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THEMATIC CLUSTER: THE POLITICS OF DATA IN
LATIN AMERICA: TOWARDS A TERRESTRIAL INTERNET

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Territories of data: ontological divergences in the growth of data infrastructure

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ABSTRACT

The construction of astronomical observatories in the Atacama Desert has prompted different actors in Chile to envision initiatives for promoting the expansion of data infrastructure. While such projects are usually seen as synonymous with development, Lickan Antay Indigenous activists affected by the construction of an observatory consider this situation the beginning of a new chapter in their history of territorial struggle. Building upon political ontology, this article argues that the growth of data infrastructures can underpin ontological divergences concerning the territory, i.e. what territory is and its relation with other entities. To do so, it compares two divergent ontologies of territory emerging in the Chilean context. While the Natural Laboratories policy and the Datagonia project transform the territory into a source of economic resources affording opportunities for developing data infrastructure (assetized ontology of territory), Lickan Antay activists conceive of territory as a unitary whole made up by human and other-than-human interdependencies (relational ontology of territory). Based on a discursive-material analysis of interviews and documents, this article delves into the ontological dimension of data colonialism and proposes an infrastructural regime that does not reproduce terricide and is aligned with the flourishing of multiple worlds.

RESUMO

A construção de observatórios astronômicos no Deserto de Atacama impulsionou diferentes atores no Chile a projetar iniciativas para promover a expansão da infraestrutura de dados. Ainda que tais projetos sejam usualmente vistos como sinônimos de desenvolvimento, ativistas indígenas Lickan Antay afetados pela construção de um observatório consideram que tal situação está inaugurando um novo capítulo em sua história de disputa territorial. Baseado em ontologia política, este artigo argumenta que a expansão da infraestrutura pode sustentar divergências ontológicas sobre o território, ou seja, o que é um território e sua relação com outras entidades. Para isso, examina duas ontologias

KEYWORDS

Infrastructure; territory; ontology; data colonialism; datafication

PALAVRAS-CHAVE

Infraestrutura; território; ontologia; colonialismo de dados; dataficação

PALABRAS CLAVE

Infraestructura; territorio; ontología; colonialismo de datos; dataficação

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de território emergentes no contexto Chileno. Enquanto a política de Laboratórios Naturais e o projeto Datagonia transformam o território em uma fonte de ativos que oferece oportunidades para desenvolver infraestruturas de dados (ontologia do território como um ativo), ativistas Lickan Antay concebem o território como um todo unitário composto por interdependências humanas e não-humanas (ontologia relacional do território). Com base na análise discursiva-material de entrevistas e documentos, este artigo se aprofunda na dimensão territorial do colonialismo de dados, e propõe um regime infraestrutural que não reproduz terricídio e está alinhado ao florescimento de múltiplos mundos.

RESUMEN

La construcción de observatorios astronómicos en el Desierto de Atacama ha impulsado a diferentes actores en Chile a proyectar iniciativas para promover la expansión de la infraestructura de datos. Si bien dichos proyectos son usualmente vistos como sinónimo de desarrollo, activistas indígenas Lickan Antay afectadxs por la construcción de un observatorio consideran que esta situación está inaugurando un nuevo capítulo en su historia de luchas territoriales. Inspirado en la ontología política, este artículo sostiene que la expansión de la infraestructura puede conllevar diferencias ontológicas sobre el territorio, es decir, qué es el territorio y su relación con otras entidades. Para ello, se comparan dos ontologías del territorio divergentes emergiendo en relación al contexto chileno. Mientras que la política de Laboratorios Naturales y el proyecto Datagonia transforman el territorio en una fuente de activos económicos que ofrecen oportunidades para el desarrollo de infraestructura de datos (ontología del territorio como un activo), activistas Lickan Antay conciben el territorio como un todo unitario conformado por interdependencias humanas y no-humanas (ontología relacional del territorio). Basado en un análisis discursivo-material de entrevistas y documentos, este artículo profundiza en la dimensión ontológica del colonialismo de datos y propone un régimen de infraestructura que no reproduce el terricidio y está alineado con el florecimiento de múltiples mundos.

1. Introduction

The increasing prominence of digital data in different areas of social life over the last few decades has been accompanied by explosive growth in the infrastructure required to produce, manage, and process such data. Data centers, fiber optic cables, and sophisticated scientific instruments of data production, such as weather stations and astronomical observatories, have been deployed across the planet. While in most cases this process is celebrated as a societal advancement, less discussed is the extent to which the expansion of data infrastructure can intersect with the occupation of territories in different latitudes of the planet – a centuries-old pattern that constitutes a condition for the sustainment of the capitalist world economy and the modern way of living.

