

The background of the entire image is a high-angle aerial photograph of a large-scale mining operation, likely a coal mine, showing extensive earthworks, winding roads, and industrial structures.

jovis

IMPLOSIONS / EXPLOSIONS

NEIL BRENNER

"I'LL BEGIN WITH THE FOLLOWING HYPOTHESIS:
SOCIETY HAS BEEN COMPLETELY URBANIZED."

— HENRI LÉFEBVRE, *LA RÉVOLUTION URBAINE* (1970)

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IMPLOSIONS / EXPLOSIONS

TOWARDS A STUDY OF PLANETARY URBANIZATION

EDITED BY NEIL BRENNER

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VISUALIZING AN URBANIZED PLANET—MATERIALS

Urban Theory Lab–GSD

Any attempt to understand and influence urbanization hinges upon representations of (a) the core spatial units that underpin this process; and (b) the spatial parameters in which its effects are thought to be circumscribed.¹ As other contributions to this book demonstrate, inherited approaches to urbanization demarcate this process with reference to spatial units characterized as “cities”—variously defined with reference to population size or density; land-use features; or nodality within transportation and communications networks. Within such frameworks, the spatial parameters of urbanization are generally represented with reference to two major vectors—inter-city relations (expressed, for instance, in exchange or communications networks); and city-suburban-hinterland relations (expressed, for instance, in flows of labor, food, energy and materials). While many twentieth-century approaches to urbanization conceptualized such parameters primarily within metropolitan, regional or national contexts, a major contribution of more recent, post-1980s studies of globalized urbanization has been to extend them to the world economy as a whole. From this point of view, the geographies of (capitalist) urbanization are necessarily global insofar as (a) cities are connected to one another across the entire world economy; and (b) they consume the resources of widely dispersed territories, which are in turn massively operationalized as their linkages to cities intensify.

Within urban social science, assumptions regarding the spatial units and parameters of urbanization are largely implicit, but have occasionally been articulated in reflexive

cartographic forms (see Figures 27.1, 27.2 and 27.3 in Ch. 27). Such cartographies of the urban are of considerable interest and import, because they put into stark relief some of the dominant metageographies—frameworks of assumptions about spatial organization—that inform both research and action on urbanization processes.²

One of the major agendas of this book is to supersede city-centric metageographies of urbanization through the development of new conceptualizations of how urbanization processes are imprinted upon the landscapes of capitalism. The pursuit of such an agenda requires us not only to develop new theoretical categories, but also to excavate the ways in which methodologically cityist metageographies have been constructed, disseminated and naturalized through hegemonic strategies of spatial representation. The materials assembled in this chapter represent an initial contribution to such an endeavor, derived from a more comprehensive investigation into the historical and contemporary cartographies of urbanization that is currently being undertaken in the Urban Theory Lab–GSD.

For present purposes, we have selected 14 maps, mostly from the last 60 years, which articulate some of the most prevalent understandings of the spatial units and parameters of urbanization within the social sciences and planning/design disciplines. In curating this selection, we are concerned less with representations of cityness *per se*, than with maps that represent the entire planet as a *space of urbanization*. The majority of these representational strategies reproduce the bounded city metageographies discussed at length in Ch. 27, albeit through a diverse, often quite ingenious range of data, analytical methods and representational techniques. However, several of the maps presented here begin to open up important windows onto the operational landscapes of urbanization, and thus contribute to the construction of countervailing metageographies. As in the various forms of geospatial information on the Mediterranean discussed in Ch. 27, the maps considered here emphasize several core indicators of the urban condition—population (Figures 28.1–28.4); economic activity (28.5–28.7); transportation networks (28.8–28.10); communications infrastructures (28.11, 28.12); and patterns of worldwide land occupation and environmental transformation (28.13, 28.14). These materials also illustrate how, even as new, potentially more sophisticated data sources become available, many of the same basic representational taxonomies remain operative in relation to the classic indicators that have long been used to demarcate urbanization processes.

Urbanization as a Cartography of Population

Figures 28.1, 28.2, 28.3 and 28.4 contain various representations of the spatial distribution of population on a worldwide scale. Figure 28.1 (page 463) is from the *Atlas of Economic Development* produced at the University of Chicago in the early 1960s. Following the population-centric definition of urbanization developed earlier by Kingsley Davis, national territories are shaded according to the percent of their population living in settlements with 20,000 or more people.³ Insofar as data on settlement sizes are aggregated on a country-by-

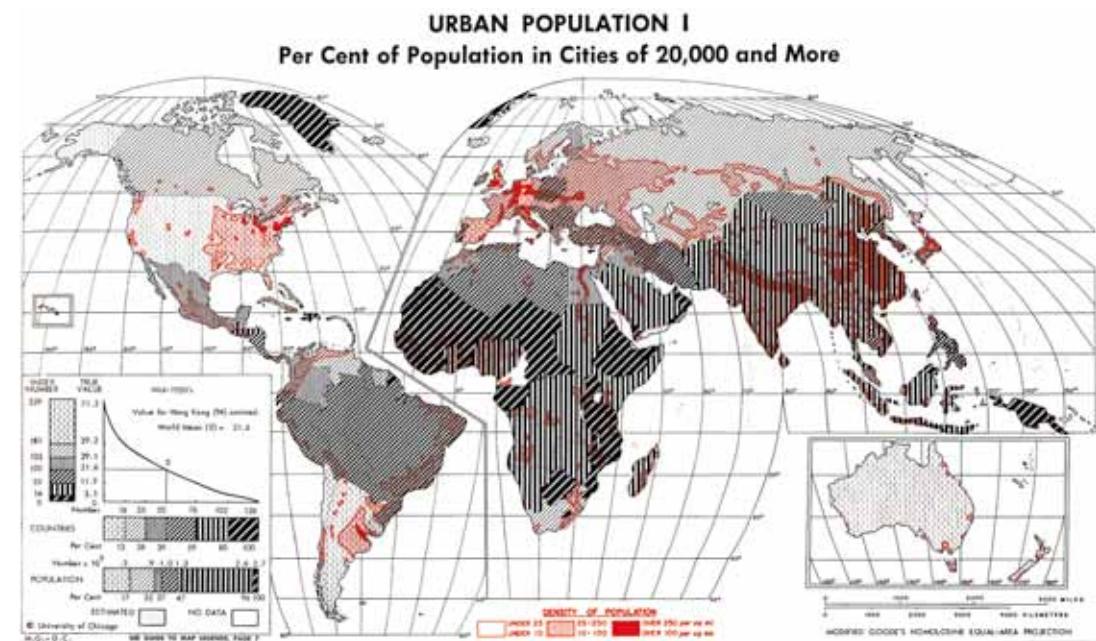
country basis, the map represents the geography of urbanization as being parceled among distinct national containers. Elsewhere, one of the creators of this map, geographer Brian Berry, famously attempted to explore the links between national urbanization rates and national economic development.⁴ Although this correlation proved elusive, the quest to track it embodied the prevailing assumption that the national scale was the privileged level of spatial organization and political intervention.

