

January 2020

Geographies of the Underground in Latin America

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Recommended Citation

Himley, Matthew and Marston, Andrea (2020) "Geographies of the Underground in Latin America," *Journal of Latin American Geography* 19(1): 172-181.

DOI: 10.1353/lag.2020.0024

Available at: <https://muse.jhu.edu/article/744049>

Geographies of the Underground in Latin America

INTRODUCTION

During the first four decades of CLAG's history, the subterranean received only marginal attention in the pages of the organization's publications. The interest that existed centered mainly on the geography of minerals (petroleum included) and mineral production. Especially notable are three ten-year review articles that took the measure of geographical scholarship on Latin American mines and minerals produced during the 1960s (Minkel, 1971), 1970s (Minkel & Smith, 1981), and 1980s (Mower, 1991). All three call attention to the relative lack of geographical research (published in English at least) on Latin American mineral geography. The reviews also suggest that for those few geographers who trained their sights on the region's subsoil resources, they approached their studies mainly from the perspectives of economic geography – heavily interested, for instance, in the regional development impacts of resource extraction (e.g., Mulchansingh, 1983). Largely absent was a concern for the human costs or cultural politics of extraction – topics that were of increasing interest within cognate fields like anthropology (e.g., Nash, 1979). Overall, what stands out from the reviews is a sense that Latin American mineral geography was an understudied but potentially high-yield area of inquiry: for Clarence Minkel (1971), a “veritable ‘gold mine’ of opportunity” (p. 212); for Roland Mower (1991), “a treasure house of Latin American research topics” (p. 209).

Yet, within CLAG publications, at least, sustained attention to subsurface resources and their development has only very recently materialized. Spurred by a confluence of factors (free-market policies, elevated commodity prices, rising demand from China and other industrializing countries, among others), the 1990s and early 2000s were years of rapidly expanding subsoil resource extraction across much of Latin America. Throughout this period, however, CLAG publications remained curiously silent on the topic, a notable exception being Jeffrey Bury and Adam Kolff's (2002) article on mining expansion, livelihood change, and popular protest in the rural Peruvian Andes. Things began to change in the 2010s. Since 2011, at least 18 articles focused on the socio-ecological dimensions (broadly understood) of mineral, oil, and natural gas extraction have been published in the *Journal of Latin American Geography*, many of these (though not all: see below) focusing on the contemporary period. Significantly, and as illustrated by the 11 articles constituting the 2018 special issue “Petro-Geographies and Hydrocarbon Realities in Latin America” (Fry & Delgado, 2018), this scholarship is notable for the critical perspectives – many drawn from political ecology – that it brings to bear on the topic of subsoil resource extraction. This work is thus reflective of a wider boom in research on what Anthony Bebbington and Bury (2013) refer to as the ‘political ecology of the subsoil’ in Latin America.

These trends suggest that the underground is shaking its marginalized status within Latin American geography. We contend, nonetheless, that the ground beneath

our feet remains underexplored terrain for geographers of Latin America. In making this claim, we are inspired by a wider flourishing of interest in the subterranean in human geography and across the social sciences (e.g., Bobbette & Donovan, 2019; Clark & Yusoff, 2017; Melo Zurita, Munro, & Houston, 2018; Williams, 2008). At the core of this wider body of scholarship is a (re)conceptualization of the underground as a dynamic socio-natural space: one that both constitutes and is constituted by a range of human activities, from labor to literature, geological mapping to spelunking. Drawing on this expanding interest in how underground spaces are incorporated into sociopolitical life – and in turn transformed through these encounters – we now outline what we consider important and productive lines of future research on the geographies of the Latin American underground. These are: (1) the history of earth science in Latin America, and science's role in the creation of political territories and communities; (2) embodied encounters with the underground, through activities as varied as caving, mining, tourism, and tunneling; and (3) the engineering of the underground, and the relationship of subterranean infrastructures to aboveground social dynamics.

POLITICAL GEOGRAPHIES OF EARTH SCIENCE

Understandings of the underground are neither static nor universal. A now significant literature on the history of earth science and its lithosphere-focused branches (geology, mineralogy, paleontology, petrology, volcanology, etc.) has traced how scientific understandings of the earth's interior have evolved as a result of theoretical and methodological changes 'internal' to the scientific enterprise as well as shifting cultural, economic, political, and social contexts (e.g., Laudan, 1987; Oldroyd, 1996; Williams, 2008). For geographers, this probing of the spatio-temporally specific character of earth-scientific knowledge production has been especially important for investigating the relations between science and the construction of political territories and communities (e.g., Braun, 2000; Frederiksen, 2013). Especially influential has been work by Bruce Braun (2000) on the relations between geology and governmental rationality in late-nineteenth-century Canada, which deftly analyzes the role of state-sponsored geological science in the production of 'vertical' understandings of Canadian territory and in the creation of a citizenry trained to 'see' national space in terms of its mineral-resource potential.