Drawing on the case of astronomy data in Chile, I argue that not only extractivist mining or vast monocultures, but also the expansion of data infrastructure, can impinge upon the cultivation of worlds based on human and other-than-human interdependence. Thanks to the pristine skies of the Atacama Desert, the construction of mega

observatories by scientific organizations predominantly from the United States – such as the Association of Universities for Research in Astronomy (AURA) – and Europe – such as the European Southern Observatory (ESO)- have transformed the Atacama Desert into one of the main sources of terrestrial observational data. According to estimates, such volumes reached 16.5 Petabytes¹ per year in 2021 (Ministry of the Economy 2019, 3). In light of this seemingly unique opportunity, members of the public and the private sector in Chile now envisage initiatives aimed at expanding the construction of data infrastructure for economic goals. This article focuses on the Natural Laboratories policy, which seeks to replicate the case of astronomy by identifying geophysical singularities that can attract foreign investment; and Datagonia, which aims to build a farm of data centers in a cold region of the country. In contrast to this optimistic narrative, Lickan Antay indigenous communities affected by the construction of one of these observatories consider the expansion of astronomy infrastructure to be the start of a new chapter in their history of territorial struggle.

In this article, I adopt the lens of political ontology, which focuses on conflicts regarding different *ways of worlding*, i.e. disputes over what entities are taken to exist and the relationships between them (Blaser and de la Cadena 2018). Based on a discursive-material analysis of interviews and documents, I argue that the conflicts spurred by the expansion of data infrastructure in Chile point to divergences regarding the entities that make up the territory; in other words, these conflicts point to different *ontologies of territory*. My main claim is that at stake in this divergence is not only the continuity of the flora and fauna present in the area, but more broadly, the very possibility of sustaining forms of coexistence in the territory that differ from the one that emerged with modernity. As I explain, this way of approaching the expansion of data infrastructure sheds light on a previously overlooked dimension of data colonialism (Couldry and Mejias 2019), a body of work that has privileged the lenses of political economy and epistemology. Moreover, the type of analysis I offer in this article has become increasingly urgent in times of what Mapuche activist Millán (2020) calls *the terricide*, i.e. a criminal operation threatening the worlds of Indigenous peoples and sustainability of the planet.

The insights of this article echo this volume's invitation to think about data in Latin America in alignment with Bruno Latour's terrestrial politics. Like Latour, here I advocate for incorporating the territory as "an agent that participates fully in public life" (2018, 34). I also echo Latour's concern with the different *worlds* in which individuals and groups live, although in the case of this article the emphasis is not on advocating for a particular world – "a New World" (2018, 34; emphasis added) – but on enabling what the Zapatistas from Chiapas, Mexico, would call the *pluriverse*, i.e. "a world in which *many worlds* fit" (cited in Blaser and de la Cadena 2018, 1; emphasis added). Moreover, and in light of criticism of the "ontological turn" in the social sciences (Todd 2016), this article privileges the voice of Indigenous people and of authors who have engaged directly with Indigenous knowledges.

With the above aims, this article proceeds as follows. First, I look at discussions about territory and political ontology to develop a conceptual framework, which is followed by an account of the politics of data infrastructure and data colonialism. After that, I refer to the methods employed for the data collection, which involved interviews and documents, and to the discursive-material approach deployed in the analysis. In the subsequent

¹One Petabyte equals to 1000,000 Gigabytes.

empirical sections, I delineate the assetized and relational ontologies of territory emerging in Chile in relation to astronomy data infrastructure. Finally, in the conclusion, I explain how this study might speak to debates held in critical data studies not addressed in this article.

2. Territorial conflicts as ontological divergences

The notion of *territory* is a contested one in Latin America. The dominant understanding of this word has its origins in European modernity, when the rise of the nation-state transformed space into a bounded area subject to sovereign forms of exercising power (Elden 2010). Calculative techniques of measuring, mapping, and surveying are employed to this day to compartmentalize and regulate space under this logic. By contrast, some Indigenous, Afrodescendant, and peasant communities, as well as social movements in Latin America, hold a divergent understanding of territory (Escobar 2018). For these, territory is the product of a thick set of interdependencies between human and other-than-human actors that are crucial for the sustainment of ways of life that differ from the precepts of capitalist modernity. Rather than being subjected to the control of a superior sovereign authority, under this understanding all entities are dependent on each other. In light of the Latin American context, this article privileges “territory” as an analytical category, rather than alternatives such as “land,” due to this term’s capacity to address the geopolitical and ecological character of territorial conflicts.

More recently, anthropologists looking at Latin America have attended more carefully to the *ontological* stakes of territorial conflicts in this region. Seeking to avoid the privileging of modern categories, anthropologists Mario Blaser, Marisol de la Cadena, and Arturo Escobar (Blaser 2009; Blaser and de la Cadena 2018; Escobar 2018) approach territorial conflicts involving Indigenous communities not as battles over “resources” (political economy) or as incompatible “visions” about nature (political ecology), but as profound disagreements regarding *what exists* – in other words, as divergences about the very *worlds* societies and communities are part of. Informed by science and technology studies (STS), political ontology challenges the modern assumption that all human groups live in a single common world in which *nature* is the mere background of *culture* (Escobar 2018, 100). This is because this scheme does not fit some non-modern worlds in which other-than-human actors such as mountains and rivers can become active participants in political discussions. For example, in the world of the Lickan Antay people living in the Atacama Desert, Chile, the mountains are their ancestors, who can intervene in the life of the people (Bastien 1978). Thus, political ontology calls for acknowledging that ontological conflicts point to different *ways of making worlds* and implies decentering the human as the main agent of history. When adopting a historical perspective, it becomes clear that the destruction of Indigenous worlds has been part and parcel of the colonial and modern projects.