Despite its pervasive methodological nationalism, however, the map also illustrates the ways in which national units obscure patterns of uneven spatial development. In a striking overlay of data that is superimposed upon the national grid of urbanization rates, the map depicts a population density gradient at three color-coded levels (red, pink and white). In this way, the map productively problematizes its own framing assumption that urbanization within each country could be represented on the basis of a uniform national average, and opens up a cartographic perspective through which to conceptualize patterns of sociospatial inequality at other spatial scales. Of particular interest are the red zones on the map, which reveal the broad contours of the world's most densely settled regions. Here, high population density appears to serve as a proxy for the morphology of subnational urbanization patterns.

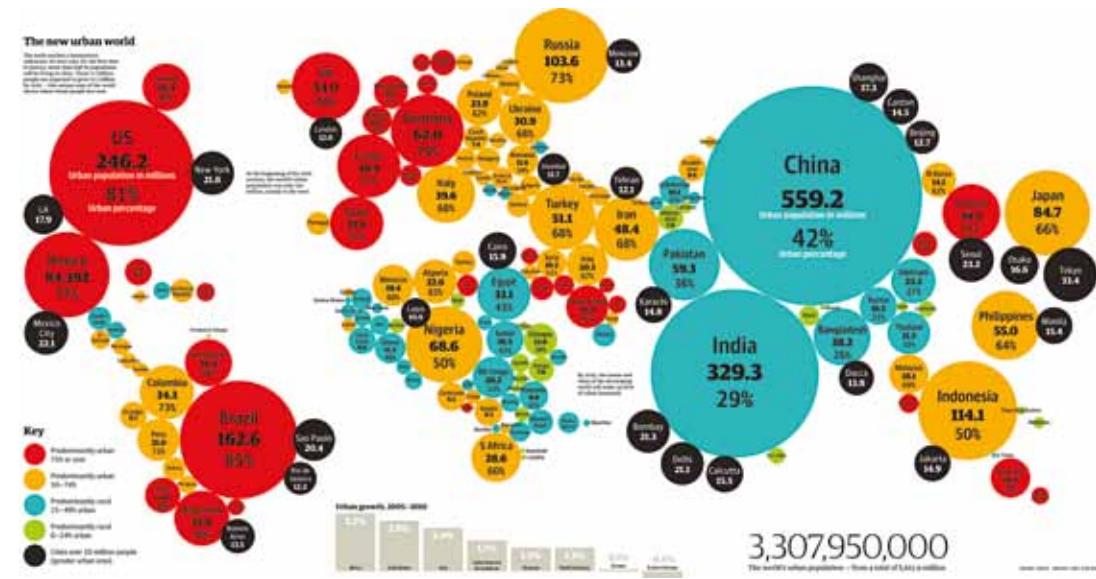
Figure 28.2 is a more recent embodiment of this state-centric, population-based cartography of the global urban condition that appeared in *The Guardian* in 2007. In this map, which is based on data compiled by the United Nations (UN), three key indicators are synthesized through the use of bubbles that are scaled and color-coded to express worldwide urban distributions. First, national bubbles are scaled to express absolute urban population levels. Second, the national bubbles are color-coded to express urbanization levels, still understood in Kingsley Davis' classic, mid-century terms as the percentage of the total national population living within urban areas. Third, the map depicts the locations and population sizes of cities containing over 10 million people. While *The Guardian*'s map is intended for journalistic purposes, it embodies each of the core social-scientific maneuvers associated with contemporary "urban age" discourse, as promoted by the UN—the use of nationally specific census definitions, based on arbitrary population thresholds, to define urban areas; the embrace of a rigid urban/rural divide to classify national settlement space; the understanding of urbanization as a property of national territories; and the reduction of urbanization to a simple percentage level.⁵ Additionally, through its graphic emphasis on cities with very large populations, the map also advances the popular view of urbanization as a process expressed paradigmatically in the formation of ever larger megacities. In effect, urbanization is understood here as a universal process through which, across national territories, populations are relocated into formally identical, if differentially sized, urban settlement units.

While over four decades old, Figure 28.3 (page 464) offers a strong counterpoint to such assumptions. This map appeared in a 1967 report by the Regional Plan Association,