While scholars from other social science fields have begun to uncover Latin America's rich histories of earth-scientific activity (e.g., Contreras & Cueto, 2008; Deustua, 2017; Ferry, 2013), these histories have not garnered sustained attention in the geographical literature. Perhaps the most significant exception is work by Heidi Scott. This includes two stimulating articles published in the *Journal of Latin American Geography* that explore ideas and representations – cultural as well as technoscientific – of subterranean spaces during the colonial period, and the role of these in the construction of colonial governmental systems and spaces of resource extraction (H. Scott, 2012, 2015). Despite their rich content, however, these two articles but scratch

the surface when it comes to the history of earth-scientific knowledge production in Latin America. From the late-eighteenth-century Nordenflicht expedition, organized by the Crown, to revitalize silver mining in Potosí (Aguado, 2015; Buechler, 1973); to efforts by nineteenth-century Republican governments, with the help of European scientists, to catalog their nations' subsoil resource endowments (Azuela, 2009; García, 2007; Marston, 2019); to the creation, in the late nineteenth and twentieth centuries, of specialized scientific institutions and professional organizations dedicated to the study of countries' subterranean (and other territorial) features (Contreras & Cueto, 2008; Himley, 2019; López-Ocón Cabrera, 1995; Pérez, 2019) – there is no scarcity of opportunities for geographers to delve into histories of Latin American earth science.

While these histories reveal close linkages between subterranean scientific knowledge production and programs of economic development via resource extraction, we see the political-geographical dimensions of these activities to be an especially rewarding area of future research. How have earth-science activities – à la Braun (2000) – contributed to 'vertical' or 'three-dimensional' understandings of territory in Latin America? What roles have geologists played in efforts to forge cohesive nation-states? How can investigations into histories of earth scientific activity in Latin America improve understandings of the knowledge politics of colonialism and neocolonialism in the region? Geographers of Latin America, drawing on theoretical insights from the broader geographical literature on the science-resources-territory nexus, are well positioned to take up questions like these.

EMBODIED ENCOUNTERS UNDERGROUND

Although the subterranean is rarely associated with life, humans have been burrowing underground since ancient times. Down in the deep, they have built homes, buried the dead, drained water, explored, and extracted metals, gems, and hydrocarbons. All of these activities have involved humans descending into material worlds that shape and are shaped by the people who occupy them. These underground realms are *places* in the sense described by Doreen Massey (1994): they are constituted by a mixture of natural and social histories, and they are transformed by both local everyday practices and processes that extend far beyond the place itself. It is in this multi-scalar sense that geographers of Latin America might approach the study of the world beneath, where humans and subsoil remake one another.

There is nothing especially new about subterranean place-making. In present-day Colorado, Native Americans built homes in the cliff faces of Mesa Verde starting in the twelfth century; in the Mexican Yucatan Peninsula, the Maya have used *cenotes* (water sinkholes) as water sources and gateways to the rain gods *chaaks* for thousands of years (Munro & Melo Zurita, 2011). More recently, spelunkers in Venezuela and Cuba delight in mapping underground territories (Pérez, 2015, 2019), and tourists flock to the Cerro Rico silver mine in Potosí, Bolivia for hair-raising tours (Pretes, 2002). Regardless of why people go underground, the worlds they generate are both

socio-culturally rich and ‘naturally’ complex. Emerging as the result of millions of years of sedimentation, erosion, folding, and tectonic pressure, rocky subterranean formations shape the social worlds that emerge within them as surely as humans give the rocks new shapes. Together, they produce complex ‘geo-social formations’ (Clark & Yusoff, 2017) that reverberate politically on the surface.

However, the making of underground places in Latin America is only beginning to receive the attention it deserves from geographers. A fruitful path forward, we contend, lies at the nexus of underground and bodily geographies. Between disorienting darkness, perpetual damp, claustrophobic enclosure, and absolute silence, the unique qualities of the subterranean create a sensorially rich experience that has an impact on material flesh. Silicosis, the scarring of lung tissue caused by daily inhalation of silica dust, is perhaps the most well-known bodily effect of the underground; but there are others: miners lose their ability to see clearly in the bright sun, their joints ache from dampness-induced rheumatism, and their hands burn from acidified water. Anthropologist Pascale Absi (2002) argues that even the smell of the underground, which lingers on the bodies of Bolivian miners long after showering, “guarantees that the worker, like his diabolic ‘alter ego’, joins his body with the mine” (p. 282). Even after ores have been transported to the surface, the tailings of abandoned mines continue to transform downstream bodies and lives, creating ‘waste subjects’ through the physical intimacy of flesh and toxins (Ureta, Mondaco, & Landherr, 2018). And yet, despite all of this, the underground can be a place of freedom and adventure, and the darkness a place to organize politically (Mitchell, 2011) or to escape the watchful eyes of society (Hwang, 2016). With growing geographical interest in the body as an important political scale and site of struggle, these complex and embodied engagements with the underground are key areas of future study for Latin American geography.