Drawing on the two discussions above, this article identifies two *ontologies of territory* (the assetized and the relational ones) mobilized in relation to astronomy data in Chile, asking what territory emerges in each case and what types of relations sustain it. Compared to political ontology, my approach is more specific since in this article I do not outline the overarching ontology of particular groups, but rather analyze the ontology

underlying the assumptions and practices about the territory mobilized in relation to the growth of data infrastructure in Chile.

3. The infrastructure of data colonialism

Due to its focus on data infrastructure, this article aligns with ongoing efforts to debunk the predominantly abstract aura of related technological developments, such as the Internet, by bringing to the fore the sociotechnical systems required to produce, distribute, and process large volumes of information. As Edwards (2010) notes in his study of climate sciences, data does not float freely across the planet, but relies on a “vast machine” that spans the globe and comprises data centers, fiber optics cables, standards, and forms of expertise. The fact that astronomy manages some of the largest volumes of data when compared to other scientific disciplines makes this infrastructure particularly relevant for research (McCray 2017). As different authors have argued, the infrastructure that makes possible the circulation of data across the planet has been, and still is, implicated in colonialism and its legacy in different ways. From a material perspective, the global distribution of this infrastructure echoes the “geopolitical matrix of pre-existing colonial and national routes” (Starosielski 2015, 30), reflecting the asymmetries between center and periphery that emerged with European colonialism. Data infrastructures can also exert power in a more symbolic register when they act as a “colonial sublime” that ushers in “an overwhelming sense of grandeur and awe in the service of colonial power” (Larkin 2008, 7).

In this article, the growth of data infrastructure is understood as part of a broader shift taking place in the last decade, in which data becomes a source of political power and economic wealth. Among existing proposals, Couldry and Mejias (2019) put forward a framework to grasp the current role of data in society that is sensitive to history and geopolitics. For these authors, the increasing valorization of data is giving rise to a new phase of both capitalism and colonialism called *data colonialism*; this is based on the appropriation of the life of individuals by social media platforms and other transnational companies. In addition to a political economy, data colonialism also encompasses a flawed epistemology that undermines alternative forms of knowledge production. In this scheme, the vast volumes of data produced by astronomy would represent an important driver of the *logistical* layer that makes data colonialism possible, contributing to the expansion of global data infrastructure and the development of cutting-edge data processing techniques that will be transferred to industry (Ministry of the Economy 2019). In addition to this, a broad take on data colonialism would also consider the production of biological and environmental data as a form of capture of the commons (Ricaurte 2019, 355), a source of epistemic obedience for data-poor groups (Lehuedé 2021) and involving forms of extraction not developed by Couldry and Mejias.

That the data at stake in the case study of this article pertains to astronomy shall not be overlooked. Modern sciences have been crucial for colonialism in aspects such as the formulation of the nature/culture divide, the transformation of distant lands into sources of raw data, and the undermining of Indigenous knowledges. The construction of the Thirty Meter Telescope (TMT) on the Mauna Kea mountain in Hawai‘i, Kanaka sacred land, constitutes a perfect case in point (Salazar 2014). This article also shows how initiatives involving scientific data can become subsumed by economic logics. In the case of Chile, the

main advocates of infrastructure projects based on astronomy data pursue economic development and business growth goals.

Against this backdrop, this article draws on data colonialism in order to acknowledge the economic drive underpinning the expansion of data infrastructure in Chile and the functional-logistical role of such infrastructure in the reproduction of colonial dynamics of extraction. Moreover, taking into consideration ontological politics and territorial struggles can expand accounts of data colonialism by signaling a previously overlooked colonial pattern of power.

4. Methods

The insights discussed in this article stem from empirical data collected from interviews and documents for a broader research project. For this project, I conducted 34 semi-structured interviews with people affiliated to Chilean organizations, and also working on or affected by the production and management of astronomy data. Interviewees were academics (16), members of the public (8) and private (5) sectors, as well as Indigenous (3) and digital (2) activists; in terms of gender, they identified as men (27) and women (7), which reflects the unequal balance of astronomy-related positions in the country. No interviewee opted for any type of anonymity. These interviews were conducted in Spanish between December 2018 and May 2019 in Santiago de Chile, La Serena City and San Pedro de Atacama. The analysis also draws on the book “Natural Laboratories for Chilean Science” (Aguilera and Larraín 2018) and ethnographic studies looking at the Lickan Antay and Andean cosmology (Barros 1997; Bastien 1978; Núñez Atencio 2007).