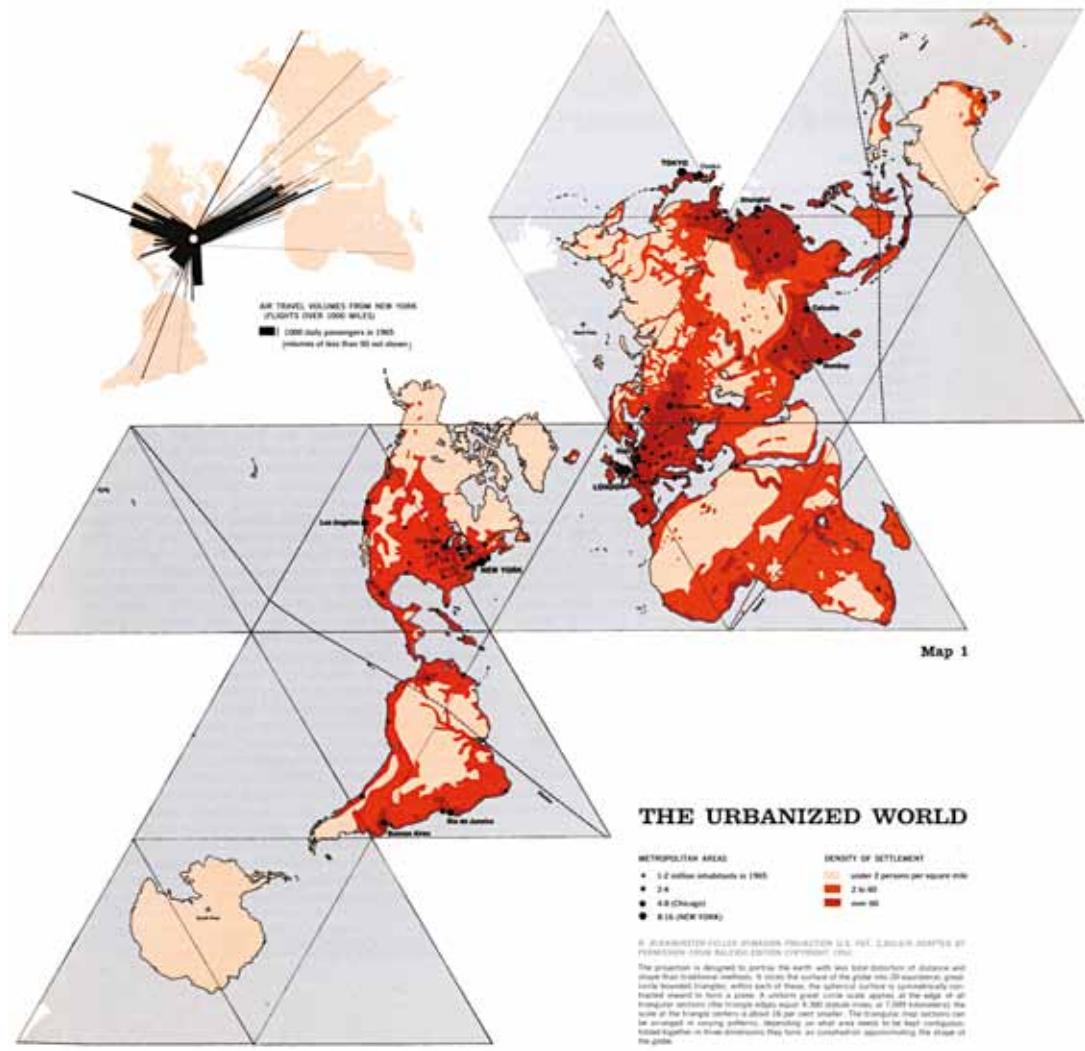
produced as part of the second Regional Plan for the Greater New York region. Here, the urban condition is depicted as a continuous gradient of population density rather than as a rigid percentage level. Instead of plotting population density distributions within the territorial matrix of states, as in Figure 28.1, this map employs the Dymaxion projection scheme developed by R. Buckminster Fuller, in order to represent urbanization as a worldwide process of simultaneous densification and extension.⁶ Additional layers



28.1 World urban population as percent of population in cities of 20,000 and larger, 1961



28.2 The new urban world, 2007



28.3 The urbanized world, 1967

of information complement this image: dots weighted according to population sizes correspond to the major metropolitan areas; and a smaller diagram shows air connections from New York, suggesting the role of networked linkages among major centers in processes of densification (see also Figures 28.9 and 28.10, pages 469, 470).

The density gradients depicted in Figures 28.1 and 28.3 were based on rough statistical estimations derived from national census data. By contrast, Figure 28.4 introduces a more sophisticated statistical methodology in which census data and satellite imagery are combined to redistribute population variables over a homogeneous terrestrial grid. However, despite its complex quantitative methodology, and the impressive image of worldwide density gradients it produces, the GRUMP approach still hinges upon an underlying taxonomy of planetary space as being rigidly differentiated among urban and



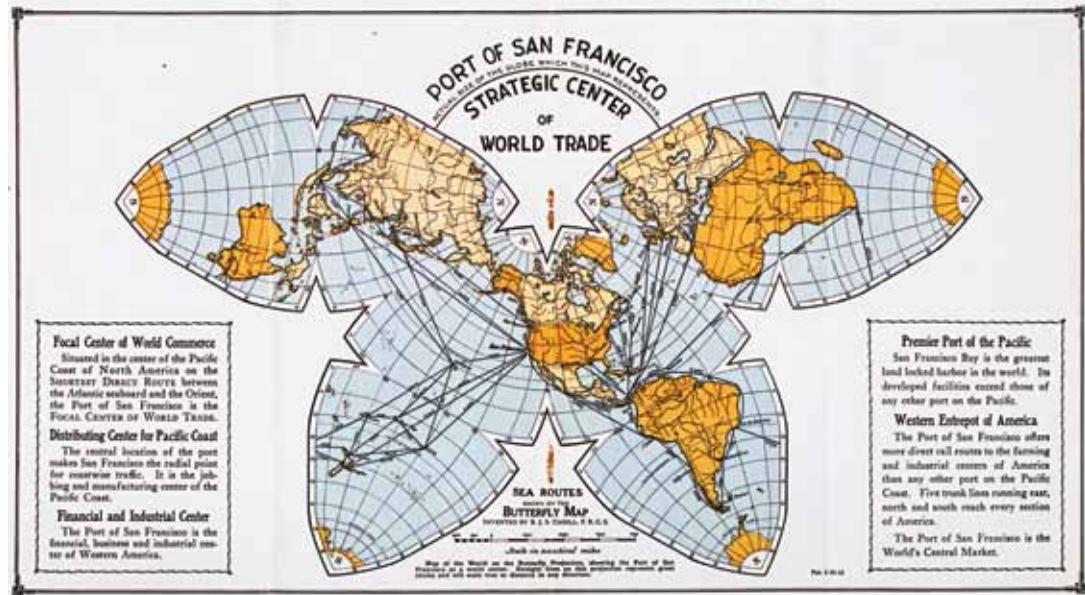
28.4 Global population density, 2009

rural zones. As highlighted in our discussion of such data in the preceding chapter (see Figures 27.11, 27.12 and 27.13), the cartography of urbanization extracted via the GRUMP method is premised upon the assumption that settlement space is differentiated coherently among bounded urban regions (statistically defined using a mechanism labeled as an “urban mask”) that are in turn surrounded by a vast, worldwide zone of rurality. In this sense, paradoxically, a bounded city metageography underpins a representation that ostensibly depicts a borderless density gradient.

