ATLAS OF

WAREHOUSE GEOGRAPHY

IN THE

US

MATTHIEU SCHORUNG

GIS EXPERT

THIBAULT LECOURT

SUPERVISION

LAETITIA DABLANC

ATLAS OF WAREHOUSE GEOGRAPHY IN THE US

MATTHIEU SCHORUNG
PHD IN GEOGRAPHY AND URBAN PLANNING, POSTDOCTORAL FELLOW, LOGISTICS CITY RESEARCH CHAIR, SPLOTT, UNIVERSITY GUSTAVE EIFFEL
-
THIBAULT LECOURT
GEOSTATISTICAL AND GIS EXPERT, PHD STUDENT, UNIVERSITY OF AVIGNON
-
UNDER THE SUPERVISION OF
LAETITIA DABLANC
RESEARCH DIRECTOR, DIRECTOR OF THE LOGISTICS CITY RESEARCH CHAIR, LUMT, UNIVERSITY GUSTAVE EIFFEL

Chaire LOGISTICS CITY

Université Gustave Eiffel

SUMMARY


MS 197
CT204

ACKNOWLEDGMENTS

This project was financed by the Logistics City research chair (University Gustave Eiffel) hosted by the LVMT and SPLOTT research units.

This chair benefits from the financial support of private (Sogaris, Poste Immo, GeoPost) and public (Ile-de-France region) sponsors.

The activities and news of the Chair can be followed at this address:

www.lvmt.fr/en/chaires/logistics-city

As well as the Chair's website dedicated to e-commerce mobilities:

www.ecommercemobilities.com

Chaire LOGISTICS CITY

1.

INTRODUCTION

UNDERSTANDING THE DIFFERENTIAL WAREHOUSING DEVELOPMENT PATTERNS

The Covid-19 pandemic has had an impact on logistics markets, and in particular on e-commerce demand. The strong economic recovery due to the improved health situation and the continued growth of e-commerce are fueling a very dynamic logistics market.

As a result, there is a near shortage of logistics warehouses available for rent, with vacancy rates below 4% and even approaching 3% in some regions, and therefore an increase in rents for both XXL and urban warehouses. Logistics professionals will therefore have to increase the construction of new warehouses, taking into account three recent market developments: the strong demand for urban warehouses in territories with low land availability; the explosion in demand for automated warehouses [1]; and the emerging but increasingly strong demand for multi-story warehouses, which remain complex and expensive projects for the time being [2]. More than 568.2 million square feet of industrial property was under construction in the U.S. in the fourth quarter of 2021, up from 368.6 million in the fourth quarter of 2020 and 329.9 million in the same period of 2019, according to Cushman & Wakefield. Companies in the U.S. are also facing growing opposition from local communities to new warehouse locations [3].

According to a study conducted by Cushman & Wakefield [4], demand for logistics warehouses will remain strong in 2022 and 2023, with nearly 40% of that demand coming from the e-commerce sector alone. This tight logistics market should keep rents rising sharply, by more than 15% by the end of 2023 for Class A warehouses, and even more for innovative new formats. Between 2022 and 2023, more than 920 million square feet of warehouse space is expected to be delivered, allowing the market to loosen slightly but with rental rates still high (US$8.72 per square foot by year-end 2023). These recent developments in the US logistics market will have a definite impact on the spatial distribution of warehouses, so it will be interesting to identify the effects on logistics sprawl and the new warehouses development patterns.

1 note: https://www.mhlnews.com/transportation-distribution/article/21168952/the-state-of-us-logistics-2021-building-an-agile-supply-chain

2 note: https://www.wealthmanagement.com/industrial/multi-story-warehouses-are-still-rarity-us-changing

3 note: https://www.wsj.com/articles/americans-are-pushing-back-on-the-warehouse-construction-boom-11649422800

4 note: https://www.cushmanwakefield.com/en/united-states/insights/us-articles/what-do-recent-ecommerce-trends-mean-for-industrial-real-estate

Logistics sprawl corresponds to the growth in the number of warehouses in fringe areas of large cities, particularly in suburban areas where densities are low, land is available and cheap and plot sizes are high (Dablanc, 2018; Dablanc, Palacios-Argüello, De Oliveira, 2020).

Urban renewal, land pressure, competition with other activities, have created a context that is less and less favorable to the development of logistics activities in dense areas (Heitz, 2017) while **peri-urban areas** offered logistics activities large plots of land and proximity to large consumer markets thanks to good road and highway connections. The availability of transport infrastructure in fact offers good **accessibility** on two scales: firstly, **local** (to delivery areas) and secondly, **regional** or **inter-regional** (to other cities, to other countries for logistics facilities that have an extended hub role). Local public policies in favor of the development of logistics policies also influence the location of warehouses, with, for example, the creation of **logistics zones** in fringe areas to attract warehouses. The lack of regulation of metropolitan margins has favored the development of warehouses in suburban areas, fueling a process of **logistics sprawl** (Dablanc et al., 2014), which shows that the geography of warehouses is concentrated in sparsely populated peri-urban areas (Bowen, 2008; Cidell, 2010). The intensity of logistical sprawl varies with the type of warehouse (higher for distribution centers, lower for courier terminals) and according to the type of strategy implemented by the actor considered (Heitz et al., 2019). This logistics sprawl can also be explained by the evolution of the **supply chain** and the demand for **logistics real estate** (Hesse, 2008).

The lack of regional and metropolitan **regulation** of logistics has given way to logistics development on the margins of cities, contributing to logistics sprawl, the result of a negotiation between isolated peripheral municipalities and real estate development actors integrated into international financial markets (Raimbault, 2014). The main **negative impacts** of logistics sprawl (congestion, pollution, land artificialization) contradict the objectives of the "sustainable city" which includes densification, functional mix, reduction of congestion and CO2 emissions, fight against land artificialization. These **new sustainability objectives** have led to a refocusing of the debate on the "last mile", rather than the development of logistics in the peripheries, as a compensatory measure to this sprawl. At the same time, private demand for warehouses in **dense** areas has emerged. Some logistics sectors, particularly those linked to **e-commerce**, have started to look for new **urban warehouses**. This new demand for real estate also corresponds to the public authorities' objectives of redeveloping logistics activities in city centers in order to limit logistics sprawl. Thus, on the one hand, we are seeing the development of peri-urban logistics characterized by the rise of large, standardized logistics buildings, mainly intended for logistics service providers, mass distribution or industry (Heitz et al., 2017). On the other hand, we are witnessing the rise of urban logistics made up of buildings that are still largely "tailor-made" and which are subject to particular attention in terms of urban integration. This **dualization** of the **real estate market** reveals two patterns of logistics real estate development: a **peri-urban logistics** that is in the majority and an emerging **urban logistics** that is in the minority. However, these two types of logistics can now function as a **network** covering the entire metropolitan area.

In addition to the traditional demand for warehouses for retail, mass distribution and industrial activities, e-commerce reinforces this demand for logistics warehouses. **E-commerce**

is simultaneously creating a new retail landscape through **digitalization** and new **consumption** and distribution **practices** (virtual access to a wide range of products, instantaneity, **omnichannelity**) (Ramcharran, 2013; Hagberg et al, 2016) and a new **freight landscape** in terms of the structuring of demand, the location characteristics of warehouses and distribution centers, transport strategies (modal choices and nodal facilities) and the handling of the last mile in central urban areas (Bowen, 2012; Rodrigue, 2020). Jean-Paul Rodrigue (2020) has identified four major effects of **e-commerce** on the distribution of goods: effect on distribution structures (growth of B2C deliveries), effect on the real estate market (decrease in retail real estate and land footprint and increase in warehouse footprint), effect on logistics facilities (development of new types of warehouses - e-fulfillment centers, sortation centers, urban logistics centers), effect on business strategies (vertical integration, development of 3PL and 4PL services or own transport services by e-commerce pure players). E-commerce players are seeking to maximize **access to urban markets** and **minimize delivery times** by relying on significant economies of scale and density, particularly for their distribution centers (Houde et al., 2017), developing their own urban logistics strategies for **last-mile deliveries** (Browne et al., 2019) and promoting this vertical integration, of which Amazon is a pioneer company (Lieb and Leib, 2016).

The changes in the location of logistics establishments reflect the overall transformation of the warehouse and logistics economic sector:

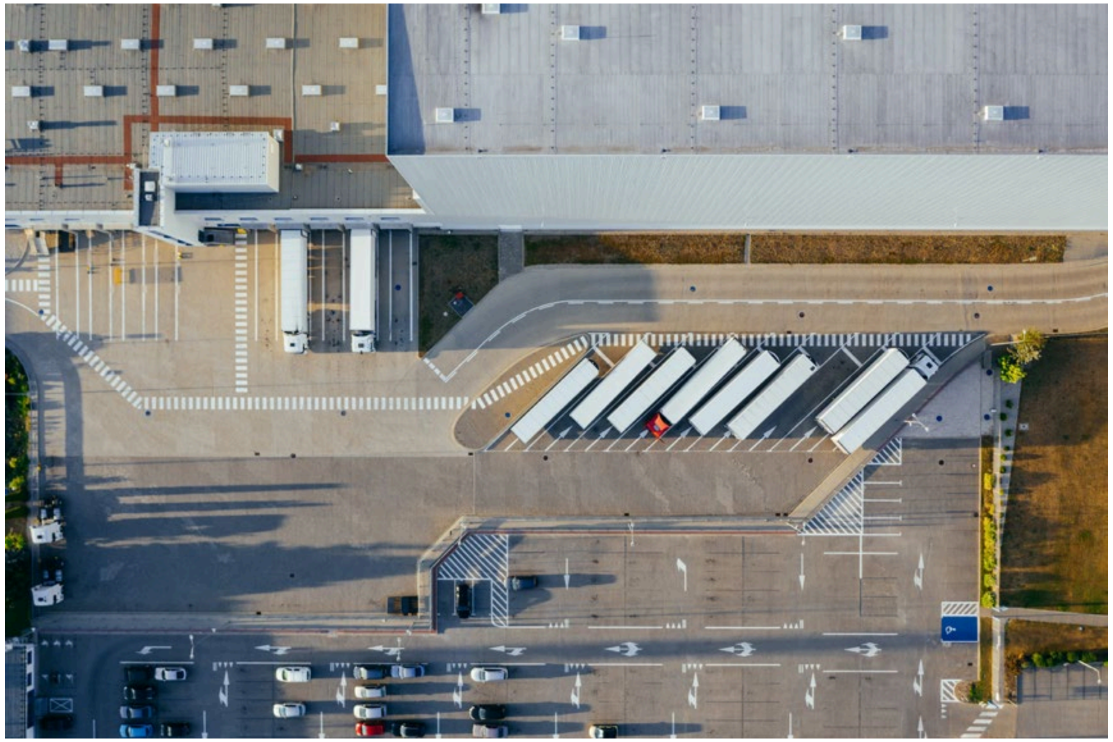
> « The warehousing industry has undergone major restructuring, transforming it into a distribution industry serving major importers (Christopherson and Belzer, 2009) and big box retailers, based on direct access to consumption markets and hub and spoke networks. Starting in the 1980s, the US and many other parts of the world entered a "new distribution economy" (Hesse and Rodrigue, 2004), an economy largely dependent upon efficient and increasingly globalized networks of goods distribution and just-in-time operations. This has led to a reduction in large inventories of intermediate and final products, but also to a concomitant rise in hub distribution centers (Movahedi et al., 2009). Global supply chains require more logistics facilities, and the way these facilities are spatially organized has become a key feature of an efficient goods distribution network » (Dablanc and Ross, 2012, p. 433).

The geographical impact of **e-commerce** is reflected in two distinct developments in logistics real estate (Dablanc et al., 2014). On the one hand, the creation of so-called "XXL" distribution centers or mega-fulfillment centers (over 50,000 square meters), which follow the historical trend of logistics zones moving away from urban centers and, on the other hand, the search for space in dense areas to meet the demand related to e-commerce. In order to meet consumer expectations, which are generally shown in surveys to appreciate ever faster deliveries, goods must be located close to the consumer. **Urban warehouses** have been introduced by large e-commerce players such as Amazon, which has, for example, set up in several central locations in Los Angeles (several dozen urban warehouses, from 50,000 to 200,000 sq.ft.), New York or Chicago (Schorung, Lecourt, 2021). Historically, Asian cities have pioneered urban warehouses, such as in Tokyo, Hong Kong, and Seoul. Because there is a potential for optimizing urban goods mobility (distributing as much with less), pooled urban distribution centers have been envisioned to more collaboratively manage the operations of all carriers needing to deliver in a given urban area (a city center, for example). E-commerce has accelerated the development of what are known as urban logistics spaces and logistics micro-hubs. **New models** are being organized based on small logistics facilities in dense urban areas to organize load breaks and enable last-mile deliveries with electric or non-motorized vehicles (Buldeo Rai, 2019).

2.

STATE OF THE ART:

LOGISTICS SPRAWL IN THE US



Several recent studies have analyzed the location of warehouses in metropolitan areas and the evolution over time of this location. These studies have demonstrated a shift in the **location of warehouses and logistics facilities to peripheral areas** (Bowen, 2008; Allen and Browne, 2010; Cidell, 2010; Heitz and Dablanc, 2015; Giuliano et al., 2016; Heitz, Dablanc, and Tavasszy, 2017).

Logistics warehouse location dynamics are based on several criteria and a complex supply chain cost structure (transportation, accessibility, distribution activities, structure of the regional economy, warehouse equipment, land and real estate, organization of logistics flows and the last mile, etc.) (Dablanc and Rakotonarivo, 2010). This evolution has been characterized as a "**logistics sprawl**" phenomenon that can be defined as "the tendency for warehouses to move from urban to suburban and exurban areas" (Dablanc and Ross, 2012, p. 434) that has been identified by research in all the case studies considered (Cidell, 2010; Dablanc and Ross, 2012; Dablanc et al., 2014; Heitz and Dablanc, 2015; Guerin et al., 2021). In the case of **North America**, several works have analyzed case studies, Atlanta, Los Angeles, Seattle, Toronto (Dablanc and Ross, 2012; Dablanc et al., 2014; Woudsma et al., 2016) and recently a comparative analysis on Chicago and Phoenix (Dubic, Kuo, Giron-Valderrama, Goodchild, 2020).

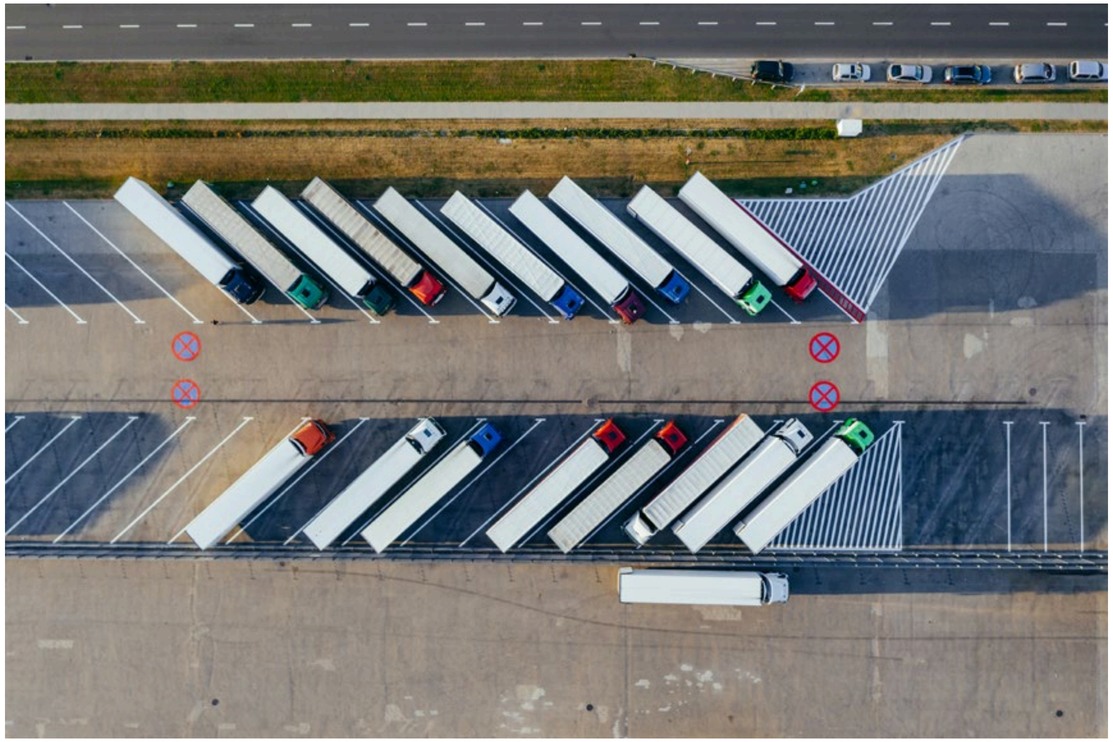
Several works seek to identify the **determinants** of the **location** of logistics facilities:

- The opportunity to access larger and cheaper vacant parcels in peripheral areas and **proximity** to highway **networks** and airports (Allen and Browne, 2010; Dablanc and Ross, 2012) ;
- The growth of the logistics industry fueled by **globalization** and new production and distribution dynamics (Andreoli et al., 2010; Sakai, Beziat, and Heitz, 2020);
- The correlation of the dynamics of the location of logistics establishments with **economic dynamics** at the national and regional levels (Bowen, 2008);
- The presence of public **regulatory** tools in terms of development permits and land use (Sakai et al., 2016) ;
- **Transportation costs** although they have become less of a determinant over the past 30 years or so. The spatial distribution of logistics warehouses depends only marginally on transportation costs (Glaeser and Kohlhase, 2004; Dablanc and Ross, 2012) offering them "increased locational flexibility" (Rodrigue, 2004) ;
- The transformation of the **logistics real estate sector**, increasingly dominated by global firms whose activities are organized around multi-scalar distribution networks (Hesse, 2004);
- **Land and real estate costs**, which mostly favor the location of warehouses in the outskirts of major cities (Oliveira, Dablanc and Schorung, 2021);
- **Social** and wage **conditions** can also play a role in the location of warehouses such as the availability of a large and cheap labor force and the differential in terms of labor costs, as in the case of the Inland Empire in Southern California (De Lara, 2013).

The results of the various case studies in the **United States** can be compared with the results obtained in this cartographic and statistical work. The contribution of this atlas is to deepen the corpus of cases analyzed to identify and characterize the logistics sprawl, to propose a comparative look at **45 American metropolises** and to apply the analysis of logistics sprawl and the logics of logistics warehousing location to the **main American megaregions**.

This work aims to offer in open access a cartographic representation of logistics warehouses and the evolution of their location in major US metropolitan areas and megaregions.

3.
METHODOLOGY



A. Mapping methodology at Zip Code Level

The aim of this ebook is to show logistics sprawl in 45 U.S. metro areas using the County Business Pattern database (U.S. Census Bureau) for 2012, 2015 and 2019, which provides location data for logistics facilities at Zip Code granularity, but not at a more fine-grained scale. Since Zip Codes vary widely in size, each Zip Code cannot be represented by a flat color corresponding to the number of establishments: the bigger Zip Code areas would stand out prominently because of their size and the larger number of warehouses in them, a "size effect" that would distort the analysis.

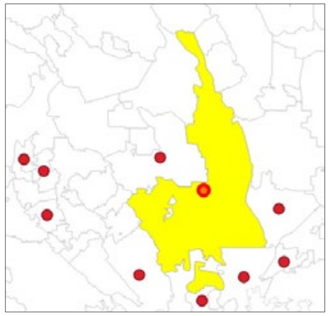
To address this, three complementary types of representation are proposed: centroid mapping, grid mapping, and heat maps. In addition, this work provides profiling statistics and indicators for each metropolitan region. It was decided to use the same indicators, the same semiology, and the same classes of data for all the metropolitan regions in order to facilitate comparison. The analysis can then be refined for some of them to reveal their particular dynamics and development patterns.

Mapping by centroids

Centroids, or barycenters, are the most central points of a polygon (in this case the Zip Codes), shown here without any particular weighting. This technique limits the size effect by relating each polygon to a point, independently of its surface area. These maps use proportional circles to show the number of logistics establishments present in 2019. The color of the circles indicates how this number changed compared with 2012. For reasons of processing costs, only the centroids strictly within the study areas are represented.

This method of representation facilitates comparison with other previous cartographic productions, and gives an initial snapshot of the distribution of establishments in each metropolis. It also makes it possible to observe both the gross number of establishments in 2019 and a diachronic analysis of changes on a single map. However, it presents certain visual biases:

- since the Zip Codes are sometimes complex in shape, or composed of several unconnected polygons, the centroids can be located outside the Zip Codes;
- since the surface area of some Zip Codes is very large, locating the point in their center could falsely suggest a distance between the establishments and other bordering Zip Codes.



In the illustration above, the two yellow areas correspond to a single large Zip Code, whose centroid is circled in red. The location of this centroid does indicate that the majority of the logistics establishments could conceivably be located in the southern part of the area. To address these biases, two other types of representation are proposed: by grid, and by heat map.

Grid Mapping

Representation of the number of establishments

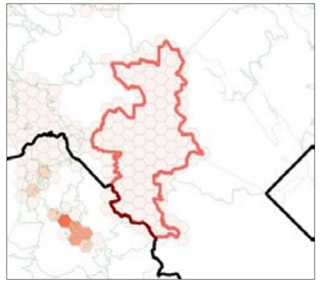
To produce these maps, we first created a grid with centroids spaced 5 km (3,1miles) apart and each cell having an area of 25km² (9,6 sq. mi.). For each cell, we then calculated the proportion of the Zip Code's area contained within it. We then estimated the number of establishments in each portion of the Zip Code, making the broad assumption that establishments are evenly distributed across the Zip Codes. Each cell was assigned a value equal to the sum of the estimated number of establishments in each portion of the Zip Code it contains. This is why the value of some cells can be between 0 and 1: if there is 1 establishment in a Zip Code, each cell containing a portion of this Zip Code will contain a number of establishments equal to 1 divided by the number of cells concerned. It was decided not to represent empty cells in order not to overload the maps and to better value the spaces with logistics warehouses in them. This method limits the size effect because a large Zip Code, which logically contains more establishments than a small one, will not be over-represented: the number of establishments in it will be related to its size and its color will therefore tend towards pale yellow rather than red. Also, by contrast with the Zip Code centroid mode of representation, this one reveals the contiguity between bordering Zip Codes. These same effects could have been obtained by representing the Zip Code territories in terms of density, i.e. the number of establishments relative to their surface area. The grid method was preferred because it more effectively takes into account small Zip Codes, which might otherwise be almost invisible despite the presence of a large number of establishments within them.

The data processed in these map productions, unlike the others presented in this report, cover the entire territory of the United States, and are not limited to the study areas. They thus allow us to observe whether Zip Codes outside the study areas contain logistics establishments, and whether certain areas need to be expanded in order to properly assess the sprawl phenomenon. These include northern Washington (in red on the map below) and Philadelphia:

Representation of the standard deviation ellipse and its barycenter

These maps also provide a representation of the standard deviation ellipse and its barycenter for the MSA/CSA concerned for the years 2012 and 2019. To calculate this, we chose not to rely directly on Zip Code territories, as these often straddle MSA/CSA boundaries, and it would not be appropriate to include or exclude them in the calculation. Instead, weighted barycenters were calculated from cells containing more than 0 logistics establishments, selecting only those that are strictly and entirely within the MSAs/CSAs studied.

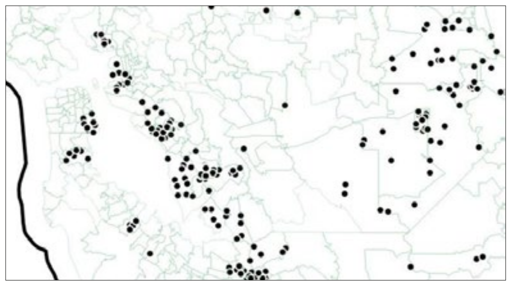
This method can be used to observe a phenomenon of extension in one geographical direction in cases where this extension is not balanced by another extension in the opposite direction (two equivalent extensions in opposite directions will not displace the barycenter), nor by a dynamic of concentration around the barycenter. This indicator should therefore be used with caution. As the scale of the maps in the report differs between MSAs/CSAs, the displacement of the barycenter of the ellipse in kilometers has been specified in the legend in order to permit comparison. Finally, the grid map method has a visual bias to consider, again a size effect: large Zip Codes containing few establishments, even a single establishment, will be entirely covered by pale yellow cells. This can produce a visual impression of sprawl, though the few (or single) existing establishment(s) in the Zip Code may be concentrated in one particular area. For example, in the map below, the Zip Code circled in red contains only 3 establishments: these might be concentrated in a single cell.



In the absence of more accurate geolocation data, it is not possible to correct reliably for this bias. To limit the bias, we nevertheless carried out a localization by Zip Code centroid as seen above. As an additional measure, we propose a random localization method by means of heat maps, as explained below.

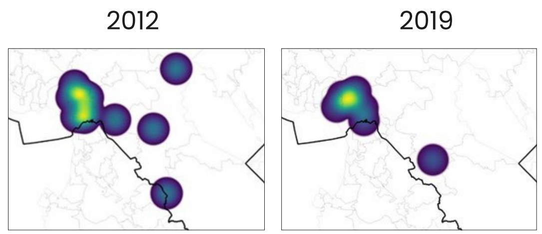
Heat maps

The aim of the third mapping technique – heat maps – is to limit the size effect of large Zip Codes, and to better highlight areas of concentration. To produce them, as many points as there are logistics establishments were generated in random locations in each Zip Code, for 2012 and for 2019, as in the example below:



From this base, heat maps were produced by drawing a 10km (6,2 miles) radius around each point, intensifying in color from purple to yellow to green depending on the density of the points. Only points within the study areas were selected.

Large areas with few settlements thus have a much lower visual impact. The areas of concentration are also more visible, and are no longer clearly restricted to the delimitation of a Zip Code or a cell as above. On the other hand, these visualizations should be interpreted with caution: since the location of the points is random, we should not be misled into believing that an establishment is located precisely at the point. Similarly, since the random generation process is restarted from scratch for the 2012 and 2019 maps, the displacement of individual points within a single Zip Code should not be interpreted as a displacement of logistics establishments. In the case below, for example, we see new points appearing that correspond to new facilities, but also the displacement of the isolated point to the east, which should not be interpreted as the displacement of a real logistics facility.



Finally, to further refine the analysis, we provide a number of indicators and statistical measurements.

Statistics

The "statistics" section draws first on the newly published (2019) data at the MSA/CSA level of granularity. Data at Zip Code granularity have not yet been published. Included are the number of logistics establishments and the number of employees, which allows us to calculate the average number of employees per establishment. Also provided is a chart and count of the distribution of the number of establishments (again in 2019) per numbers of employees, which gives an idea of the profile of MSA/CSA establishments. This data could be compared diachronically if needed, but this would involve some aggregation work because it is not provided at CSA granularity for years prior to 2017.

The last table provides a logistics sprawl indicator expressed in square kilometers for the years 2012 and 2019. This does not measure the total surface area of Zip Codes with at least one establishment, as this indicator would be too heavily influenced by large Zip Codes with few establishments which, as discussed above, does not necessarily indicate sprawl. We chose to rely on both the random points and the grid: we selected all the cells in the grid in which at least one point (i.e. an establishment) was generated.

This methodology is not exact, because the random generation of points can in some cases lead to two points being concentrated in a single cell when this is not the case in reality, or conversely to the selection of two cells each containing one point when the two logistics establishments are in fact very close. Nevertheless, this indicator provides a fairly reliable idea, particularly when it comes to comparing sprawl in two cities and measuring its evolution over time.

B. Mapping methodology at the megaregion level

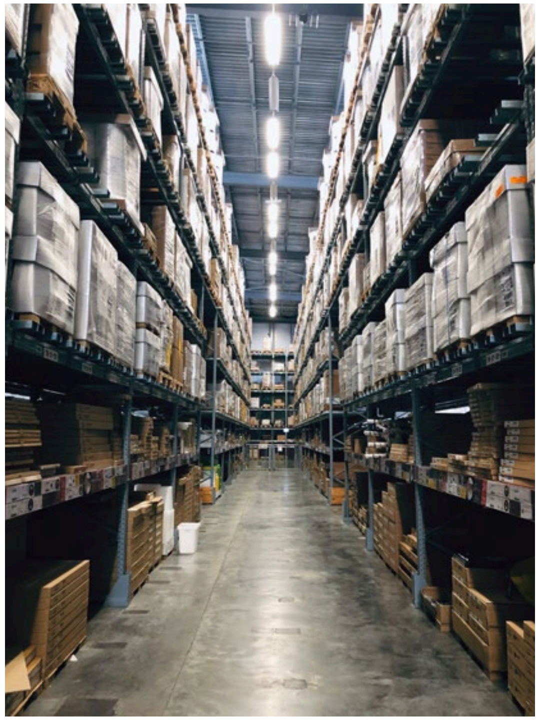
The graphic semiology of the map is therefore the same for all the megaregions studied. Nevertheless, some megaregions are not covered by certain categories: for example, there are no counties with a gross change of more than +50 in Cascadia. If the maps are published in isolation, it would be preferable to remove unnecessary legend items, so as not to muddle the reading. The data classes (categories) are constructed using the Jenks method, which maximizes inter-class differences and minimizes intra-class differences, and then manually adjusted to avoid classes with excessive undercount.

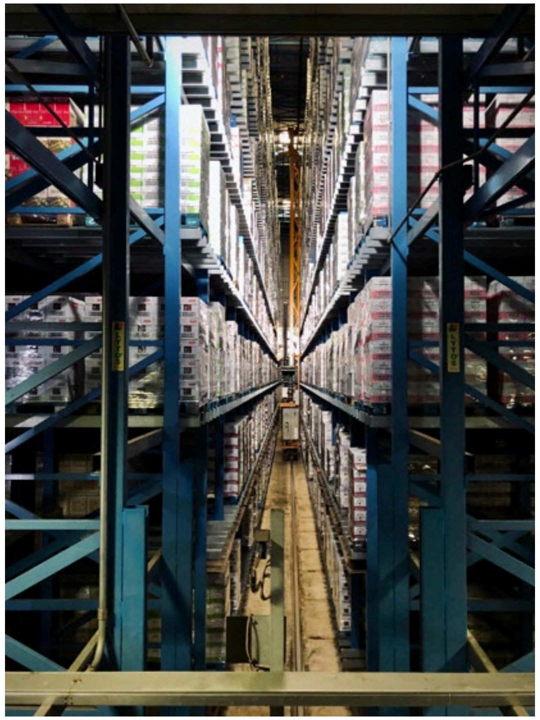
Gross change in the number of logistics establishments by county

We have chosen to represent the gross change, not the percentage change, to avoid over-representing counties with a small number of establishments but a large change (a change from 1 to 2 means +100%, but only +1 establishment). This methodology allows us to highlight the counties with both the highest change and the highest number of establishments.

Counties with fewer than 3 establishments are treated in the database as having no establishments. To avoid representing false shifts (from 0 to 3 or from 3 to 0), we chose to represent shifts from -3 to +3 in a neutral color.

A point of caution: the parts outside the megaregions are tinted with a 50% opaque filter. This graphic choice helps to focus attention on the study area, but could lead to misinterpretation of the colors outside the megaregions, as they appear lighter.





Number of logistics establishments by Zip Code centroids

Both the size and color intensity of the circles reference the same information: the number of establishments per Zip Code centroid. The redundancy in the visual information here makes it easier to read changes at a single glance. The smaller circles are always placed in front of the larger circles. [1]

1 Note: this method of representation does not provide a clear visualization of the zones of concentration when several circles are superimposed.

Heatmaps of logistics establishments by Zip Code centroids[2]

Each Zip Code centroid with at least one establishment is represented by a purple circle with a radius of 10km. Unlike in the previous maps, the heat maps allow one to visualize the concentration points, which are represented by a warmer color (yellow).

Average number of employees per logistics establishment

The objective of this map is to offer an indirect representation of the location

2 Note: unlike in the previous maps, the color code is relative and adjusted to each megaregion represented in the atlas. A yellow dot in Seattle does not indicate the same degree of concentration as a yellow dot in Los Angeles. A yellow dot means that, in the map in question, this is the point with the highest concentration of facilities. For this reason, there is no legend associated with the colors on the heat map.

of large and small establishments, by representing the average number of employees per establishment (assuming that there is a correlation between employee numbers and establishment size).[3] There is an error in the legend: the category “0 or no data” corresponds to the color white and not gray.

Change in the number of logistics establishments by Zip Code centroids

Centroids, or barycenters, are the most central point of a polygon (in this case, Zip Codes). This technique limits the size effect by relating each polygon to a point, independently of its surface area. These maps show, by means of proportional circles, the number of logistics establishments in 2019. The color of the circles indicates how this number has changed compared with 2012.

Points to watch:

- Zip Codes without logistics establishments in 2012, but with at least one logistics establishment in 2019, are considered to have grown by 100%;
- as Zip Codes sometimes have complex shapes, or are composed of several disconnected polygons, centroids may be placed outside the Zip Codes;
- some Zip Codes are very large in area, and the location of the point in their center could falsely suggest a distance between the settlements and the other bordering Zip Codes;
- the standard deviation ellipses and their barycenters are computed from the centroids of Zip Codes strictly within the megaregions studied, using the Yuill method corrected with multiplication by the square root of 2 and the use of degrees of freedom.

3 Note: Counties are represented regardless of the number of establishments. A county with 3 large establishments will be over-represented compared to a county with 100 small establishments. These maps should therefore not be used to read the evolution in the number of counties, but only to analyze the size of these establishments; they should therefore be viewed in conjunction with the previous maps.

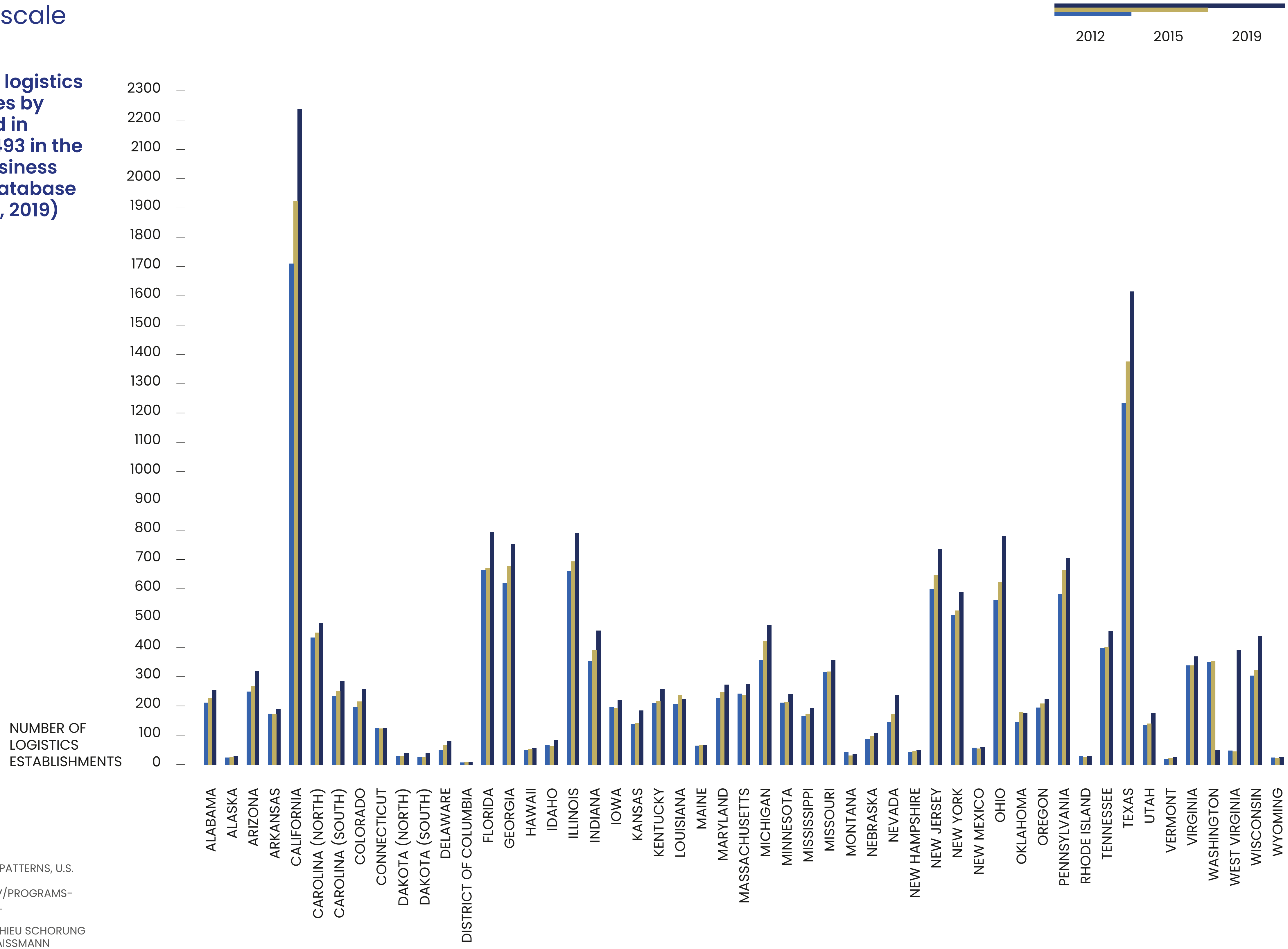
4.