My exchange with Indigenous activists was not devoid of extractivist dynamics, especially when considering my positionality as a Chilean non-Indigenous researcher affiliated to a university based in the Global North. Despite this, I consider the conversations I had with them as politically illuminating for both parties. While this exchange allowed me to identify an alternative ontology of territory, the Lickan Antay activists had the opportunity to reflect about the initiatives of the Chilean government with regards to astronomy data.

For the in-depth analysis, I followed the discursive-material approach proposed by Carpentier (2017), a hybrid framework that acknowledges the role of these two dimensions as deeply entangled. The discursive focuses on attempts to fix certain constructions of reality, and was explored by identifying divergences surrounding “territory” and related signifiers (e.g. environment and landscape) in the empirical material. On the other hand, the material acknowledges the agency of other-than-human actors and was analyzed by locating the attribution of agency to the territory and other-than-human actors. Like other qualitative methods, discursive-material analysis does not aim at generalization but at providing an in-depth account of the phenomenon studied.

In the next empirical section I identify two ontologies of territory underlying the production of astronomy data in Chile. The discussion of the first one, which I call assetized, begins with an account of the growth of data infrastructure in Chile and analyzes the Natural Laboratories and Datagonia initiatives. After that, I turn to the relational ontology of territory by providing background information of the Lickan Antay Indigenous communities and referring to two conflicts they have had with the ALMA observatory.

5. The assetized ontology of territory

5.1. Astronomy infrastructure in Chile

The ontologies of territory I discuss in this article have been delineated and mobilized against the backdrop of the growth of astronomy infrastructure in Chile. Currently, around 60% of the world's terrestrial observational infrastructure is concentrated in Chile (Ministry of the Economy 2019, 3). This situation has been made possible thanks to the outstanding geographical conditions afforded by the Atacama Desert, the relative institutional stability of the country, and a series of land, tax, diplomatic and labor benefits for international scientific organizations. Despite an ongoing debate regarding the benefits of the construction of the mega observatories for the Chilean industry (Guridi, Pertuze, and Pfothenauer 2020), the dominant discourse is optimistic. The growth and prestige of the Chilean astronomy community and the recent launch of the Data Observatory public-private initiative are two of the reasons behind such enthusiasm. As the title of an opinion piece states, astronomy is considered to be ushering in “digital infrastructure for development and innovation in Chile” (Arellano 2018).

5.2. The Natural Laboratories policy

The first ontology I discuss in this article is particularly clear in the Natural Laboratories governmental policy. Seeking to replicate the case of astronomy in other areas, in 2011 the National Commission for Scientific and Technological Research (CONICYT) identified a series of “natural laboratories” afforded by the Chilean geography that could attract world-leading research infrastructure. After an initial formulation, policy-makers from the Ministry of the Economy also got involved in considering this initiative's capacity to attract foreign investment and boost local industry. As a book co-authored by scientific and economic government officials states, a natural laboratory is “a singularity or anomaly of the environment that attracts the attention of world science, and when this occurs in emerging countries provides competitive advantages that are not replicable anywhere else” (Aguilera and Larraín 2018, chapter 1, section 3, para. 2). Just like the pristine skies of the Atacama Desert, Chile's frequent earthquakes, cold sea currents, and a series of other unique geographic features, are expected to attract international scientific organizations and prompt the development of infrastructure. This initiative has been accompanied by a map identifying a series of natural laboratories in Chilean geography (Figure 1). Strikingly, the concept of “natural laboratory” was also employed almost a century ago by a South African scientific organization in relation to the African context (Tilley 2011).

As some participants explained to me, the Natural Laboratories requires policy makers to approach the territory from a specific direction. The words of Gabriel Rodríguez, a governmental official from the Ministry of Foreign Relations whom I met in his office in Santiago's civic center, illustrate this point:

You have to look at the landscape from the point of view of its geography, that is to say, from the point of view of what our participation is on the planet that we have got. Chile is a natural laboratory. It has the Humboldt current,² it has the most spectacular skies in the world for studying astronomy.

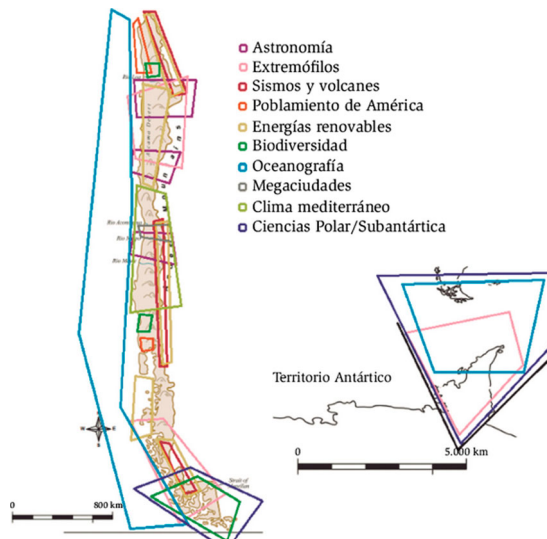


Figure 1. Map of Natural Laboratories in Chile. The list reads: astronomy; extremophiles; earthquakes and volcanoes; the settlement of the Americas; renewable energies; biodiversity; oceanography; megacities; Mediterranean climate; polar/subantarctic sciences. Used with permission (Aguilera and Larraín 2018).