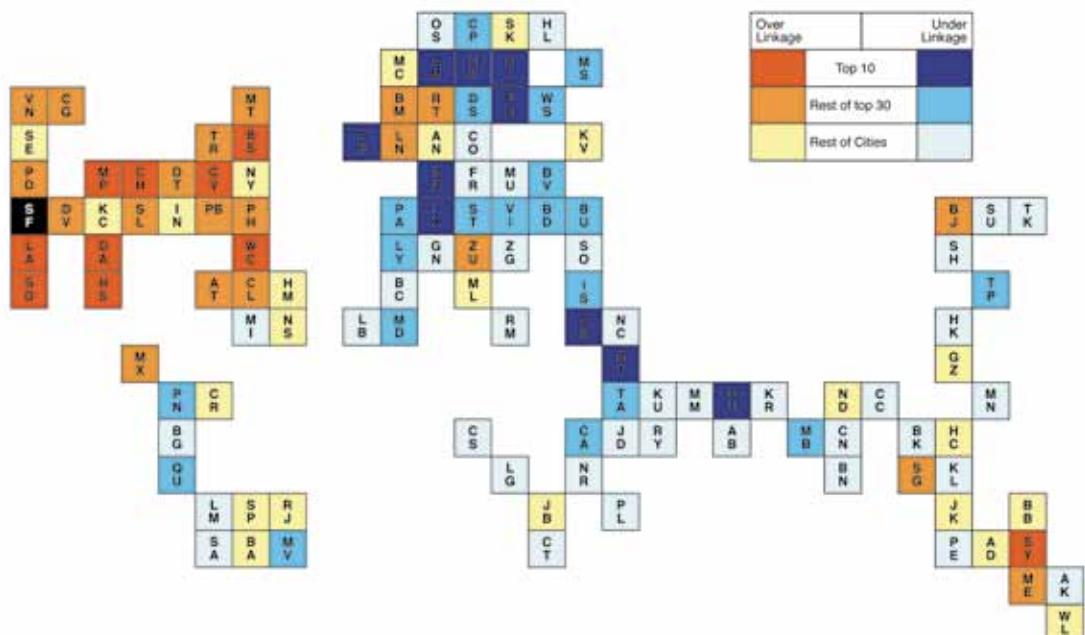
Urbanization and the Geography of Economic Activity

The agglomeration of economic activity is another important indicator of urbanization, and has accordingly figured centrally in influential maps of global urbanization. Figure 28.5 (next page), a map of the San Francisco Port’s trade connections in 1922, is a typical example of such a visualization. Produced by the Port of San Francisco as part of a shipping guide, the map was indicative of an era in which water transport was the predominant means of world commerce. Through its use of an original “butterfly” projection scheme, this map illustrates the pattern of flows into and out of a major urban center, in this case via transoceanic shipping, thereby highlighting the port’s transnational economic reach. The urban is thus conceived predominantly as a gateway within a global space of commodity flows. The parameters of urbanization are understood with reference to the progressive extension of the city’s trade networks—a vast, ultimately worldwide hinterland for resource extraction and commodity exchange.

Figure 28.6 offers a more contemporary depiction of San Francisco's role as an economic agglomeration; it was developed in 2004 by researchers in the Globalization and World Cities (GaWC) research group at Loughborough University. In contrast to the traditional concept of a hinterland mediated through trade among geographically dispersed places, this "cartogram" depicts a "hinterworld" geography defined by networked relations within the



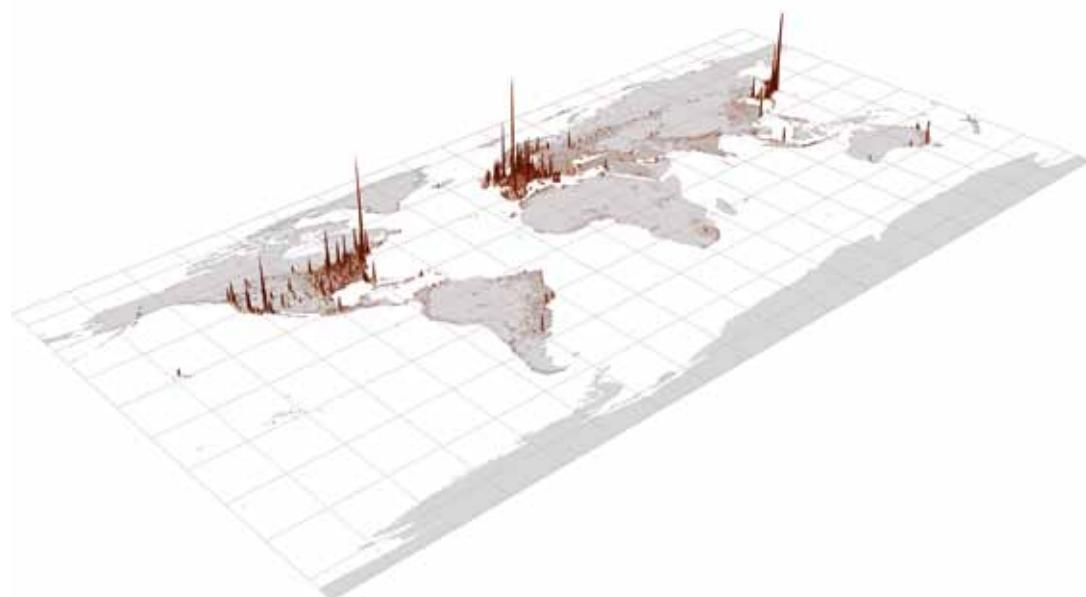
28.5 Port of San Francisco, strategic center of world trade, 1922



28.6 The hinterworld of San Francisco, 2004

corporate organizational structures of advanced producer services firms. To the degree that such firms are connected to subsidiary offices located elsewhere within the world economy, an inter-firm network emerges based upon differential levels and forms of connectivity to those locations. Represented as a matrix of cells approximating the geographical location of cities, "[a] hinterworld is the pattern of a city's relations with other cities across the world."⁷ In effect, this approach treats urban space as a site of corporate agglomeration and the space of urbanization as a zone of intra-firm organizational coordination.