THE LOCATION

OF WAREHOUSES IN THE USA

A. State scale

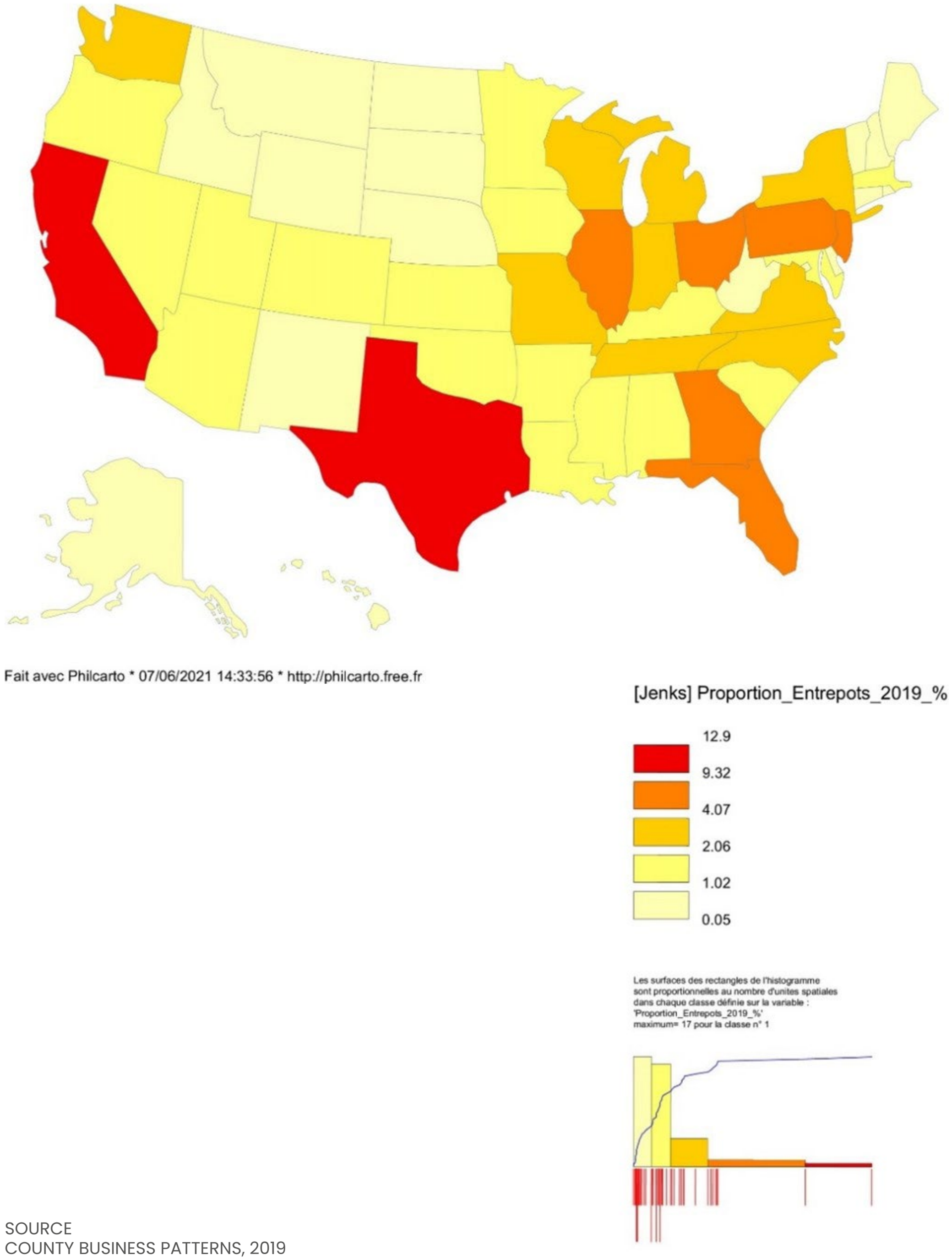
**Diagram 1.
Number of logistics warehouses by State listed in category 493 in the County Business Patterns database (2012, 2015, 2019)**



SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU: WWW.CENSUS.GOV/PROGRAMS-SURVEYS/CBP.HTML

REALISATION: MATTHIEU SCHORUNG
DESIGN: OLIVIER WAISSMANN

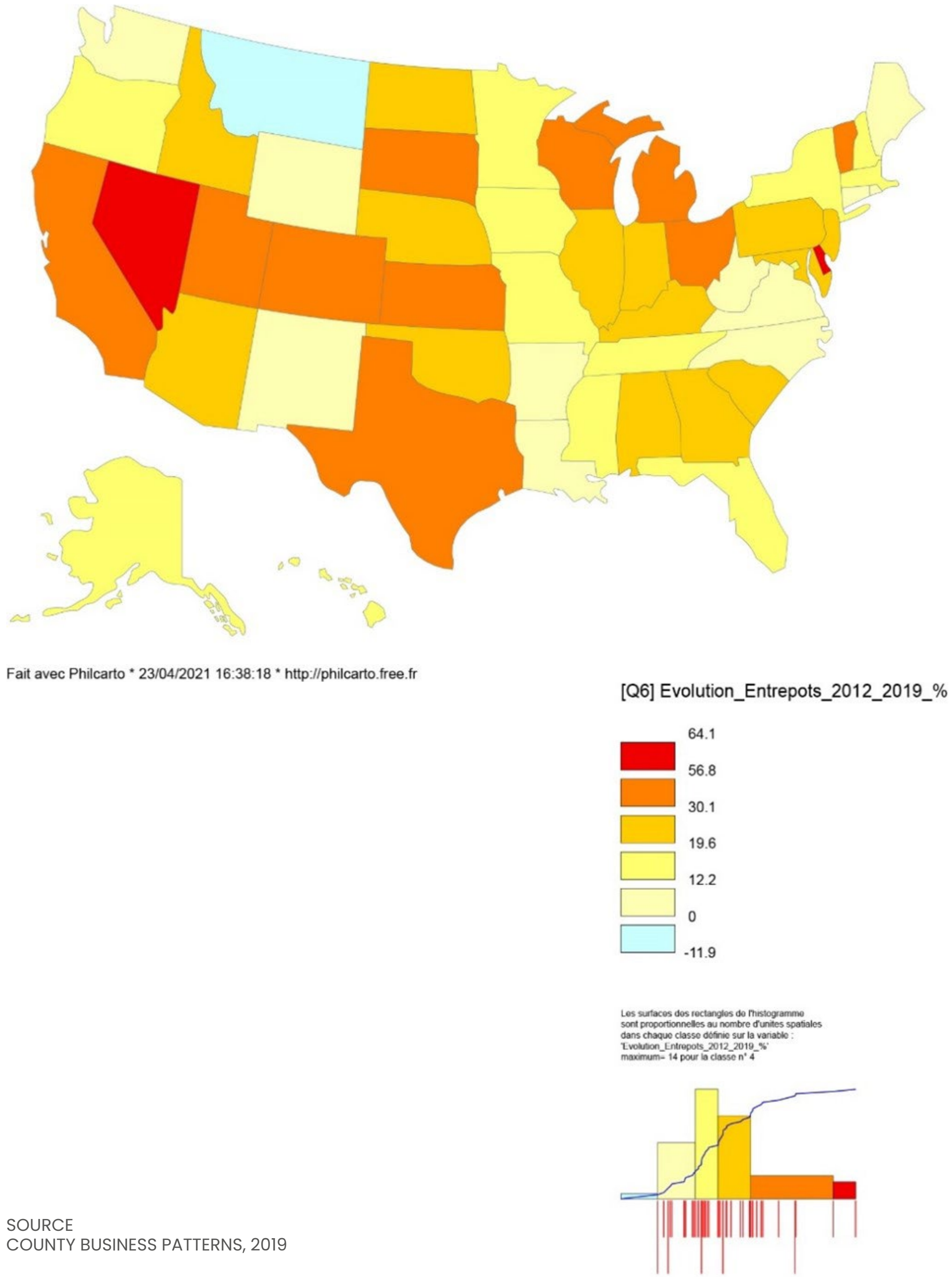
Map 1.
Share of logistics establishments by state in 2019.



SOURCE
COUNTY BUSINESS PATTERNS, 2019

REALISATION: MATTHIEU SCHORUNG

Map 2.
Changes in the number of logistics facilities by state between 2012 and 2019.

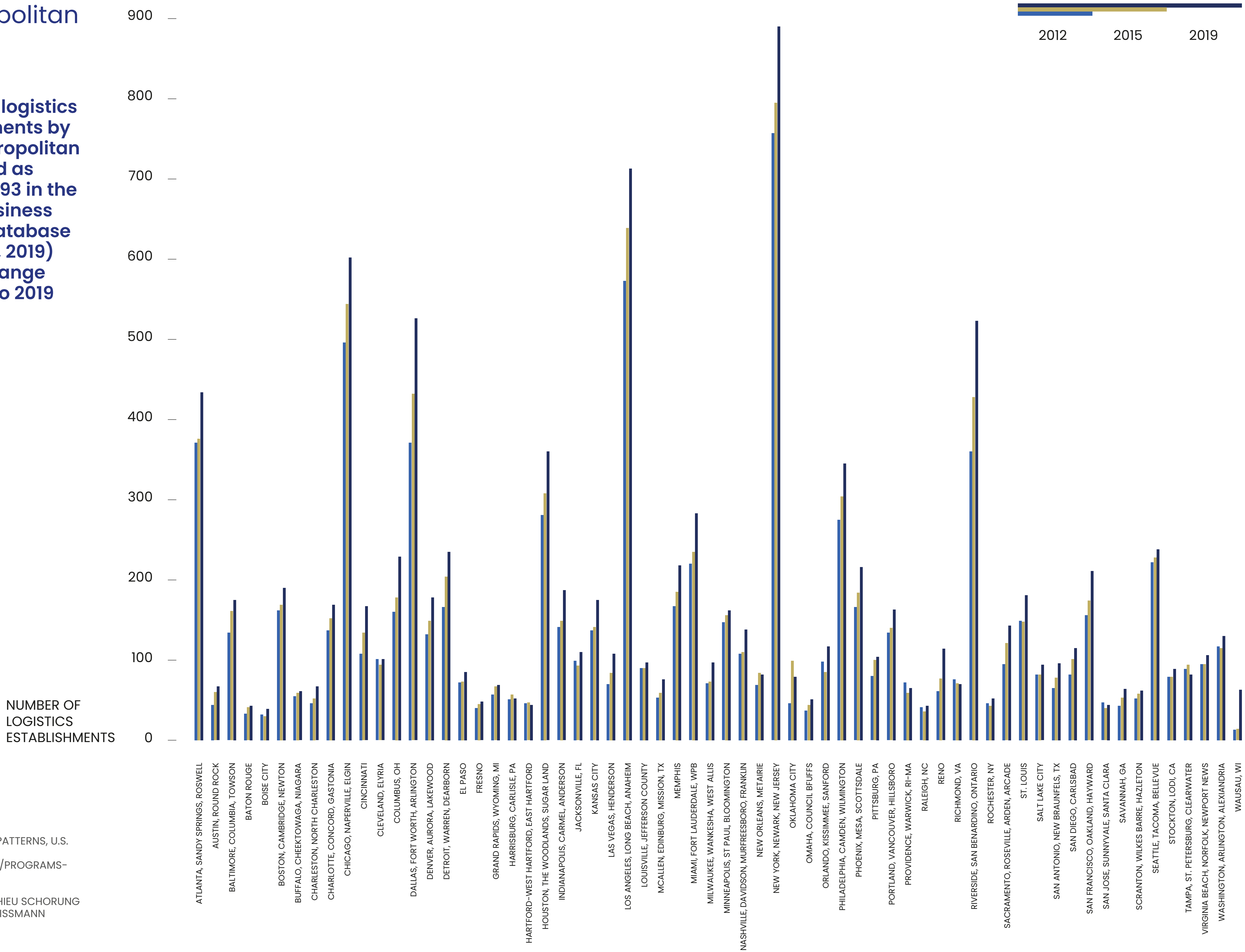


SOURCE
COUNTY BUSINESS PATTERNS, 2019

REALISATION: MATTHIEU SCHORUNG

B. Metropolitan scale

Diagram 2. Number of logistics establishments by major metropolitan areas listed as category 493 in the County Business Patterns database (2012, 2015, 2019) and the change from 2012 to 2019

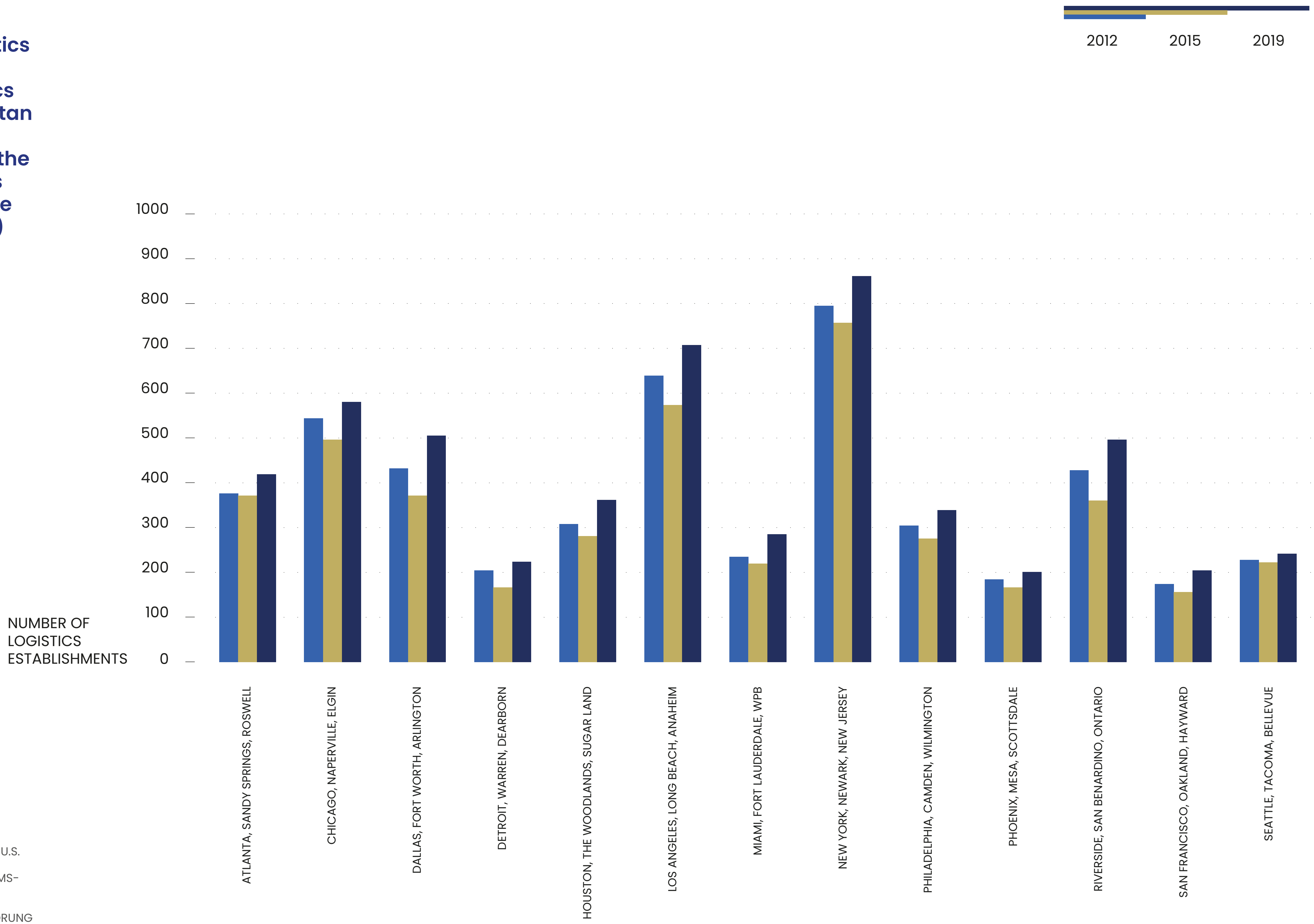


SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU: WWW.CENSUS.GOV/PROGRAMS-SURVEYS/CBP.HTML

REALISATION: MATTHIEU SCHORUNG
DESIGN: OLIVIER WAISSMANN

B. Metropolitan scale

Diagram 3. Number of logistics warehouses in the main logistics hubs (metropolitan areas) listed in category 493 in the County Business Pattern database (2012, 2015, 2019)

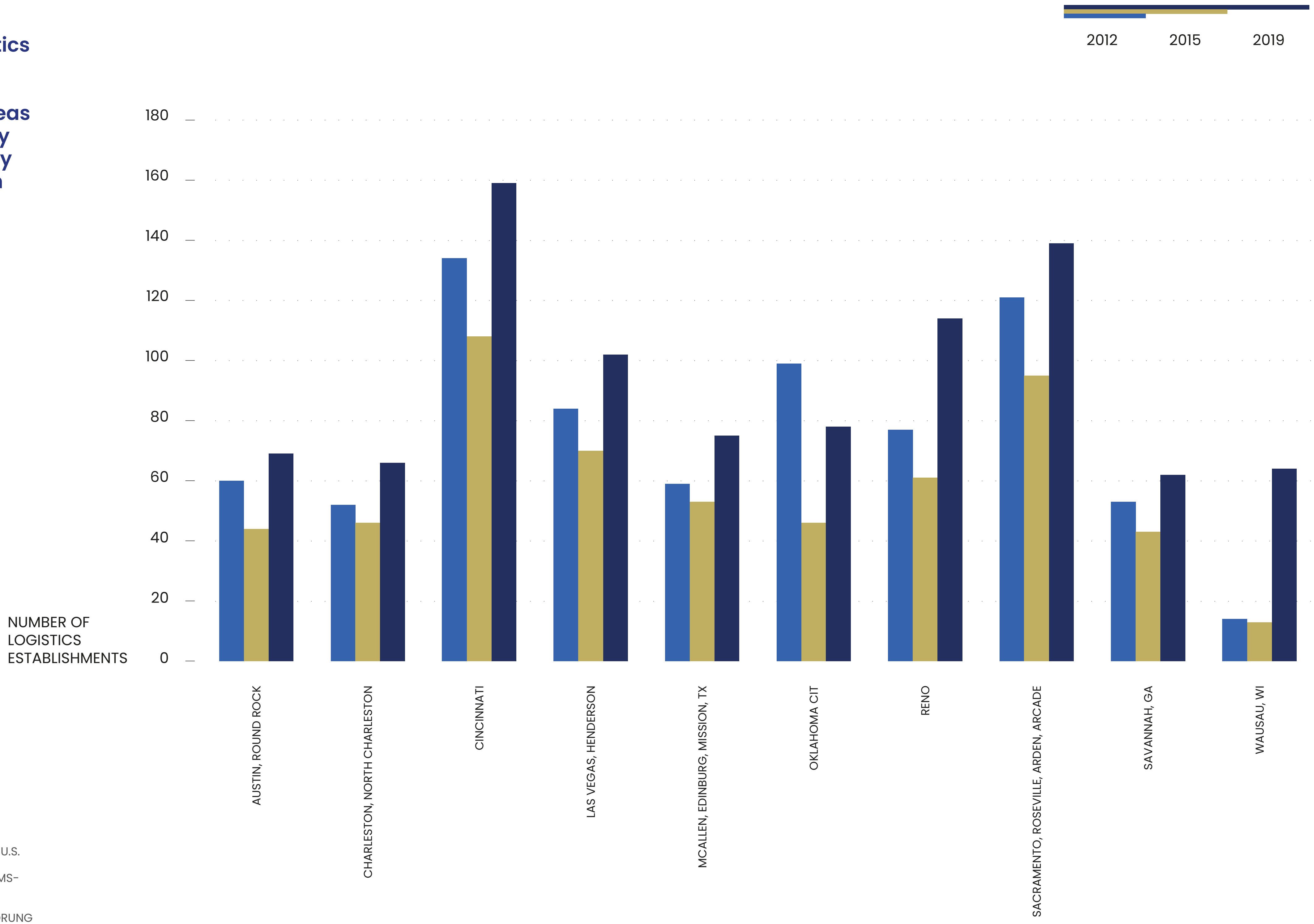


SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU: WWW.CENSUS.GOV/PROGRAMS-SURVEYS/CBP.HTML

REALISATION: MATTHIEU SCHORUNG
DESIGN: OLIVIER WAISSMANN

B. Metropolitan scale

Diagram 4. Number of logistics warehouses in intermediate metropolitan areas listed in category 493 in the County Business Pattern database (2012, 2015, 2019)

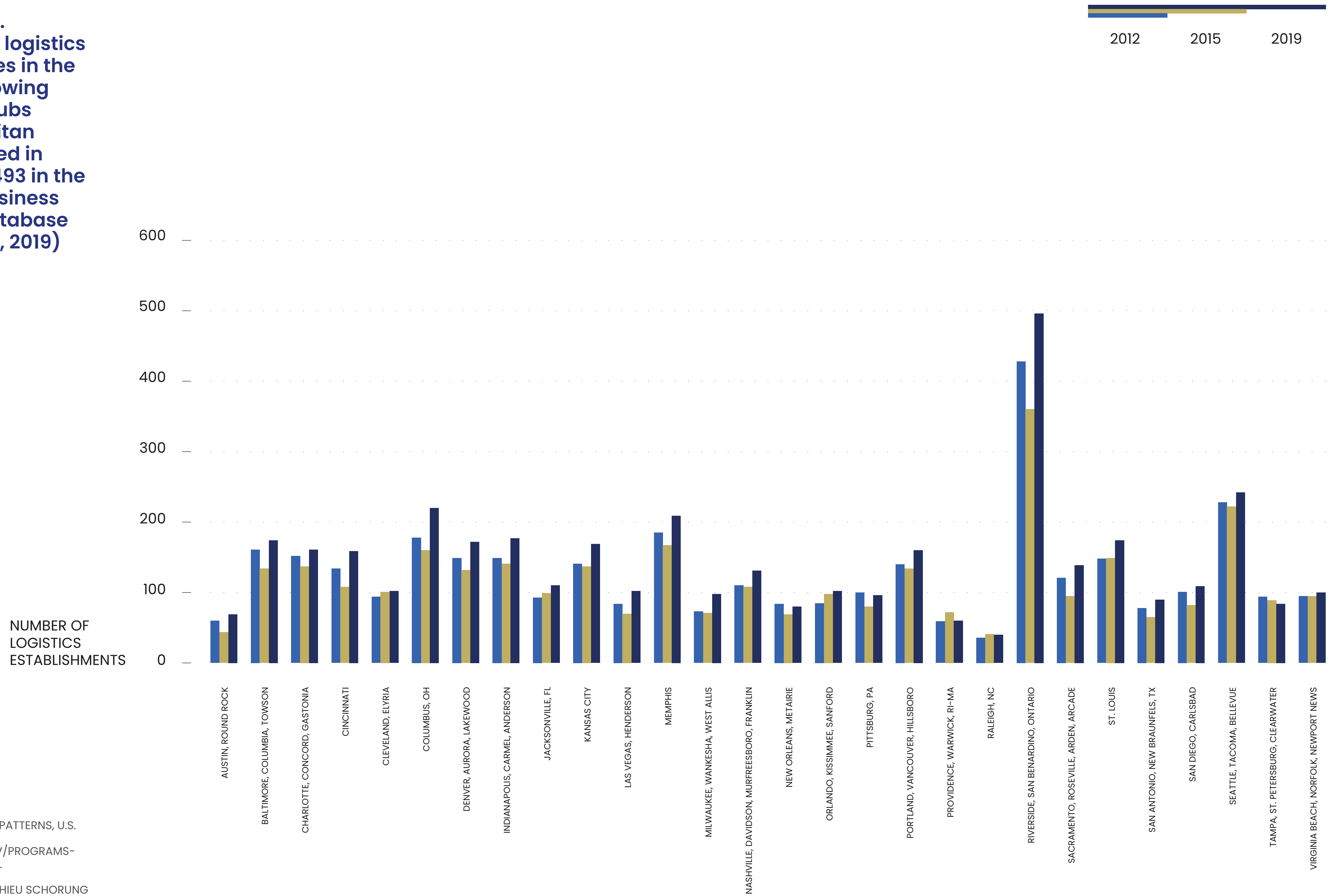


SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU: WWW.CENSUS.GOV/PROGRAMS-SURVEYS/CBP.HTML

REALISATION: MATTHIEU SCHORUNG
DESIGN: OLIVIER WAISSMANN

B. Metropolitan scale

**Diagram 5.
Number of logistics warehouses in the fastest growing logistics hubs (metropolitan areas) listed in category 493 in the County Business Pattern database (2012, 2015, 2019)**



SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU: WWW.CENSUS.GOV/PROGRAMS-SURVEYS/CBP.HTML

REALISATION: MATTHIEU SCHORUNG
DESIGN: OLIVIER WAISSMANN

TABLES

TABLE 1.

NUMBER OF LOGISTICS WAREHOUSES BY STATE IN THE UNITED STATES IN 2012, 2015 AND 2019

STATE	2012	2015	2019
ALABAMA	212	228	254
ALASKA	24	27	28
ARIZONA	250	268	319
ARKANSAS	174	173	189
CALIFORNIA	1711	1924	2238
CAROLINA (NORTH)	434	451	483
CAROLINA (SOUTH)	235	251	285
COLORADO	196	216	259
CONNECTICUT	126	124	126
DAKOTA (NORTH)	30	28	39
DAKOTA (SOUTH)	27	26	39
DELAWARE	51	67	80
DISTRICT OF COLUMBIA	7	9	8
FLORIDA	665	671	795
GEORGIA	621	678	752
HAWAII	49	53	56
IDAHO	67	64	85
ILLINOIS	661	694	791
INDIANA	353	390	458
IOWA	196	193	220
KANSAS	138	143	185
KENTUCKY	211	235	258
LOUISIANA	206	237	224
MAINE	65	68	68
MARYLAND	227	249	273
MASSACHUSETTS	243	237	275
MICHIGAN	358	422	478
MINNESOTA	212	214	242
MISSISSIPPI	167	174	193
MISSOURI	316	318	358
MONTANA	42	31	37
NEBRASKA	88	98	109
NEVADA	145	172	238
NEW HAMPSHIRE	43	46	50
NEW JERSEY	601	646	736
NEW YORK	511	526	589
NEW MEXICO	58	55	60
OHIO	561	624	781
OKLAHOMA	146	179	177
OREGON	195	209	224
PENNSYLVANIA	583	664	706
RHODE ISLAND	29	25	30
TENNESSEE	399	402	456
TEXAS	1236	1376	1616
UTAH	136	140	177
VERMONT	18	22	26
VIRGINIA	339	339	370
WASHINGTON	350	353	391
WEST VIRGINIA	48	45	49
WISCONSIN	304	324	440
WYOMING	24	22	25

SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU (2012, 2015, 2019)

TABLE 2.

NUMBER OF LOGISTICS WAREHOUSES BY METROPOLITAN AREA IN THE UNITED STATES IN 2012, 2015 AND 2019

METROPOLITAN AREA	2012	2015	2019	METROPOLITAN AREA	2012	2015	2019
ATLANTA, SANDY SPRINGS, ROSWELL	371	376	434	MINNEAPOLIS, ST PAUL, BLOOMINGTON	147	156	162
AUSTIN, ROUND ROCK	44	60	67	NASHVILLE, DAVIDSON, MURFREESBORO, FRANKLIN	108	110	138
BALTIMORE, COLUMBIA, TOWSON	134	161	175	NEW ORLEANS, METAIRIE	69	84	82
BATON ROUGE	33	41	43	NEW YORK, NEWARK, NEW JERSEY	757	795	890
BOISE CITY	32	30	39	OKLAHOMA CITY	46	99	79
BOSTON, CAMBRIDGE, NEWTON	162	169	190	OMAHA, COUNCIL BFUFFS	37	44	51
BUFFALO, CHEEKTOWAGA, NIAGARA	55	59	61	ORLANDO, KISSIMMEE, SANFORD	98	85	117
CHARLESTON, NORTH CHARLESTON	46	52	67	PHILADELPHIA, CAMDEN, WILMINGTON	275	304	345
CHARLOTTE, CONCORD, GASTONIA	137	152	169	PHOENIX, MESA, SCOTTSDALE	166	184	216
CHICAGO, NAPERVILLE, ELGIN	496	544	602	PITTSBURG, PA	80	100	104
CINCINNATI	108	134	167	PORTLAND, VANCOUVER, HILLSBORO	134	140	163
CLEVELAND, ELYRIA	101	94	101	PROVIDENCE, WARWICK, RI-MA	72	59	65
COLUMBUS, OH	160	178	229	RALEIGH, NC	41	36	43
DALLAS, FORT WORTH, ARLINGTON	371	432	526	RENO	61	77	114
DENVER, AURORA, LAKEWOOD	132	149	178	RICHMOND, VA	76	71	70
DETROIT, WARREN, DEARBORN	166	204	235	RIVERSIDE, SAN BENARDINO, ONTARIO	360	428	523
EL PASO	72	73	85	ROCHESTER, NY	46	43	52
FRESNO	40	45	48	SACRAMENTO, ROSEVILLE, ARDEN, ARCADE	95	121	143
GRAND RAPIDS, WYOMING, MI	57	67	69	ST. LOUIS	149	148	181
HARRISBURG, CARLISLE, PA	51	57	52	SALT LAKE CITY	82	82	94
HARTFORD-WEST HARTFORD, EAST HARTFORD	46	47	44	SAN ANTONIO, NEW BRAUNFELS, TX	65	78	96
HOUSTON, THE WOODLANDS, SUGAR LAND	281	308	360	SAN DIEGO, CARLSBAD	82	101	115
INDIANAPOLIS, CARMEL, ANDERSON	141	149	187	SAN FRANCISCO, OAKLAND, HAYWARD	156	174	211
JACKSONVILLE, FL	99	93	110	SAN JOSE, SUNNYVALE, SANTA CLARA	47	40	44
KANSAS CITY	137	141	175	SAVANNAH, GA	43	53	64
LAS VEGAS, HENDERSON	70	84	108	SCRANTON, WILKES BARRE, HAZLETON	52	58	62
LOS ANGELES, LONG BEACH, ANAHEIM	573	639	713	SEATTLE, TACOMA, BELLEVUE	222	228	238
LOUISVILLE, JEFFERSON COUNTY	90	90	97	STOCKTON, LODI, CA	79	79	89
MCALLEN, EDINBURG, MISSION, TX	53	59	76	TAMPA, ST. PETERSBURG, CLEARWATER	89	94	82
MEMPHIS	167	185	218	VIRGINIA BEACH, NORFOLK, NEWPORT NEWS	95	95	106
MIAMI, FORT LAUDERDALE, WPB	220	235	283	WASHINGTON, ARLINGTON, ALEXANDRIA	117	115	130
MILWAUKEE, WANKESHA, WEST ALLIS	71	73	97	WAUSAU, WI	13	14	63

SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU (2012, 2015, 2019)

TABLE 3.

NUMBER OF LOGISTICS WAREHOUSES IN THE MAIN LOGISTICS HUBS IN THE UNITED STATES IN 2012, 2015 AND 2019

METROPOLITAN AREA	2012	2015	2019
ATLANTA, SANDY SPRINGS, ROSWELL	371	376	434
CHICAGO, NAPERVILLE, ELGIN	496	544	602
DALLAS, FORT WORTH, ARLINGTON	371	432	526
DETROIT, WARREN, DEARBORN	166	204	235
HOUSTON, THE WOODLANDS, SUGAR LAND	281	308	360
LOS ANGELES, LONG BEACH, ANAHEIM	573	639	713
MIAMI, FORT LAUDERDALE, WPB	220	235	283
NEW YORK, NEWARK, NEW JERSEY	757	795	890
PHILADELPHIA, CAMDEN, WILMINGTON	275	304	345
PHOENIX, MESA, SCOTTSDALE	166	184	216
RIVERSIDE, SAN BENARDINO, ONTARIO	360	428	523
SAN FRANCISCO, OAKLAND, HAYWARD	156	174	211
SEATTLE, TACOMA, BELLEVUE	222	228	238

TABLE 4.

NUMBER OF LOGISTICS WAREHOUSES IN THE FASTEST GROWING LOGISTICS HUBS IN THE UNITED STATES IN 2012, 2015 AND 2019

METROPOLITAN AREA	2012	2015	2019
AUSTIN, ROUND ROCK	44	60	67
CHARLESTON, NORTH CHARLESTON	46	52	67
CINCINNATI	108	134	167
LAS VEGAS, HENDERSON	70	84	108
MCALLEN, EDINBURG, MISSION, TX	53	59	76
OKLAHOMA CITY	46	99	79
RENO	61	77	114
SACRAMENTO, ROSEVILLE, ARDEN, ARCADE	95	121	143
SAVANNAH, GA	43	53	64
WAUSAU, WI	13	14	63

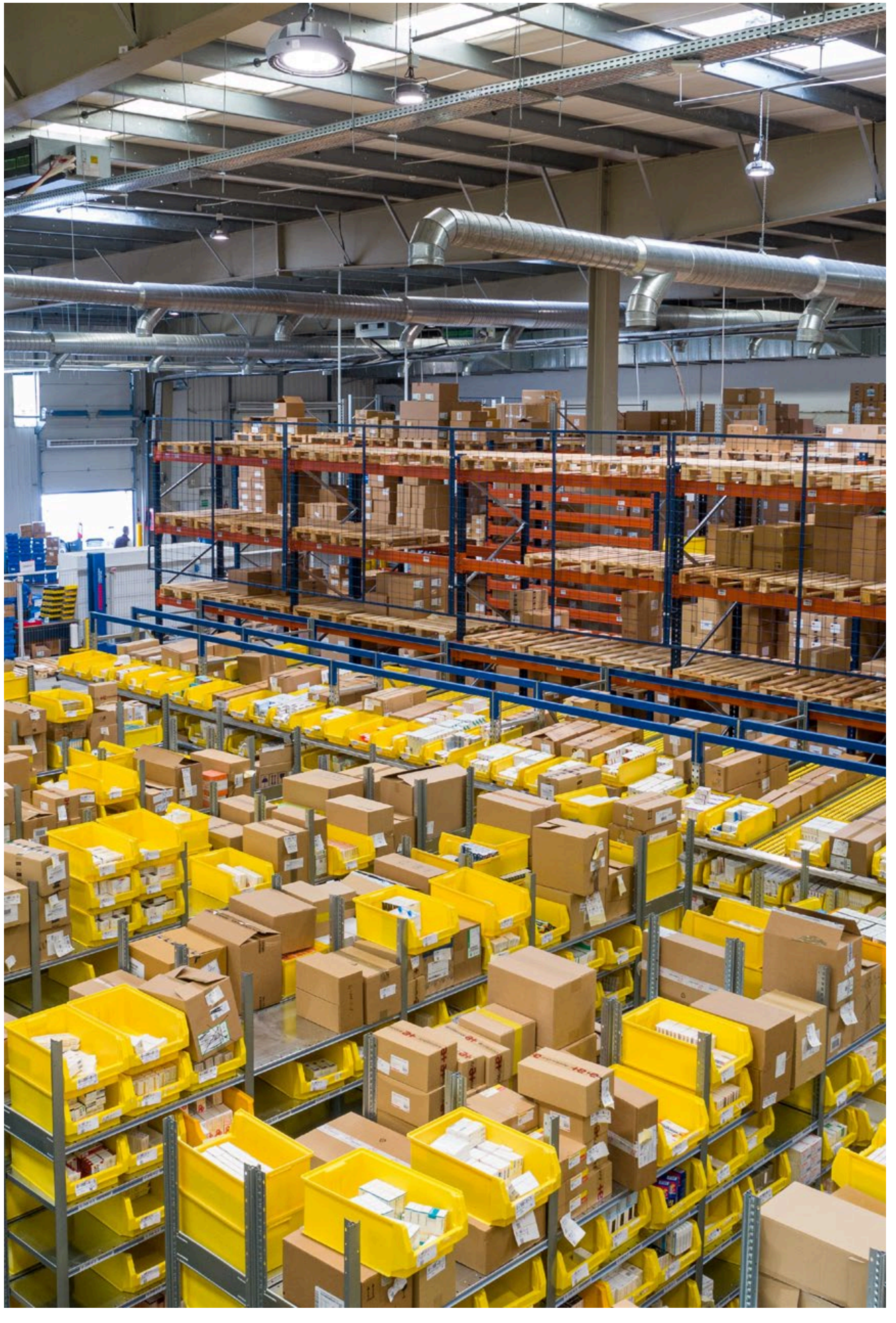
SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU (2012, 2015, 2019)

TABLE 5.

NUMBER OF LOGISTICS WAREHOUSES IN INTERMEDIATE METROPOLITAN AREAS IN THE UNITED STATES IN 2012, 2015 AND 2019

METROPOLITAN AREA	2012	2015	2019
AUSTIN, ROUND ROCK	44	60	67
BALTIMORE, COLUMBIA, TOWSON	134	161	175
CHARLOTTE, CONCORD, GASTONIA	137	152	169
CINCINNATI	108	134	167
CLEVELAND, ELYRIA	101	94	101
COLUMBUS, OH	160	178	229
DENVER, AURORA, LAKEWOOD	132	149	178
INDIANAPOLIS, CARMEL, ANDERSON	141	149	187
JACKSONVILLE, FL	99	93	110
KANSAS CITY	137	141	175
LAS VEGAS, HENDERSON	70	84	108
MEMPHIS	167	185	218
MILWAUKEE, WANKESHA, WEST ALLIS	71	73	97
NASHVILLE, DAVIDSON, MURFREESBORO, FRANKLIN	108	110	138
NEW ORLEANS, METAIRIE	69	84	82
ORLANDO, KISSIMMEE, SANFORD	98	85	117
PITTSBURG, PA	80	100	104
PORTLAND, VANCOUVER, HILLSBORO	134	140	163
PROVIDENCE, WARWICK, RI-MA	72	59	65
RALEIGH, NC	41	36	43
RIVERSIDE, SAN BENARDINO, ONTARIO	360	428	523
SACRAMENTO, ROSEVILLE, ARDEN, ARCADE	95	121	143
ST. LOUIS	149	148	181
SAN ANTONIO, NEW BRAUNFELS, TX	65	78	96
SAN DIEGO, CARLSBAD	82	101	115
SEATTLE, TACOMA, BELLEVUE	222	228	238
TAMPA, ST. PETERSBURG, CLEARWATER	89	94	82
VIRGINIA BEACH, NORFOLK, NEWPORT NEWS	95	95	106

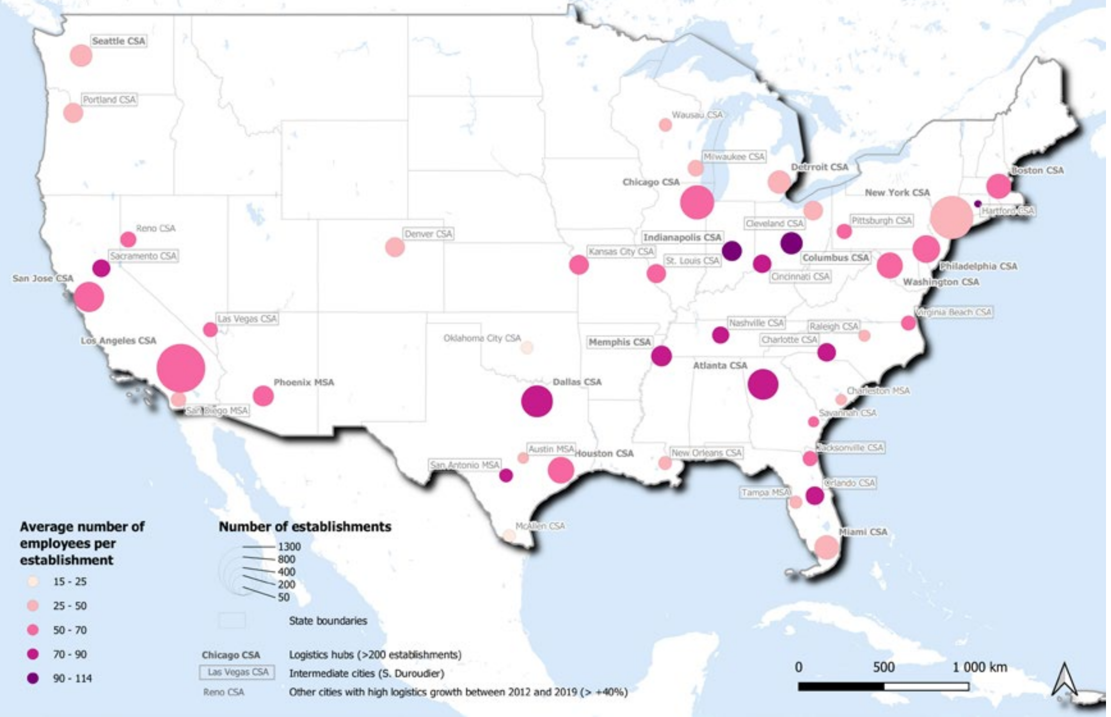
SOURCE
COUNTY BUSINESS PATTERNS, U.S. CENSUS BUREAU (2012, 2015, 2019)




2·17
2·18
2·18
2·19
7·12

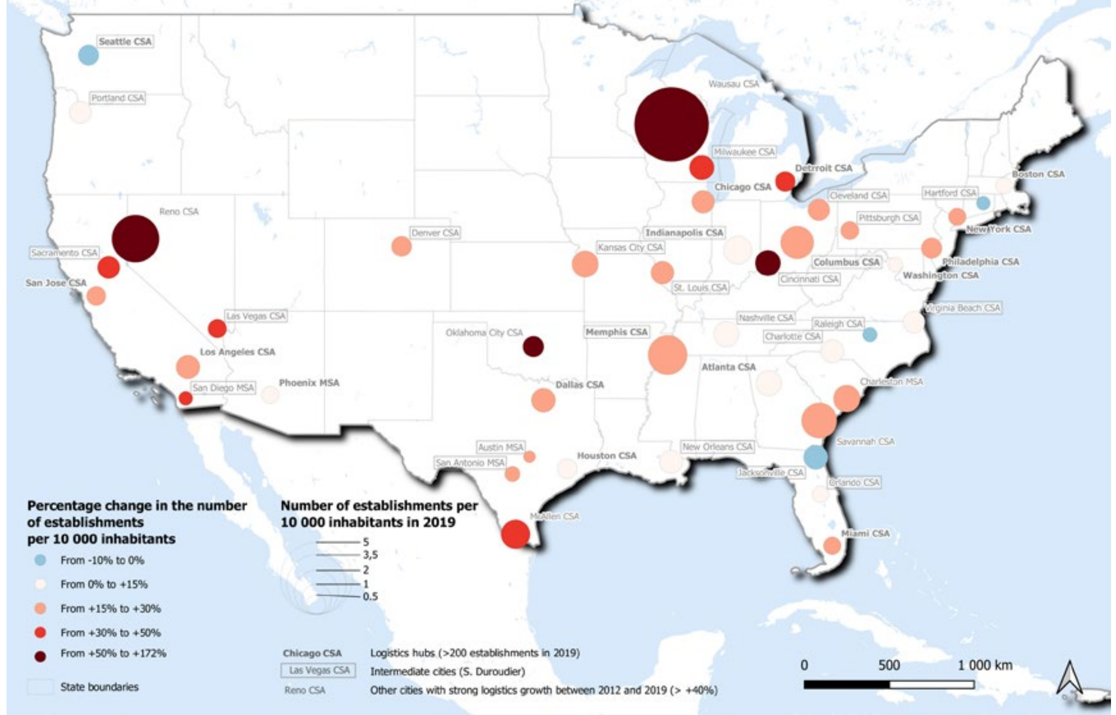
Number of logistics establishments and average number of employees per establishment in major US metropolitan areas in 2019