In line with the precepts of the Natural Laboratories, in the above quote Rodríguez was inviting me to approach the territory as a series of geophysical singularities at our disposal. The choice of the term “landscape” is telling in this regard, since it conveys the idea of stillness and passivity; of something that is out there waiting for intervention. In the case of Rodríguez, this form of appropriation is associated with a “we” pointing to the imagined community of Chilean people who are considered entitled to count on such areas. In this sense, Rodríguez’s approach to the landscape speaks to the modern notion of territory that conceives of space as subject to a single and superior form of authority, which in this case is the Chilean state.

There is an important coincidence between Gabriel Rodríguez’s quote and the definition of the Natural Laboratories as a “competitive advantage” I cited earlier: in both cases the territory is approached from a strategic vantage point and transformed into a resource for the attainment of a long-term plan. As Birch and Muniesa (2020) would say, this process is part of technocapitalism’s tendency to transform a broad range of things into *assets*. As assets, the geophysical singularities of Chile are expected to report benefits for economic development and are valorized in view of their capacity to attract potential investors.

Considering the above points, the Natural Laboratories policy delineates an ontology that transforms the territory into a source of assets capable of attracting foreign investment in scientific infrastructure. The role that such geophysical features play in the configuration of the territory, or the view of the human and other-than-human actors living in the area, is not considered a priority concern for this policy. Because of this, and as also Figure 1 indicates, the ontology underlying the Natural Laboratories is one

²The Humboldt Current makes the sea water of part of the Chilean coast colder than in the rest of the Pacific.

of disembodiedness, where components of the landscape not immediately relevant for the construction of infrastructure can be ignored or left in the background. Such an asseztized ontology is functional for the aim of attracting foreign investment, since it transforms the territory into a seamless surface where external actors can extract raw data without having to deal with natural or human frictions.

5.3. The Datagonia project

A similar ontology underpins Datagonia. This initiative aims at promoting the construction of data center farms, which are storing and processing units, in the Chilean Patagonia—the southernmost geographical area of Latin America. This project has been mainly envisioned by Grupo Datco, a company with Argentinian capital with offices in Santiago. Considering data centers' high carbon footprint (Holt and Vonderau 2015, 82), the location of Patagonia comes in handy, since the low temperatures can help reduce the large amount of power required to cool these devices. Furthermore, the company has built a prototype data center that uses local water to cool the system and has been built with volcanic rocks to facilitate the circulation of air. Grupo Datco has also developed an architectural proposal in which the data centers are “hiding in plain sight” (Holt and Vonderau 2015, 74), sunk into the natural landscape, but supporting a recreational park on top of them as revealed in a promotional 3D audiovisual piece (Figure 2).

Despite its environmental commitment, the assumptions concerning the territory underpinning Datagonia echo those of the Natural Laboratories. This is how Yessika Salazar, the person in charge of the project at Grupo Datco, presented such a commitment to me:

That's a country differentiator ... Other people say, “You know what? We could build a data centre in an abandoned mine” ... If you've got an abandoned mine, the cooling will be given by the darkness, because there is no heat. There is natural cooling. So these are the same principles, but it is necessary to take advantage of them. So let's do it!

The above remarks present the environmentally friendly character of Datagonia as a “country differentiator,” a vocabulary that, just as the definition of the Natural Laboratories as competitive advantages, stems from the field of corporate management. Along these lines, Datagonia conceives some of the features afforded by Patagonia, such as its weather and the access to water sources, as features capable of spurring the interest of national and international clients. Geographical conditions such as cold



Figure 2. Aerial shot of Datagonia. Screenshot of a 3D video of the Datagonia project by Grupo Datco. Material collected during fieldwork and used with permission.

weather and the presence of rivers, which have also been mobilized in the past to portray this area as wild and poorly resourced (Livon-Grosman 2003), are now strategically brought to the fore to promote Patagonia as data's "natural home" (Johnson 2019).

The focus on potential international clients is also key for Datagonia. Salazar explained to me that she confirmed the feasibility of Datagonia's business model when a consultant from the European Union on matters related to astronomy gave his blessing to the idea: "He saw the prototype of the green data centre that I had put together and said 'This is what we need! This is what the scientific community wants!'" As in the case of the Natural Laboratories, decisions regarding Datagonia have been shaped on the basis of attracting external actors, which in this case are the observatories constructed in the country. Still, Datagonia also seeks to attract other national and international clients from the public and the private sectors.