Figure 28.7 offers one further, economically focused visualization of world urbanization based on the apparent "spikes" of economic activity that appear to be clustered together within large, dense urban nodes around the world. Such images of a "spiky world" were popularized in an influential magazine article by urban consultant Richard Florida, and have subsequently been promoted more widely through an online application produced by McKinsey & Company's Global Institute.⁸ Figure 28.7 offers a generic, three-dimensional version of this visualization, with the red spikes intended to depict exceptionally intense levels of economic activity, generally measured through a localized aggregation of national GDP levels. Here, urban space is envisioned as a zone in which high value-added forms of economic activity and consumption are clustered together in dense, nodal agglomerations. In this conception, the entire world economy has been effectively disaggregated into an assemblage of cities, surrounded by an apparently unproductive, empty and remote global hinterland. While these maps of cities as economic nodes productively illuminate the centrality of place under contemporary capitalism, they embrace a resolutely city-centric approach that obscures the variegated operational landscapes which support the agglomeration processes being depicted.



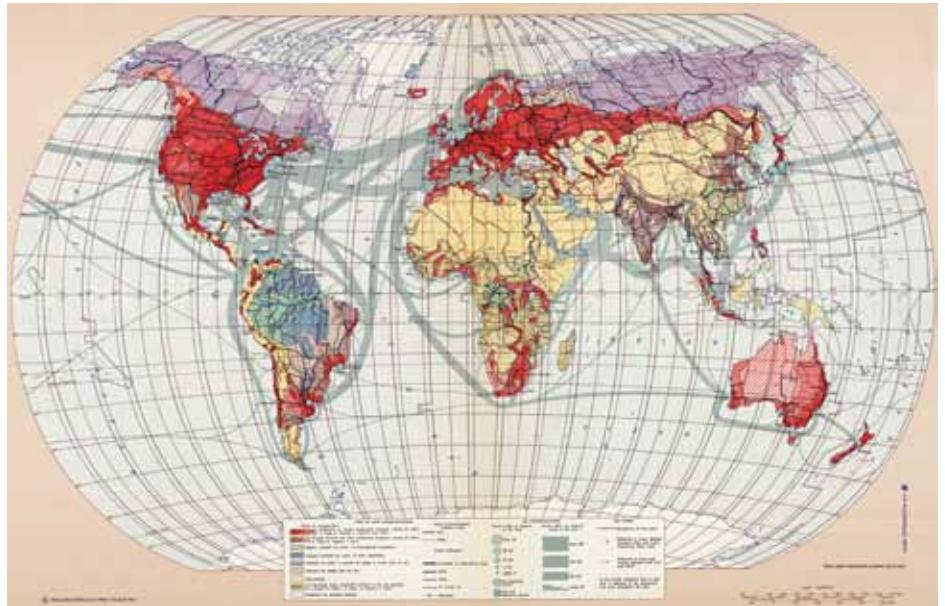
28.7 Economic activity in a spiky world, 2013

In contrast to the densified urban zones and fixed nodal points that prevail in the visualizations of population distributions and economic activity discussed above, the geographies of transportation infrastructures reveal some of the extended corridors of labor, commodity and materials circulation that animate the urbanization process. While Figures 28.8, 28.9 and 28.10 do not explicitly thematize urbanization, their depiction of global transportation networks at various moments in the twentieth century represents a powerful counterpoint to the bounded city metageography that underpins most of the maps discussed previously.

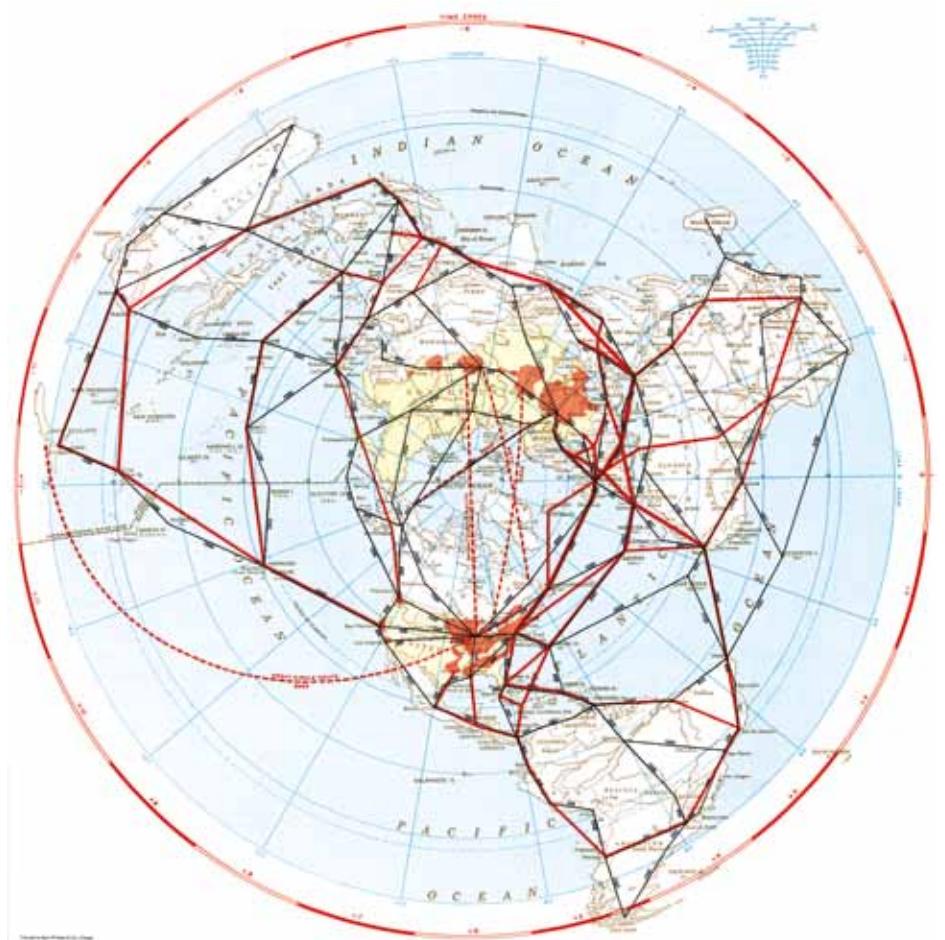
Figure 28.8 is a map of global surface transportation from the 1968 *Pergamon World Atlas*. Rather than representing network operations or flow intensities, it classifies the infrastructural equipment of the planet according to predominant technologies of transportation—from mechanized land-based systems (road and rail) to waterways and pack animals. Large territorial zones are color-coded according to the type of circulatory regime that prevails within them. On this basis, the map depicts various gradients stretching along major connectivity corridors such as waterways or railways, which are intended to illustrate the spatial differentiation of transportation capacities. Additionally, the map depicts the major ports of the world, weighted according to their traffic flows. Most strikingly, this map depicts world transportation space in the complete absence of territorial boundaries. In this sense, the map anticipates the type of accessibility analysis and visualization developed more recently through the World Bank's agglomeration index (see Figure 29.15, page 500).