Sources : US Census Bureau (CBP/MSA), TIGER, OpenStreetMap Contributors



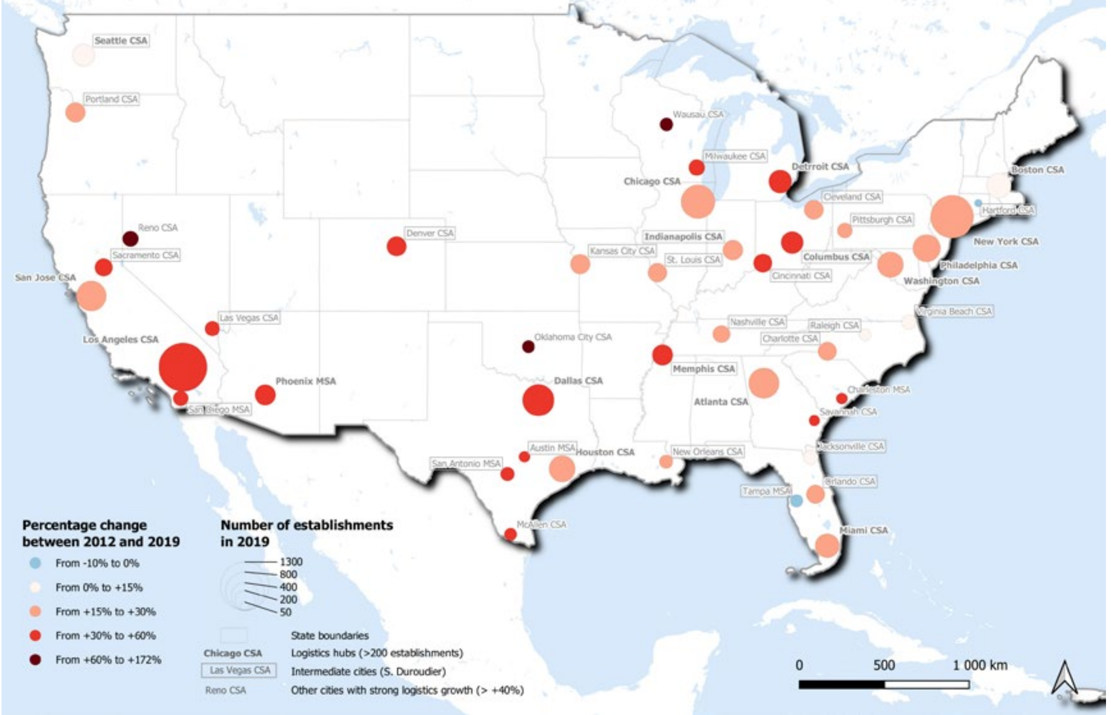
Evolution of the density of logistics establishments in the major US metropolitan areas between 2012 and 2019

Sources : US Census Bureau (CBP/MSA), TIGER, OpenStreetMap Contributors



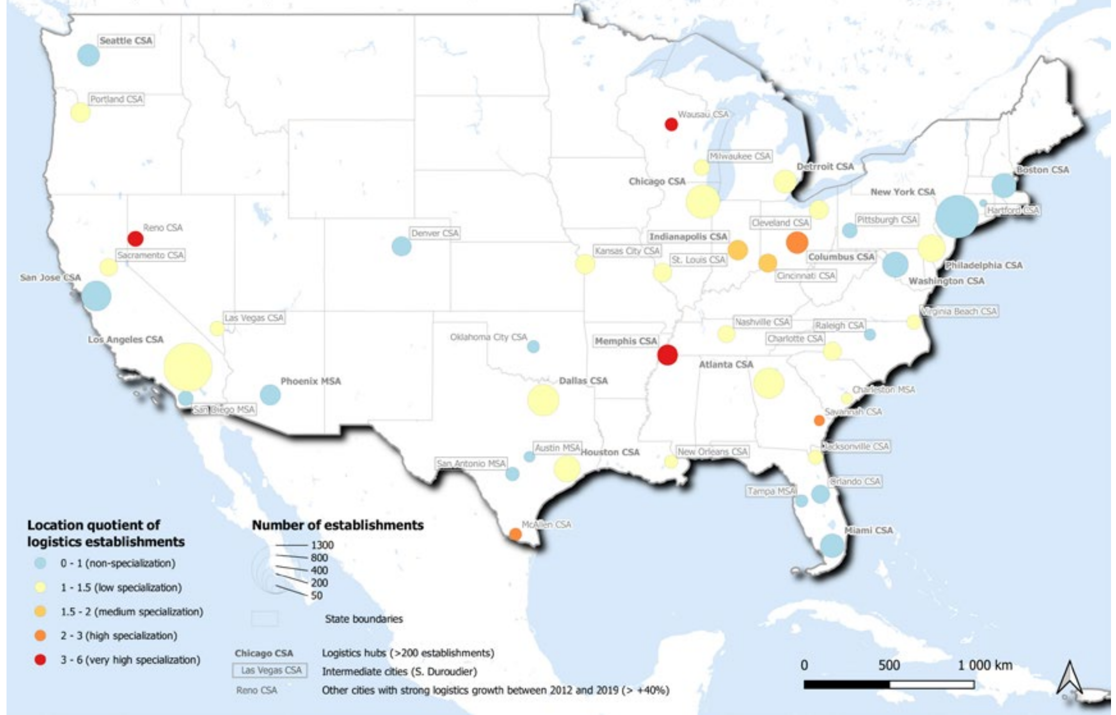
Number and evolution of logistics establishments in major US metropolitan areas between 2012 and 2019

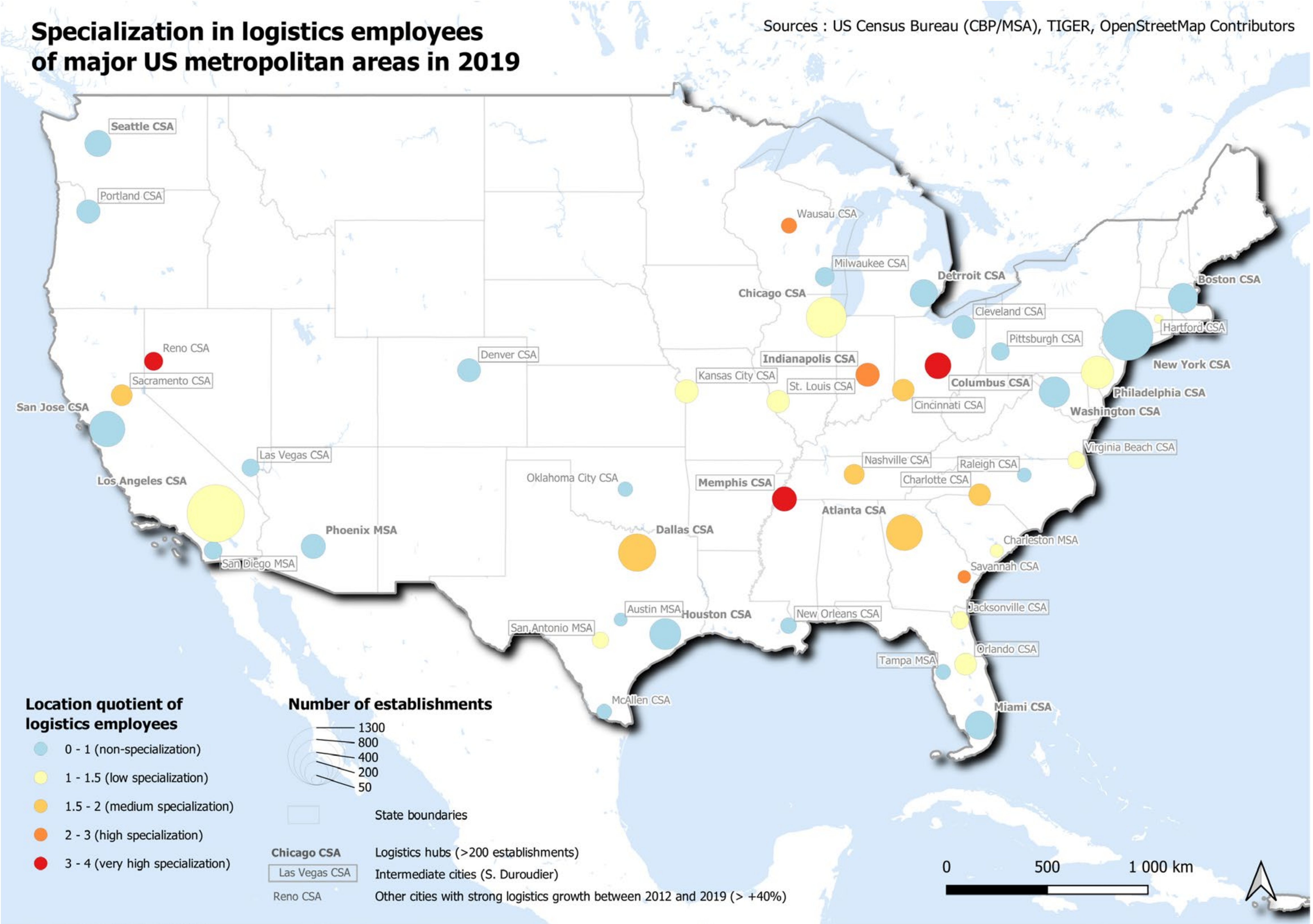
Sources : US Census Bureau (CBP/MSA), TIGER, OpenStreetMap Contributors



Specialization in logistics establishments of the major US metropolitan areas in 2019

Sources : US Census Bureau (CBP/MSA), TIGER, OpenStreetMap Contributors




Specialization in logistics employees
of major US metropolitan areas in 2019
Sources : US Census Bureau (CBP/MSA), TIGER, OpenStreetMap Contributors
Seattle CSA
Portland CSA
Reno CSA
Sacramento CSA
San Jose CSA
Denver CSA
Las Vegas CSA
Los Angeles CSA
San Diego MSA
Phoenix MSA
Oklahoma City CSA
Dallas CSA
Austin MSA
San Antonio MSA
Houston CSA
McAllen CSA
Kansas City CSA
Wausau CSA
Milwaukee CSA
Chicago CSA
Indianapolis CSA
St. Louis CSA
Memphis CSA
Nashville CSA
Atlanta CSA
New Orleans CSA
Detroit CSA
Cleveland CSA
Pittsburgh CSA
Columbus CSA
Cincinnati CSA
Charlotte CSA
Raleigh CSA
Virginia Beach CSA
Charleston MSA
Savannah CSA
Jacksonville CSA
Orlando CSA
Tampa MSA
Miami CSA
Boston CSA
Hartford CSA
New York CSA
Philadelphia CSA
Washington CSA
Location quotient of logistics employees
0 - 1 (non-specialization)
1 - 1.5 (low specialization)
1.5 - 2 (medium specialization)
2 - 3 (high specialization)
3 - 4 (very high specialization)
Number of establishments
1300
800
400
200
50
State boundaries
Chicago CSA
Logistics hubs (>200 establishments)
Las Vegas CSA
Intermediate cities (S. Duroudier)
Reno CSA
Other cities with strong logistics growth between 2012 and 2019 (> +40%)
0
500
1 000 km

MAPS

5.

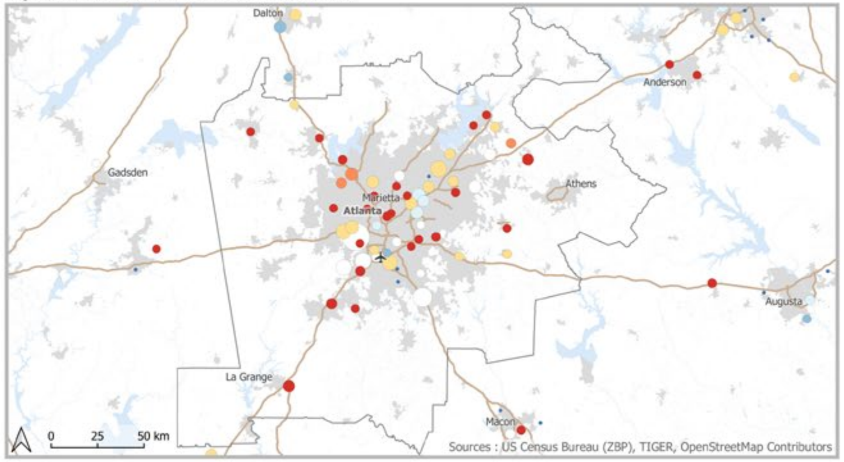
MAP ATLAS

BY METROPOLITAN AREAS

(AT THE ZIP CODE LEVEL)

[CSA] Atlanta--Athens-Clarke County--Sandy Springs, GA-AL

Zip Codes centroids between 2012 and 2019

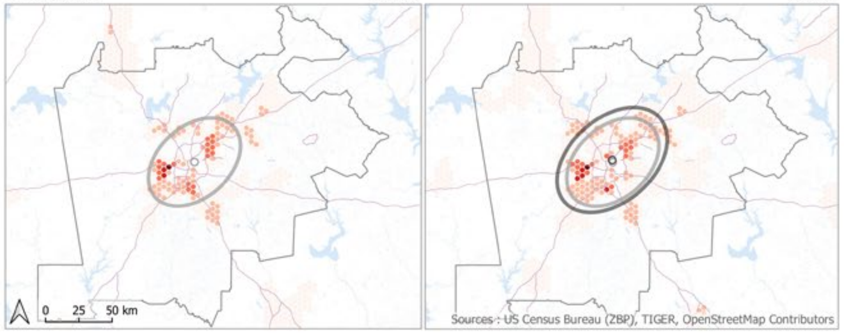


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019: 100, 50, 25, 10, 3

Studied CSA/MSA · Urban areas (2020) · Protected lands areas · Oceans, rivers and lakes · Airports · Ports · Primary roads (2020)

Grid 5x5km — 2012 — 2019

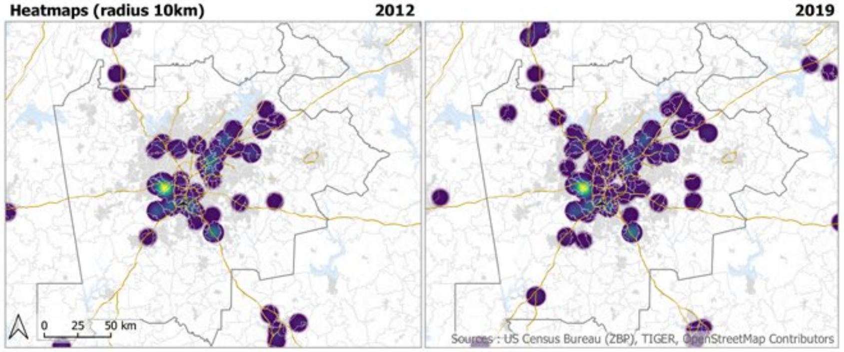


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

Studied CSA/MSA · Oceans, rivers and lakes · Primary roads

Standard deviational ellipse and his centroid: 2012 · 2019

Heatmaps (radius 10km) — 2012 — 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

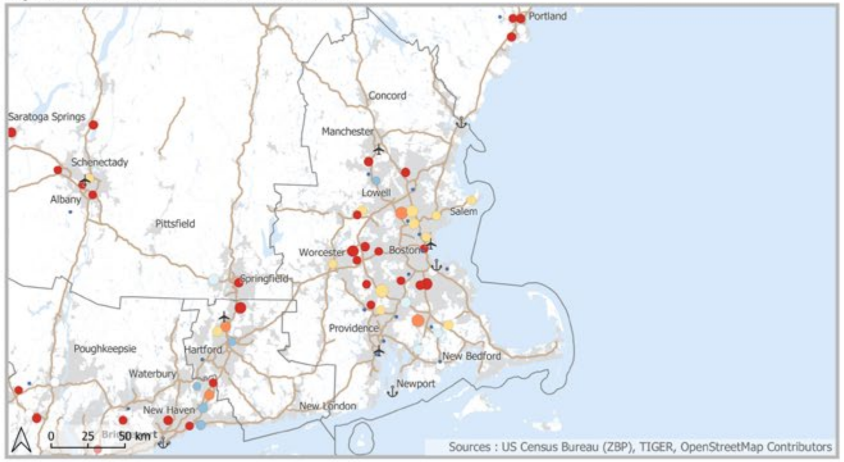
Employees	Est.
<5	[131]
5<>9	[74]
10<>19	[56]
20<>49	[77]
50<>99	[57]
100<>249	[60]
250<>500	[25]
500<>999	[10]
1000<>1499	[5]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	5920499	22645	402	56.33	0.68	3240.75 km²	-
2019	6537053	39615	495	80.03	0.76	4561.98 km²	-
Gross change	+616554	+16970	+93	+23.7	+0.08	+1321.23 km²	1.64 km
% change	+10.41%	+74.94%	+23.13%	+42.07%	+11.52%	+40.77%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Boston-Worcester-Providence, MA-RI-NH-CT

Zip Codes centroids between 2012 and 2019

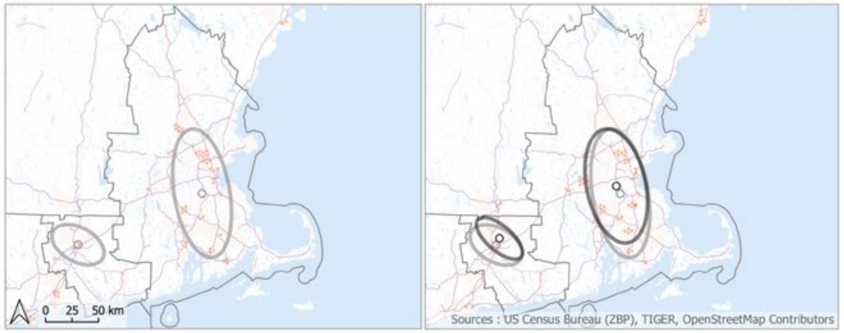


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019: 100, 50, 25, 10, 3

Studied CSA/MSA · Urban areas (2020) · Protected lands areas · Oceans, rivers and lakes · Airports · Ports · Primary roads (2020)

Grid 5x5km — 2012 — 2019

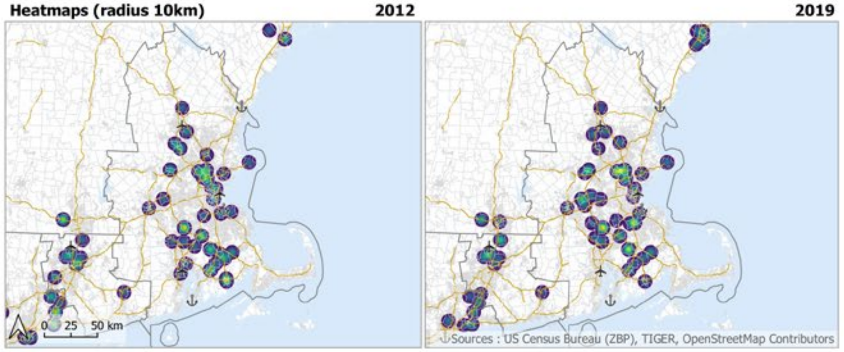


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

Studied CSA/MSA · Oceans, rivers and lakes · Primary roads

Standard deviational ellipse and his centroid: 2012 · 2019

Heatmaps (radius 10km) — 2012 — 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

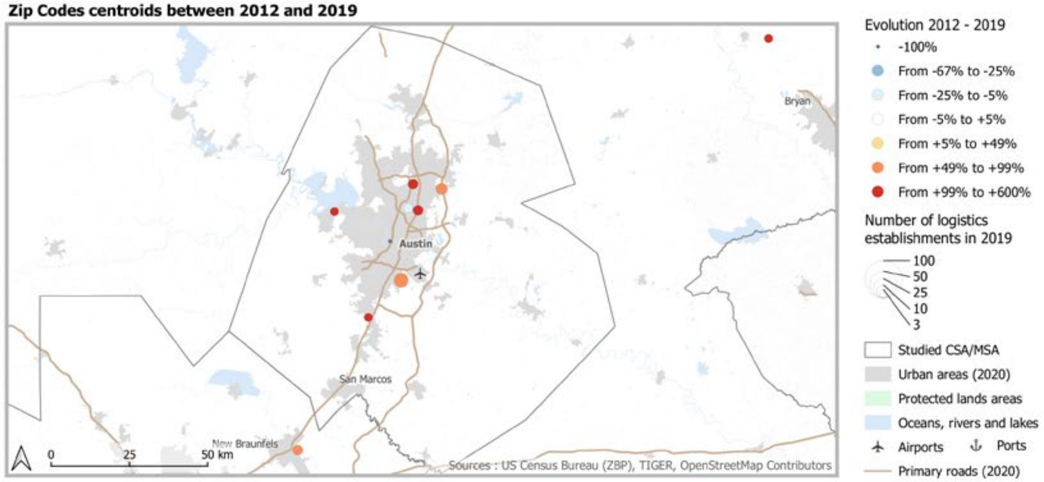
Employees	Est.
<5	[104]
5<>9	[61]
10<>19	[54]
20<>49	[50]
50<>99	[22]
100<>249	[16]
250<>500	[8]
500<>999	[7]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	7806322	13836	295	46.9	0.38	4880.36 km²	-
2019	8075016	18726	321	58.34	0.4	4607.73 km²	-
Gross change	+268694	+4890	+26	+11.43	+0.02	-272.62 km²	7.94 km
% change	+3.44%	+35.34%	+8.81%	+24.38%	+5.19%	-5.59%	-

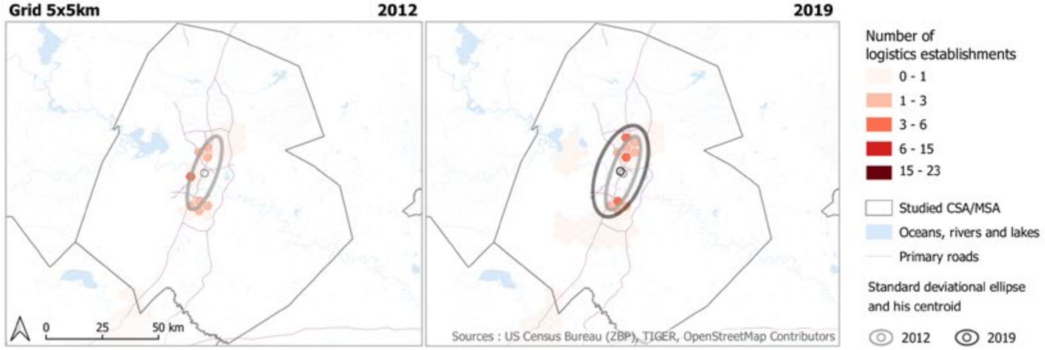
Statisticals sources : US Census Bureau (CBP/MSA)

[MSA] Austin-Round Rock-Georgetown, TX

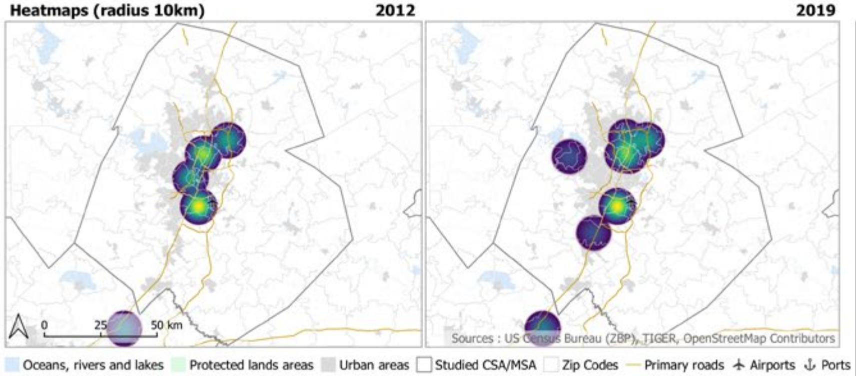
Zip Codes centroids between 2012 and 2019



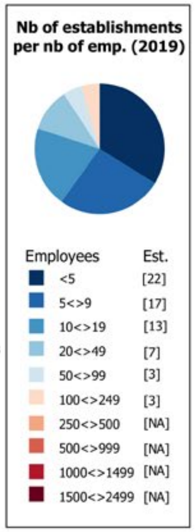
Grid 5x5km 2012 2019



Heatmaps (radius 10km) 2012 2019



Nb of establishments per nb of emp. (2019)

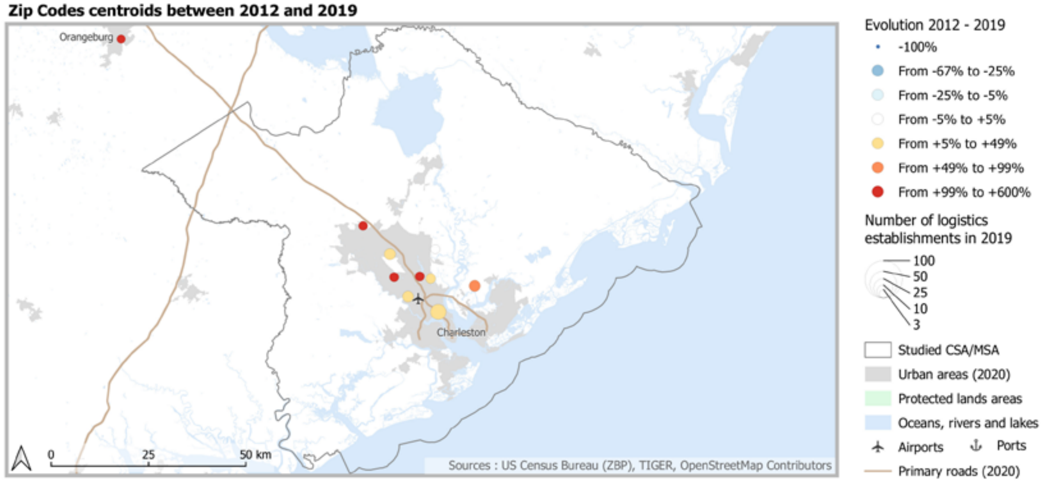


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1834586	0	44	0	0.24	284.31 km²	-
2019	2227083	2839	67	42.37	0.3	689.65 km²	-
Gross change	+392497	+2839	+23	+42.37	+0.06	+405.35 km²	1.4 km
% change	+21.39%	%	+52.27%	%	+25.44%	+142.57%	-

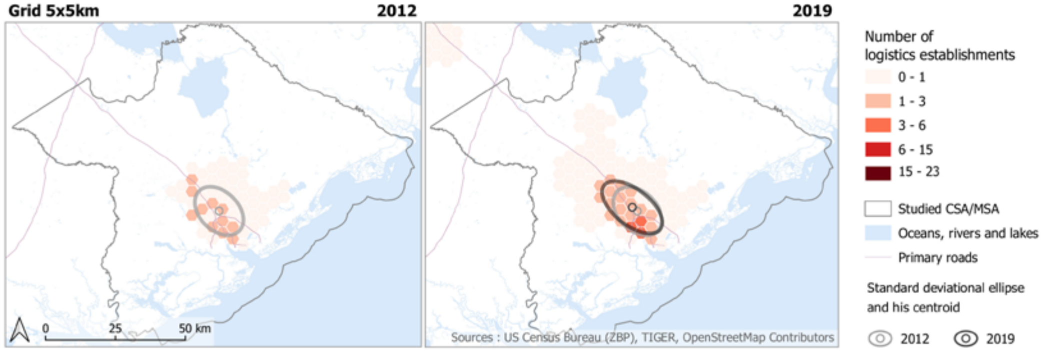
Statisticals sources : US Census Bureau (CBP/MSA)

[MSA] Charleston-North Charleston, SC

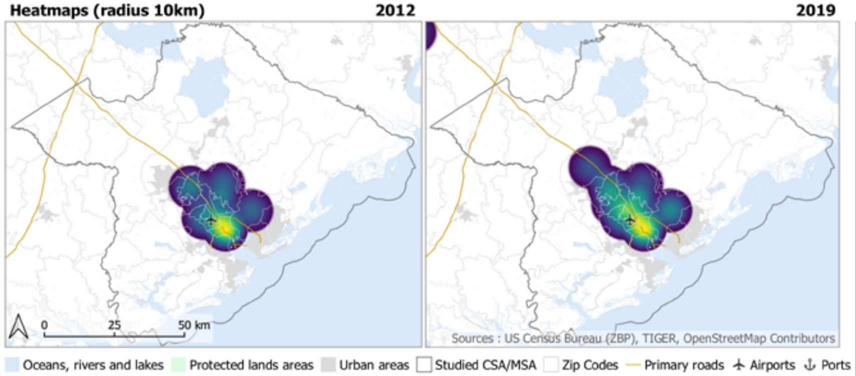
Zip Codes centroids between 2012 and 2019



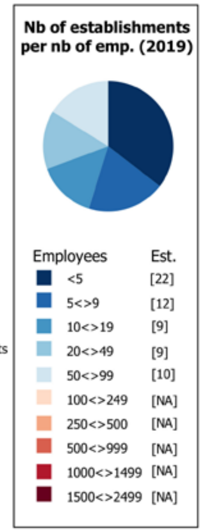
Grid 5x5km 2012 2019



Heatmaps (radius 10km) 2012 2019



Nb of establishments per nb of emp. (2019)

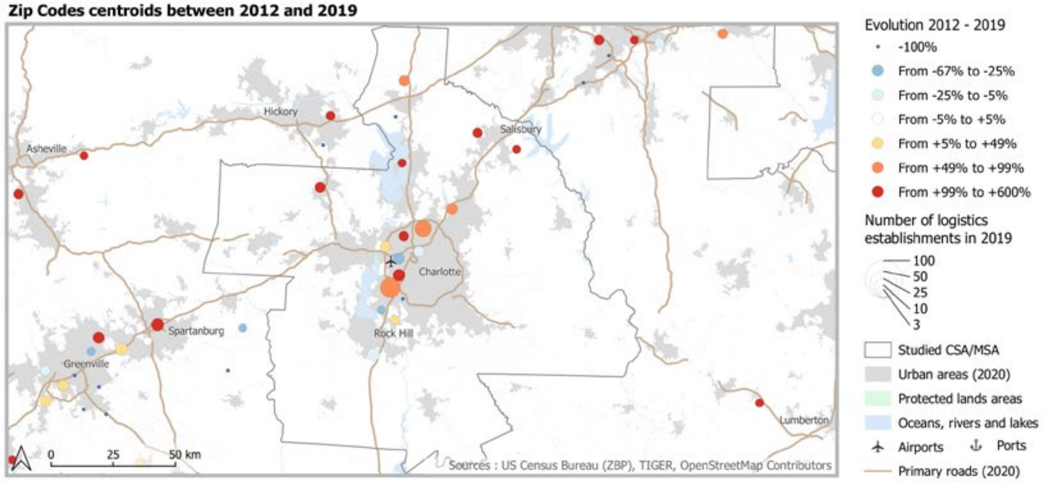


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	696839	1374	46	29.87	0.66	216.84 km²	-
2019	802122	2859	67	42.67	0.84	251.73 km²	-
Gross change	+105283	+1485	+21	+12.8	+0.18	+34.89 km²	2.29 km
% change	+15.11%	+108.08%	+45.65%	+42.86%	+26.53%	+16.09%	-

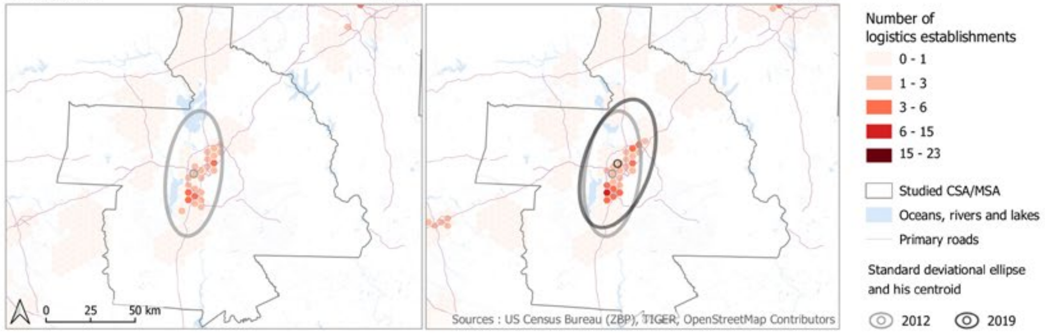
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Charlotte-Concord, NC-SC

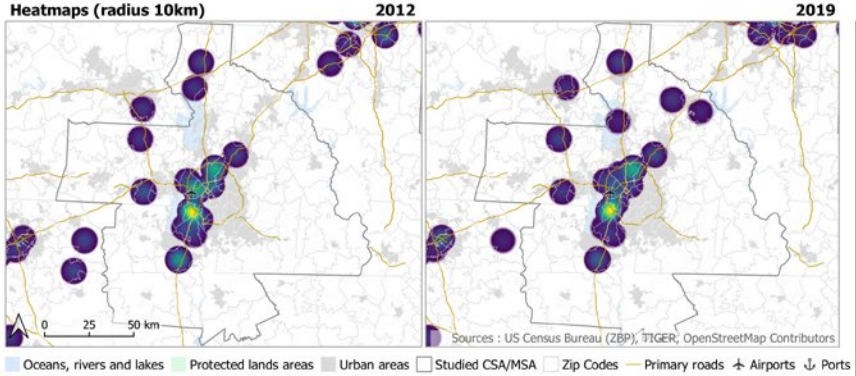
Zip Codes centroids between 2012 and 2019

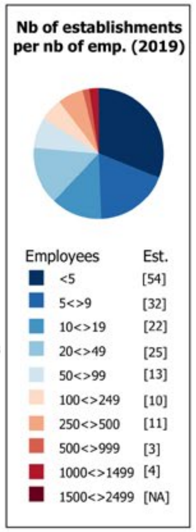


Grid 5x5km



Heatmaps (radius 10km)



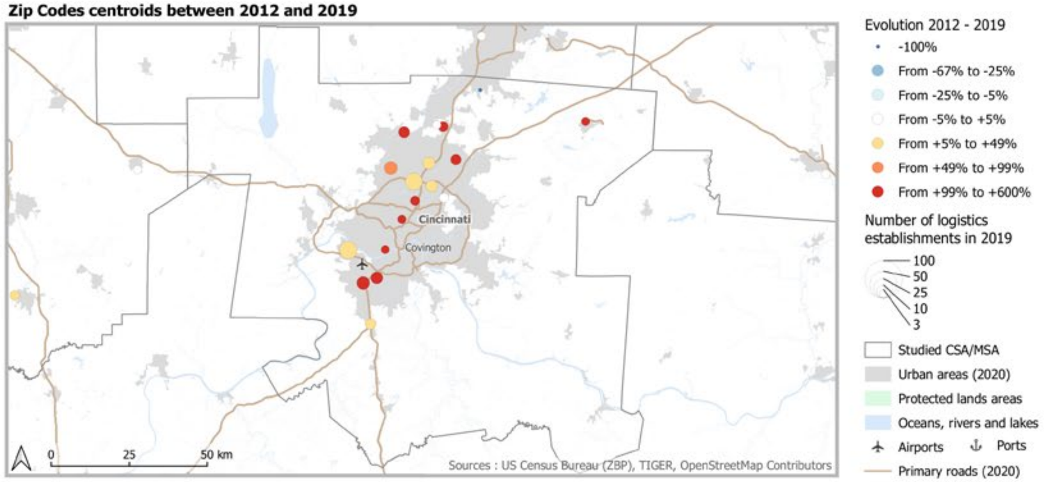


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2318671	8905	142	62.71	0.61	1682.15 km²	-
2019	2636883	15025	172	87.35	0.65	2147.3 km²	-
Gross change	+318212	+6120	+30	+24.64	+0.04	+465.14 km²	6.32 km
% change	+13.72%	+68.73%	+21.13%	+39.3%	+6.51%	+27.65%	-

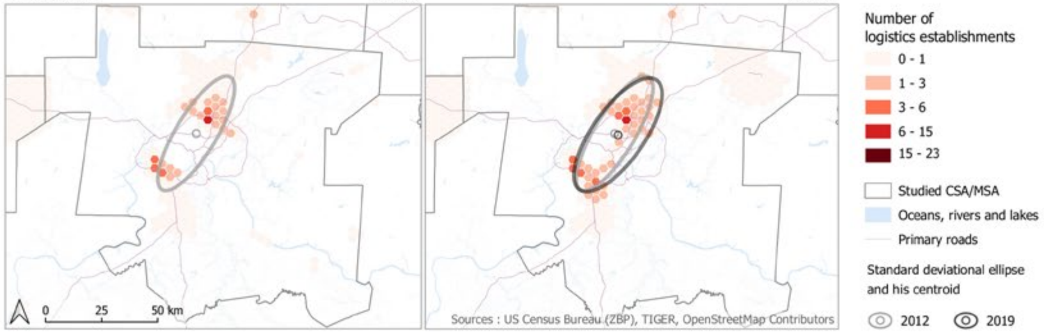
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Cincinnati-Wilmington-Maysville, OH-KY-IN

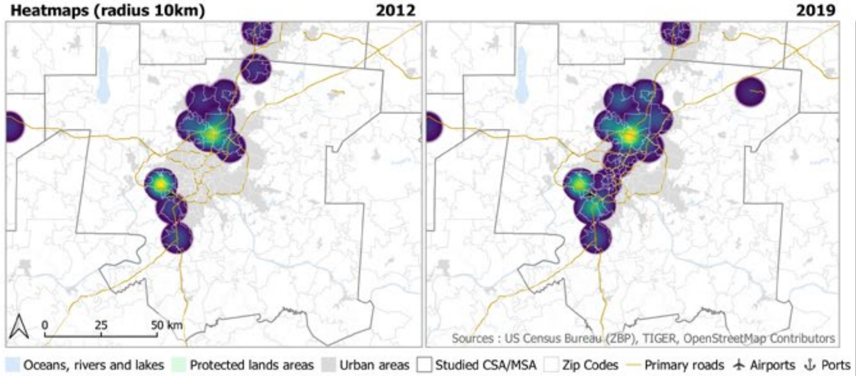
Zip Codes centroids between 2012 and 2019

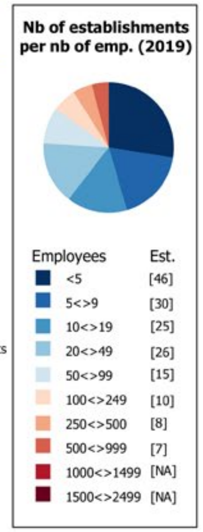


Grid 5x5km



Heatmaps (radius 10km)



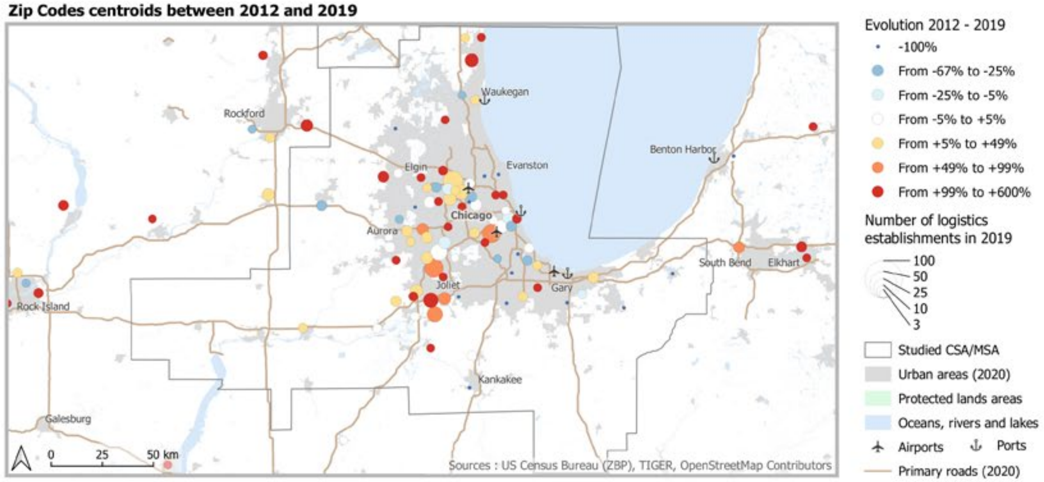


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2152554	7521	108	69.64	0.5	809.62 km²	-
2019	2221208	15132	170	89.01	0.77	1061.02 km²	-
Gross change	+68654	+7611	+62	+19.37	+0.26	+251.4 km²	1.63 km
% change	+3.19%	+101.2%	+57.41%	+27.82%	+52.54%	+31.05%	-

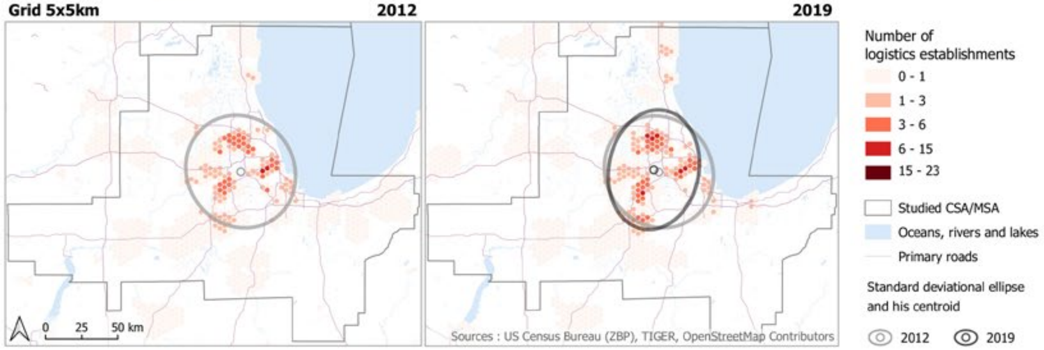
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Chicago-Naperville, IL-IN-WI

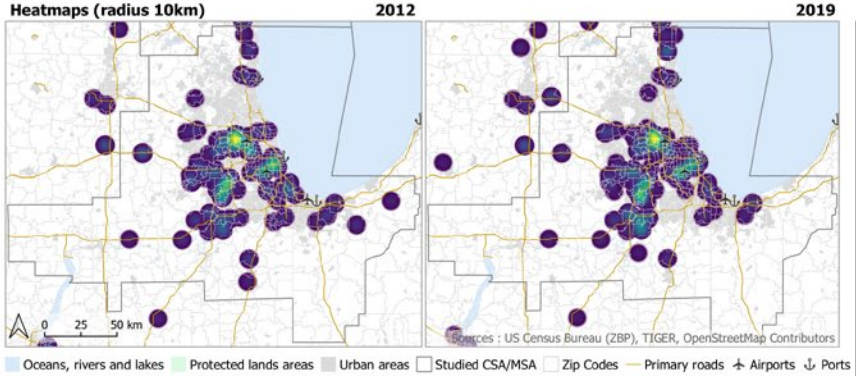
Zip Codes centroids between 2012 and 2019