ENGINEERING THE UNDERGROUND

In geography, the technologies and infrastructures that people have used to make the underground inhabitable and profitable are rarely interrogated, even with the field’s ‘vertical turn’. Subterranean worlds are not inherently hospitable environments for humans, and even in ancient times they required significant engineering just to ensure a circulation of fresh air and minimize the chances of collapse (Pérez Macías & Delgado Domínguez, 2011). Unlike the ‘pure’ science of geology, engineering is oriented towards transforming – rather than documenting/understanding – the world below. Engineers open up the underground, through visual representations and physical infrastructure, with specific goals in mind. The works they design might extend a city downwards to accommodate a subway, underground mall, or sewer system; pierce mountains with tunnels to facilitate the movement of people and goods; or create an architectural frame to maximize resource extraction. In all cases, subterranean engineering is a political process that shapes not only underground spaces but also social worlds above.

The history of engineering in Latin America – and its close ties to efforts to develop subsurface resources – has seen significant academic interest in recent decades, especially among historians (e.g., Contreras C., 1995; López Soria, 2012; Murray, 1997). Geographers of Latin America are well positioned to further develop a stream of scholarship on subterranean engineering, including through a focus on visualization. The darkness of the underground makes building in it a unique challenge: even when it is well lit, getting a sense of a whole construction site from walking its perimeter is impossible. In this context, engineers make drawings and models of their underground projects to visualize and communicate their plans. Within geography, studies of engineers’ subterranean visualizations have been limited, in part because such artifacts are rarely published or disseminated: they are typically made by engineers, for engineers, with visual shorthands that appear cryptic to non-experts (Nystrom, 2014). Yet, for geographers of Latin America, engineers’ maps and models may offer key insights into the making of underground spaces, especially given the close linkages between engineering and earth-scientific investigation. For instance, geologists have long used access points created by miners and mining engineers to study sedimentary layers, while mining engineers work with geologists to identify the most worthwhile areas to exploit. Moreover, the worlds/aims of science and engineering frequently intermingle in the context of state-funded geological mapping. This point of intersection is of critical interest for geographers interested in the sciences and technologies of territorialization in Latin America, particularly when those territories are imagined/constructed in three dimensions (Bridge, 2013; see also Marston, 2019).

But engineering, of course, is about more than visualization and mapping. The infrastructures produced by underground engineering projects are extensive, though rarely seen. Perhaps this is why – some notable exceptions notwithstanding (e.g., Valdivia, 2015) – there has been relatively limited attention to subterranean infrastructures within Latin American geography. Yet, the range of topics explored by geographers in other world regions – from the connective infrastructures (e.g., oil pipelines) that link urban and rural spaces (Barry, 2013; Kipfer, 2018; D. N. Scott, 2013) to the roles of water and sewage pipes in making cities both livable and fragile (Gandy, 2002; Kaika, 2005) to the contemporary impacts of abandoned subsurface infrastructures, such as closed mines and mausoleums (Harris, 2015) – should serve as inspiration for future work on underground built environments in Latin America.

CONCLUSION

As Bebbington (2009) notes, “Much of Latin American economic and social history could be read as a long engagement with extraction” (p. 14). This makes especially curious the lack of regard that subterranean spaces and activities received in CLAG publications during the majority of the organization’s history. While recent trends suggest that the subsoil has begun a march from the margins toward the center of Latin American geography, our hope is that scholarship on the region’s underground

geographies can grow to encompass the wide spectrum of activities through which society and subsurface are intricately and recursively related. In each of the three lines of research we have proposed, geographers can draw on and engage with scholars from cognate fields (e.g., anthropology, history, science and technology studies), located within and outside of Latin America, who are already addressing similar themes. At the same time, geographers can advance work on the society-subsurface nexus in Latin America by bringing to bear innovative conceptual and methodological tools from subfields like critical resource geography and political geography. As we peer forward in time, we see only further reason to more fully incorporate the underground into geographical scholarship on Latin America. From urban transportation and wastewater systems to the potential for large-scale geoengineering and terraforming projects, the region's futures will be made in three dimensions. Understanding the complex and intimate connections between sociopolitical life and the subsurface should be a prime concern for Latin American geography.

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