There are relevant differences between the Natural Laboratories and Datagonia. From one angle, the latter encompasses a more sensitive account of territory when considering its "green" character, and the proposal contemplates synergies with local companies and educational entities. Moreover, whereas Natural Laboratories aims at constructing data *production* machinery, Datagonia is focused on *storing* and *processing* centers. Nevertheless, both ontologies transform the territory into a source of geophysical assets capable of attracting external investment in data infrastructure. Potential sources of human or other-than-human frictions, such as the lack of electric infrastructure or the opposition by local communities, are ignored to make the territory a source of seamless production, circulation, and storage of data. Along these lines, both the Natural Laboratories and Datagonia might represent pragmatic and even original proposals, but they leave relevant and vital aspects of the territory off the map. The latter becomes clearer when compared to the Lickan Antay ontology of territory, which I delineate next.

6. The relational ontology of territory

6.1. The Lickan Antay people and ALMA

The second ontology of territory I analyze in this article is articulated in the heart of the Atacama Desert, more than a thousand kilometers north of Santiago, by Lickan Antay³ Indigenous communities. The Lickan Antay way of living has been shaped by cultural and economic exchanges with other groups living on the Pacific coast and in the Andes mountains, and throughout history they have been annexed to the Incan empire (fifteenth century), the Spanish crown (sixteenth century), Bolivia (1825), and Chile (1879) (Núñez Atencio 2007). Initially, the territorial organization of the Lickan Antay was based on an adaptable regime according to seasonal access to water, but the adoption of modern ways of living brought about private property and centralized forms of governance. The Lickan Antay people identify with the Kunza language, but this was lost after the cultural repression undertaken by the Chilean state. The reflections below draw on interviews I held with current and former members of the Council of Atacameño People (n.d.), an activist organization that represents 18 communities and villages located in the area of Atacama la Grande.

³The Lickan Antay people are also known as Atacameños due to a misnaming by the Spanish invaders.

The ALMA observatory is located around 30 kilometers from Toconao village. Inaugurated in 2013, this observatory comprises 66 radio antennas and is funded by scientific organizations from the United States, Europe, Canada, Japan, Taiwan and South Korea. Currently, ALMA grants around 3,500,000 USD per year for local projects, supports archaeological sites and has funded research on Lickan Antay “ethnoastronomy” (ALMA n.d.). Nevertheless, the activists I talked to consider that there is a lack of horizontal communication with the observatory, which they see as an enigmatic “island” whose origins and operations are obscure to them.

The ontology I discuss in this section has been mobilized by Lickan Antay activists during two conflicts they have had with ALMA and the Chilean state. The first conflict took place in 2002, when the Lickan Antay people protested against the concession of lands by the state to the observatory for fifty years. The second conflict took place in 2016, when ALMA decided to install a branch of pipelines to implement a system of natural gas. Lickan Antay activists and some communities raised objections to some aspects of this project due to its potential environmental impact.

6.2. A ritual on the mountain signals relationality

Wilfredo Cruz was the head of the Community of Toconao, the closest village to ALMA, when he and other members of the community manifested their opposition to the construction of the observatory. Almost 20 years later, Cruz introduced this story to me by making clear that “that territory ancestrally belongs to the Toconao community.” At first glance, the use of “belonging” seems to reproduce the capitalist system of property. However, an attentive reading of his account also makes it possible to identify ontological politics at play. Cruz told me one of the episodes of this story as follows: “I went up [to the Chajnantor mountain] with all my community, with two buses to protest and to make a *reivindicación del territorio* [territorial claim], to make the *pagos ancestrales* [ancestral payments] that we used to make.” When attending to the Lickan Antay cosmology, the fact that Cruz and his community undertook “ancestral payments” brings ontology to the fore.

The “ancestral payments” carried out on the Chajnantor mountain draw attention to the role of non-human actors in the Lickan Antay world. This tradition constitutes a ritual where preparations such as *aloja* (a local drink) and *coca* (a plant) are offered to the entities that make life possible (Barros 1997, 87). Mountains are one such entity, since it is from them that water, a cherished resource in the desert, emerges. But mountains are more than life-givers in the Lickan Antay world. Mountains are also the protectors of the valley and the *tatas* (ancestors) that intervene in the life of living beings. As Bastien explains: “They [Indigenous people] feed it [the mountain] and eat it. They become the mountain and the mountain becomes them” (1978, p. xxv). Because of this, entities like mountains are inseparable from human life; they are an active presence before, during and after a single life cycle. Therefore, the principle of *relationality* (Escobar 2018, 95) underpins the Lickan Antay ontology of territory since it is understood that the existence of human and other-than-human beings unfolds from their very interaction. Rather than practices circumscribed to the realm of “culture,” Lickan Antay rituals are crucial for sustaining the territory; highlighting the latter is part of what Wilfredo Cruz understands as making a “territorial claim.”

The way Wilfredo Cruz explained his discrepancy with the Chilean state to me sheds light on the divergence between the *assetized* and *relational* ontologies of territory:

The argument used by the people from the state was: “Look, you are a community. This is going to benefit humanity” and all that. “The state has to take care of all the people that are going to work in this sector. How many are you? A handful of 400 or 500 people? But with this project we will benefit more than 5 thousand people” ... “We live ancestrally,” I told him. “We have taken care of this ecosystem, we have been living here for more than twelve thousand years of history.”