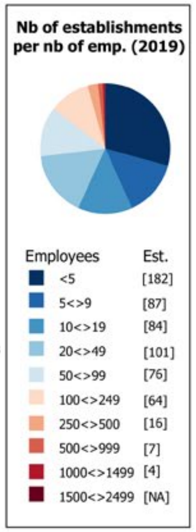


Grid 5x5km



Heatmaps (radius 10km)



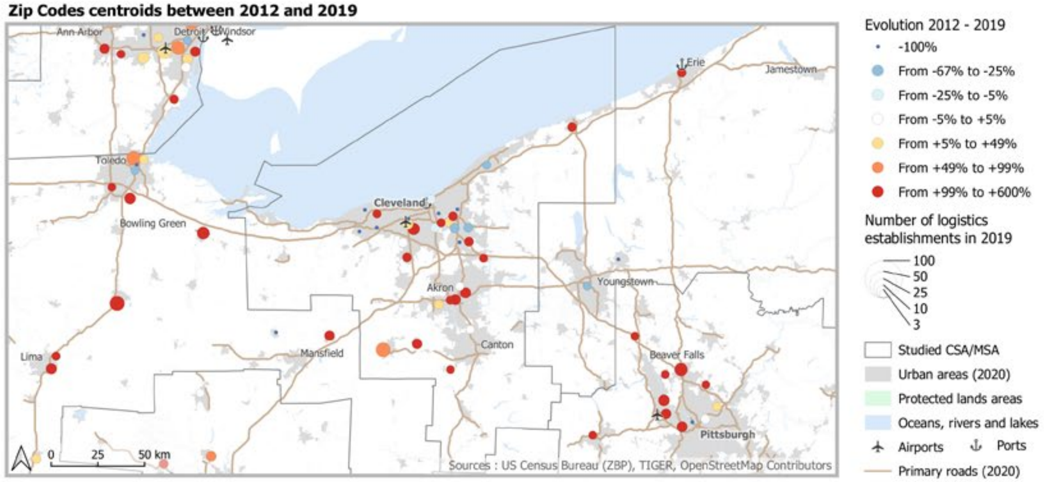


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	9752368	25764	509	50.62	0.52	4491.49 km²	-
2019	9678289	37494	614	61.07	0.63	4004.66 km²	-
Gross change	-74079	+11730	+105	+10.45	+0.11	-486.83 km²	3.85 km
% change	-0.76%	+45.53%	+20.63%	+20.64%	+21.55%	-10.84%	-

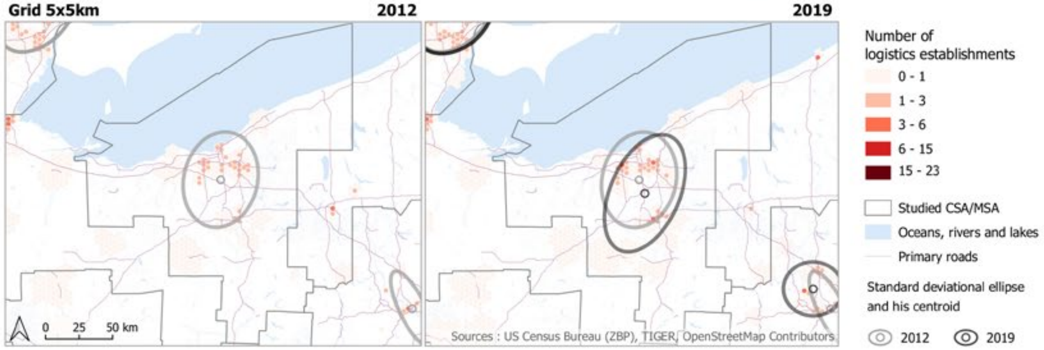
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Cleveland-Akron-Canton, OH

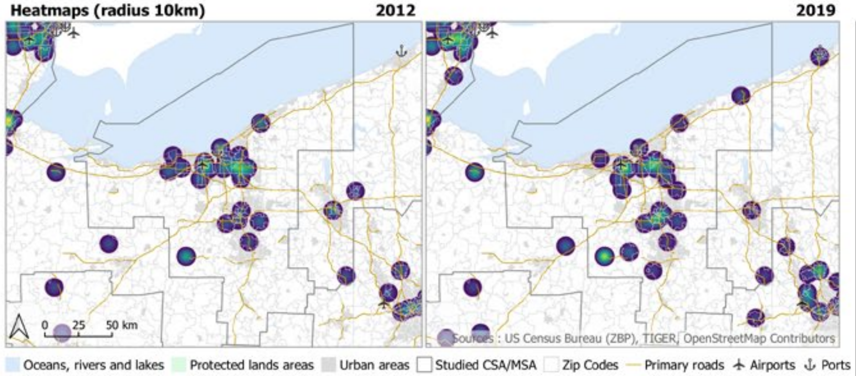
Zip Codes centroids between 2012 and 2019

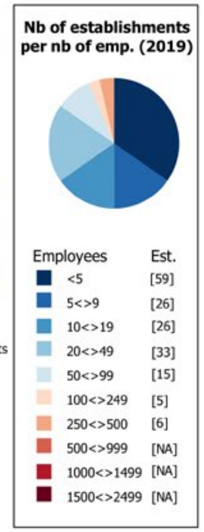


Grid 5x5km



Heatmaps (radius 10km)



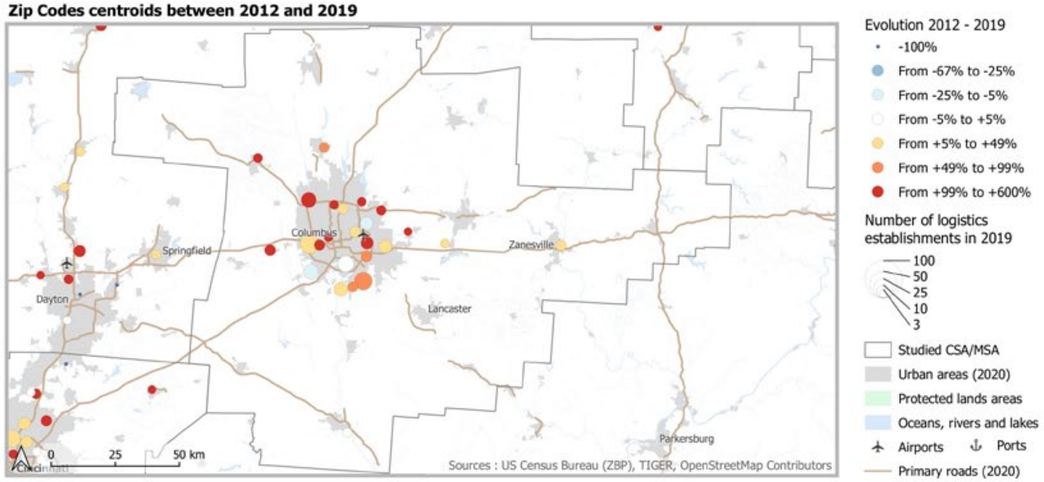


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	3170314	4175	154	27.11	0.49	2998.49 km²	-
2019	3149448	6034	188	32.1	0.6	3634.4 km²	-
Gross change	-20866	+1859	+34	+4.99	+0.11	+635.91 km²	10.68 km
% change	-0.66%	+44.53%	+22.08%	+18.39%	+22.89%	+21.21%	-

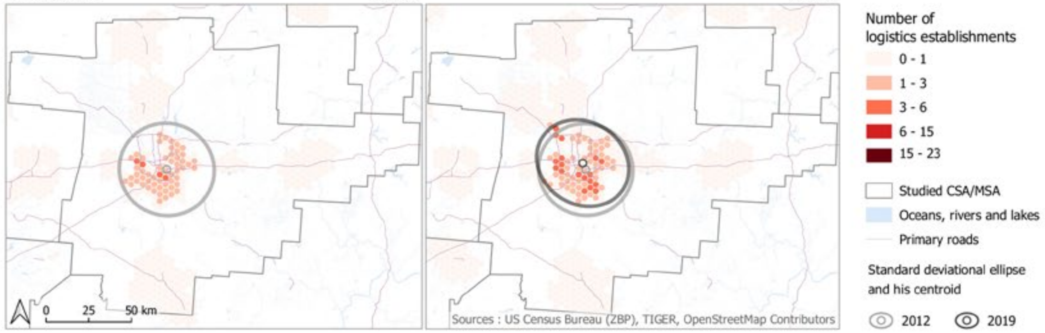
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Columbus-Marion-Zanesville, OH

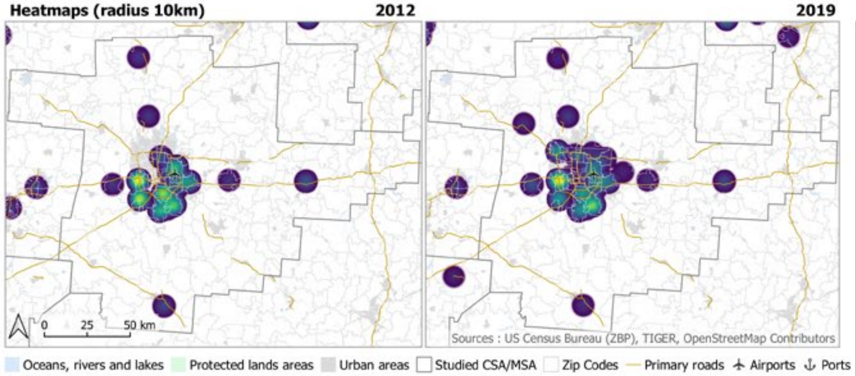
Zip Codes centroids between 2012 and 2019



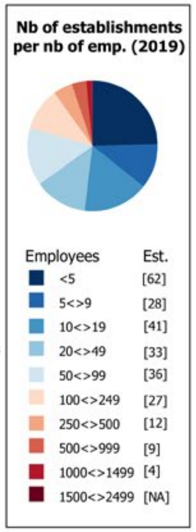
Grid 5x5km 2012 2019



Heatmaps (radius 10km) 2012 2019



Nb of establishments per nb of emp. (2019)

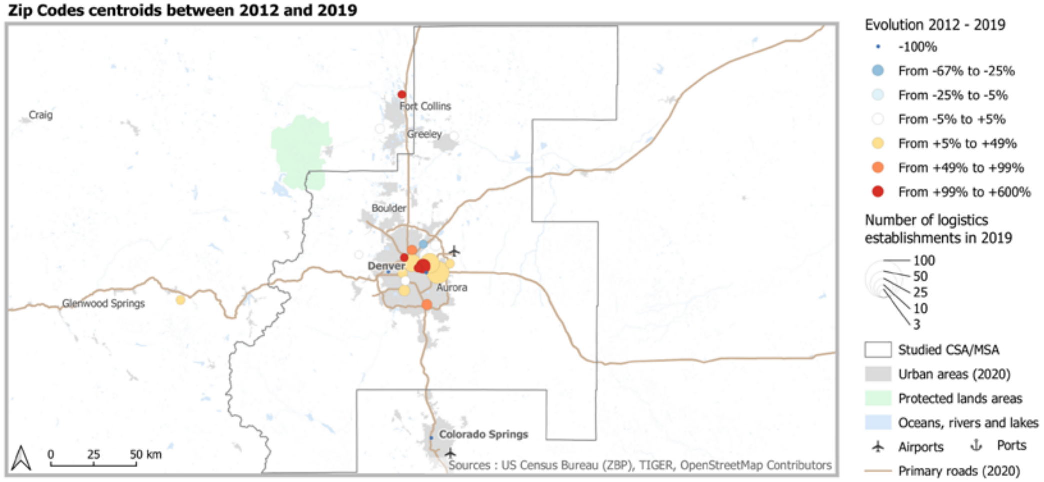


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1947208	15377	180	85.43	0.92	2299.75 km²	-
2019	2122271	26390	251	105.14	1.18	2092.93 km²	-
Gross change	+175063	+11013	+71	+19.71	+0.26	-206.82 km²	4.09 km
% change	+8.99%	+71.62%	+39.44%	+23.07%	+27.94%	-8.99%	-

Statisticals sources : US Census Bureau (CBP/MSA)

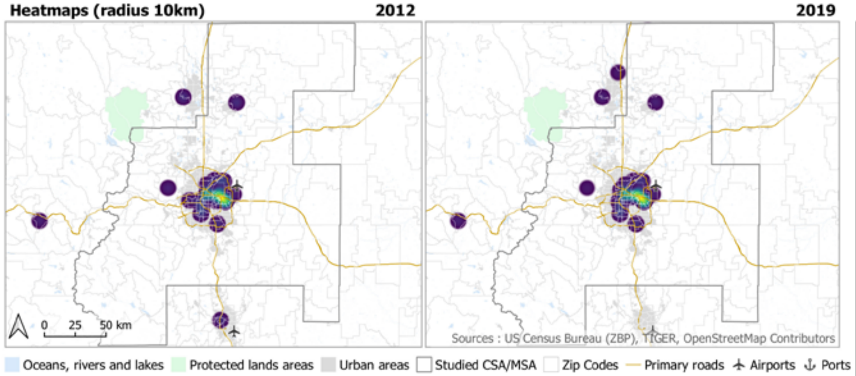
[CSA] Denver-Aurora, CO

Zip Codes centroids between 2012 and 2019

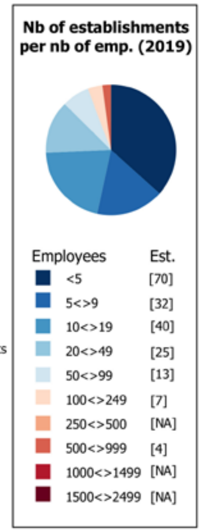


Grid 5x5km 2012 2019

Heatmaps (radius 10km) 2012 2019



Nb of establishments per nb of emp. (2019)

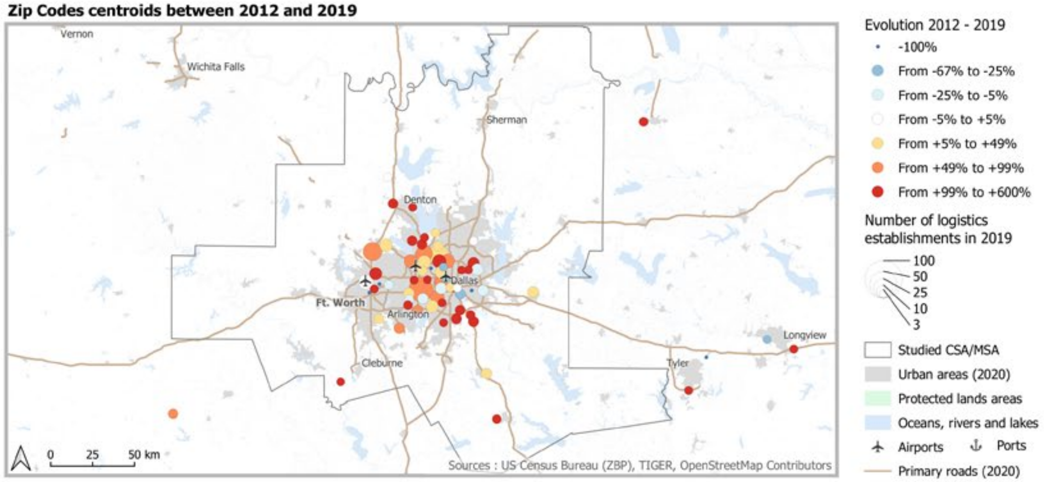


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	3218975	3757	141	26.65	0.44	958.37 km²	-
2019	3617927	7074	193	36.65	0.53	802.06 km²	-
Gross change	+398952	+3317	+52	+10.01	+0.1	-156.31 km²	0.87 km
% change	+12.39%	+88.29%	+36.88%	+37.56%	+21.79%	-16.31%	-

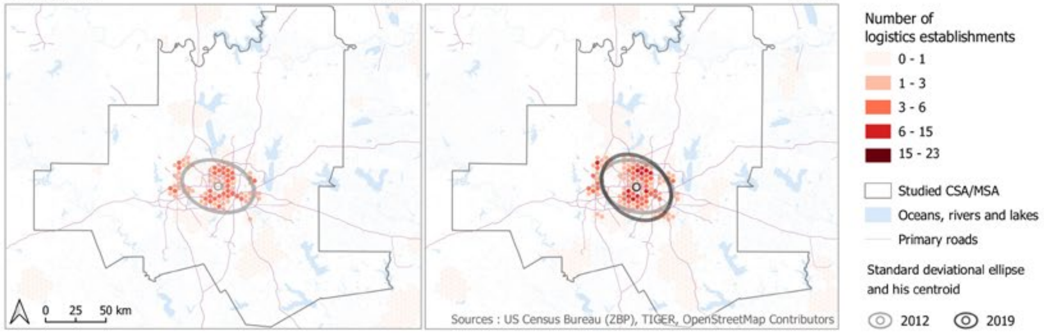
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Dallas-Fort Worth, TX-OK

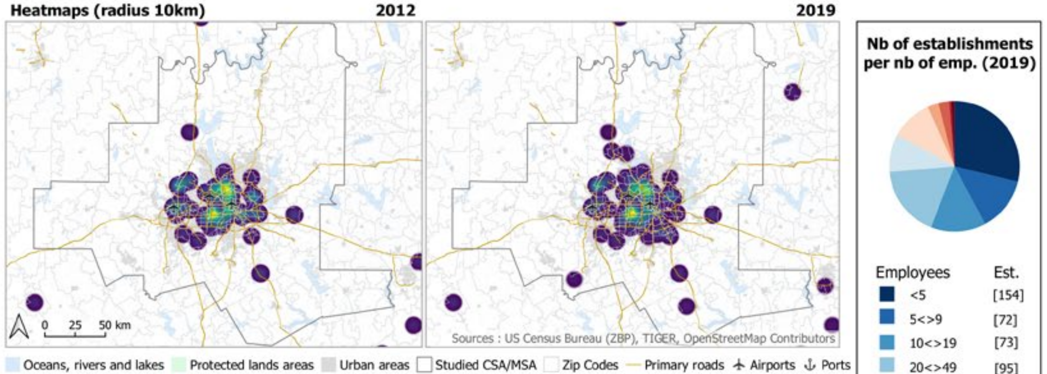
Zip Codes centroids between 2012 and 2019



Grid 5x5km



Heatmaps (radius 10km)

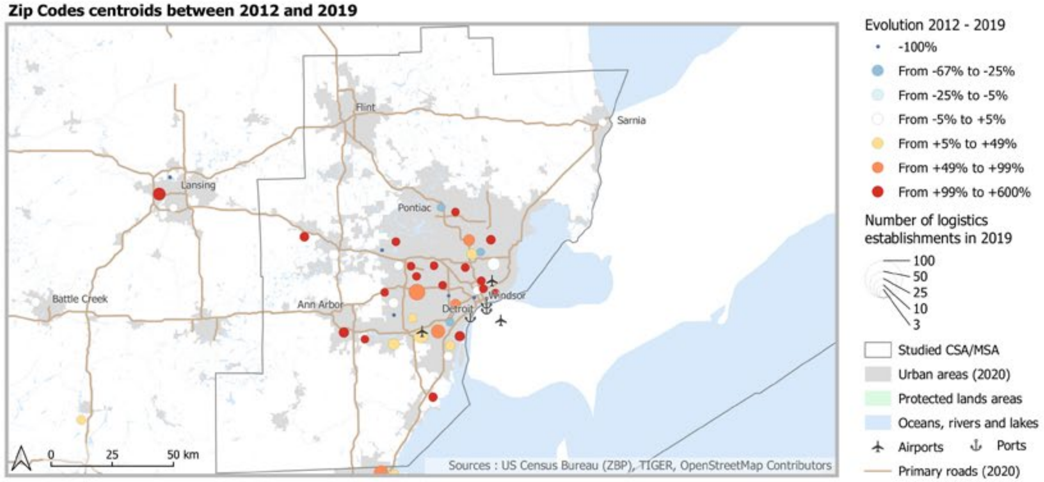


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	6766413	23462	376	62.4	0.56	1942.65 km²	-
2019	7709348	41689	533	78.22	0.69	2323.57 km²	-
Gross change	+942935	+18227	+157	+15.82	+0.14	+380.92 km²	0.67 km
% change	+13.94%	+77.69%	+41.76%	+25.35%	+24.42%	+19.61%	-

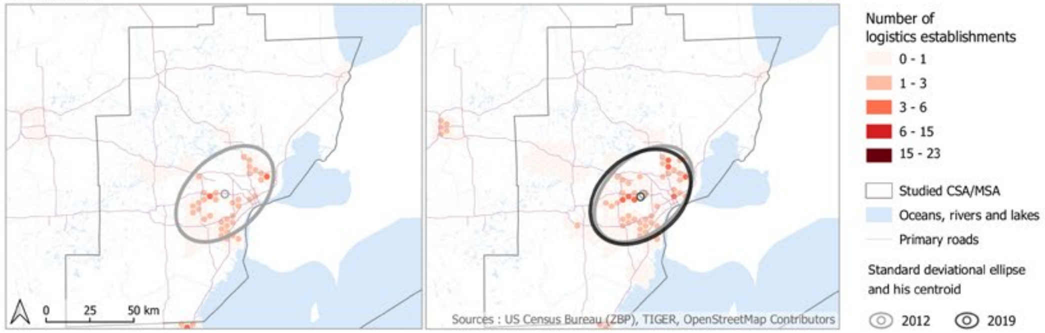
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Detroit-Warren-Ann Arbor, MI

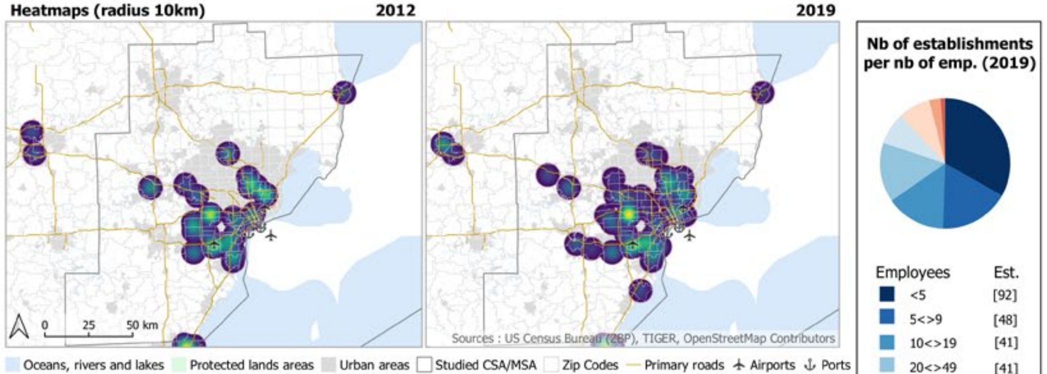
Zip Codes centroids between 2012 and 2019



Grid 5x5km



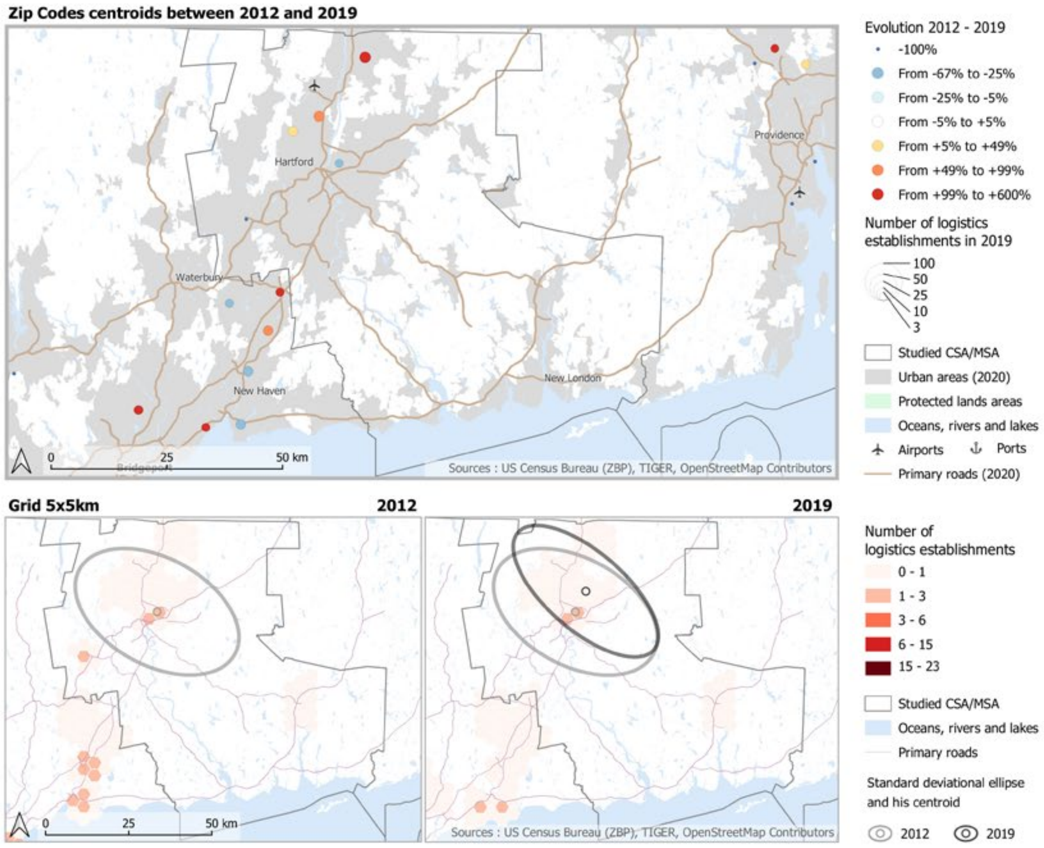
Heatmaps (radius 10km)

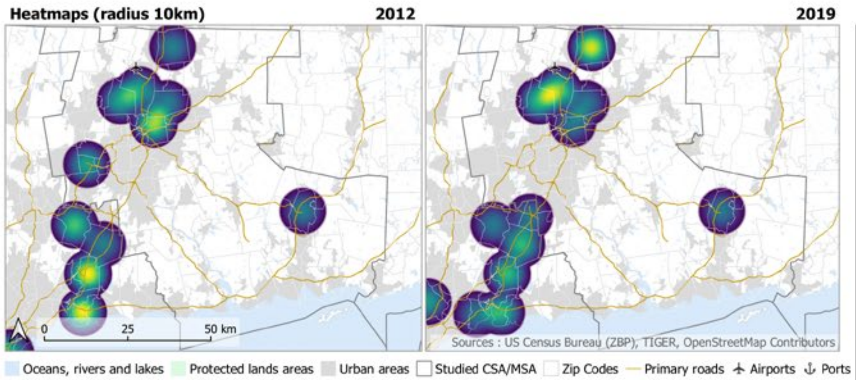


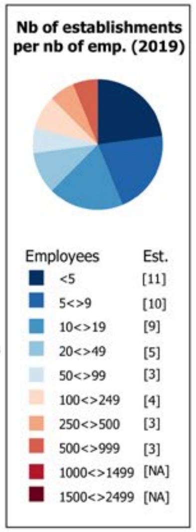
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	5222164	7423	193	38.46	0.37	2123.57 km²	-
2019	5243543	11741	275	42.69	0.52	2252.83 km²	-
Gross change	+21379	+4318	+82	+4.23	+0.15	+129.26 km²	2.12 km
% change	+0.41%	+58.17%	+42.49%	+11.01%	+41.91%	+6.09%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Hartford-East Hartford, CT



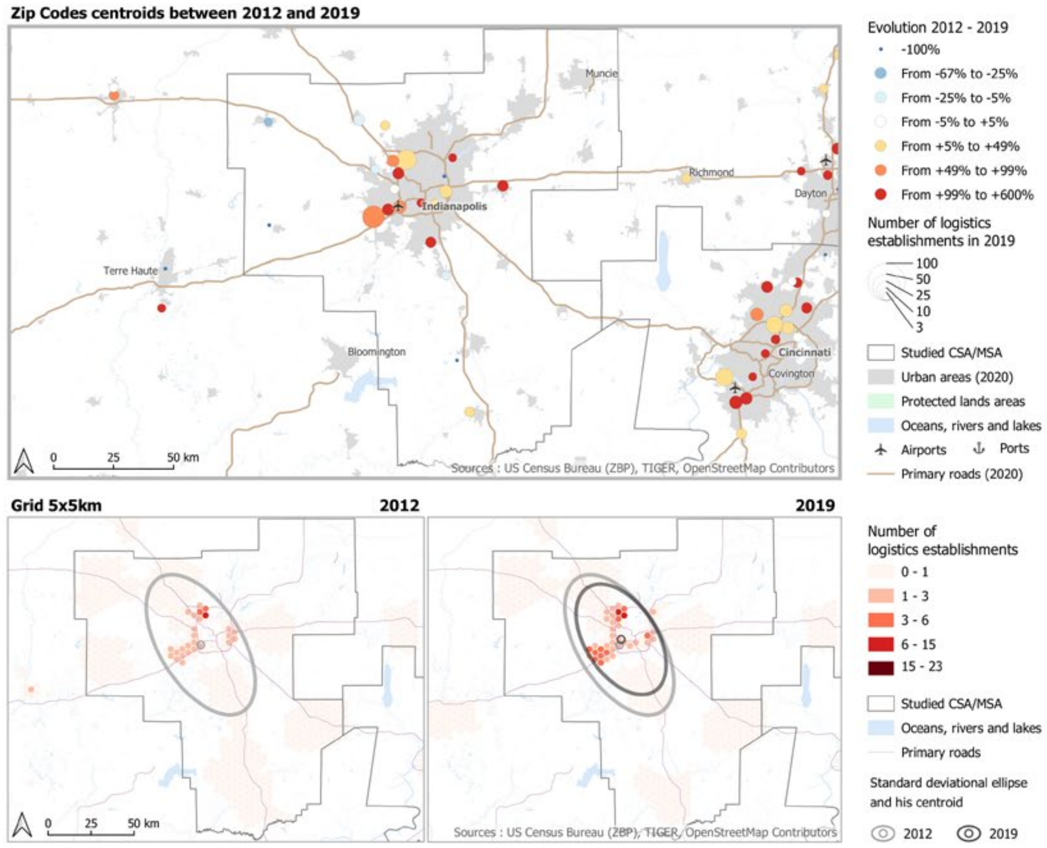


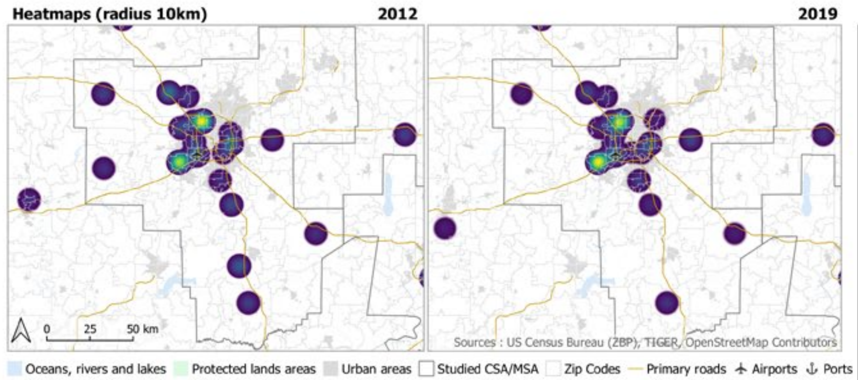


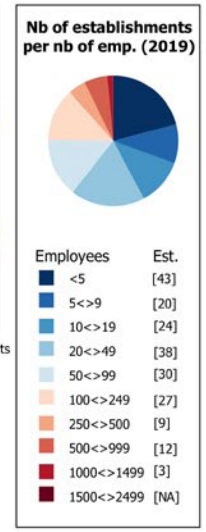
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1489398	4088	52	78.62	0.35	1317.16 km²	-
2019	1470083	5554	49	113.35	0.33	973.18 km²	-
Gross change	-19315	+1466	-3	+34.73	-0.02	-343.97 km²	6.84 km
% change	-1.3%	+35.86%	-5.77%	+44.18%	-4.53%	-26.12%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Indianapolis-Carmel-Muncie, IN



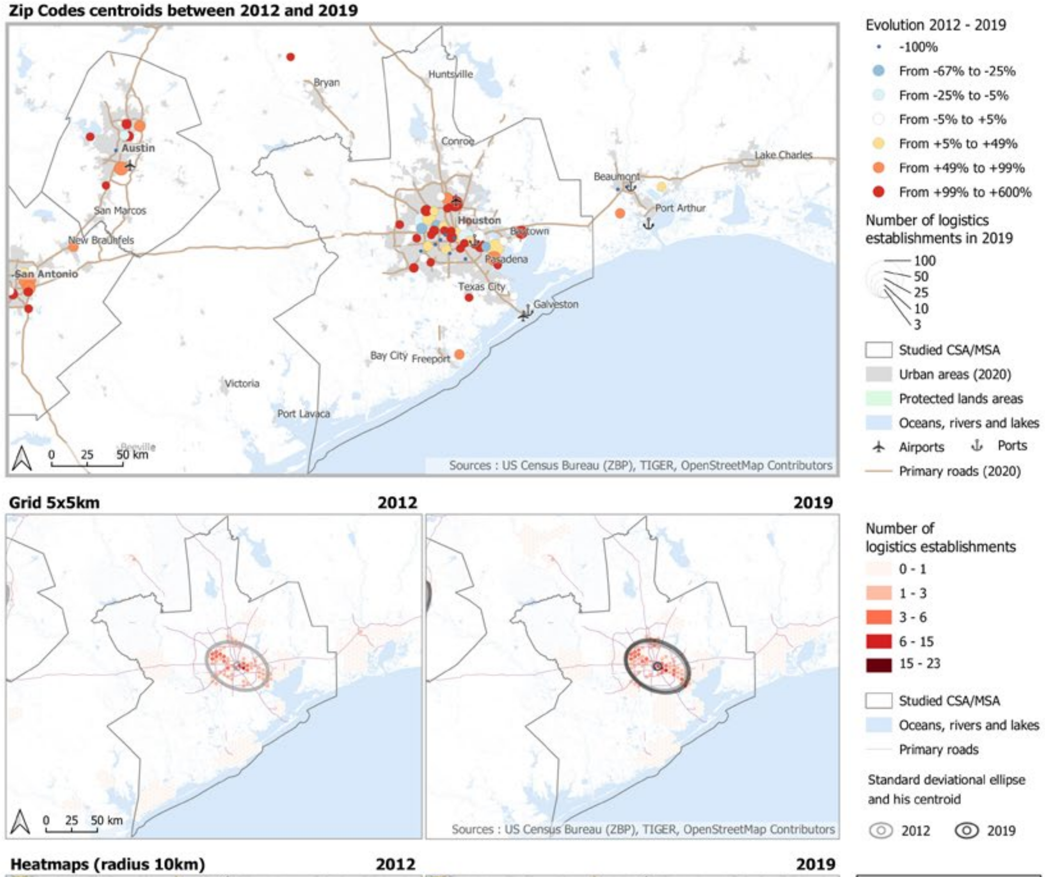


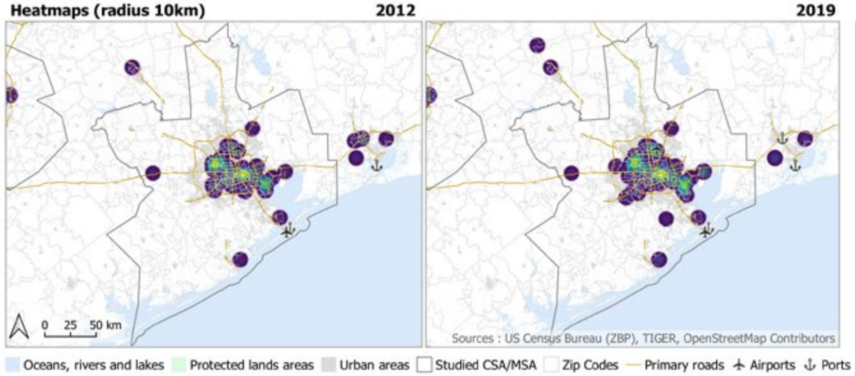


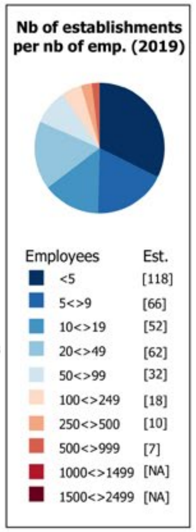
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2125706	12052	166	72.6	0.78	3312.52 km²	-
2019	2272451	22874	203	112.68	0.89	2255.15 km²	-
Gross change	+146745	+10822	+37	+40.08	+0.11	-1057.37 km²	3.35 km
% change	+6.9%	+89.79%	+22.29%	+55.2%	+14.39%	-31.92%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Houston-The Woodlands, TX



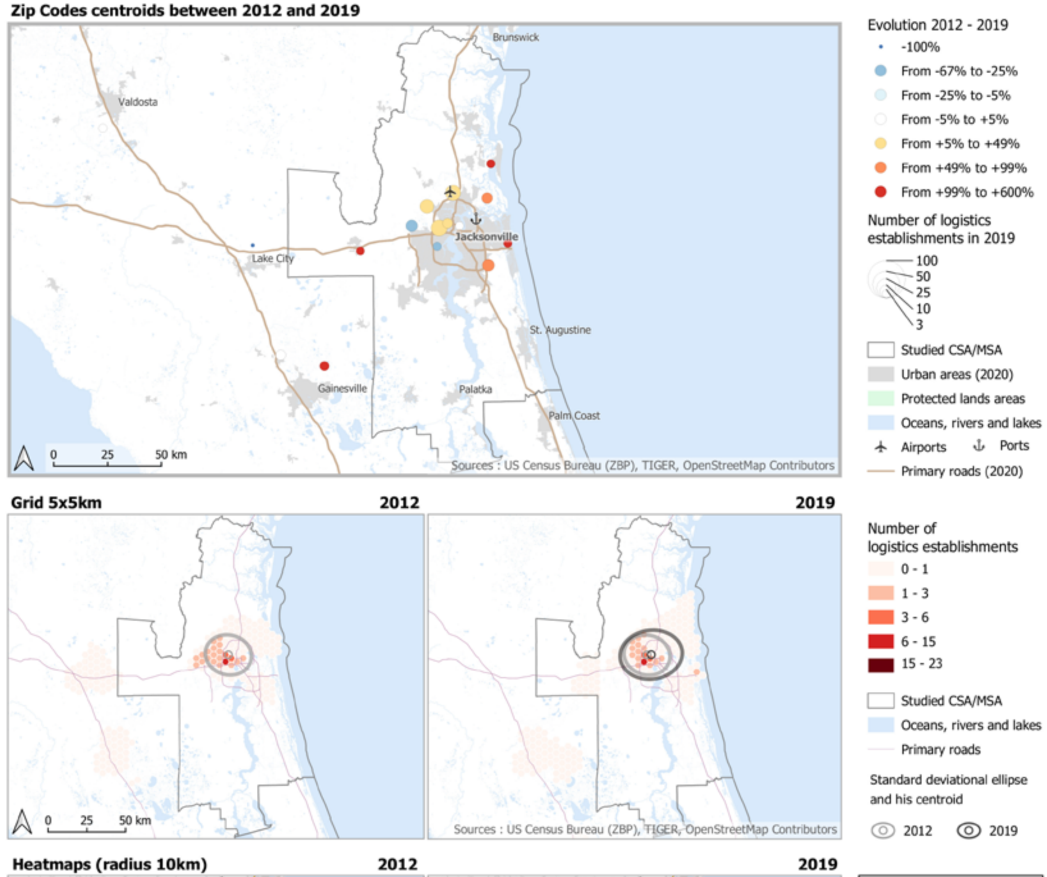


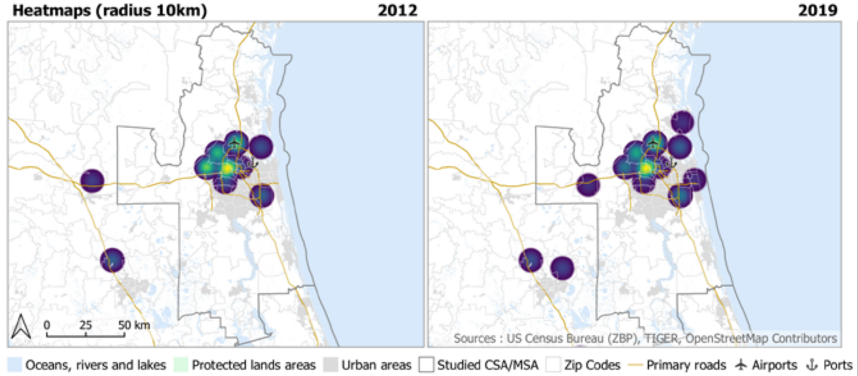


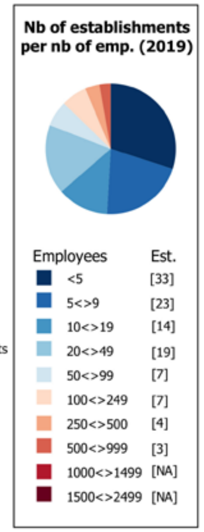
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	6183531	12402	281	44.14	0.45	2047.51 km²	-
2019	7066141	19498	363	53.71	0.51	2328.13 km²	-
Gross change	+882610	+7096	+82	+9.58	+0.06	+280.62 km²	1.71 km
% change	+14.27%	+57.22%	+29.18%	+21.7%	+13.05%	+13.71%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Jacksonville-St. Marys-Palatka, FL-GA



