle of Indigenous Peoples of Latin America and Brazil against extermination and to be recognised as bearers of rights is a centuries-long feature of politics in the region. The deployment of data as a tool to invisibilize Indigenous populations was a new tactic within an old strategy adapted to the extreme right's ambitions for territorial control and ethnic cleansing.

4.2. Collective Action

As discussed in the conceptual mapping, we foreground counter-mapping within the history of Indigenous collective action and the articulation of various collective actors to represent Indigenous Peoples. In this context, counter-mapping practices are a form of collective engagement in two aspects: They are a collective effort that requires collaboration and coordination among individuals and regional Indigenous organisations. Following the history of Indigenous mobilisation, counter-mapping practices during Indigenous Emergency had a strong anti-colonial aspect, as illustrated in Teresa's explanation:

> So today we have achieved this visibility, and we can say to Europe that they have a historical debt with us and demand reparation....We can prove that we are the guardians of life on the planet and that the world needs us one more time.

She is referring to the increased deforestation of the Amazon forest during Jair Bolsonaro's government to clear the land for commodity crops and cattle herding, while international awareness rises about the importance of the rainforest to regulate the climate. This makes the permanence of Indigenous populations crucial to the preservation of the Amazon forest. The maps produced during Indigenous Emergency could show the relation between the meatpacking facilities located in the vicinity of Indigenous reservations and the contagion among Indigenous populations.

Counter-mapping practices must therefore be understood as an element within the construction of a collective actor grounded on Indigenous cosmovisions, following Milhomens' (2022) argument about the relation between Indigenous cosmovisions and the territories they inhabit. Strategically articulated communication is the subtle mesh that holds the collective actor together, as Jorge exemplifies: "Everything

was very difficult, but we supported each other. What generated our group was the collaboration between all communicators working with Indigenous Peoples in Brazil."

The interviews demonstrate that data-driven cartography appropriated by Indigenous collectives to resist colonial dominance does not exist in a vacuum, but is anchored on long-term mobilisation processes, as Elio explains: "So, in 2003, during the first Free Land Encampment, we felt the need to come together again and create an organisation to unite all Indigenous Peoples in Brazil."

And Teresa points out that as a member of the APIB executive board, she could "meet other organisations around Brazil with all the [Indigenous] peoples, where we could have these dialogues and together think about the best way of supporting populations in their territories."

Through this collective organisation, Indigenous collective actors argue that they can construct the political power necessary to influence policy making and legislation, and the maps created through counter-mapping practices are a materialisation of this process. As Elio explains: "The action was very fast...what we managed to mobilise and what we managed to contribute to mitigate the pandemic, for this reason, the maps were crucial at that moment, and they still are."

Following the nexus of collective organisation and construction of political power, digital mobilisation is purposefully articulated and maintained in periods when it is much needed. Regina, a journalist with a long trajectory as a communication advisor for APIB, points out that they held varied communication initiatives with Indigenous Peoples for an entire year to maintain online mobilisation. And Elio argues that during the pandemic, the internet was the main vehicle to access and share data in order to articulate counter-mapping practices, while the digital maps became a source of trustworthy information for Indigenous communities.

4.3. Knowledge Appropriation

Indigenous counter-mapping practices during the Covid-19 pandemic constituted a process of knowledge appropriation in which data-driven mapping techniques were adapted and modulated in combination with local collective knowledge. It is thus not accurate to define the use of these technologies as adoption, as they are deliberately juxtaposed to other collective practices, as Jorge explains:

> I have worked a lot with maps, including geo-mapping. APOINME [Articulação dos Povos Indígenas do Nordeste, Minas Gerais e Espírito Santo] sent me assignments in my role as communicator. There was a project called Indigenous Environmental and Territorial Management, back when the government cared for the environment, so we went around in the villages to map them out. We conducted mapping projects with the Tremembé people in Ceará, and with the Pakararu people, we conducted an ethno-zoning in which we first identified the problems and then located them on the map.

The adaptation of maps to the needs, knowledge, and political demands of Indigenous collectives is also highlighted by Teresa:

> The Indigenous movement is a political movement whose main demand is the demarcation of land and the granting of rights through public policies. During the pandemic, we needed to keep doing this, to

advance these struggles and take control in the areas of healthcare and education, and protect our lands because we were experiencing many invasions during this period.