In Figure 28.9, urban spaces—in this case, airports—are connected to the spaces of urbanization via aerial transport networks. Presented in the 1953 edition of the *World Geographic Atlas*, produced by Bauhaus-educated designer Herbert Bayer under the auspices of the Container Corporation of America, the map uses a polar azimuthal equidistant projection to ensure that air routes are visualized as unbroken spatial trajectories. Although cities are represented mainly as airport terminals within a globally interconnected transportation infrastructure, the map also depicts other land-use conditions, beyond the bounded city, notably the red zones of intense regional industrialization in the United States and the Soviet Union. While building upon updated and expanded data on *de facto* patterns of air transportation, most contemporary work on global intercity networks presupposes an identical metageography of nodes and networks.⁹

Figure 28.10 (page 470), produced by GLOBAIA in 2011, offers a contemporary synthesis of available data on worldwide transportation infrastructures in the context of recent debates on the Anthropocene—a period of the earth's evolution in which human beings are said to have become the most powerful shaping influence on land-use patterns and environmental conditions.¹⁰ Building on geospatial data derived from the Digital Chart



28.8 Modes of surface transportation, 1968



28.9 World airline routes, 1953



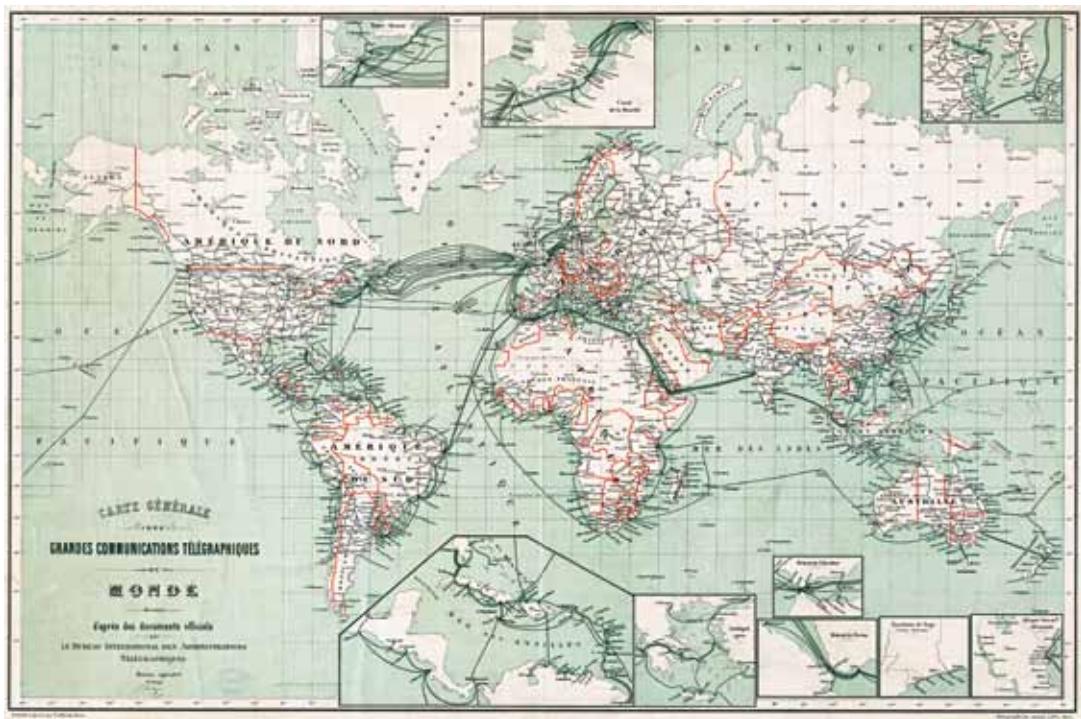
28.10 Global transportation system, 2011

of the World, Figure 28.10 combines depictions of major metropolitan regions with a synthetic visualization of all major surface, marine and air transportation networks. Here, urban agglomerations are depicted in yellow; road networks are coded green, shipping routes blue and air routes white. The map highlights the increasing density and planetary extension of transportation infrastructures, which here appear as a mosaic of operational equipment girding the earth's entire surface, both terrestrial and oceanic. This representation destabilizes the node/network binarism that underpins much work on transport geographies: here, networks have been thickened to such an extent that they are transformed into a dense fabric of connectivity woven across the planet.

Urbanization and Communications Infrastructures

Much like transportation networks, the geographies of communications infrastructures are threaded among major concentration points for population and economic activity, and they similarly extend across places, territories and scales, as well as over terrestrial, oceanic and atmospheric space. Figures 28.11 and 28.12 illustrate such infrastructural geographies at a world scale across the span of a century. Both maps also depict the contours of a “splintered” spatial configuration that promotes high levels of connectivity among some locations while relegating others to relative isolation.¹¹

Figure 28.11, published by the International Telegraph Bureau in Bern in 1901, depicts transoceanic and transcontinental telegraph networks, illustrating both their spatial pathways as well as their landing points along the coastlines or in major urban centers. Although the pace, density and reliability of communications through this network are rudimentary by contemporary standards, the map shows how a worldwide infrastructure for information circulation had already been established well over a century ago.



28.11 Major telegraph transmission lines of the world, 1901



28.12 Global Internet map, 2011

Figure 28.12, published by Telegeography in 2011, illustrates the density and speed of intercontinental internet linkages in the early twenty-first century. Connections among the five main continental regions are colored according to bandwidth capacities, while the circles surrounding the main zones likewise display information regarding internal (gray) and external (white) connectivity levels. Here, too, cities serve as landing points for very large-scale infrastructural networks, operating at once as nodes within the circuits and as major sites in which their capacities are consumed.