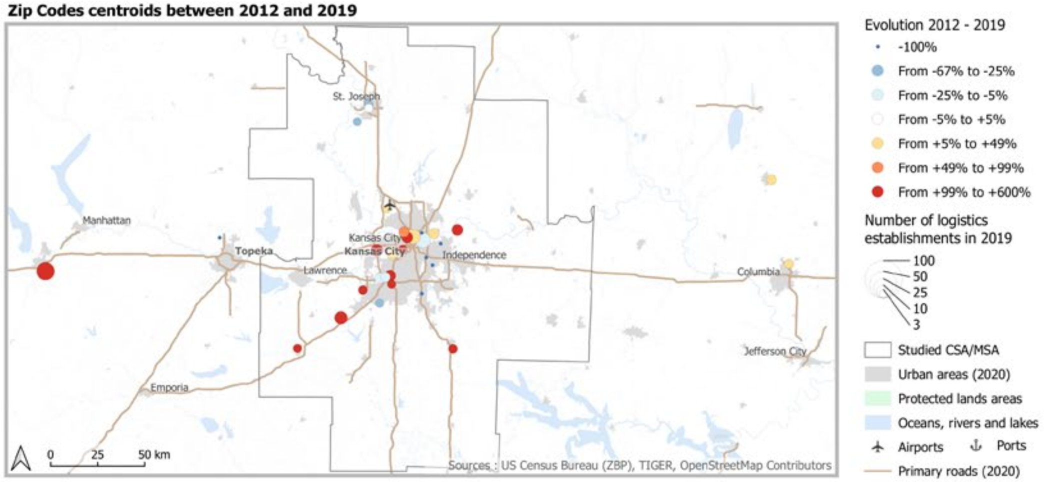


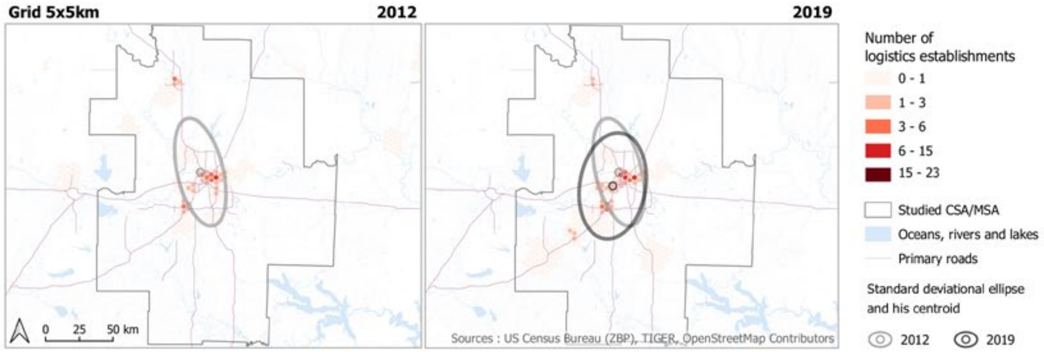


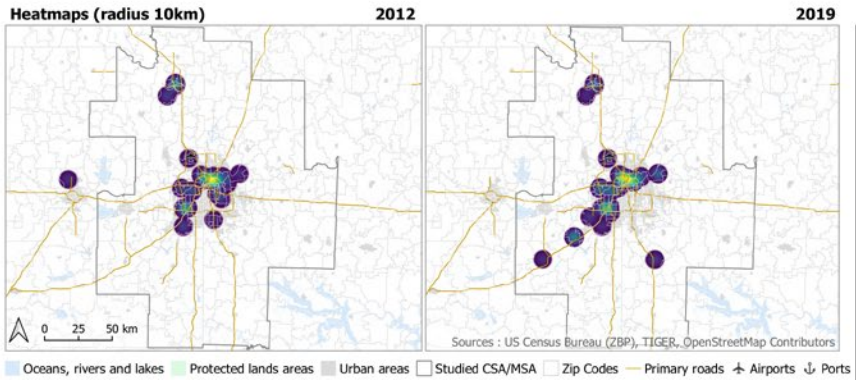
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1377607	4978	99	50.28	0.72	589.27 km²	-
2019	1559514	6229	110	56.63	0.71	968.02 km²	-
Gross change	+181907	+1251	+11	+6.34	-0.01	+378.75 km²	2.67 km
% change	+13.2%	+25.13%	+11.11%	+12.62%	-1.85%	+64.28%	-

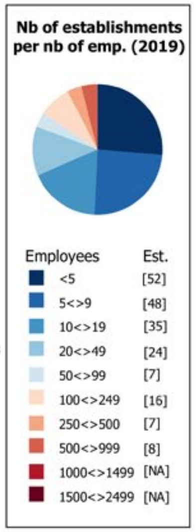
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Kansas City-Overland Park-Kansas City, MO-KS





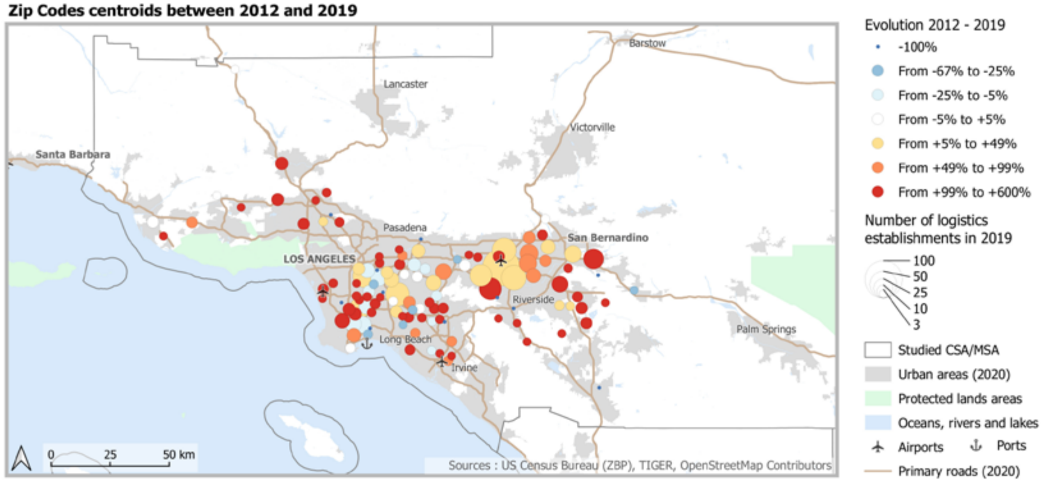


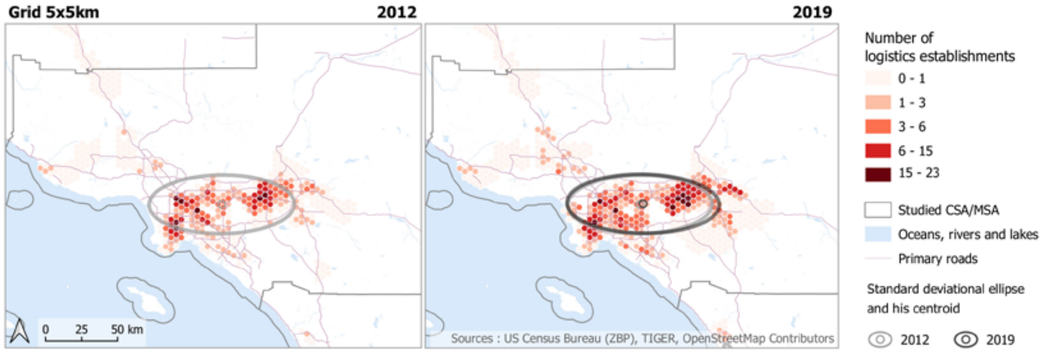


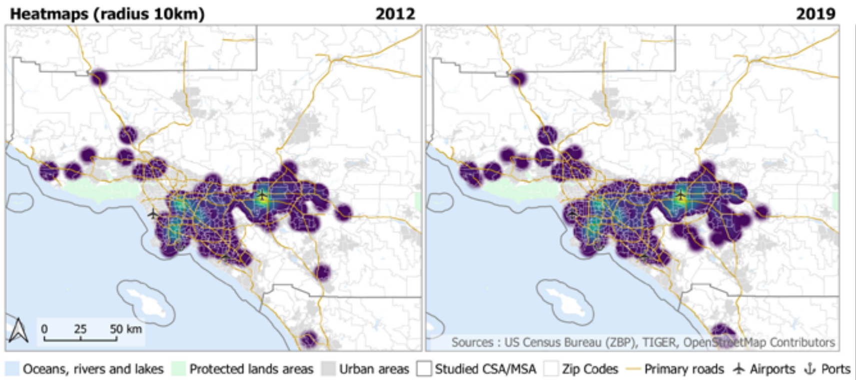
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2279807	6169	155	39.8	0.68	2103.33 km²	-
2019	2405472	13059	195	66.97	0.81	2936.7 km²	-
Gross change	+125665	+6890	+40	+27.17	+0.13	+833.37 km²	10.86 km
% change	+5.51%	+111.69%	+25.81%	+68.26%	+19.23%	+39.62%	-

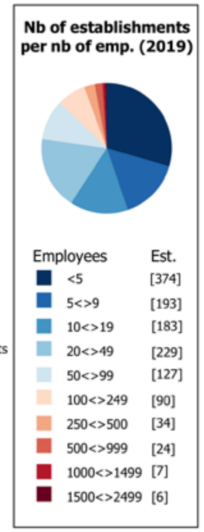
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Los Angeles-Long Beach, CA





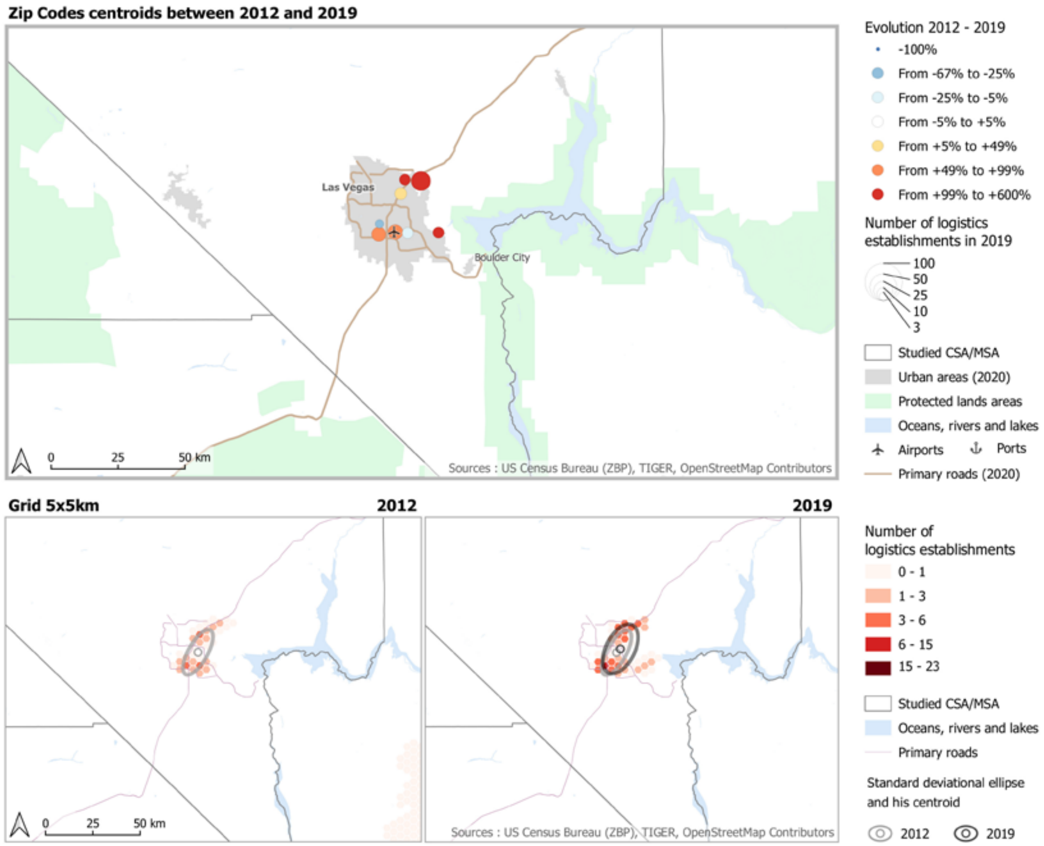


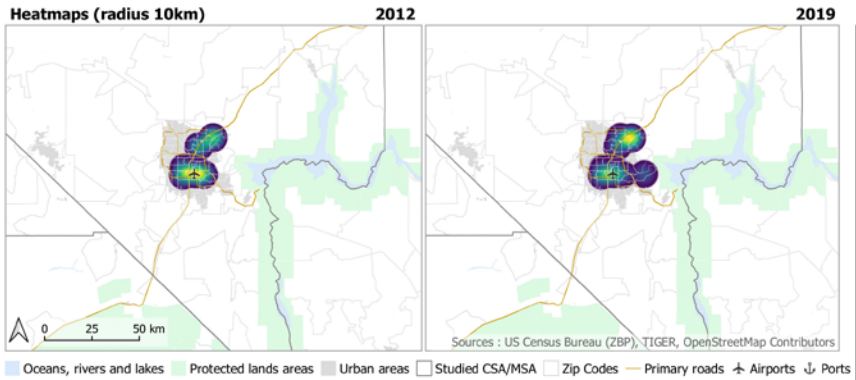


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	18181675	45623	957	47.67	0.53	3161.46 km²	-
2019	18711436	82543	1267	65.15	0.68	3369.87 km²	-
Gross change	+529761	+36920	+310	+17.48	+0.15	+208.41 km²	2.2 km
% change	+2.91%	+80.92%	+32.39%	+36.66%	+28.64%	+6.59%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Las Vegas-Henderson, NV

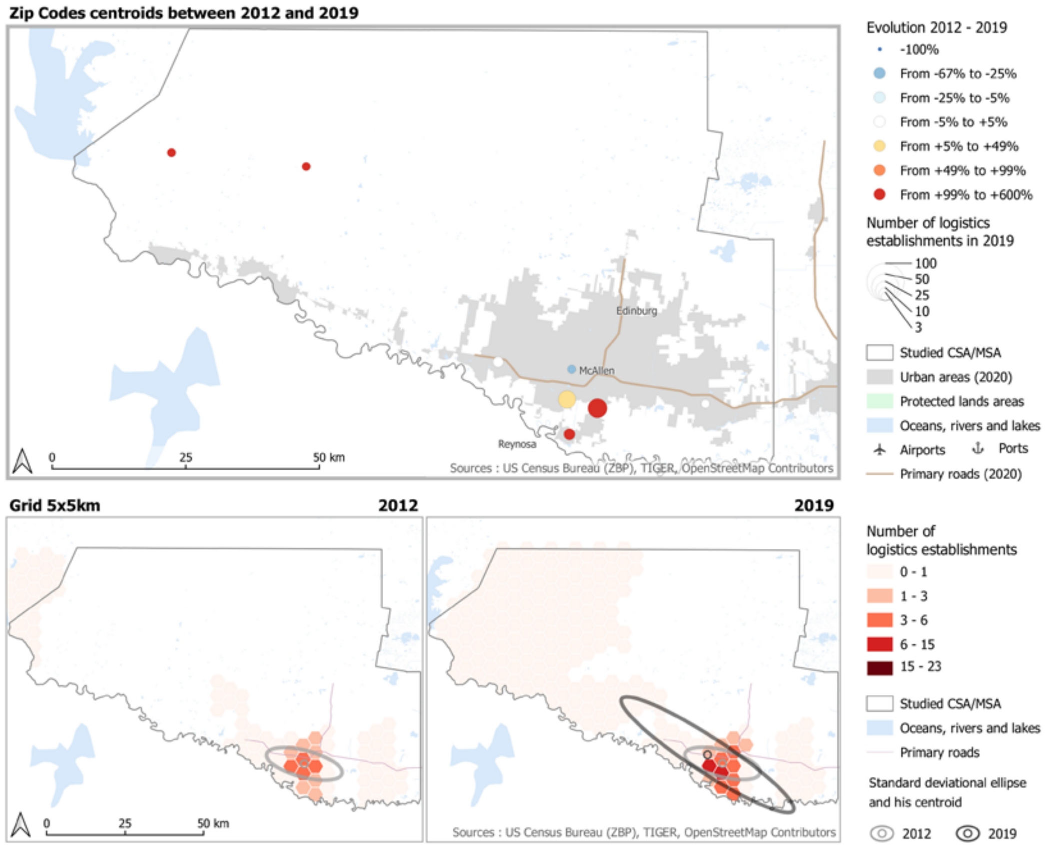


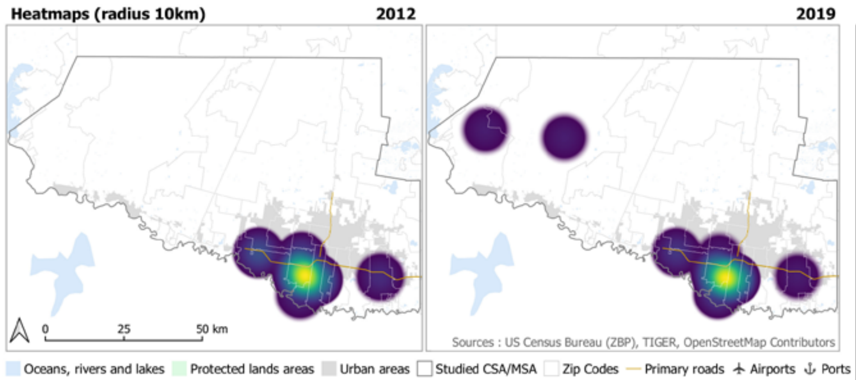


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1989224	2351	70	33.59	0.35	208.66 km²	-
2019	2266715	6888	108	63.78	0.48	332.63 km²	-
Gross change	+277491	+4537	+38	+30.19	+0.12	+123.97 km²	2.8 km
% change	+13.95%	+192.98%	+54.29%	+89.9%	+35.4%	+59.41%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] McAllen-Edinburg, TX

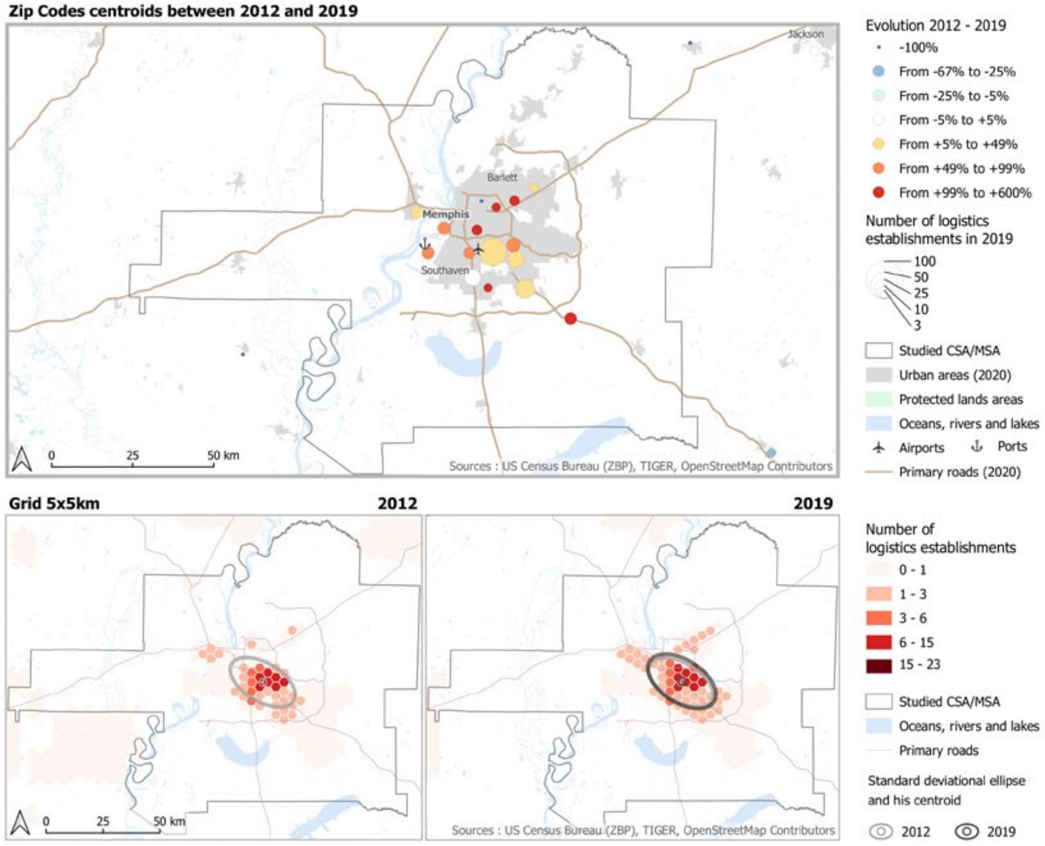


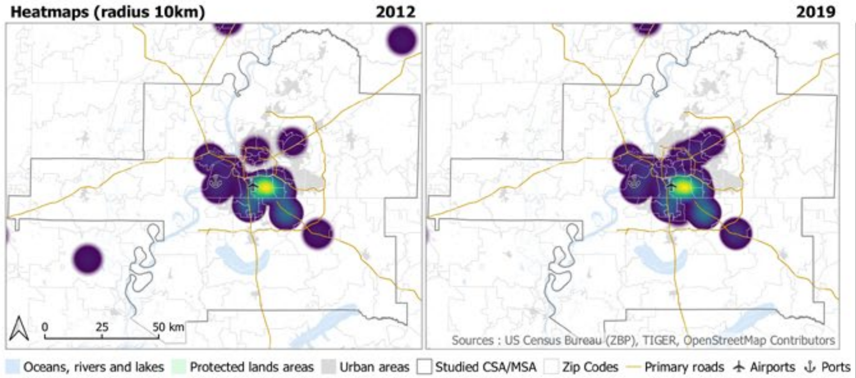


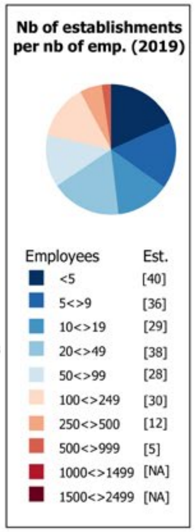
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	808334	961	57	16.86	0.71	163.6 km²	-
2019	868707	1379	82	16.82	0.94	574.07 km²	-
Gross change	+60373	+418	+25	-0.04	+0.24	+410.47 km²	5.53 km
% change	+7.47%	+43.5%	+43.86%	-0.25%	+33.86%	+250.89%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Memphis-Forrest City, TN-MS-AR



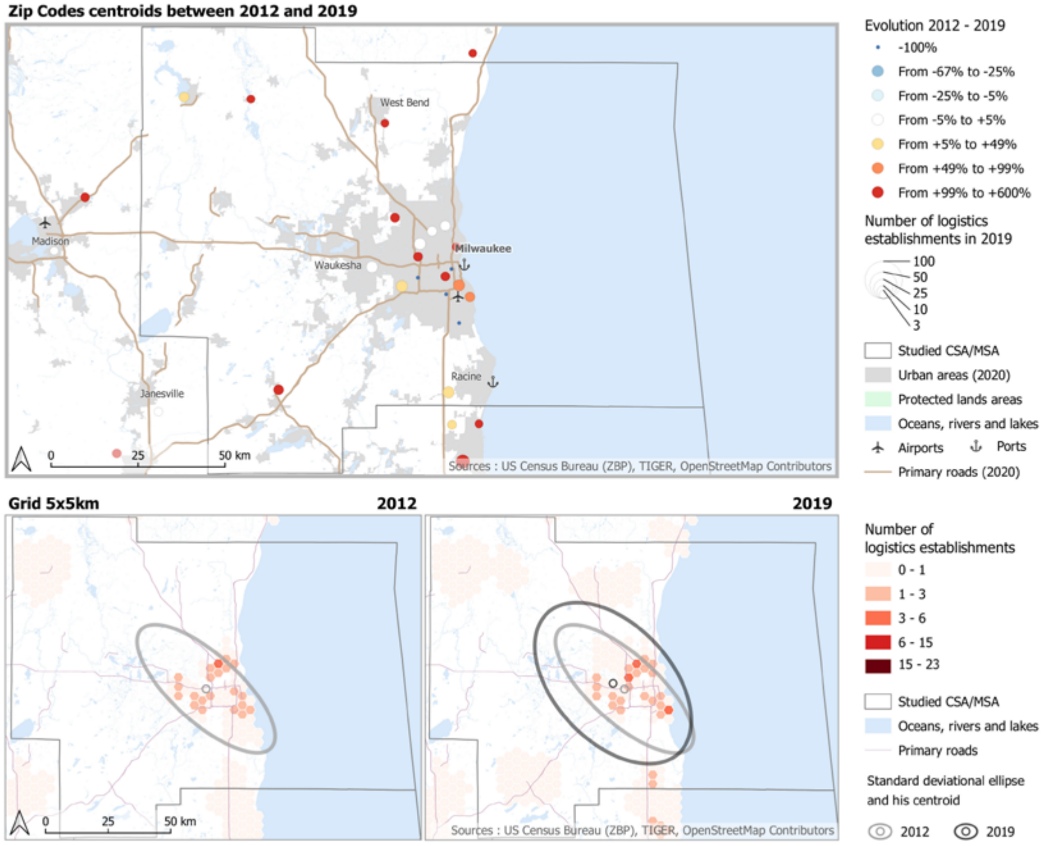


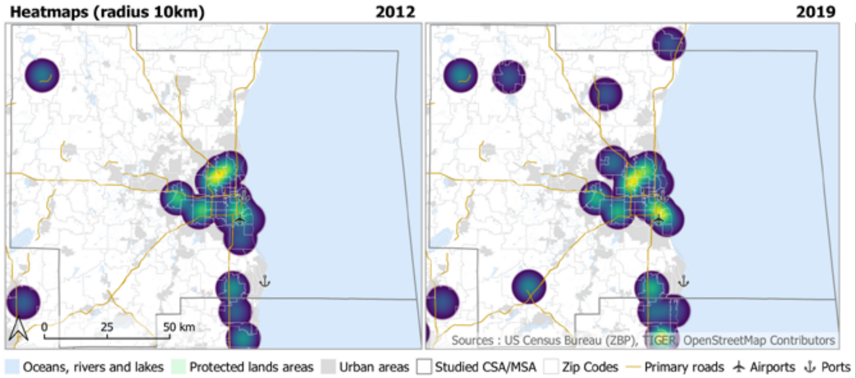


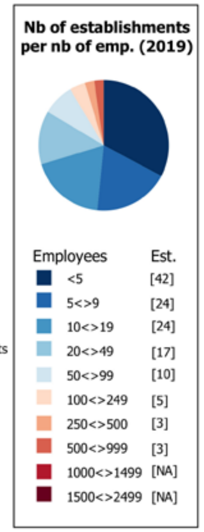
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1331396	11551	167	69.17	1.25	411.75 km²	-
2019	1346045	16905	218	77.55	1.62	491.1 km²	-
Gross change	+14649	+5354	+51	+8.38	+0.37	+79.35 km²	0.58 km
% change	+1.1%	+46.35%	+30.54%	+12.11%	+29.12%	+19.27%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Milwaukee-Racine-Waukesha, WI



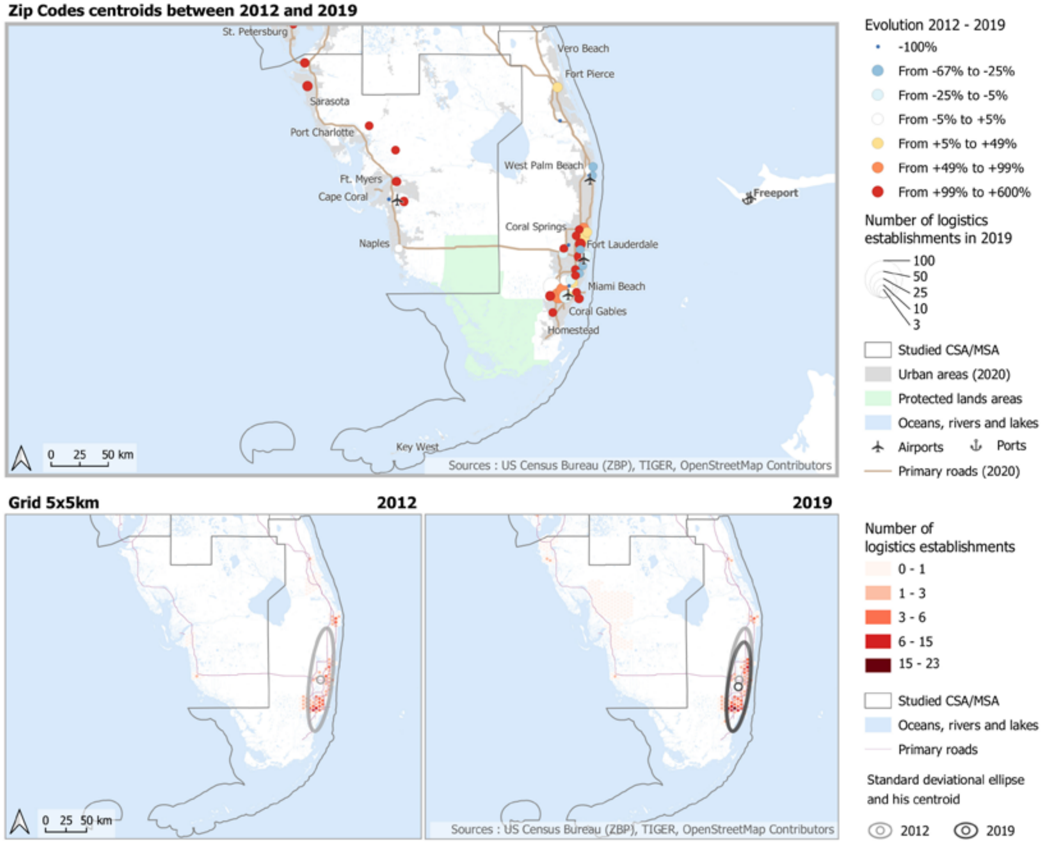


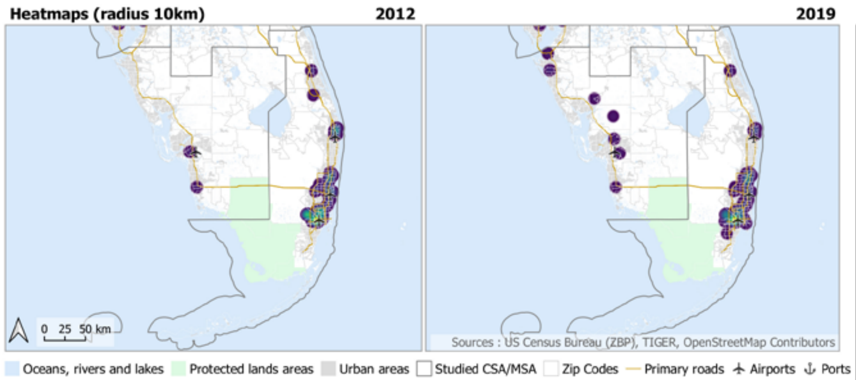


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1761842	3865	97	39.85	0.55	1460.64 km²	-
2019	1771490	5387	128	42.09	0.72	2751.73 km²	-
Gross change	+9648	+1522	+31	+2.24	+0.17	+1291.09 km²	5.07 km
% change	+0.55%	+39.38%	+31.96%	+5.62%	+31.24%	+88.39%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Miami-Port St. Lucie-Fort Lauderdale, FL

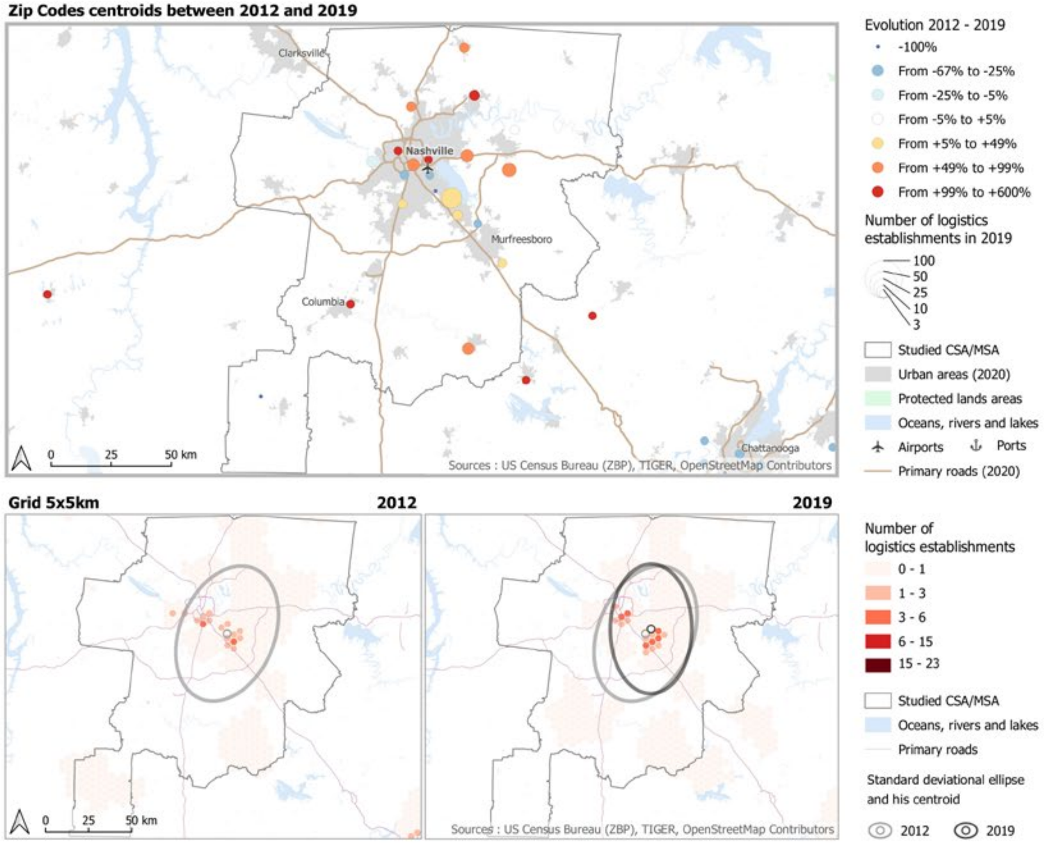


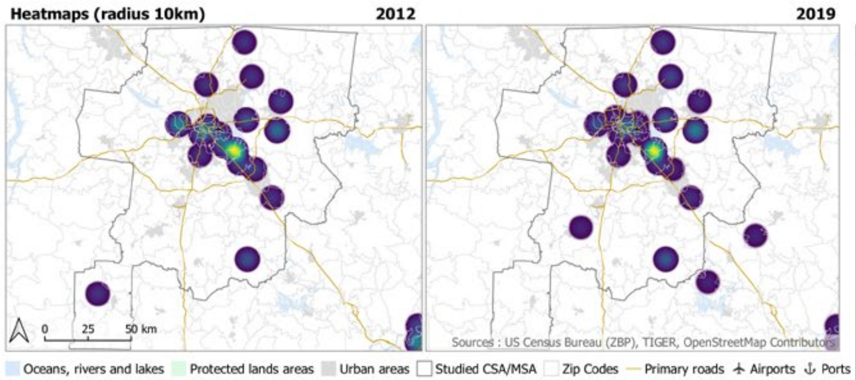


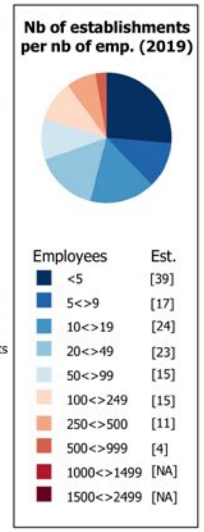
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	6318128	6744	239	28.22	0.38	2647.19 km²	-
2019	6815708	10054	302	33.29	0.44	2133 km²	-
Gross change	+497580	+3310	+63	+5.07	+0.06	-514.19 km²	8.05 km
% change	+7.88%	+49.08%	+26.36%	+17.98%	+17.13%	-19.42%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Nashville-Davidson--Murfreesboro, TN





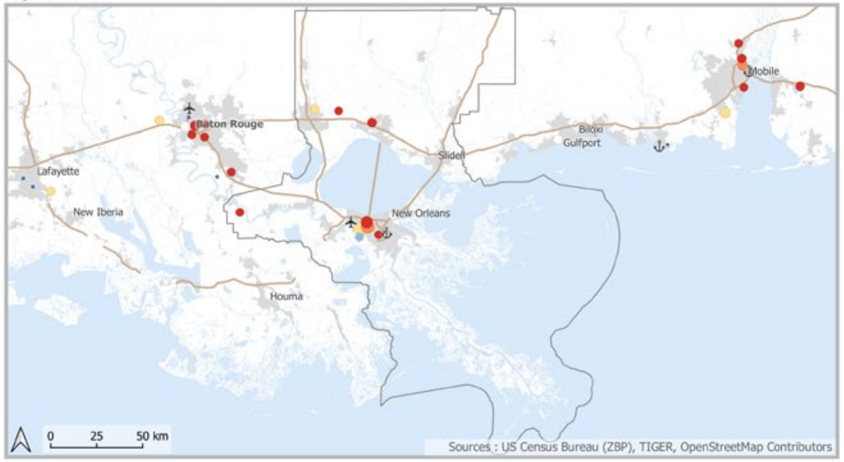


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1703609	6223	116	53.65	0.68	3416.06 km²	-
2019	1934317	11853	146	81.18	0.75	2700.67 km²	-
Gross change	+230708	+5630	+30	+27.54	+0.07	-715.39 km²	4.19 km
% change	+13.54%	+90.47%	+25.86%	+51.33%	+10.85%	-20.94%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] New Orleans-Metairie-Hammond, LA-MS

Zip Codes centroids between 2012 and 2019

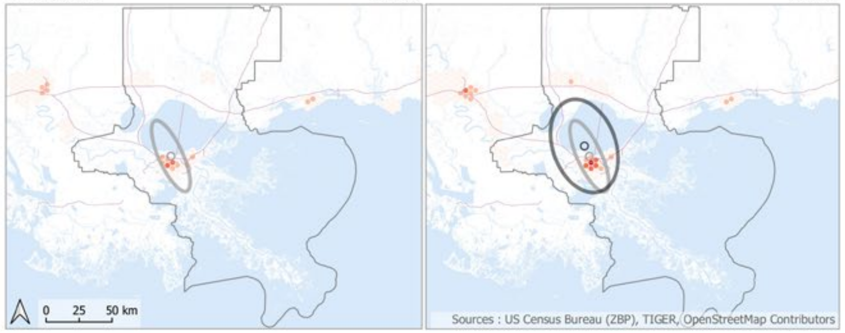


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019
- 100
- 50
- 25
- 10
- 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

Grid 5x5km 2012 2019

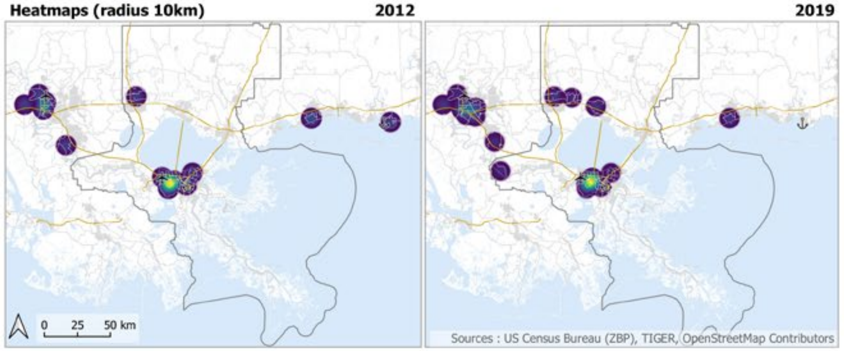


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid
- 2012
- 2019

Heatmaps (radius 10km) 2012 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