Challenging technological determinist arguments that ascribe to technologies the agency to solve problems, data-driven counter-mapping practices among Indigenous communities during the Covid-19 pandemic relied on existing relations and organic articulations among Indigenous communities and between Indigenous collectives and other sectors of society. Luis, who worked in civil society organisations allied to the Indigenous collectives, points out that even if they did not know whether information from official sources about contagion in Indigenous areas was trustworthy, the collective had the expertise to utilise the information:

> From these [official] figures, we could make estimations and develop other things as well. So, we provided this initial support to Indigenous Emergency so they could have the figures on the website and see the spreadsheets to generate data that were automatically updated without the need for someone to do this manually every time or create a new graphic and paste it there. We provided this support for the Indigenous Emergency site, a small contribution, but from the point of view of the site, it was very important. It was a well-organised process; they formed a group with Indigenous and non-Indigenous people who helped with the methodology. It was a very rigorous work done with the participation of grassroots organisations.

Personal relations and intergenerational help in the communities were also identified as key aspects for technological appropriation in symbiosis with the collective dynamics in the communities, as Elio explains:

> We kept thinking about what we could do for the information to reach [the villages]. Not everyone can use the internet, but we had to, somehow, ensure that the information reached everyone. So, for that young person who is more used to and closer to technology, we organised a live event online. He gathered the whole family to watch and then shared it with the village. I believe that many communities did the same as we did here.

These dialogues with our interlocutors reveal the complex social relations materialised through communicative processes that make up the context for data-driven counter-mapping practices or the social world that surrounds media technologies (Silverstone, 1999).

Finally, as part of a process of political mobilisation, counter-mapping cannot be an end. The maps themselves, as material artefacts, are not the final goal of counter-mapping, as suggested by Luis:

> They [the maps] had their importance, but now they need to be turned into something else. We need to transfer this data to a better-structured database and organise what we are going to do with data visualisation, if we are going to transfer it to the websites of Indigenous Peoples and Indigenous lands.

This means that, within Indigenous political mobilisation, the maps produced through data-driven counter-mapping practices cannot be seen as static media products, but as the materialisation of social and political processes, including the appropriation of knowledge.

4.4. Visibility

As media, maps represent territories and people and can thus be instruments of power, as they can be employed as tools for (in)visibility. Indigenous Peoples in Latin America have for centuries been the object of this representational power exerted first by colonisers and then by the state. It is noteworthy that most maps in mainstream Brazilian schoolbooks do not usually show Indigenous reservations or territories. In this context, the collectives involved in Indigenous Emergency, faced with a crisis in which invisibility became particularly harmful, engaged in counter-mapping practices to mitigate the consequences of the pandemic through the visibility that they expected to gain. For instance, Luis pointed out in the interview that official contagion numbers were largely underreporting contagion among Indigenous populations. With the maps, the organisations aimed at different scales of visibility—self-visibility, national visibility, and international visibility. In the previous section, we addressed how counter-mapping as a practice and the maps as artefacts were important for the communities to learn and understand how the pandemic affected them and how data was used as a tool to demand action from the state and public authorities. But the information produced during Indigenous Emergency also had an international reach, as Elio points out:

> We managed to show to certain parts of the world what was happening; it was not limited to organisations or Indigenous Peoples, or only within Brazil, but the whole world, or at least part of the world, became aware of what was happening, how Indigenous people were being treated. It helped us raise funds that we could then direct to Indigenous territories.

Nationally, the cartographic data and maps produced by Indigenous Emergency also attracted the attention of the press. The partnership with researchers and civil society organisations strengthened Indigenous Emergency's legitimacy as a source, as Luis argues:

> We scored a cover feature in Valor Econômico…it is a newspaper that circulates in a sector with strong political power in the debate. They put Sonia Guajajara's picture, and I produced the text with a journalist specialised in environmental issues.

Regina corroborates this view:

> [APIB] started producing content in a very consistent way, one reason being that the press was seeking out [APIB] because they are the best-positioned Indigenous source, the main national organisation uniting the regional collectives, so they consistently provided data to the press, and the press were continuously contacting them.

In retrospect, he positively evaluates the outcome of the coverage: "I think that there was a strong sensitisation among Brazilian society to the problems caused by the pandemic among Indigenous populations. We felt it very strongly, and it reverberated in traditional media and through social networks."