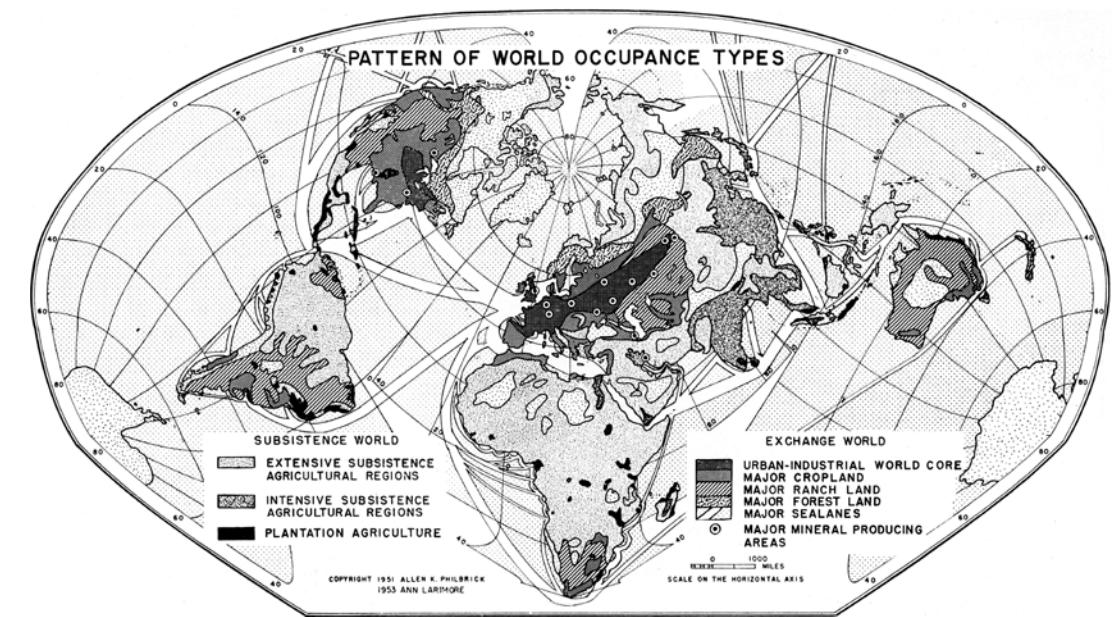
Despite their differential historical contexts and technological focal points, both maps illustrate the inescapable duality of large-scale communications infrastructures: even as they contribute to intensifying interspatial connectivity, they also create new vectors of exclusion in which some zones are actively marginalized through the very infrastructural networks that enhance accessibility for others. Such power-geometries must surely be a central concern within any critical cartography of planetary urbanization.¹²

Urbanization as Worldwide Transformation of Land Occupation and Environment

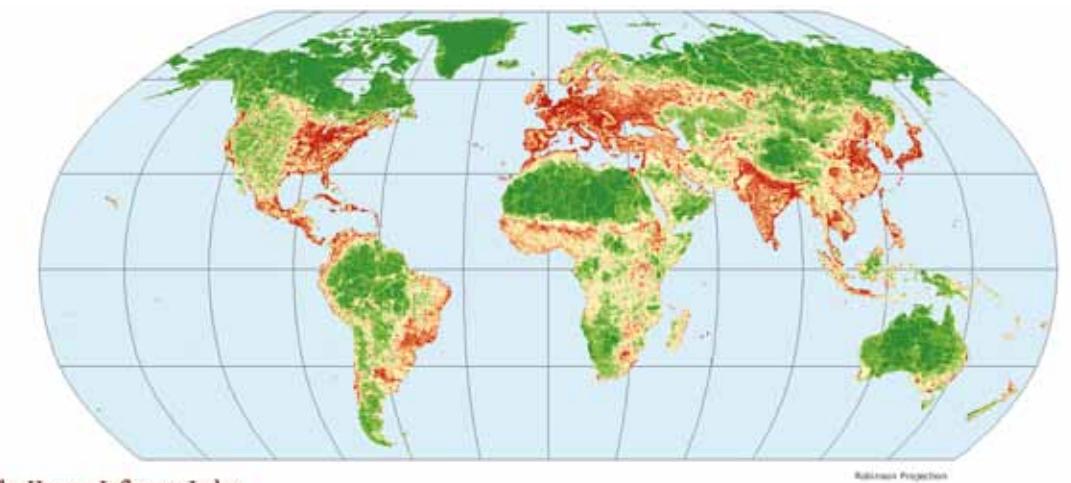
One final cartographic tradition has provocative implications for the project of constructing new metageographies of urbanization: it involves mapping the differentiation of human social activities and land uses across the earth's surface. In most such approaches, urban zones are conceived with reference to the bounded city metageography, and thus appear to occupy only a small portion of the planet's terrestrial surface. However, to the degree that this approach is concerned to grasp the diverse ways in which human social formations have transformed land-use patterns and environmental conditions, it may contain some productive provocations for exploring the operational landscapes of urbanization. Figures 28.13 and 28.14 represent typical examples of such approaches.

Figure 28.13 was produced in 1957 by the University of Chicago geographer Allen K. Philbrick. Much like R.B. Fuller's Dymaxion map (Figure 28.3, page 464), it incorporates an original projection of the planet illustrating the contiguity among continents and the differentiated geographies of human activity that are extended across them. Philbrick's scheme classifies the entire planetary terrain as a space of human "occupance" differentiated among several dominant systems of socioeconomic organization and technological capacity. The zonal typologies on the map demarcate the resultant spatial patterns through a series of areal classifications—urban-industrial zones; various zones of intensive agriculture and resource extraction; zones of shipping and transport infrastructures; and a continuum among various kinds of subsistence economy. Notably, Philbrick viewed the "urban-industrial world core" as a vast territorial field stretching across entire states and even continents (specifically, the United States, Europe and the Soviet Union). In this sense, he forcefully transcended the bounded city metageography that prevailed during his time. More generally, Philbrick's approach began to outline the ways in which industrial urbanization

hinges upon, and in turn contributes to, worldwide patterns of land-use reorganization and deepening territorial inequality. His visualizations thus open up some important perspectives for exploring the operational landscapes of extended urbanization.