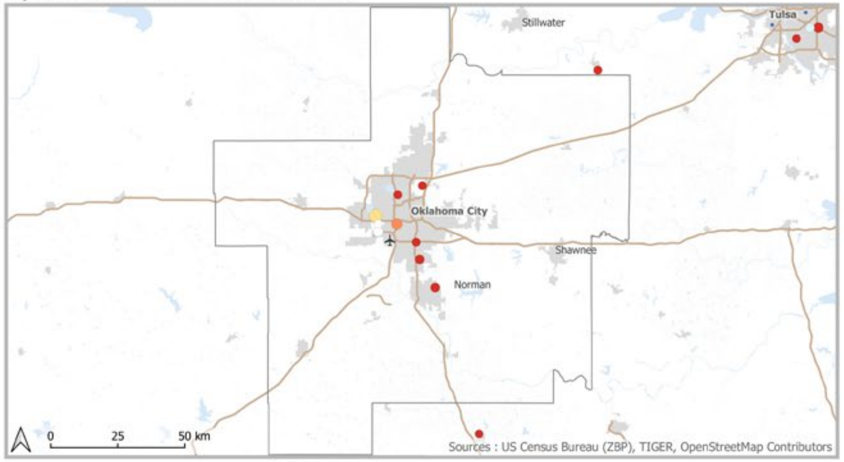
Employees	Est.
<5	[24]
5<>9	[19]
10<>19	[20]
20<>49	[14]
50<>99	[7]
100<>249	[7]
250<>500	[NA]
500<>999	[NA]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1350533	1885	77	24.48	0.57	811.67 km²	-
2019	1405288	3787	91	41.62	0.65	2646.55 km²	-
Gross change	+54755	+1902	+14	+17.13	+0.08	+1834.88 km²	8.46 km
% change	+4.05%	+100.9%	+18.18%	+69.99%	+13.58%	+226.06%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Oklahoma City-Shawnee, OK

Zip Codes centroids between 2012 and 2019

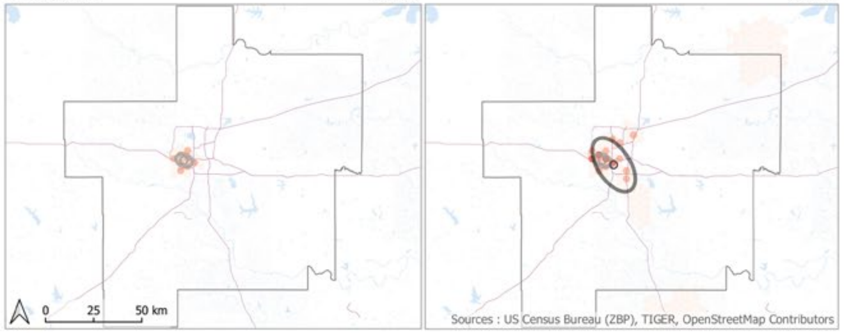


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019
- 100
- 50
- 25
- 10
- 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

Grid 5x5km 2012 2019

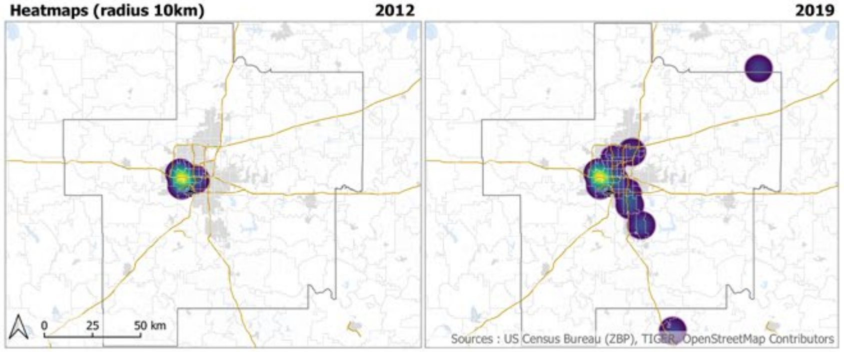


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid
- 2012
- 2019

Heatmaps (radius 10km) 2012 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

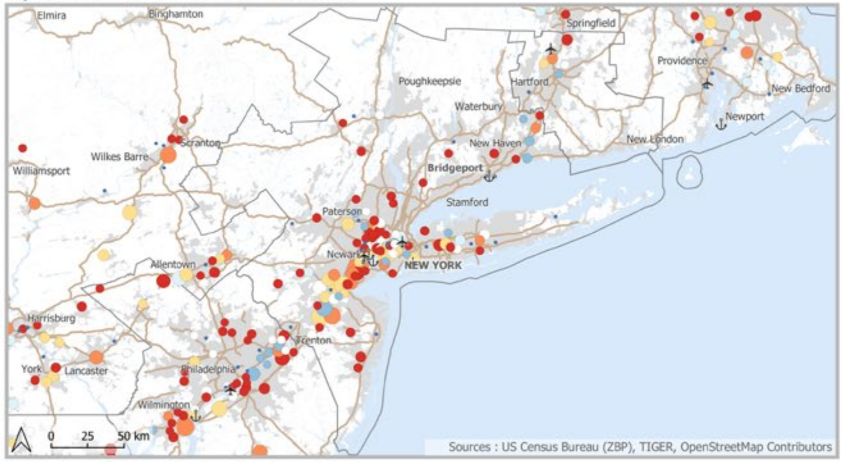
Employees	Est.
<5	[45]
5<>9	[10]
10<>19	[11]
20<>49	[8]
50<>99	[5]
100<>249	[NA]
250<>500	[NA]
500<>999	[NA]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1297857	848	46	18.43	0.35	42.66 km²	-
2019	1408950	1187	79	15.03	0.56	406.15 km²	-
Gross change	+111093	+339	+33	-3.41	+0.21	+363.48 km²	6.3 km
% change	+8.56%	+39.98%	+71.74%	-18.49%	+58.2%	+851.95%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] New York-Newark, NY-NJ-CT-PA

Zip Codes centroids between 2012 and 2019

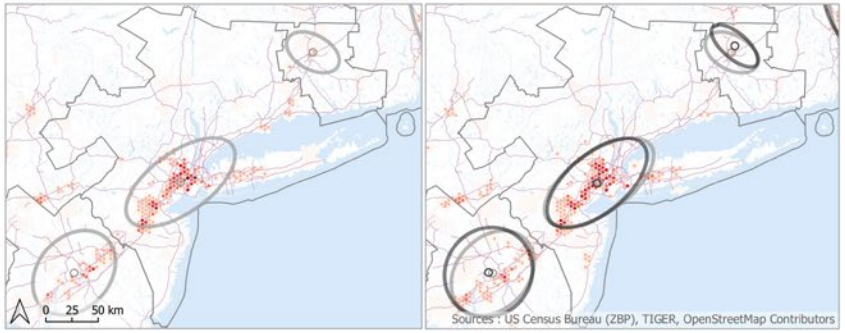


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019: 100, 50, 25, 10, 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

Grid 5x5km — 2012 — 2019

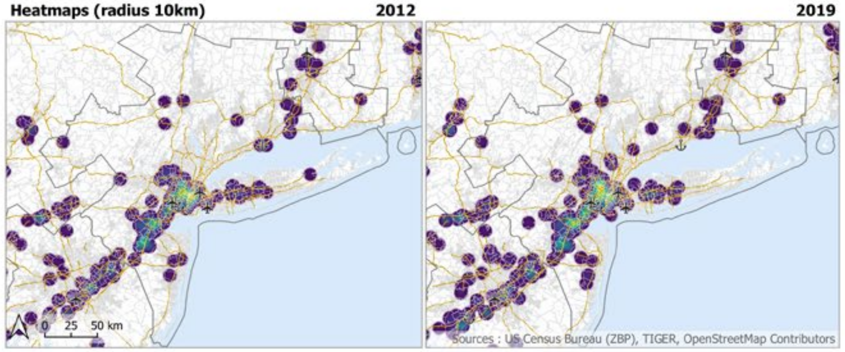


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid: 2012, 2019

Heatmaps (radius 10km) — 2012 — 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

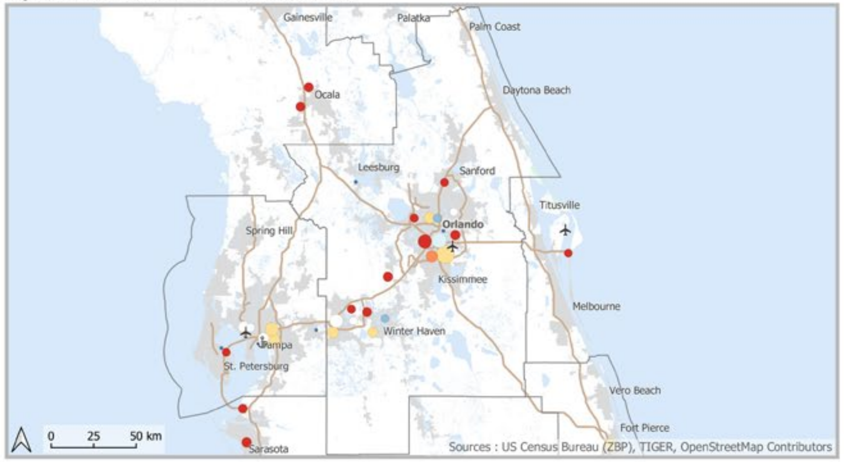
Employees	Est.
<5	[337]
5<>9	[157]
10<>19	[183]
20<>49	[195]
50<>99	[90]
100<>249	[78]
250<>500	[24]
500<>999	[12]
1000<>1499	[NA]
1500<>2499	[3]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	22338796	30455	844	36.08	0.38	5290.22 km²	-
2019	22408703	44776	993	45.09	0.44	4906.91 km²	-
Gross change	+69907	+14321	+149	+9.01	+0.07	-383.31 km²	1.9 km
% change	+0.31%	+47.02%	+17.65%	+24.96%	+17.29%	-7.25%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Orlando-Lakeland-Deltona, FL

Zip Codes centroids between 2012 and 2019

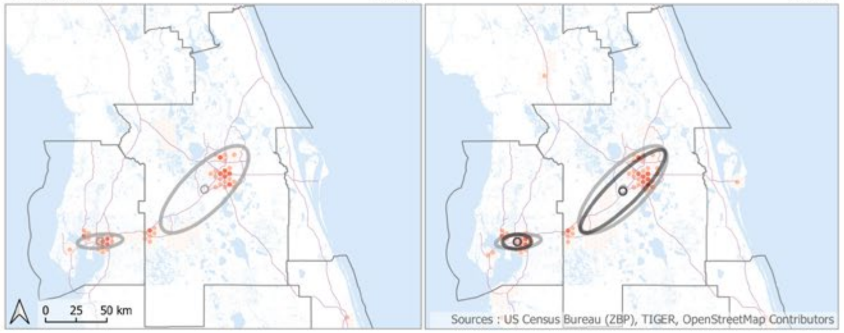


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019: 100, 50, 25, 10, 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

Grid 5x5km — 2012 — 2019

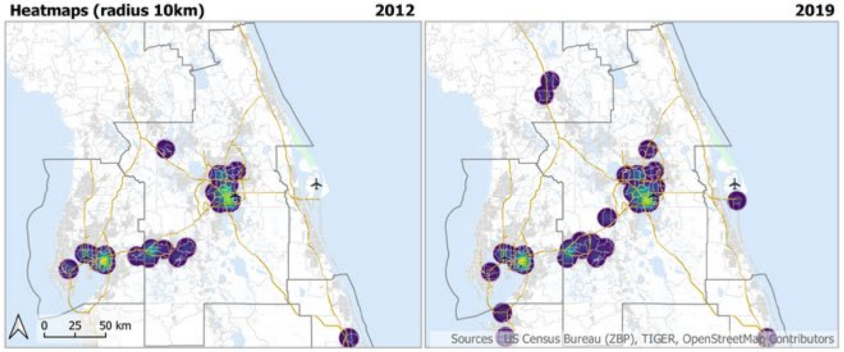


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid: 2012, 2019

Heatmaps (radius 10km) — 2012 — 2019



Oceans, rivers and lakes · Protected lands areas · Urban areas · Studied CSA/MSA · Zip Codes · Primary roads · Airports · Ports

Nb of establishments per nb of emp. (2019)

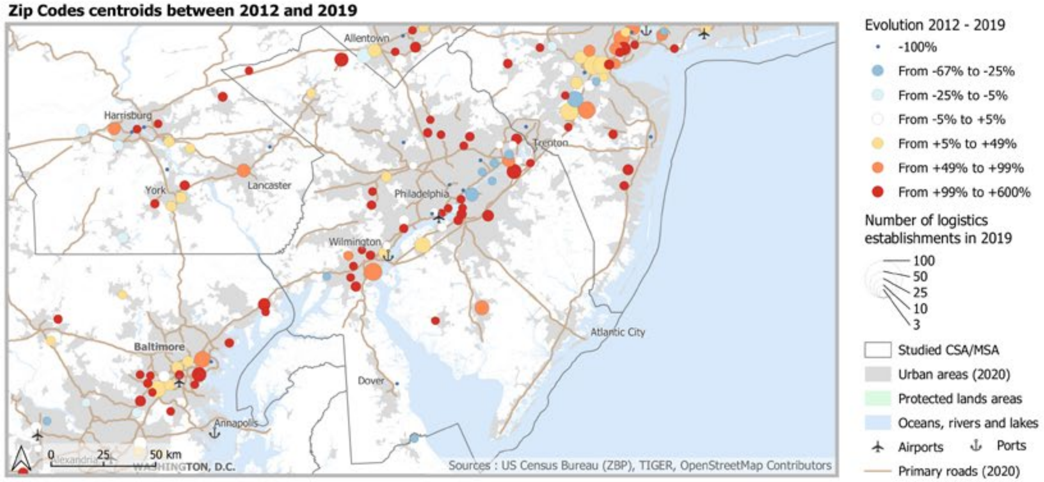
Employees	Est.
<5	[41]
5<>9	[18]
10<>19	[23]
20<>49	[21]
50<>99	[8]
100<>249	[8]
250<>500	[3]
500<>999	[NA]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	3537727	9036	144	62.75	0.41	2628.43 km²	-
2019	4133709	13799	172	80.23	0.42	1711.96 km²	-
Gross change	+595982	+4763	+28	+17.48	+0.01	-916.47 km²	1.36 km
% change	+16.85%	+52.71%	+19.44%	+27.85%	+2.22%	-34.87%	-

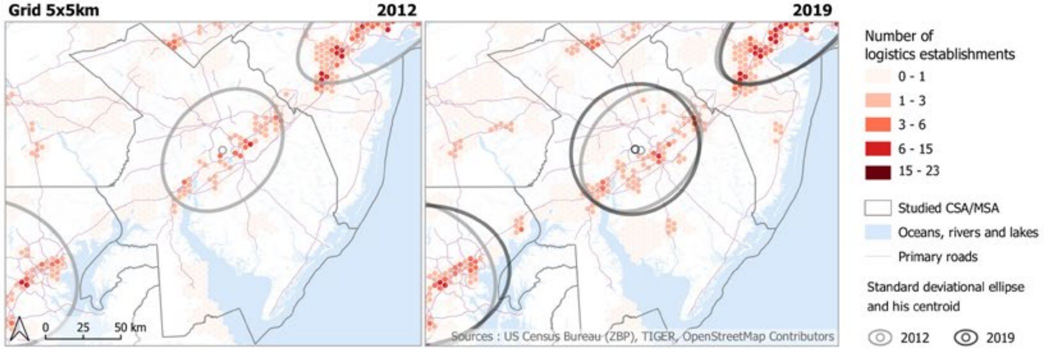
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Philadelphia-Reading-Camden, PA-NJ-DE-MD

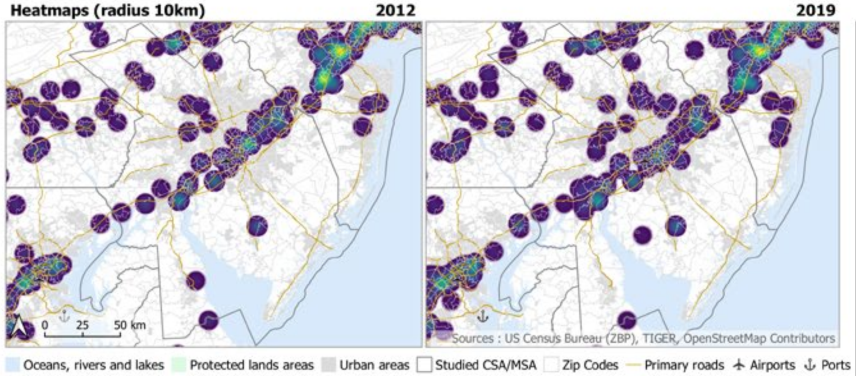
Zip Codes centroids between 2012 and 2019

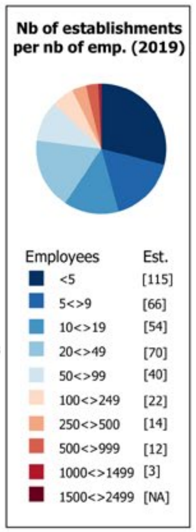


Grid 5x5km



Heatmaps (radius 10km)



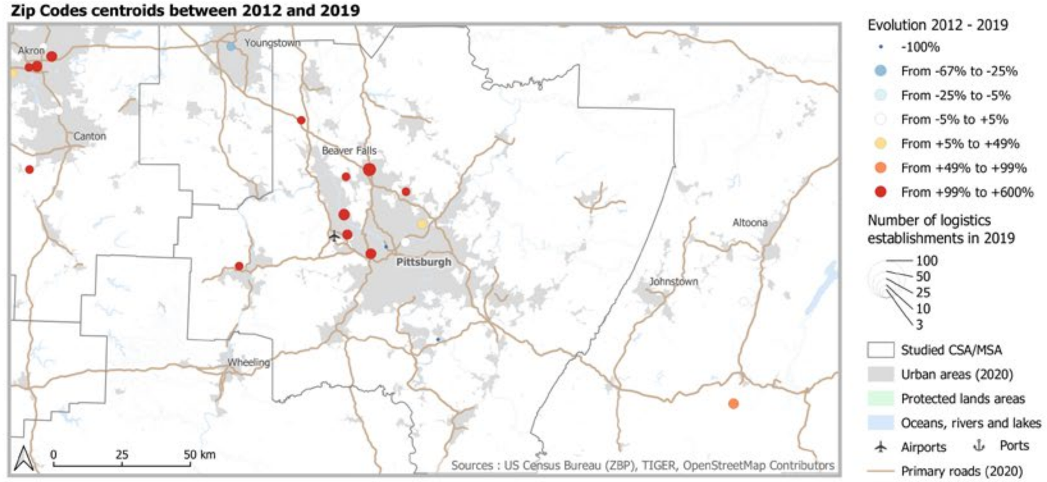


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	7125222	16878	324	52.09	0.45	4763.58 km²	-
2019	7209620	27457	395	69.51	0.55	5567.76 km²	-
Gross change	+84398	+10579	+71	+17.42	+0.09	+804.18 km²	3.84 km
% change	+1.18%	+62.68%	+21.91%	+33.44%	+20.49%	+16.88%	-

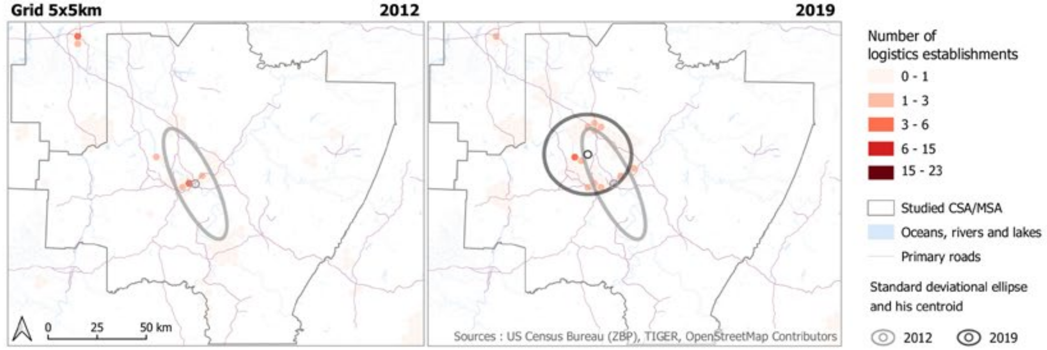
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Pittsburgh-New Castle-Weirton, PA-OH-WV

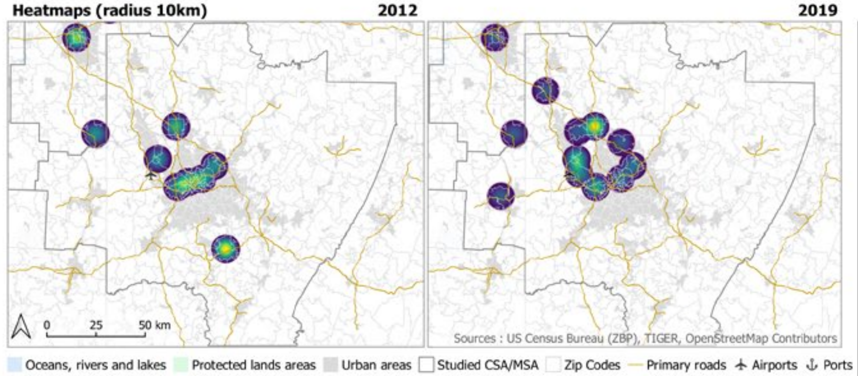
Zip Codes centroids between 2012 and 2019

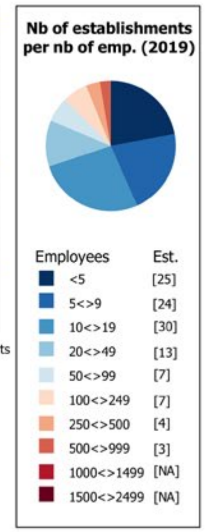


Grid 5x5km



Heatmaps (radius 10km)



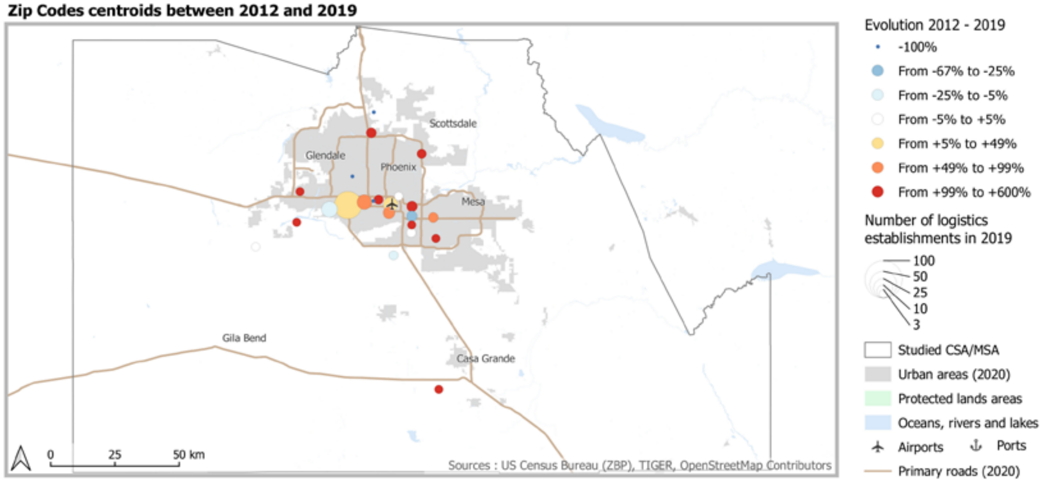


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2483123	3152	89	35.42	0.36	927.28 km²	-
2019	2433674	6007	113	53.16	0.46	1378.48 km²	-
Gross change	-49449	+2855	+24	+17.74	+0.11	+451.21 km²	19.8 km
% change	-1.99%	+90.58%	+26.97%	+50.1%	+29.55%	+48.66%	-

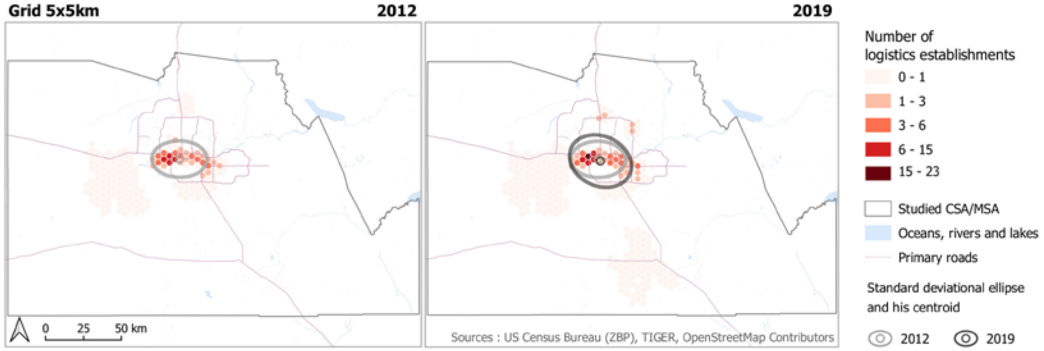
Statisticals sources : US Census Bureau (CBP/MSA)

[MSA] Phoenix-Mesa-Chandler, AZ

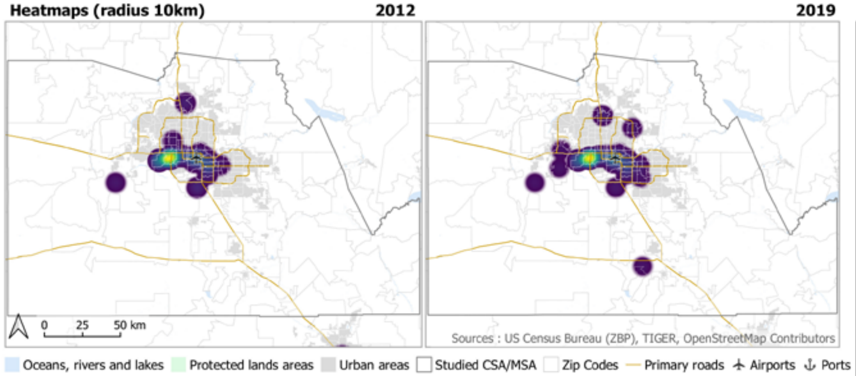
Zip Codes centroids between 2012 and 2019



Grid 5x5km



Heatmaps (radius 10km)

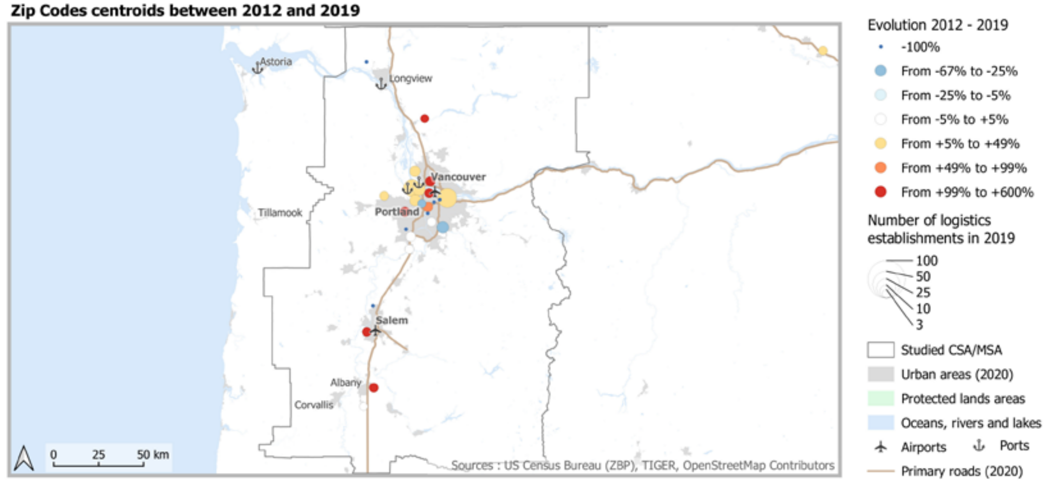


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	4329756	10868	166	65.47	0.38	669.84 km²	-
2019	4948203	14499	216	67.13	0.44	1076.04 km²	-
Gross change	+618447	+3631	+50	+1.66	+0.05	+406.2 km²	1.9 km
% change	+14.28%	+33.41%	+30.12%	+2.53%	+13.86%	+60.64%	-

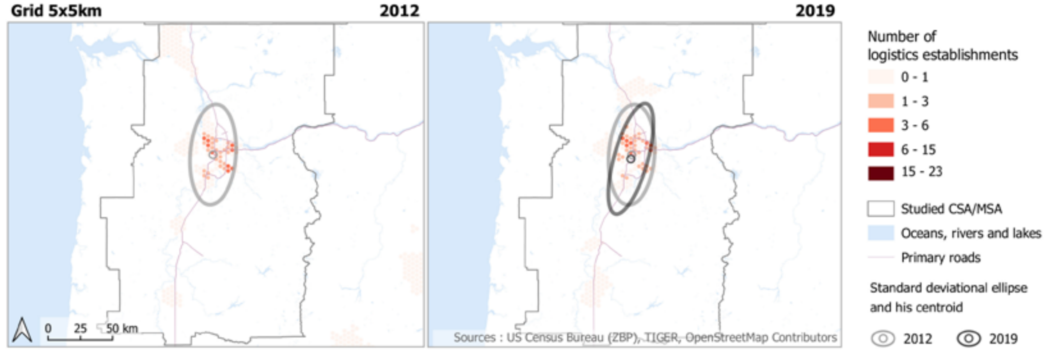
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Portland-Vancouver-Salem, OR-WA

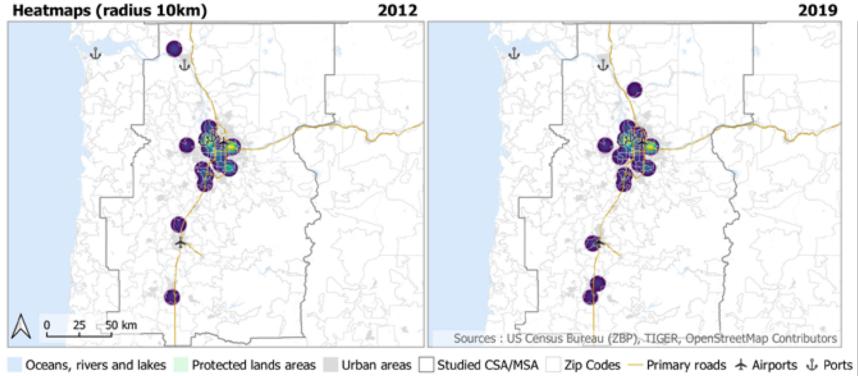
Zip Codes centroids between 2012 and 2019

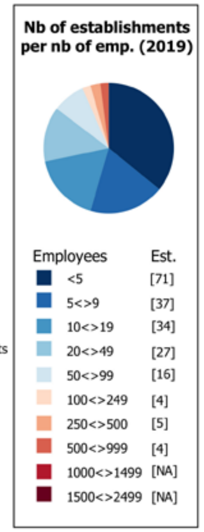


Grid 5x5km



Heatmaps (radius 10km)

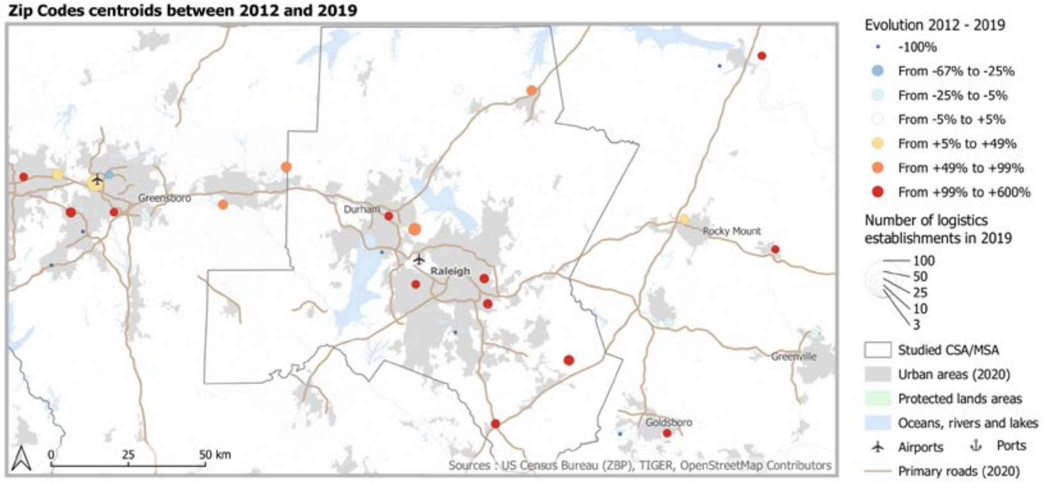


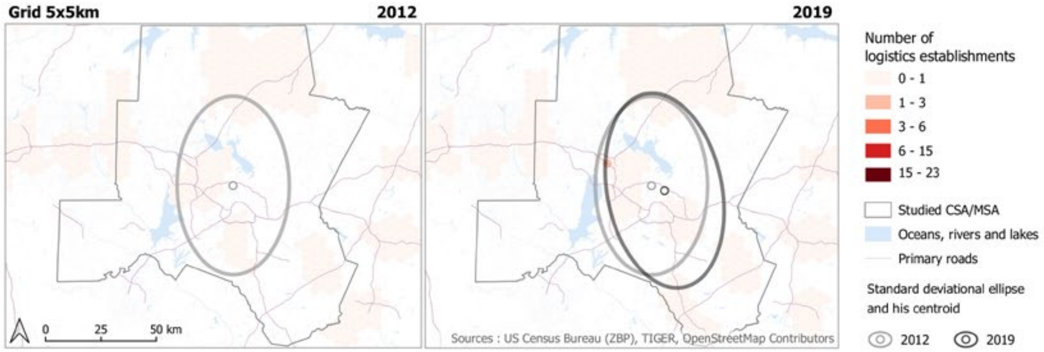


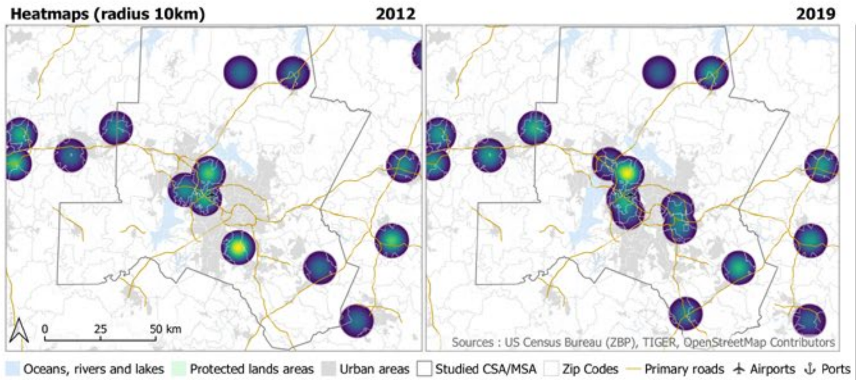
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2991155	4398	164	26.82	0.55	2064.82 km²	-
2019	3259710	8222	198	41.53	0.61	1734.64 km²	-
Gross change	+268555	+3824	+34	+14.71	+0.06	-330.18 km²	3.14 km
% change	+8.98%	+86.95%	+20.73%	+54.85%	+10.79%	-15.99%	-

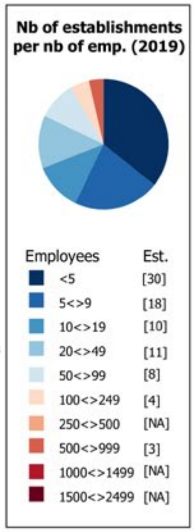
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Raleigh-Durham-Cary, NC





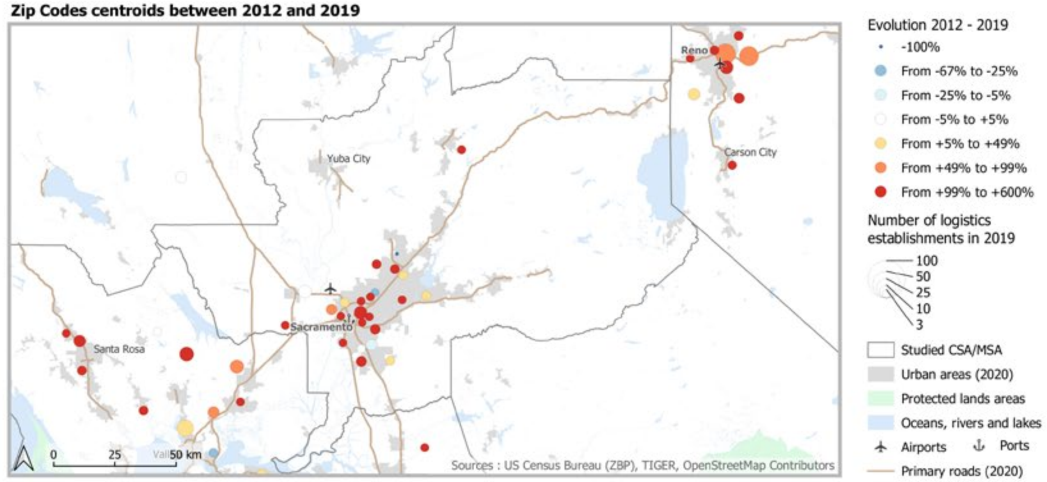


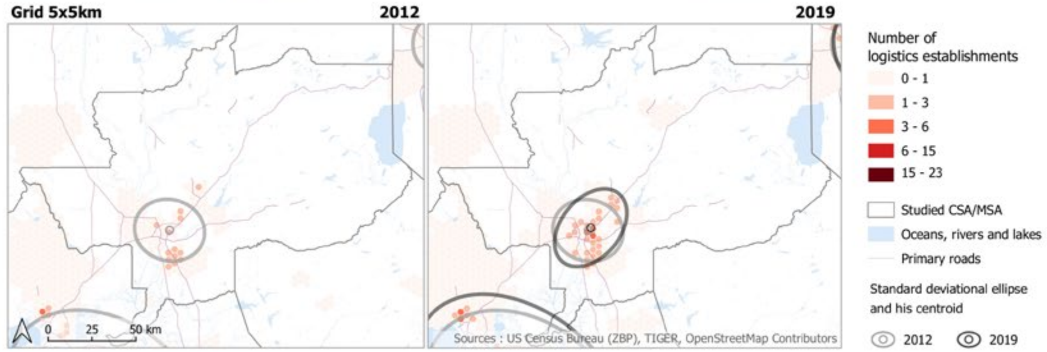


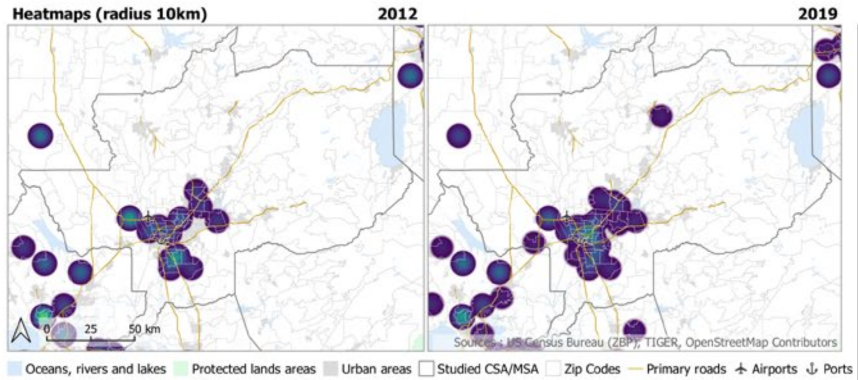
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1769583	1167	69	16.91	0.39	3133.31 km²	-
2019	2035152	2938	73	40.25	0.36	3540.49 km²	-
Gross change	+265569	+1771	+4	+23.33	-0.03	+407.19 km²	6.24 km
% change	+15.01%	+151.76%	+5.8%	+137.96%	-8.01%	+13%	-

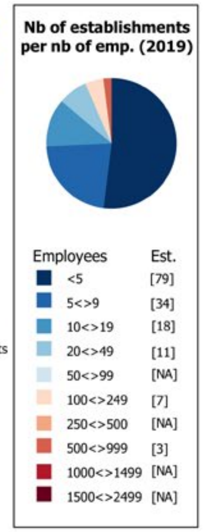
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Sacramento-Roseville, CA







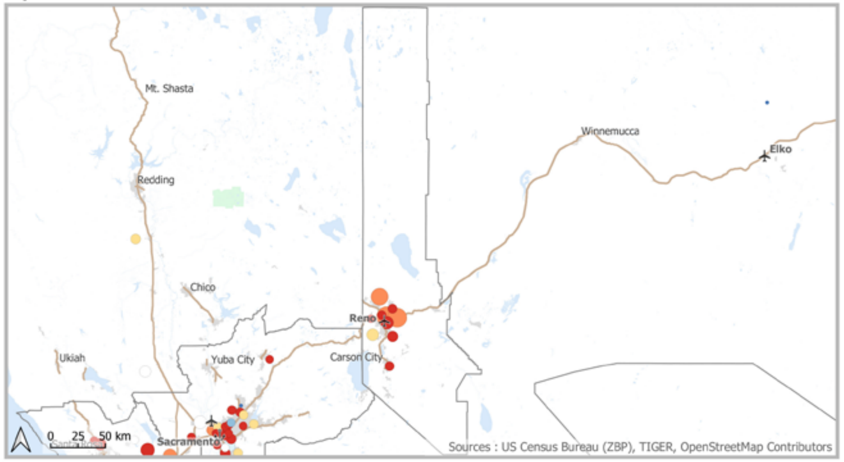


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2357229	3912	103	37.98	0.44	1079.84 km²	-
2019	2539369	12018	157	76.55	0.62	1293.51 km²	-
Gross change	+182140	+8106	+54	+38.57	+0.18	+213.67 km²	2.09 km
% change	+7.73%	+207.21%	+52.43%	+101.54%	+41.49%	+19.79%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Reno-Carson City-Fernley, NV

Zip Codes centroids between 2012 and 2019



Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019
- 100
- 50
- 25
- 10
- 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