As in the modern ontology of territory, the state official privileges a “calculative grasp” (Elden 2010, 809) that draws on consequentialist and quantitative logics to justify the intervention of the territory. Instead, Cruz argues that the Lickan Antay people have been “living ancestrally” and “taking care” of the ecosystem for thousands of years. For him, their success in sustaining the environment demonstrates their capacity to take care of the ecosystem. Considering the above analysis, this success has been achieved through practices that acknowledge the mutual interdependency among the actors that make up the territory, such as when they undertake “payment” rituals. Thus, the territory constitutes a crucial and active actor in the Lickan Antay world; external interventions undertaken without dialogue can threaten a way of living based on a peaceful coexistence with the environment.

The relational character of this ontology of territory constitutes a departure from the assetized one. In the relational ontology entities such as mountains cannot be isolated from their environment since their existence is part of a web of human and other-than-human interdependencies. Rather than a source of assets, the territory and the entities that make it up become enablers of life and responsible for sustaining balanced forms of coexistence. It is important to note that such ontologies are not present in pure form. Some overlaps can be identified when considering that the Datagonia project incorporates a concern for the environment and that Wilfredo Cruz mobilized notions of land ownership (it “belongs” to them) and mainstream environmentalism (“ecosystem”).

The fact that the Lickan Antay ontology of territory is mobilized through a ritual is not a coincidence. As Mario Blaser explains, verbalized stories are certainly relevant, but it is through embodied practices involving human and other-than-human actors that relational ontologies come into being (2009, 877). As I show next, such attentiveness to embodied practices and other-than-human interdependence also makes it possible to identify the ontological contours of a more recent conflict.

6.3. Protecting the chululos replenishes the territory

Leticia González Silvestre was a leader of the Community of Toconao when a second conflict between ALMA, the state, and local communities took place. In 2014 ALMA hired consultants to assess the environmental impact of the adoption of natural gas pipelines. After visiting the area three times, these consultants did not bring up any “significant adverse effect” (Comisión de Evaluación 2017, 28) that could emerge from the process. However, the picture changed drastically in 2016 when, sceptical of the conclusion arrived at by ALMA, members of the Lickan Antay community from Toconao village decided to check the area in the field. Thanks to this, a previously ignored

other-than-human actor came to the surface. This is how Leticia González Silvestre referred to this episode:

They [ALMA] usually hire consultancy firms from Santiago that do not know the territory ... They were really in a rush to get the approval for their pipeline ... And we said, "No, the community has to check *en terreno* (in the field) the information that you collected" ... The elder, who knew the *chululos*, would say "It is full of *chululo* burrows here" ... Experts from Santiago did not see them, but local people did ... The pipelines were going to break the whole ecosystem.

The decision of the Lickan Antay people to visit the area made it possible to identify the existence of the *chululos*, which are rodents of no more than 30 centimeters that inhabit sandy and high environments and rarely leave their burrows. Without this field visit, it would have been impossible to protect what ended up being 22 colonies of *chululos* (Comisión de Evaluación 2017, 28). In Spanish, Leticia González referred to this field visit as a *visita en terreno*, the literal translation of which would be "terrain visit." A potential explanation for the use of "terrain" could be an attempt to situate the divergence in a more scientific register, since "terrain" is also used in geography and geology (Elden 2010, 807). Nevertheless, the visit undertaken by the Toconao villagers challenges many of the precepts of modern epistemology (Mignolo 2009). Rather than obstacles for generating "objective" knowledge, the bodies and the memory of the elder figure here as crucial resources for grasping the complexity of the territory. At the same time, González Silvestre's story does not conceal the knowing subject, as modern sciences tend to do, but rather considers the presence of the elder a crucial aspect of the success of the enterprise. As a whole, the field visit by the Toconao villagers can be considered a form of "epistemic disobedience" (Mignolo 2009) motivated by the goal of safeguarding an ontology of territory.

The epistemology underpinning the field visit by the Toconao villagers is particularly suitable for acknowledging the presence of all the entities that make up the territory. The ontology emerging from this conception connects with a crucial concept in the Lickan Antay world: the *Pachamama*, which is both the ground that supports life as well as a broad cosmos that embraces everything which exists (Barros 1997, 88). Following Aymara/Bolivian thinker Silvia Rivera Cusicanqui, the *Pachamama* presents what could be translated as the Earth or the territory as "a very complex and infinitely varied conjunction of living and palpitating beings" (2018, 54). Because of this, balanced coexistence in the *Pachamama* requires approaching what is out there with humility and attentiveness to detail. The protection of seemingly irrelevant creatures such as the *chululos* is one of the responsibilities that arise from living in the *Pachamama*. This is why for González Silvestre the pipelines' impact on the *chululos* could "break the whole ecosystem."