28.13 Pattern of world occupancy types, 1957



The Human Influence Index

The Human Influence Index (HII) is a measure of direct human influence on terrestrial ecosystems using the best available data sets on human settlement (population density, built-up areas), access (roads, railroads, navigable rivers, coastline), landscape transformation (land use/land cover) and electric power infrastructure (nighttime lights). HII values range from 0 to 64. Zero value represents no human influence and 64 represents maximum human influence possible using all 8 measures of human presence.

28.14 Human influence index, 2008

Map 28.14, developed at Columbia University's Earth Institute in 2008 as part of the Last of the Wild research project, offers a more explicitly environmental perspective on the same set of issues. The Earth Institute's cartographic strategy is derived from a technical procedure that assesses the environmental impact of various human activities as they are articulated across the earth's surface. Drawing upon a range of data sets on human settlements, transportation infrastructures, landscape transformations and energy infrastructures, the map classifies planetary space on a scale from 0 (minimal impact) to 64 (maximum impact). Predictably, urban zones are coded as the highest impact areas, whereas more remote locations are said to be largely "wild," devoid of human influence. The map's representational strategy resonates with Philbrick's concern to differentiate the diverse forms of socio-environmental transformation induced through human activities. However, in contrast to Philbrick, who focused on the organization of socioeconomic activities, the Earth Institute map generates a technoscientific version of the long entrenched society/nature binarism that is largely divorced from any consideration of worldwide systems of political-economic power or territorial inequality.¹³

To the degree that urbanization processes hinge upon and in turn transform operational landscapes located beyond the most densely settled zones, their classification as largely "natural" areas of low- or zero-influence may require significant reassessment. Perhaps more crucially still, these operational landscapes are inextricably enmeshed within contemporary formations of uneven spatial development, and thus frequently play strategic roles in the reproduction of larger regimes of capital accumulation, political domination and sociopolitical exclusion.¹⁴

• • •

The conceptual framework under development in this book complicates the task of visualizing urbanization processes, since it destabilizes inherited assumptions regarding both the spatial units and the parameters of the urban condition. It suggests that inherited assumptions regarding such issues are seriously incomplete, because vast terrains of sociospatial relations that have long been relegated to the putatively "non-urban" realm must now be internalized within our understanding of the urban condition. More generally, insofar as urbanization is no longer equated here with the diffusion of a universal settlement type—be it the city, the metropolitan region or the mega-city—it is imperative to develop categories and modes of analysis that permit us to recognize the wide range of sociospatial patterns in and through which such processes unfold. How, then, to map urbanization processes in ways that illuminate the dialectics between agglomerations and their operational landscapes, across places, territories and scales, and over *longue durée* time-periods? These tasks remain to be confronted, but it seems clear that we will be considerably better equipped to do so if we are critically attuned to the metageographical assumptions, visual techniques and spatial ideologies that pervade both historical and contemporary representations of the global urban condition.

Notes

- 1 This chapter is a collaborative contribution by four members of the Urban Theory Lab-GSD (Neil Brenner, Danika Cooper, Ghazal Jafari and Nikos Katsikis). It is part of a broader project on (geo) spatial ideologies of urbanization that is currently being pursued within our research group.
- 2 On the question of metageographies, see Neil Brenner and Nikos Katsikis, "Is the Mediterranean Urban?" this book, Ch. 27.
- 3 See Kingsley Davis, "The origins and growth of urbanization in the world," *American Journal of Sociology* 60, 5 (1955) 429-37. For a critical assessment, see Neil Brenner and Christian Schmid, "The 'Urban Age' in Question," this book, Ch. 21.
- 4 Brian J. L. Berry, "City size distributions and economic development," *Economic Development and Cultural Change* 9, 4 (1961) 573-88.
- 5 See Brenner and Schmid, "The 'Urban Age' in Question," this book, Ch. 21.
- 6 On Fuller's Dymaxion map as a tool for understanding world urbanization, see Nikos Katsikis, "Two approaches to 'World Management': C.A. Doxiadis and R.B. Fuller," this book, Ch. 29.
- 7 Peter J. Taylor and David Walker, "Urban Hinterworlds Revisited," *Geography* 89, 2 (2004) 145.
- 8 See Richard Florida, "The World is Spiky: Globalization Has Changed the Economic Playing Field, But Hasn't Leveled It," *Atlantic Monthly* 296, 3 (2005) 48; for McKinsey's analogous visualization and analysis, see: http://www.mckinsey.com/insights/mgi/in_the_news/urban_world_app.
- 9 See, for example, Ben Derudder and Frank Witlox, "An Appraisal of the Use of Airline Data in Assessing the World City Network," *Urban Studies* 42, 13 (2005) 2371-88.
- 10 On the Anthropocene, see Paul J. Crutzen, "Geology of Mankind," *Nature*, 415 (2002) 23; and Erle Ellis, "Anthropogenic Transformation of the Terrestrial Biosphere," *Philosophical Transactions of the Royal Society A* 369, 11 (2011) 1010-35.
- 11 On "splintered" infrastructures, see Stephen Graham and Simon Marvin, *Splintering Urbanism* (New York: Routledge, 2003). As Graham and Marvin emphasize, the project of "rolling out" standardized public infrastructures of communication and transportation at a national scale—which was pursued around the world during much of the twentieth century, up until the 1980s—represents a remarkable exception to the currently resurgent tendency towards splintering.
- 12 On power-geometries, see Doreen Massey, *Place, Space, Gender* (Minneapolis: University of Minnesota Press, 1994).
- 13 On such technoscientific legacies in urban theory, see Nikos Katsikis, "Two Approaches to 'World Management'" and Brendan Gleeson, "What Role for Social Science in the 'Urban Age,'" this book, Ch. 22.
- 14 This proposition is powerfully illustrated in Stefan Kipfer, "The Fractures of Worldwide Urbanization: Insights from the Literary World," this book, Ch. 20.

Figure Credits

- 28.1 Norton Ginsburg, Brian Berry and Bert Frank Hoselitz, *Atlas of Economic Development* (Chicago: University of Chicago Press, 1961) 35.
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