Data driven counter-mapping practices can thus be understood within the framework of communicative citizenship (Mata, 2002, 2006) as collective communicative efforts to reclaim power over both communication tools—maps—and collective representation. Taken as a whole, the interviews show that among individuals with leadership positions within Indigenous collectives and allied organizations there is a

strong consciousness and acute understanding about the ways in which Indigenous communities are in general marginalized and were particularly vulnerable during the pandemic. This consciousness materialises in the processes that produce the maps as a hyper-representation of the territory in the sense that they have continuously shown unfolding relations between people and territories. Among these collectives, there is also robust accumulated knowledge about different aspects of communication—including strategies, technologies, and the relation between communication and politics, as well as a strong sensibility for collective demands and for the importance of Indigenous Peoples in questions that have a much broader social impact, such as the climate crisis. As Elio explains:

> We need to show that we are citizens as any other citizen and that we are the foremost guardians of that which is going to guarantee our future in 50, 100 years—our natural resources, our forests—that are ever more coveted by developed countries who want to take away our resources. If we do not take care of Indigenous Peoples soon, we will not have fresh air to breathe, we will no longer have life, so we need to protect Indigenous populations in Brazil.

Elio's explanation resonates with Morley's (2009, p. 115) that even the latest technologies rely on material infrastructures to work. Further, we argue that the material infrastructures are supported by robust social structures that facilitated the circulation of the data that made the maps possible.

In Jorge Luis Borges's short tale *On the Exactitude of Science*, the Argentinian author tells the reader about a map so exact and faithful to the space represented that it lost its informational use and became a ruin. Conversely, Indigenous counter-mapping initiatives became useful artefacts precisely because of the socio-political relations that underpin their making. Instead of becoming a decaying ruin, they represented the context-rich and dense interconnection between communities and the territories where they live. During the pandemic (and beyond), these maps were produced through resistant communicative processes that disrupted the logics through which Indigenous Peoples were objects of data and documentation that served a particularly hostile government.

5. Concluding Discussion

Data-driven cartographic representations of varied data points plotted on maps were an important communication tool during the Covid-19 pandemic between 2020 and 2022. Jeppesen and Sartoretto (2023) argue that the hegemonic maps widely circulated through varied media failed to show the inequalities and vulnerabilities among marginalised groups. Our study demonstrates that Indigenous collectives in Brazil, foregrounded by a decade's long history of political mobilisation, were quickly aware of the failures in official data mapping the pandemic, and consequently, of their territorial and social invisibilization in official cartographic representations of the pandemic. This account adds to the body of research on Indigenous cartographies and counter-mapping worldwide, including Canada (Hunt & Stevenson, 2016; Lowan-Trudeau, 2021), Colombia (Oslender, 2021), and Australia (Syme, 2020), contributing to a conceptualisation of the communicative aspects of counter-hegemonic mapping practices. Our study adds nuance to current discussions on Indigenous communication in general and Indigenous counter-mapping in particular by providing a snapshot of the exceptional pandemic scenario coupled with an openly hostile extremist government. During the pandemic, counter-mapping was mobilised by Indigenous Peoples in Brazil as a crisis communication strategy worthy of attention in similar (and imminent) crisis situations.

Furthermore, the study highlights that it is impossible to dislocate data-driven counter-mapping practices from Indigenous resistance and from the dynamics of collective action within Indigenous collectives and communities. However, it is possible to partially relate the intense focus on data-driven counter-mapping that culminated in the Indigenous Emergency initiative to the exceptional historical moment of Jair Bolsonaro's government as a stark antagonist to Indigenous Peoples and their collectives. It is also worth noting that the rapid and effective mobilisation made use of strategic collaborations with other civil society organisations such as media collectives and research institutes.

The interviews articulate a collective understanding that access to technology and the adoption of new technologies are not an end but are a means to achieve visibility at different scales (within the communities, nationally, and internationally) and legitimate demands for political representation. In this process, political articulation and consciousness precede and condition technological appropriation, in which data combined with cartographic knowledge and representation becomes an instrument for political struggle. In this sense, the collective appropriation of technologies and the political awareness among Indigenous collectives and leadership play an important role in avoiding a Faustian bargain. For the collectives involved in Indigenous Emergency, it is not the technologies but the association between an oppressive state and corporate power that poses threats to their livelihoods.

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About the Authors

Paola Sartoretto is an associate professor in media and communication at the School of Education and Communication, Jönköping University, Sweden, and the director of the international MSSc Sustainable Communication. Dr Sartoretto has published extensively on media activism and communication rights in English and Portuguese.

Luana Martins is a graduate student in communication at the University of São Paulo (USP). In 2022, she participated in MITACS Globalink in Canada, researching data journalism. Martins completed a scientific initiation grant funded by CNPq (Brazilian National Research Agency—Conselho Nacional de Pesquisa) and has worked as a journalist and marketing assistant since 2023.