7. Discussion: reconstituting worlds in data colonialism

The two ontologies I identified in relation to the growth of data infrastructure in Chile reflect discrepancies about the entities that make up the territory and the relations between them. On one hand, the assetized ontology conceives of territory as a set of geophysical assets that can be dis-embedded from the environment, rendering secondary the features that are not immediately relevant for ensuring investment in infrastructure. On

the other hand, the relational ontology conceives of territory as made up by human and other-than-human actors whose existence unfold from their very interaction. Importantly, these ontologies do not hold the same capacity to account for the series of human and other-than-human interdependencies that sustain the territory. While the assetized one tends to obscure the frictions that can affect the construction of data infrastructure, mountains and seemingly minor creatures such as the *chululos* are crucial for the relational ontology and considered worthy of undertaking rituals and epistemic disobedience.

The assumptions and practices underpinning the assetized ontology connect with the type of occupation that took shape with European colonialism, in which the territory figures as the mere background of culture and history. Just like large-scale mining and monocultures, an expansion of data infrastructure predicated upon an assetized ontology involves the reduction of a *pluriverse*, where different worlds coexist, to a *universe*, where only a single world of capitalist and modern contours is allowed to thrive. Following this logic, data infrastructure can be described as an industrial complex not only because of its underlying political economy and justificatory logics (Hogan 2021), but also because, as other sectors dependant on endless growth, its continuous expansion is imposing homogeneity where there was diversity.

In contrast, the relational ontology fosters an ethic of care that acknowledges interdependency, opening up the possibility of a world in which many worlds fit. The ritual carried out as part of the protest against the concession of the Chajnantor mountain and the epistemic disobedience undertaken to protect the *chululos* connect with the centuries-old history of territorial struggle in Latin America aimed at cultivating worlds otherwise. Relational philosophies have become crucial in the context of the terricide since they can facilitate the much-needed reconstitution of worlds. As Alison Powell (2021) has shown, relational ontologies can also orient the implementation of data technologies in the so-called smart city.

These two ontologies illuminate a previously underexplored dimension of data colonialism. For Couldry and Mejias (2019), a central feature of data colonialism is the appropriation of the life of individuals through the extraction of data. For Paola Ricaurte, data colonialism constitutes an “economic model, based on epistemic dominance” (2019, 351). Whereas these accounts have delved into political economy and epistemology, the divergence I explored in this article sheds light on the ontological dimension of data colonialism, where the assumptions and practices undergirding the expansion of the exoskeleton that makes possible data colonialism can generate ontological occupation. Looking at the case of Chile, the “colonial” character of data colonialism is also given by the fact that the search for wealth derived from the production and processing of data is relying on an assetized ontology of territory incompatible with the flourishing of multiple worlds. This dynamic is not limited to user data since it also applies to datasets produced by scientific machinery.

More broadly, I showed that the expansion of data infrastructure encompasses a non-metaphorical dimension of colonialism. For Couldry and Mejias (2019, p. xi), data colonialism is far from a metaphor since, even though the intensity and methods might change, it represents a continuation of the logic of extraction that undergirded European colonialism. Following Yang and Tuck (2012), this article also shows that data colonialism can manifest in the direct link between the expansion

of data infrastructure and the occupation of Indigenous lands. Furthermore, this article signals that Indigenous data sovereignty should not only respect Indigenous rights in relation to data collected about them and their environment (e.g. Kukutai and Taylor 2016), but also concerning the threat posed to the territories by the growth of data infrastructure.

8. Conclusion

The growth of data infrastructures is usually associated with progress and development, but in this article, I have shown that this process can also intersect with centuries-old forms of territorial struggle and ontological occupation in Latin America. Looking at the production of vast volumes of astronomy data in the Atacama Desert, I argued that initiatives seeking to take advantage of this situation can rest on an assetized ontology that disembeds “competitive advantages” from their environment due to their unique opportunities for infrastructure development. In contrast, Lickan Antay Indigenous communities affected by the construction of an observatory hold a relational ontology in which the territory is conceived as the product of, and a condition for, a balanced coexistence between human and other-than-human actors.

These ontologies did not manifest in pure form, but they nonetheless hold a different position in the cases examined. At the same time, they respond to different genealogies and horizons. The assumptions and practices underpinning the assetized ontology connect with the type of ontological occupation that took shape with European colonialism. This ontology is present in both the Natural Laboratories and Datagonia, although the latter incorporates some elements from the discourse on environmental protection that might offer a more nuanced approach. In contrast, the relational ontology aligns with the efforts by Indigenous communities in Latin America aimed at enabling a world in which many worlds fit. This ontology of territory did not manifest in pure form either, since Lickan Antay activists are articulating it in relation to the principles of property and mainstream environmental awareness.

In this article, I have signaled the relevance of the case of astronomy data in Chile for discussions about territory, political ontology, data infrastructure, and data colonialism. However, the insights discussed can also shine light on debates not covered here. An example of this concerns critical data studies, a field of study that has sought to debunk the flawed epistemological assumptions underlying data. While here I occasionally referred to this dimension, as in the transformation of territory into a source of raw data by the assetized ontology, future research could usefully look at debates concerning the construction of “rawness” or the role of materiality from the lens of political ontology.

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