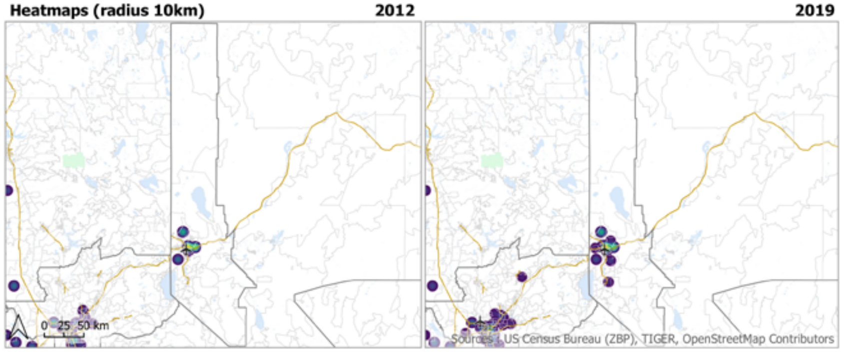
Grid 5x5km **2012** **2019**

Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid
- 2012
- 2019

Heatmaps (radius 10km) **2012** **2019**



Oceans, rivers and lakes | Protected lands areas | Urban areas | Studied CSA/MSA | Zip Codes | Primary roads | Airports | Ports

Nb of establishments per nb of emp. (2019)

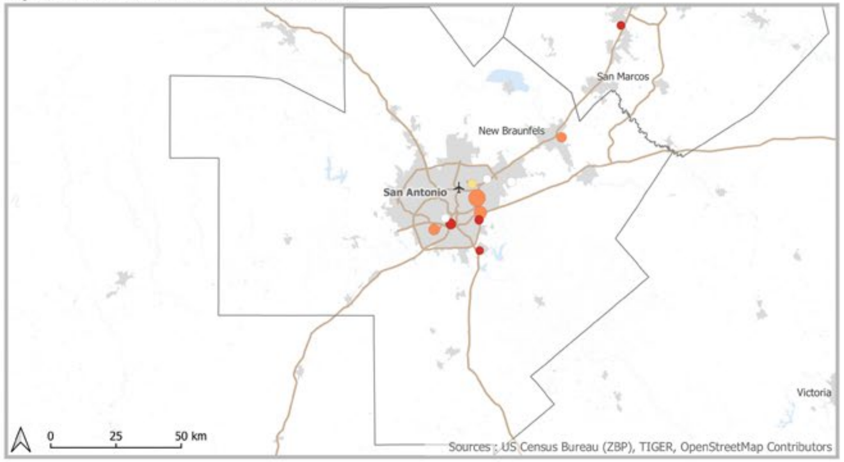
Employees	Est.
<5	[44]
5<>9	[18]
10<>19	[19]
20<>49	[21]
50<>99	[7]
100<>249	[6]
250<>500	[5]
500<>999	[NA]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	485520	3616	64	56.5	1.32	457.75 km²	-
2019	531558	6451	122	52.88	2.3	547.63 km²	-
Gross change	+46038	+2835	+58	-3.62	+0.98	+89.88 km²	1.87 km
% change	+9.48%	+78.4%	+90.63%	-6.41%	+74.12%	+19.64%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[MSA] San Antonio-New Braunfels, TX

Zip Codes centroids between 2012 and 2019

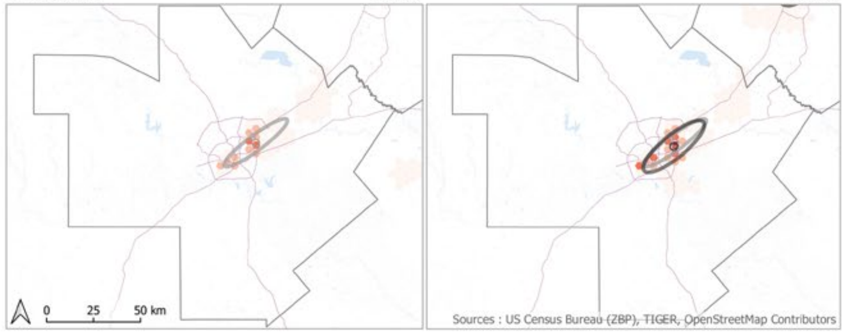


Evolution 2012 - 2019
- -100%
- From -67% to -25%
- From -25% to -5%
- From -5% to +5%
- From +5% to +49%
- From +49% to +99%
- From +99% to +600%

Number of logistics establishments in 2019
- 100
- 50
- 25
- 10
- 3

- Studied CSA/MSA
- Urban areas (2020)
- Protected lands areas
- Oceans, rivers and lakes
- Airports
- Ports
- Primary roads (2020)

Grid 5x5km **2012** **2019**

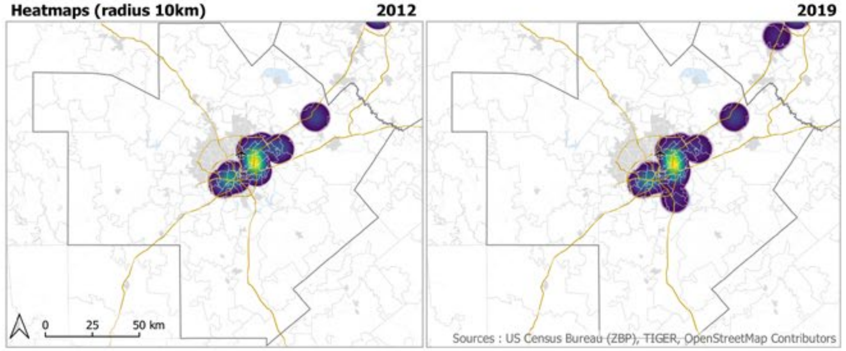


Number of logistics establishments
- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 15
- 15 - 23

- Studied CSA/MSA
- Oceans, rivers and lakes
- Primary roads

Standard deviational ellipse and his centroid
- 2012
- 2019

Heatmaps (radius 10km) **2012** **2019**



Oceans, rivers and lakes | Protected lands areas | Urban areas | Studied CSA/MSA | Zip Codes | Primary roads | Airports | Ports

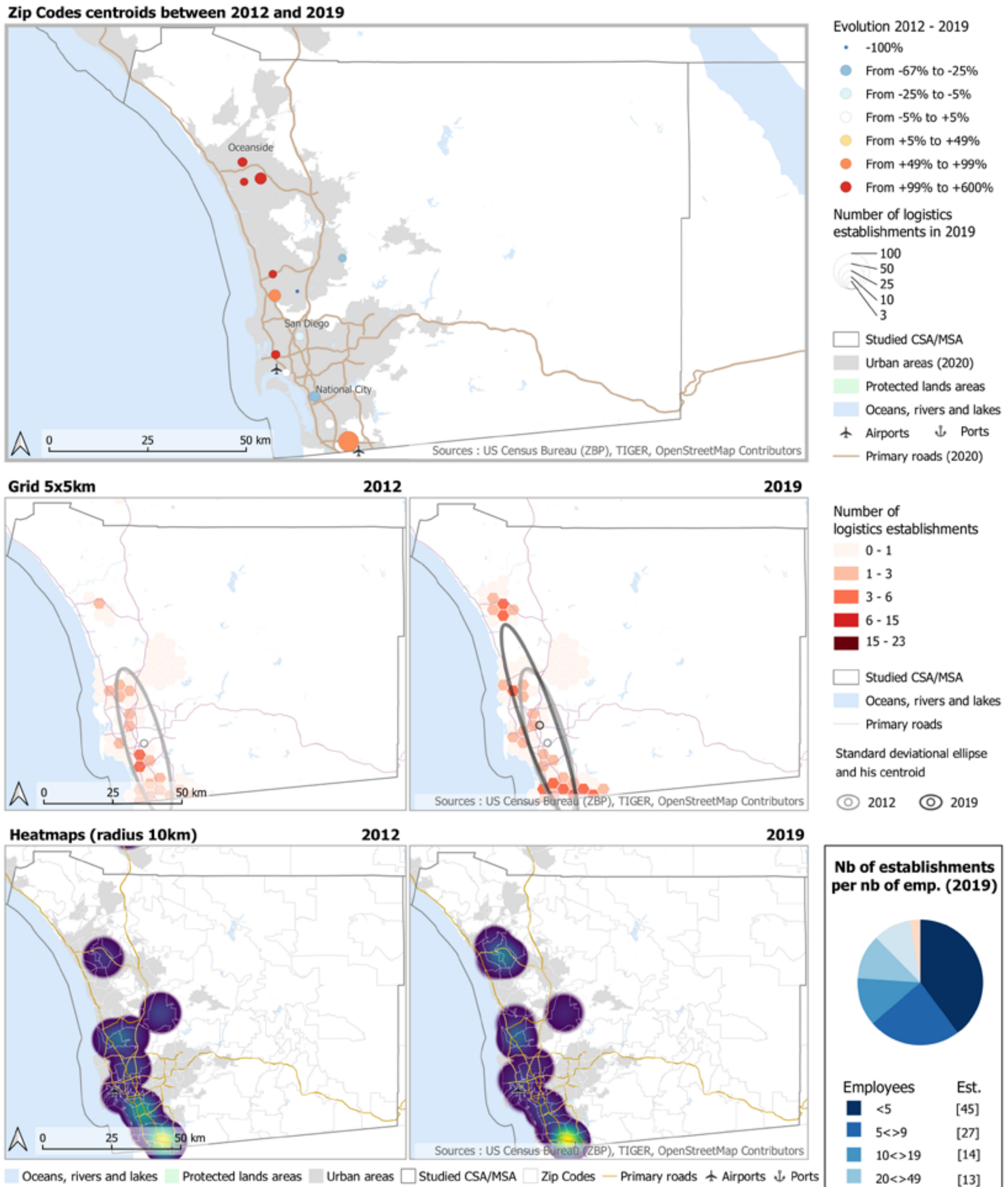
Nb of establishments per nb of emp. (2019)

Employees	Est.
<5	[27]
5<>9	[9]
10<>19	[15]
20<>49	[22]
50<>99	[9]
100<>249	[5]
250<>500	[3]
500<>999	[5]
1000<>1499	[NA]
1500<>2499	[NA]

Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2236981	4645	65	71.46	0.29	260.32 km²	-
2019	2550960	7995	96	83.28	0.38	386.53 km²	-
Gross change	+313979	+3350	+31	+11.82	+0.09	+126.21 km²	1.91 km
% change	+14.04%	+72.12%	+47.69%	+16.54%	+29.51%	+48.48%	-

Statisticals sources : US Census Bureau (CBP/MSA)

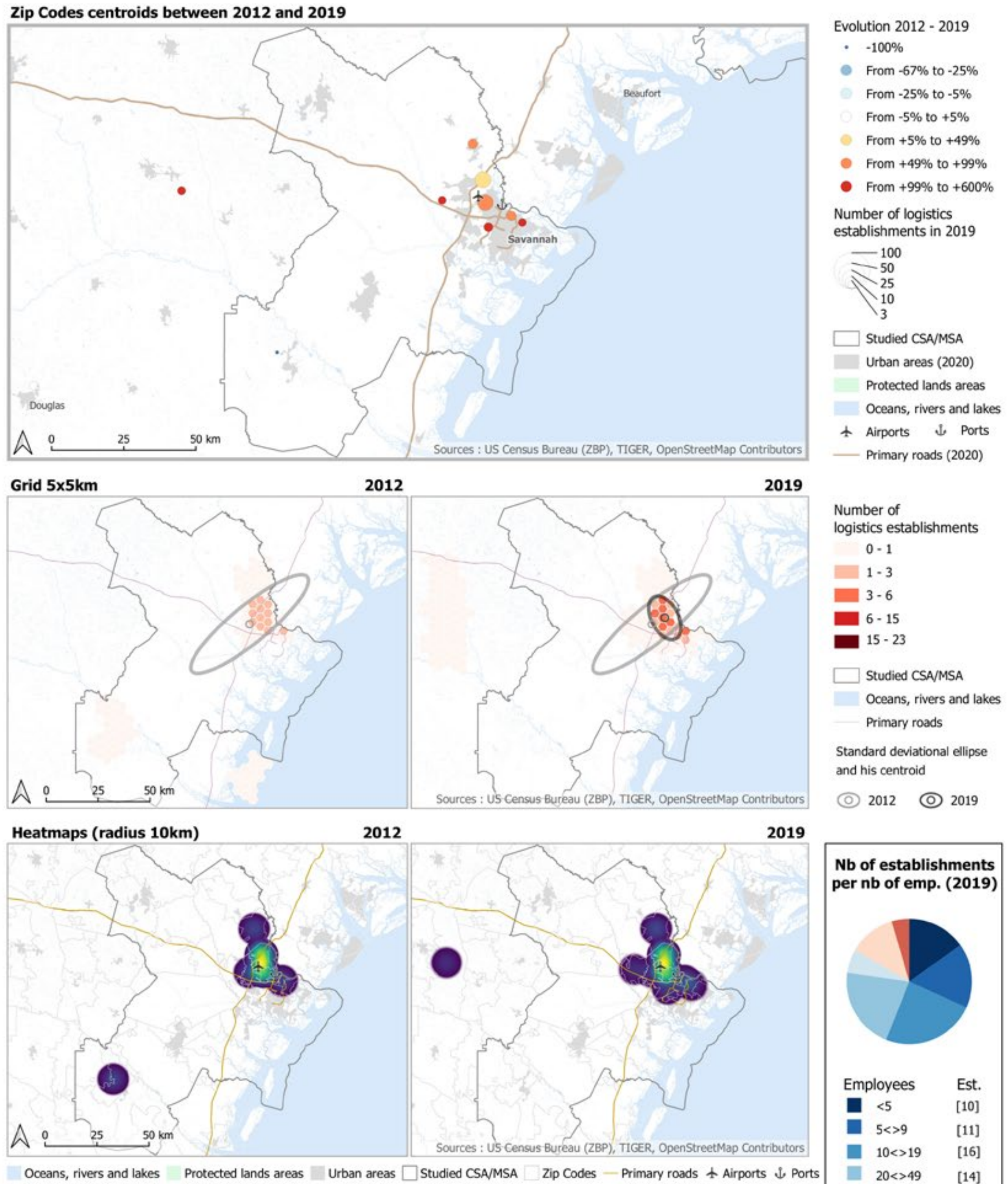
[MSA] San Diego-Chula Vista-Carlsbad, CA



Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	3174335	1610	82	19.63	0.26	583.81 km²	-
2019	3338330	2876	115	25.01	0.34	723.5 km²	-
Gross change	+163995	+1266	+33	+5.37	+0.09	+139.69 km²	7.08 km
% change	+5.17%	+78.63%	+40.24%	+27.37%	+33.35%	+23.93%	-

Statisticals sources : US Census Bureau (CBP/MSA)

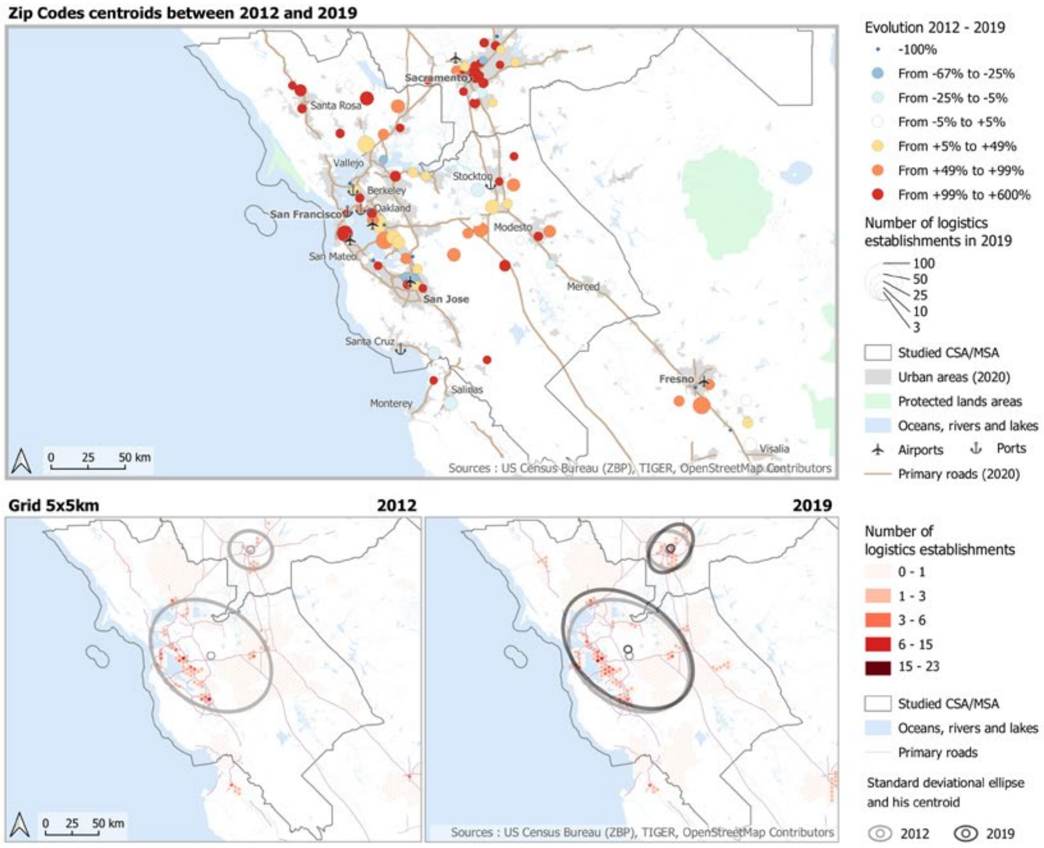
[CSA] Savannah-Hinesville-Statesboro, GA

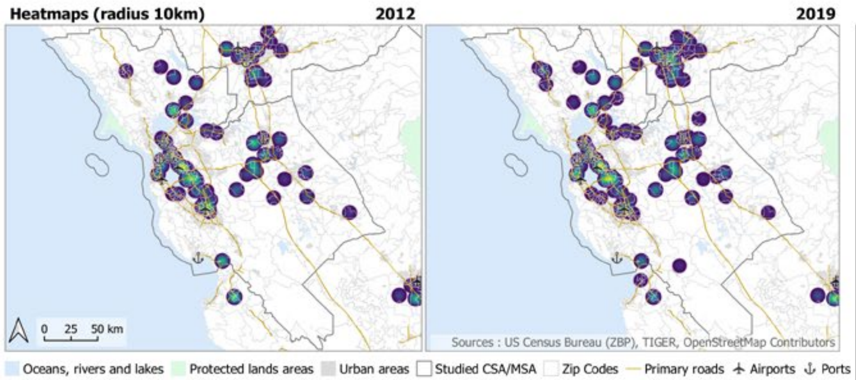


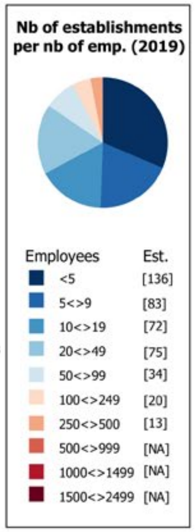
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	442151	1587	46	34.5	1.04	985.68 km²	-
2019	474347	3560	64	55.63	1.35	224.95 km²	-
Gross change	+32196	+1973	+18	+21.13	+0.31	-760.73 km²	6.91 km
% change	+7.28%	+124.32%	+39.13%	+61.23%	+29.69%	-77.18%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] San Jose-San Francisco-Oakland, CA



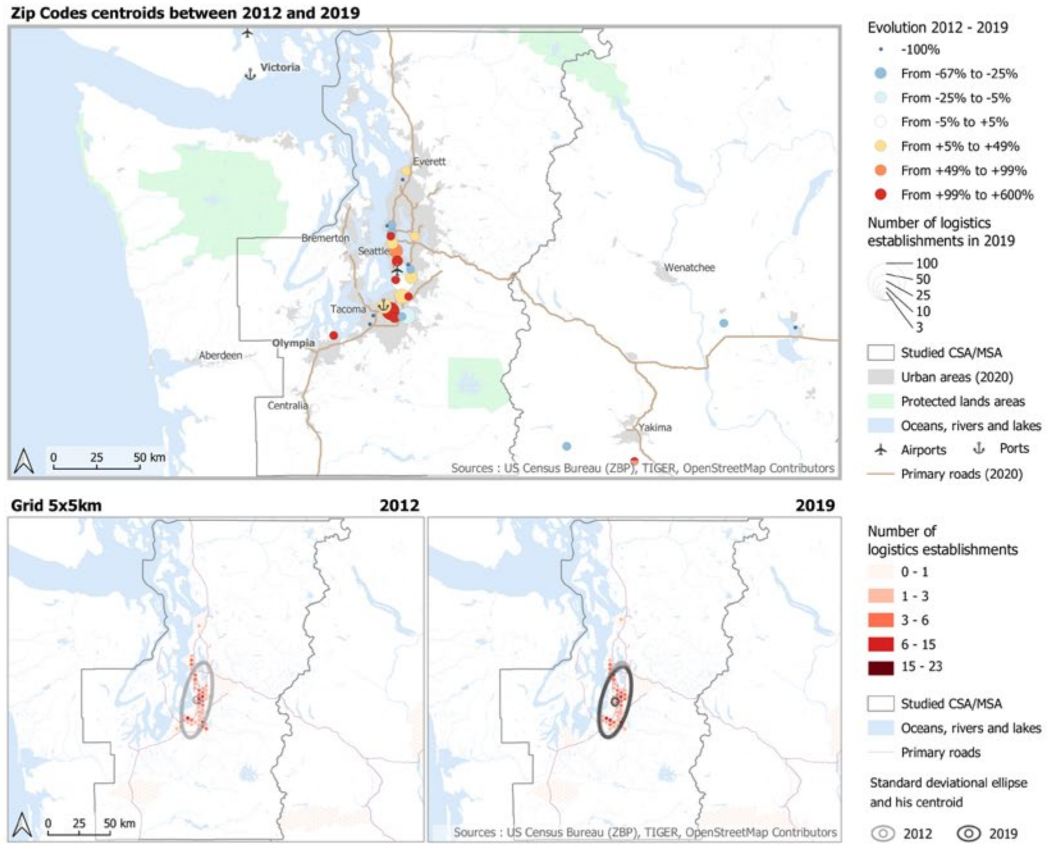


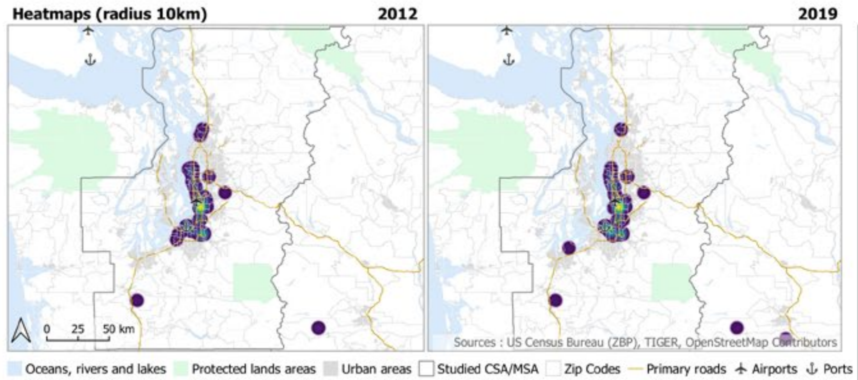


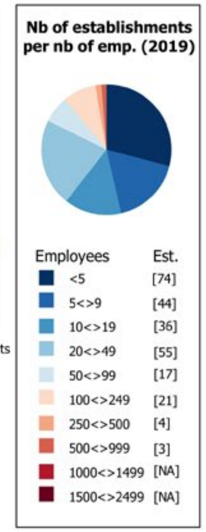
Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	9145354	11922	374	31.88	0.41	8706.13 km²	-
2019	9665887	25127	476	52.79	0.49	9570.74 km²	-
Gross change	+520533	+13205	+102	+20.91	+0.08	+864.61 km²	6.16 km
% change	+5.69%	+110.76%	+27.27%	+65.6%	+20.42%	+9.93%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Seattle-Tacoma, WA





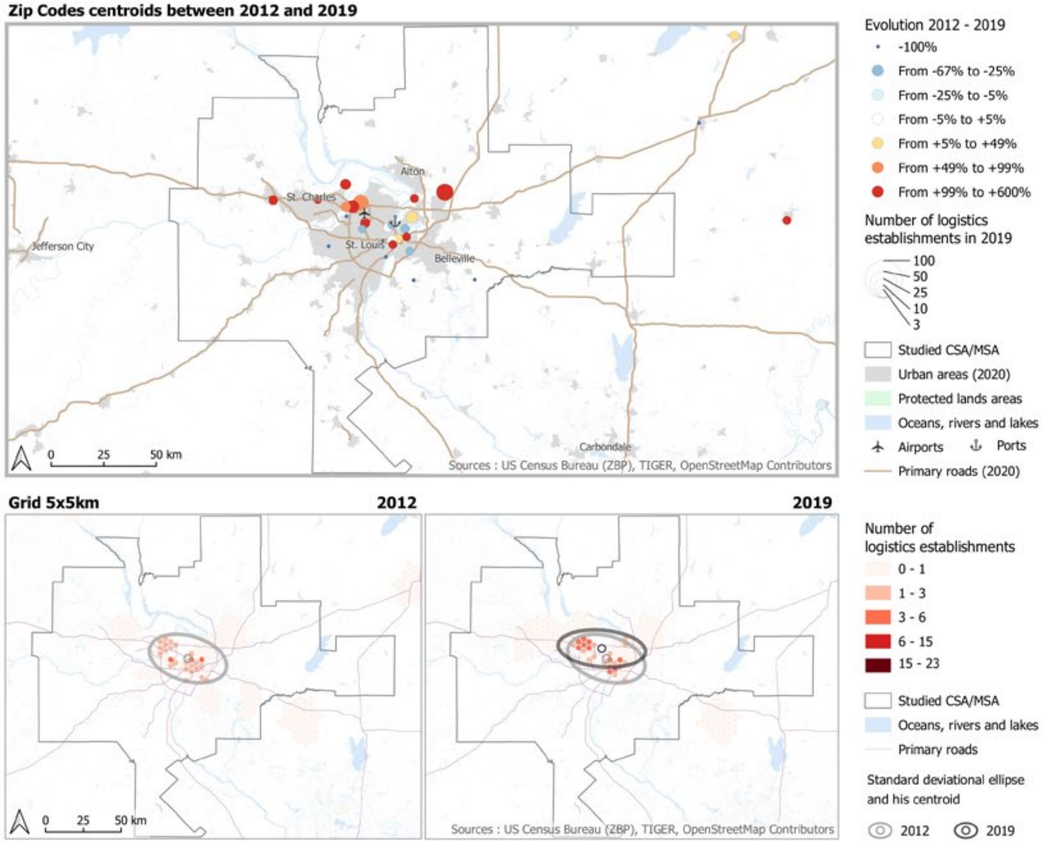


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	4189409	8703	241	36.11	0.58	1025.32 km²	-
2019	4671059	11774	253	46.54	0.54	986.25 km²	-
Gross change	+481650	+3071	+12	+10.43	-0.03	-39.07 km²	1.45 km
% change	+11.5%	+35.29%	+4.98%	+28.87%	-5.85%	-3.81%	-

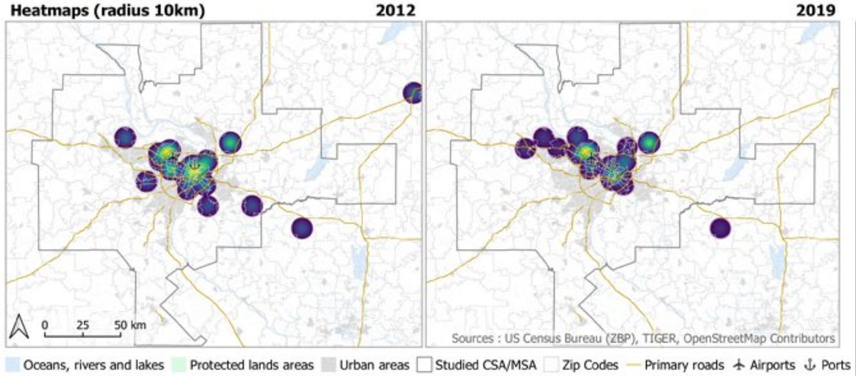
Statisticals sources : US Census Bureau (CBP/MSA)

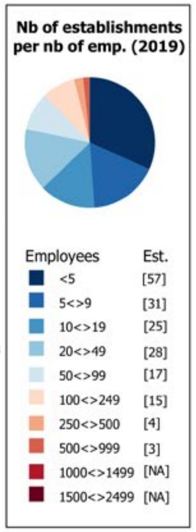
[CSA] St. Louis-St. Charles-Farmington, MO-IL

Zip Codes centroids between 2012 and 2019



Heatmaps (radius 10km)



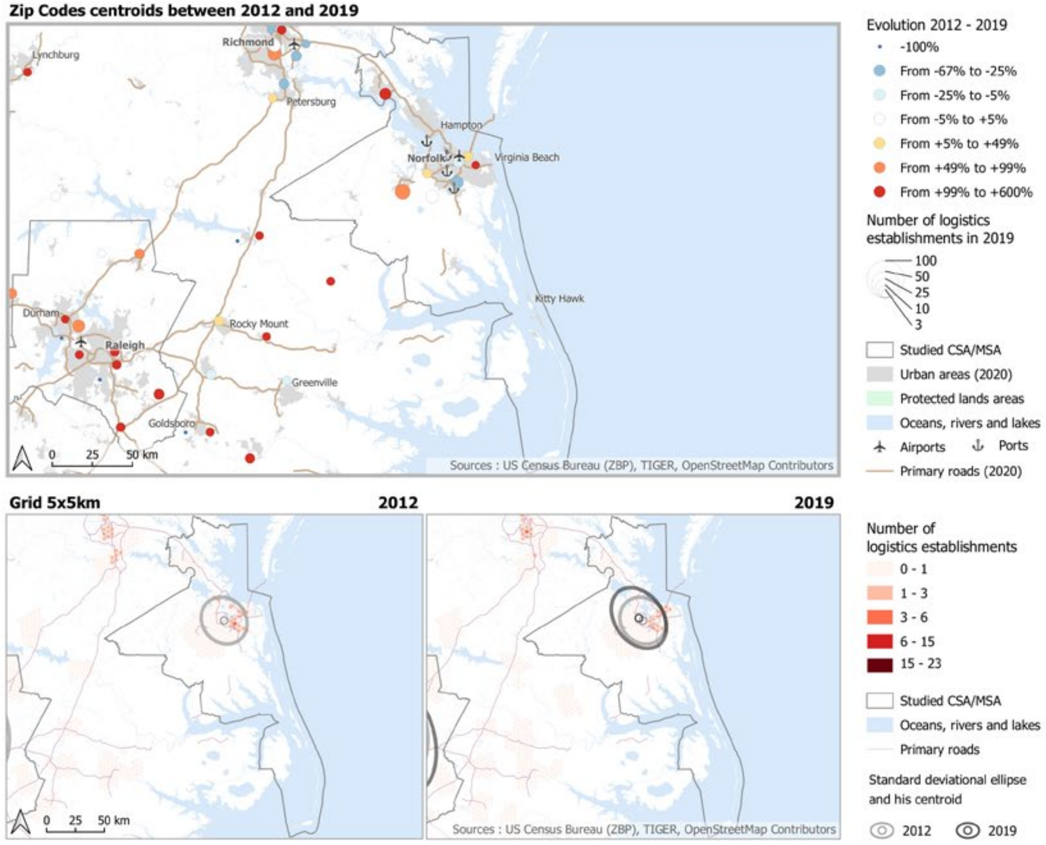


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2796682	4174	149	28.01	0.53	1192.72 km²	-
2019	2803228	11049	181	61.04	0.65	1061.18 km²	-
Gross change	+6546	+6875	+32	+33.03	+0.11	-131.54 km²	7.18 km
% change	+0.23%	+164.71%	+21.48%	+117.91%	+21.19%	-11.03%	-

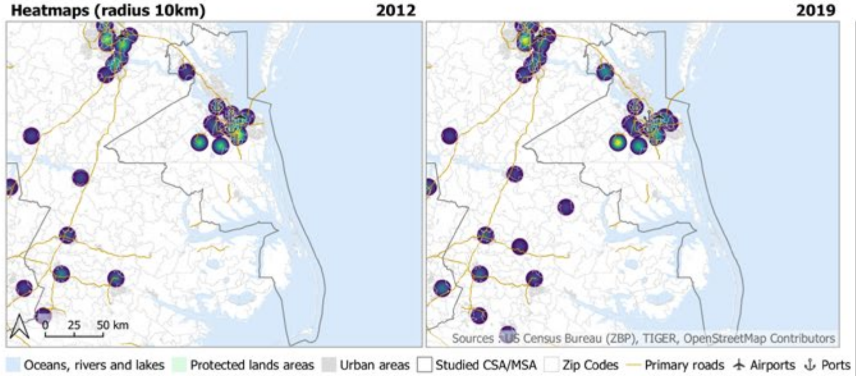
Statisticals sources : US Census Bureau (CBP/MSA)

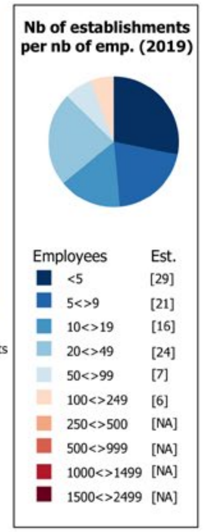
[CSA] Virginia Beach-Norfolk, VA-NC

Zip Codes centroids between 2012 and 2019



Heatmaps (radius 10km)

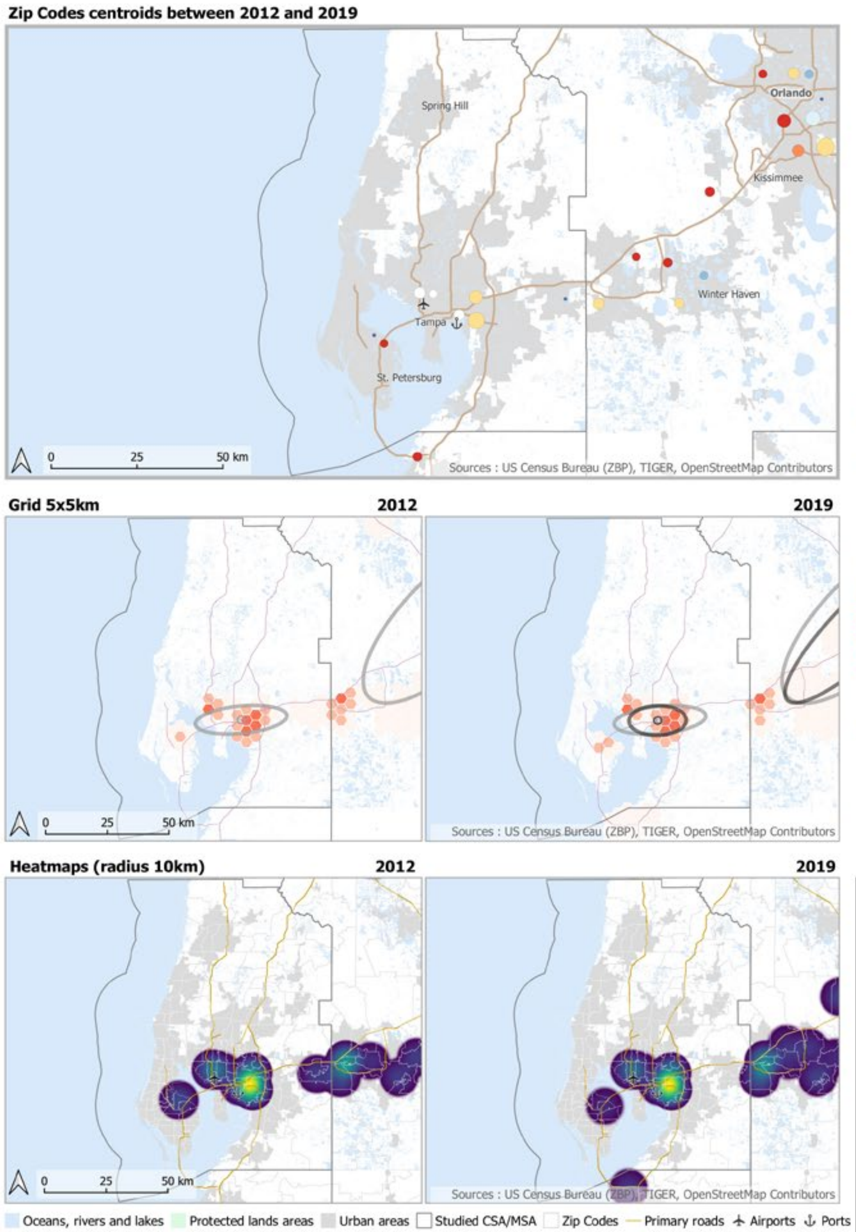




Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	1734121	3263	98	33.3	0.57	1204.58 km²	-
2019	1768901	5540	106	52.26	0.6	1805.16 km²	-
Gross change	+34780	+2277	+8	+18.97	+0.03	+600.58 km²	4.06 km
% change	+2.01%	+69.78%	+8.16%	+56.97%	+6.04%	+49.86%	-

Statisticals sources : US Census Bureau (CBP/MSA)

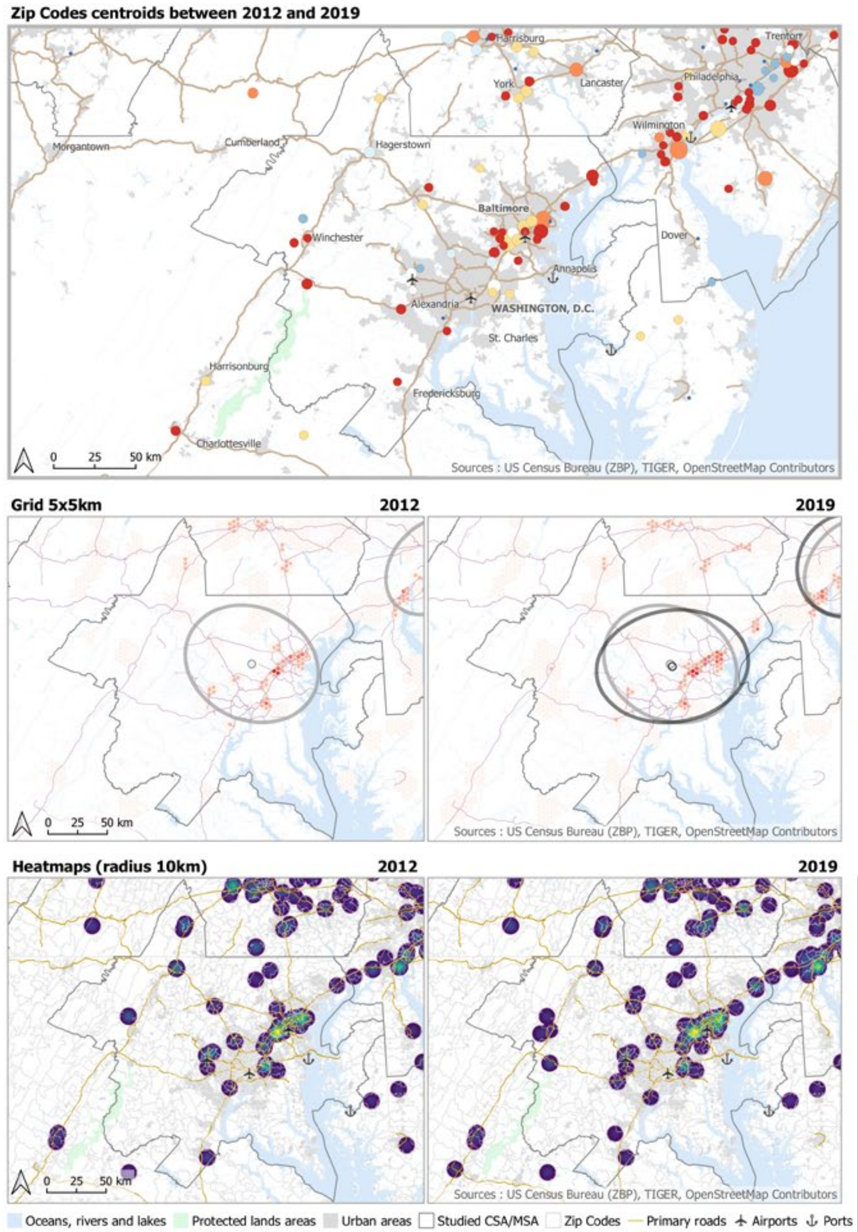
[MSA] Tampa-St. Petersburg-Clearwater, FL

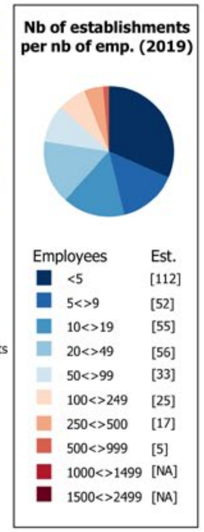


Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	2843636	2757	89	30.98	0.31	321.19 km²	-
2019	3194831	2943	82	35.89	0.26	215.5 km²	-
Gross change	+351195	+186	-7	+4.91	-0.06	-105.69 km²	0.96 km
% change	+12.35%	+6.75%	-7.87%	+15.86%	-17.99%	-32.91%	-

Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Washington-Baltimore-Arlington, DC-MD-VA-WV-PA

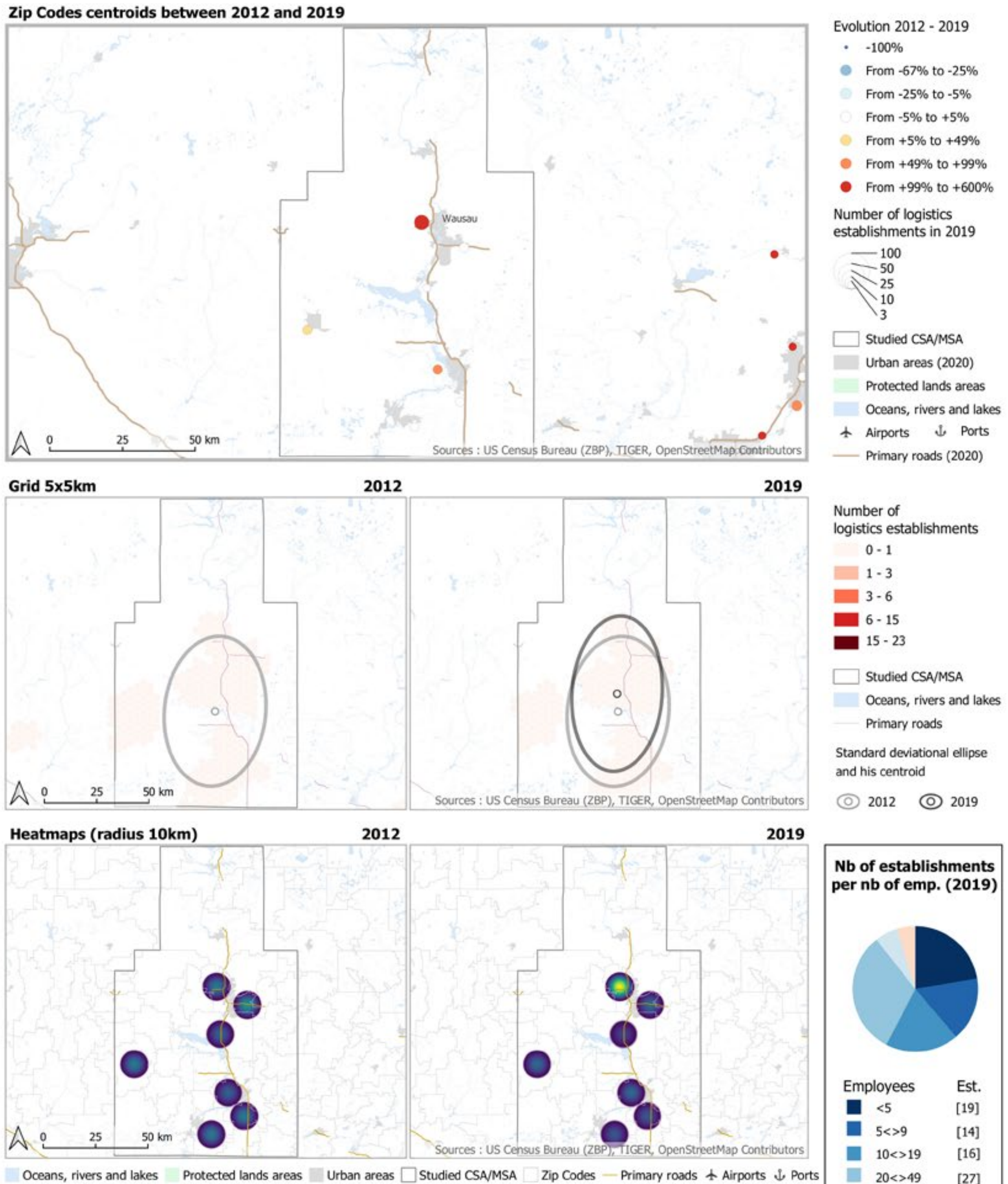




Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	9298200	13882	292	47.54	0.31	8344.63 km²	-
2019	9777747	21813	349	62.5	0.36	9199.24 km²	-
Gross change	+479547	+7931	+57	+14.96	+0.04	+854.61 km²	2.49 km
% change	+5.16%	+57.13%	+19.52%	+31.47%	+13.66%	+10.24%	-

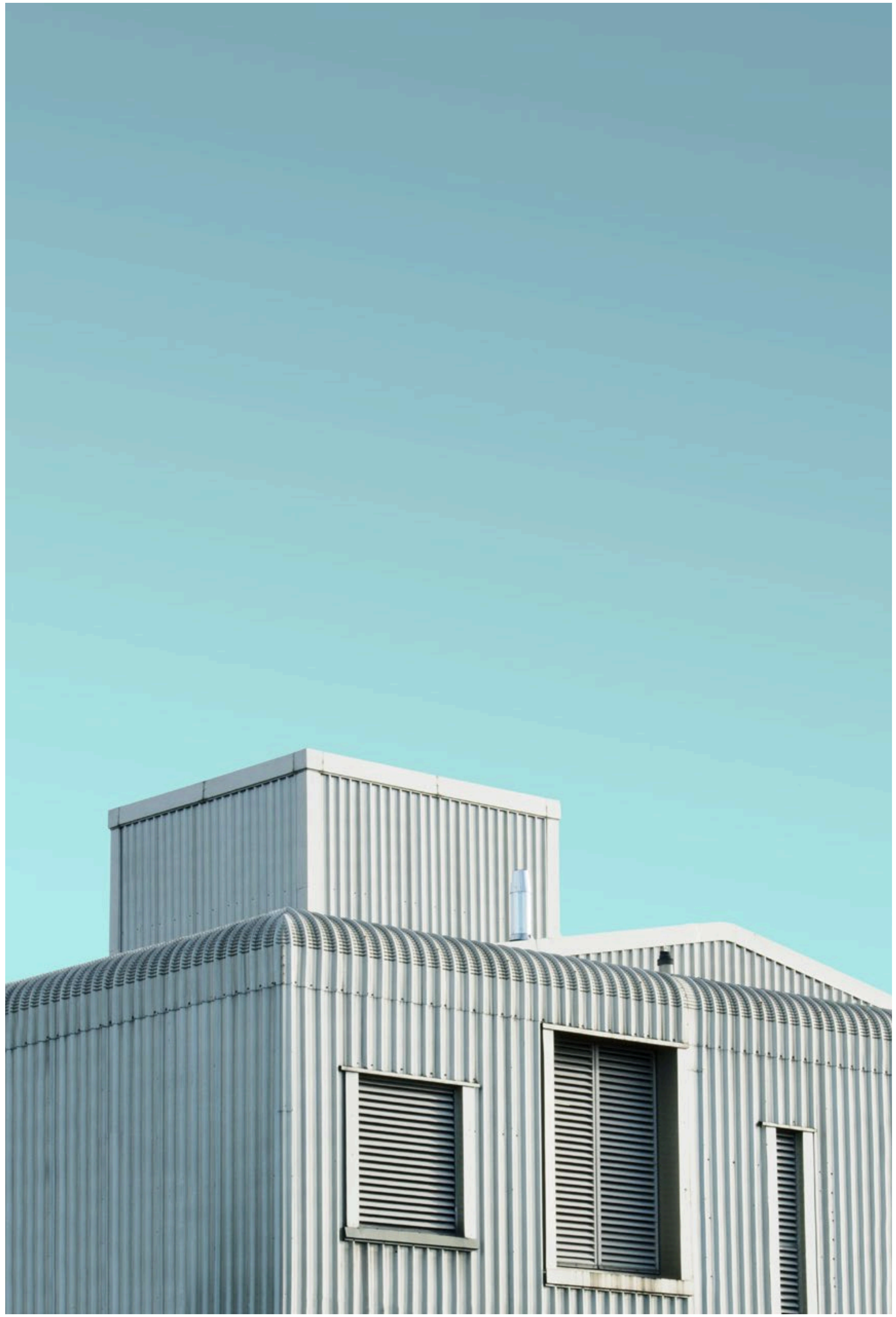
Statisticals sources : US Census Bureau (CBP/MSA)

[CSA] Wausau-Stevens Point-Wisconsin Rapids, WI



Statistics	Pop.	Emp. 493	Est. 493	Average nb of emp. per est.	Nb of est. per 10 000 inhbts	Standard deviational ellipse area	Movement of the centroid's ellipse
2012	162870	107	32	3.34	1.96	2699.79 km²	-
2019	163285	2968	87	34.11	5.33	2471.69 km²	-
Gross change	+415	+2861	+55	+30.77	+3.36	-228.11 km²	8.42 km
% change	+0.25%	+2673.83%	+171.88%	+920.26%	+171.18%	-8.45%	-

Statisticals sources : US Census Bureau (CBP/MSA)



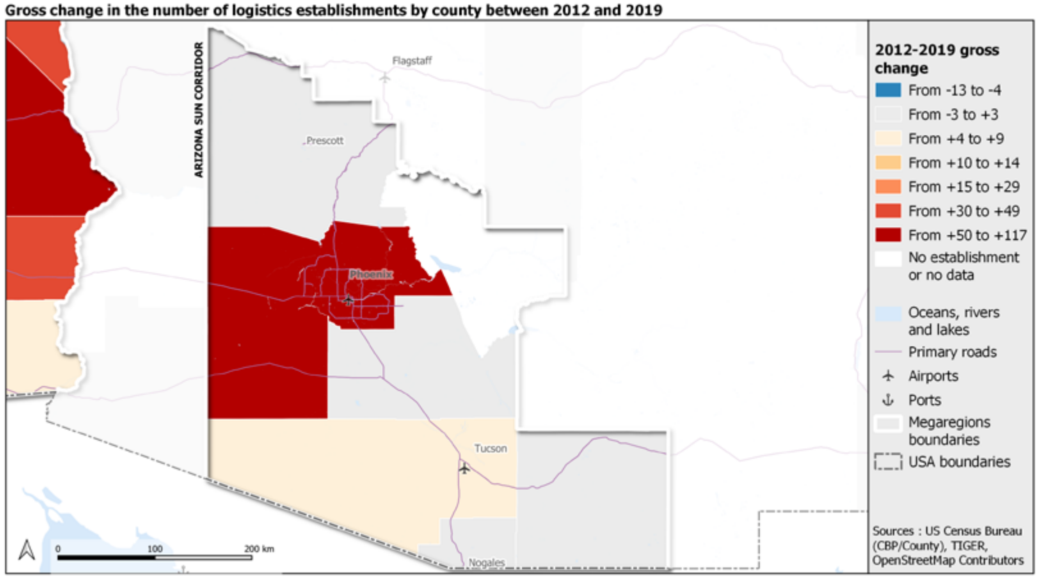
6.

MAP ATLAS

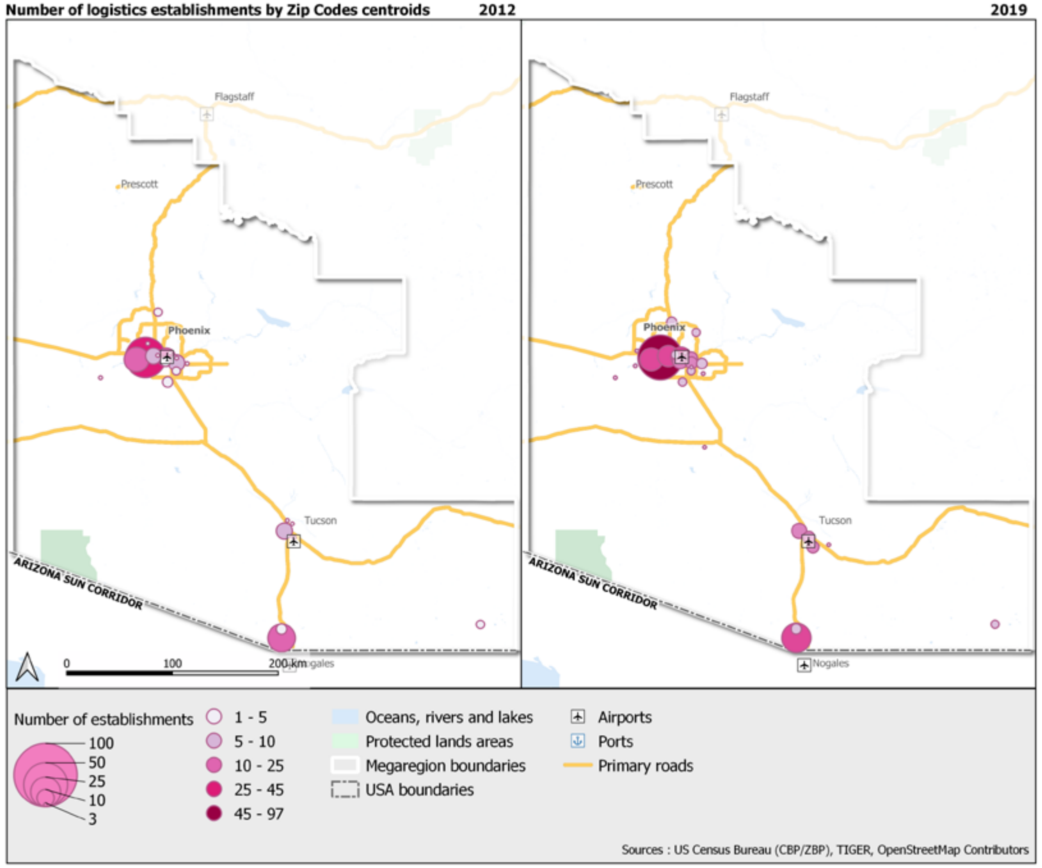
BY MEGAREGION

Arizona Sun Corridor

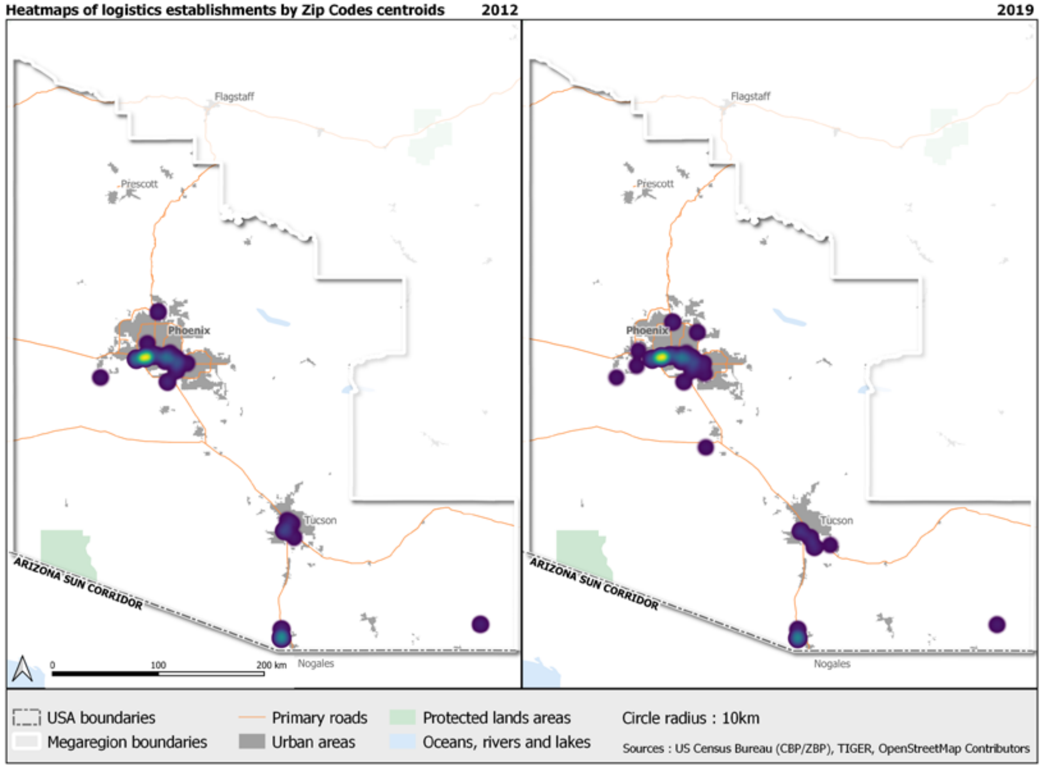
Gross change in the number of logistics establishments by county between 2012 and 2019



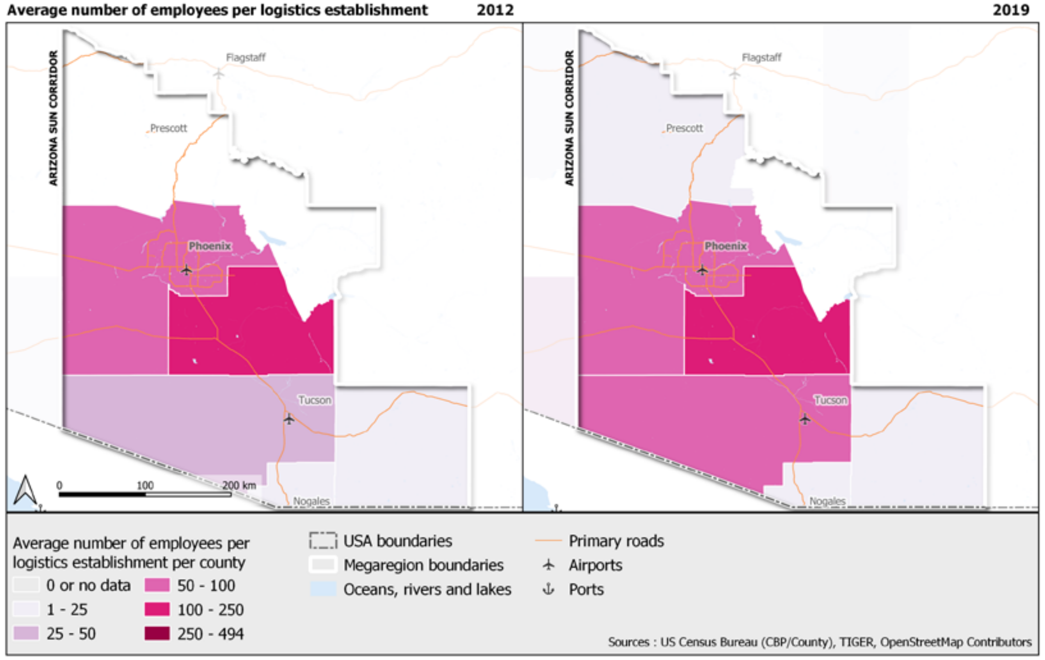
Number of logistics establishments by Zip Codes centroids 2012 2019



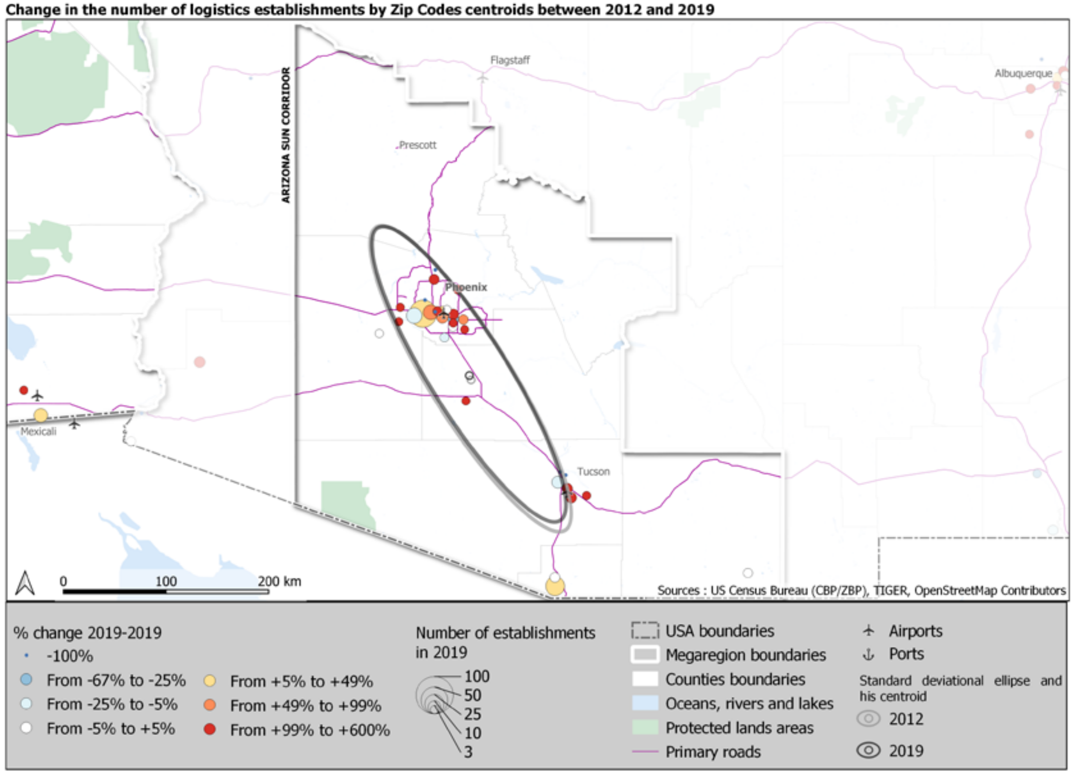
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019

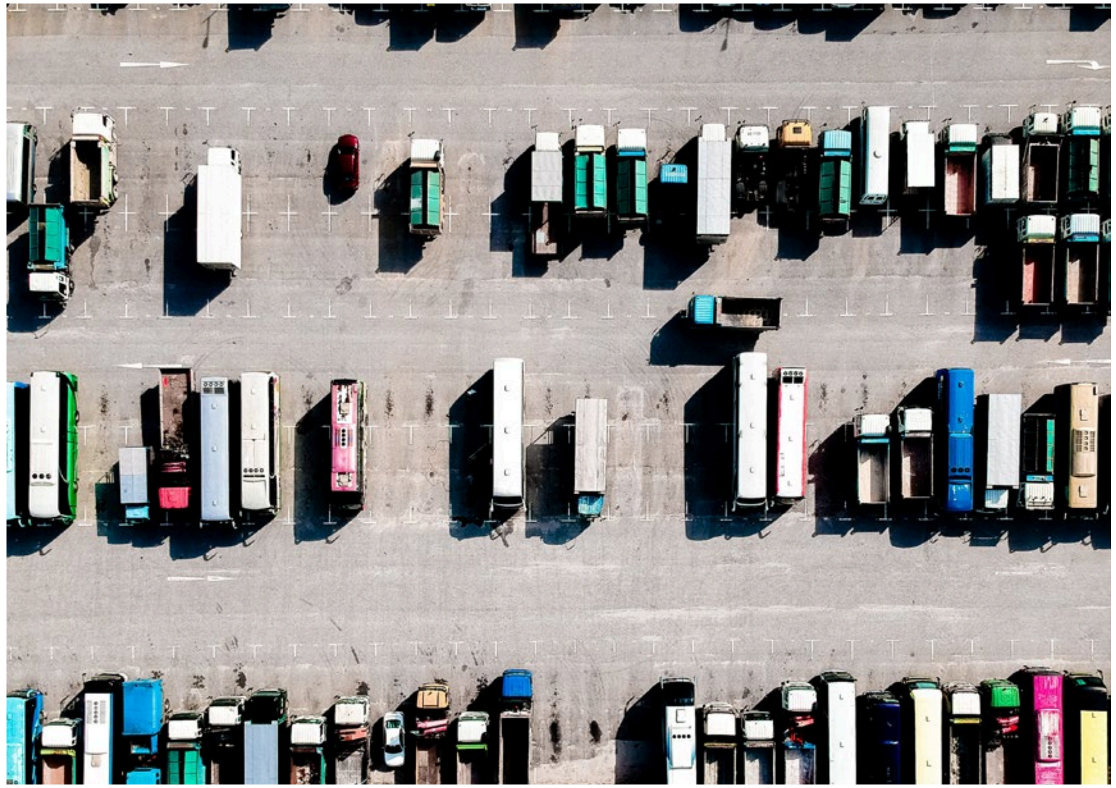


Average number of employees per logistics establishment 2012 2019



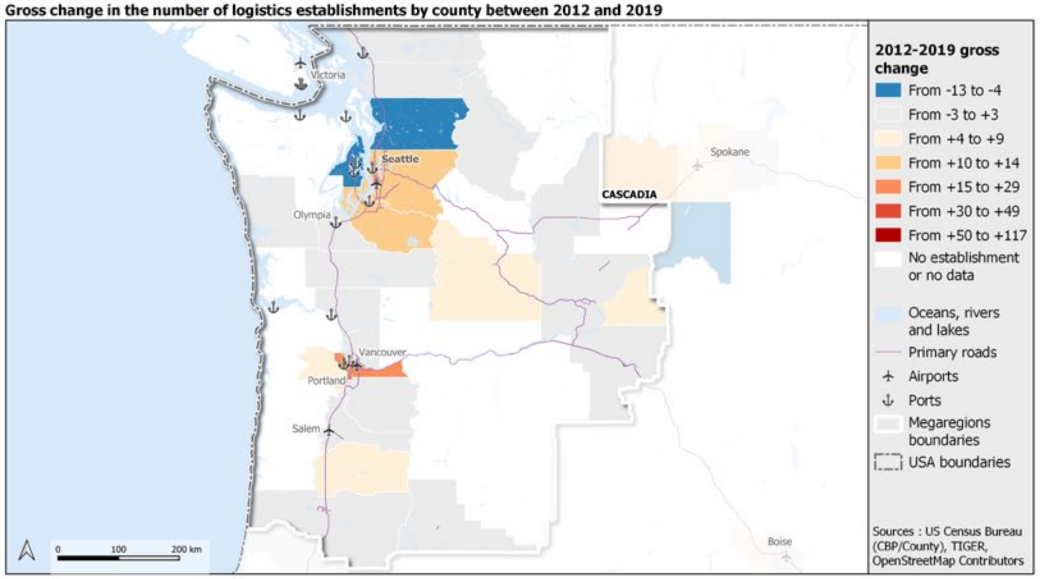
Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019



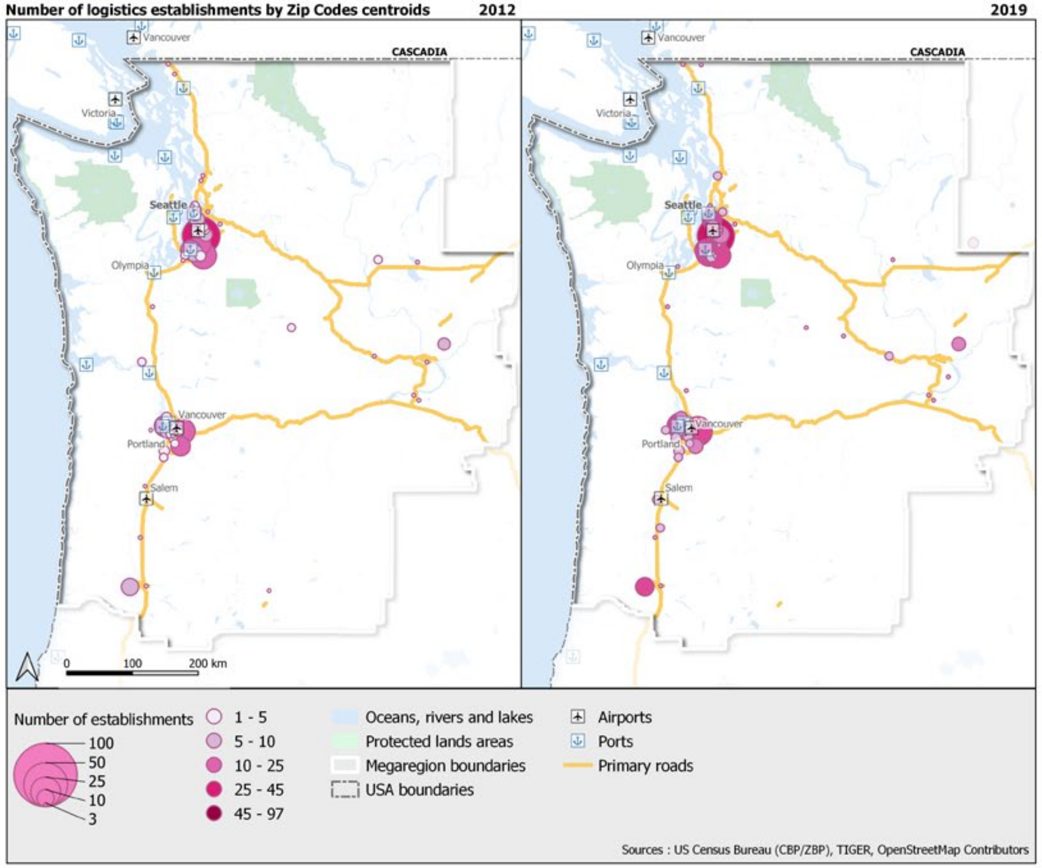


Cascadia

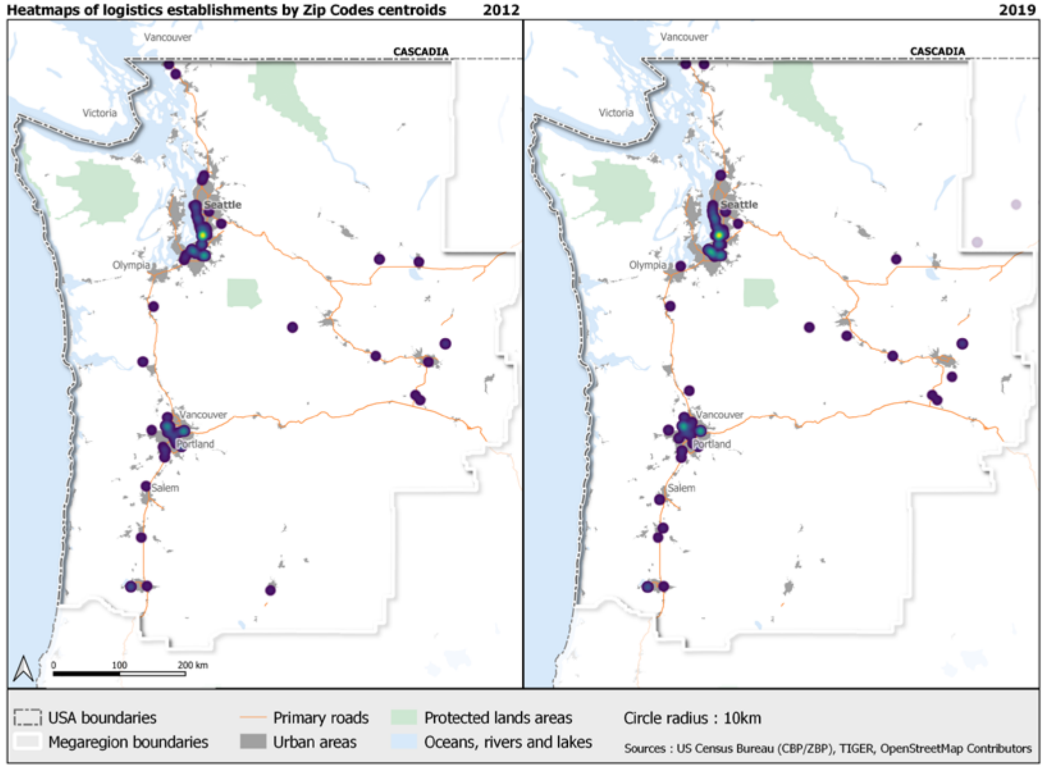
Gross change in the number of logistics establishments by county between 2012 and 2019



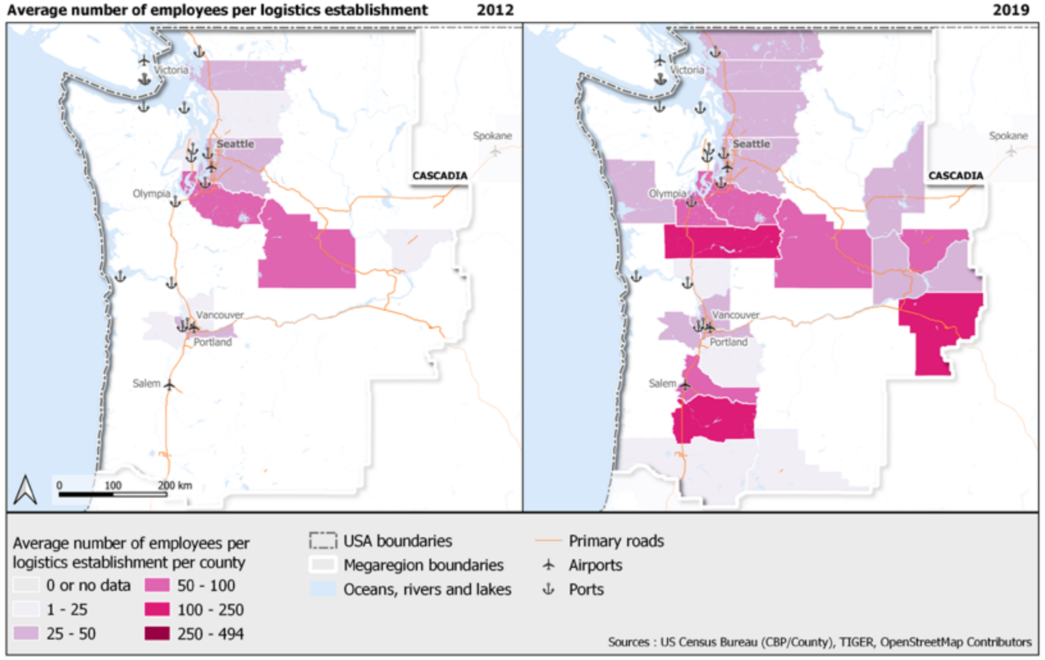
Number of logistics establishments by Zip Codes centroids 2012 2019



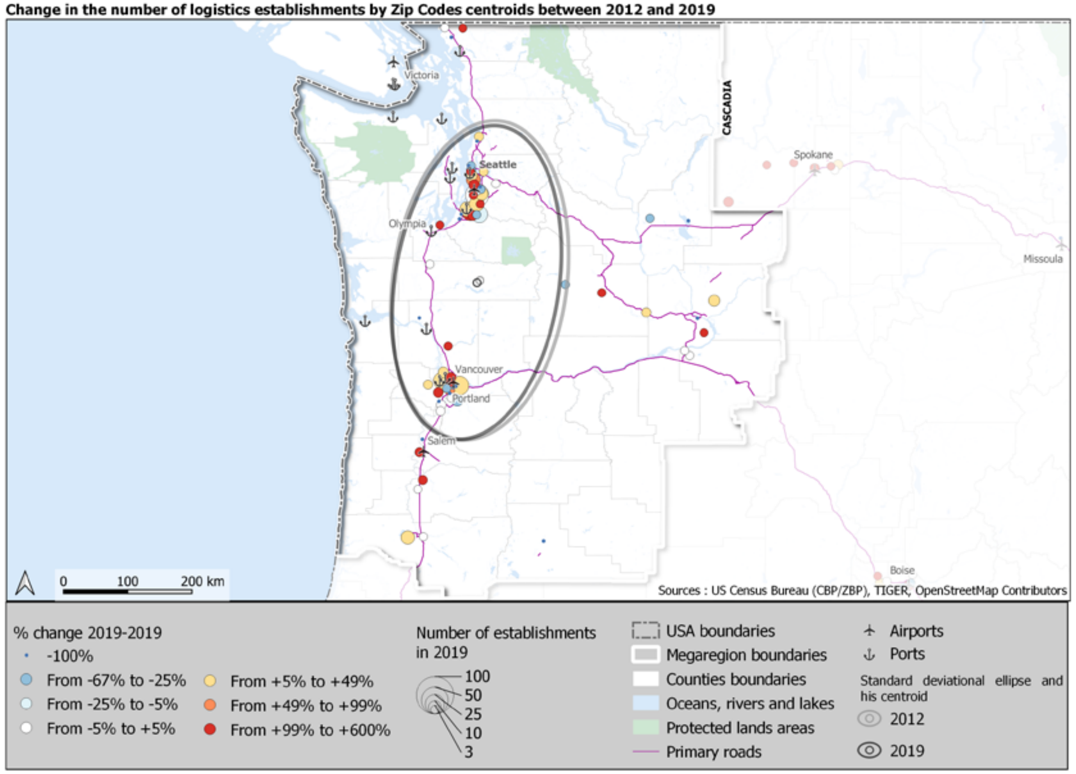
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

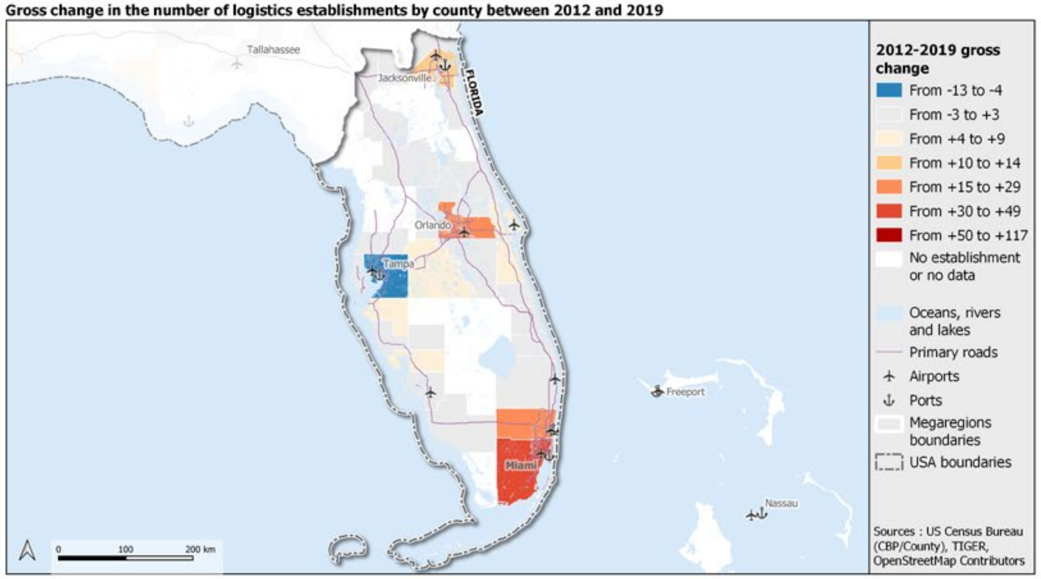


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

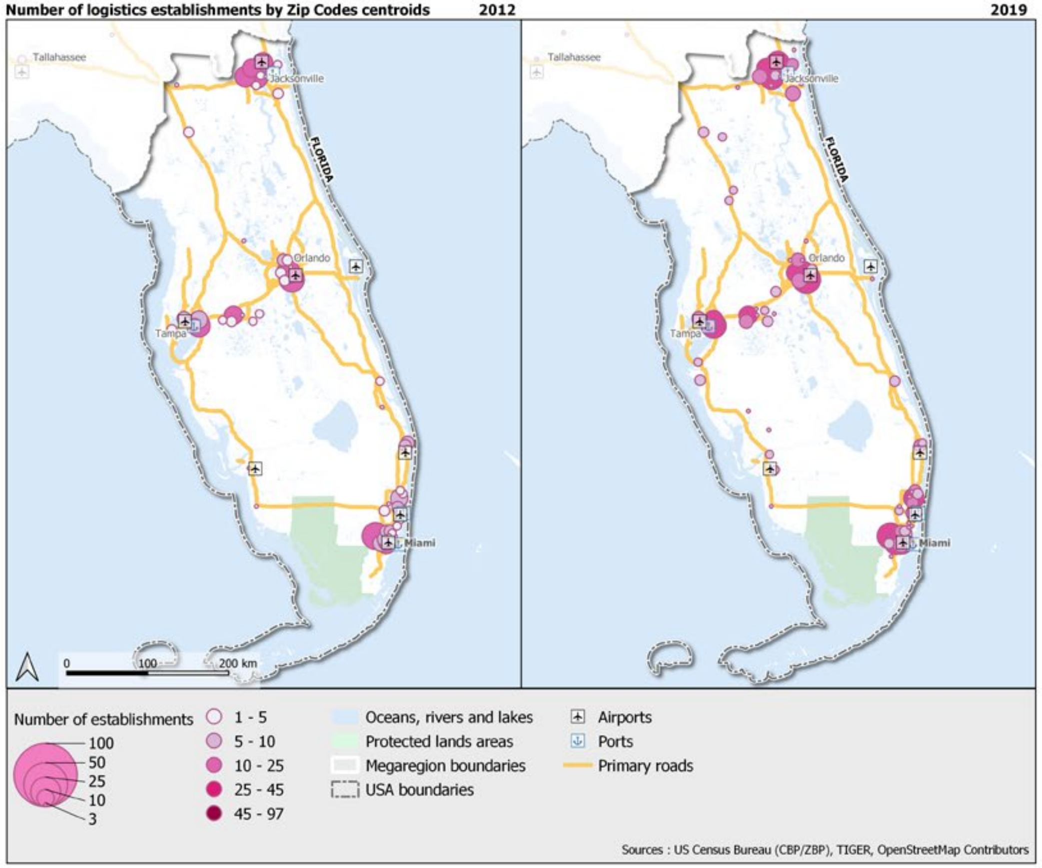


Florida

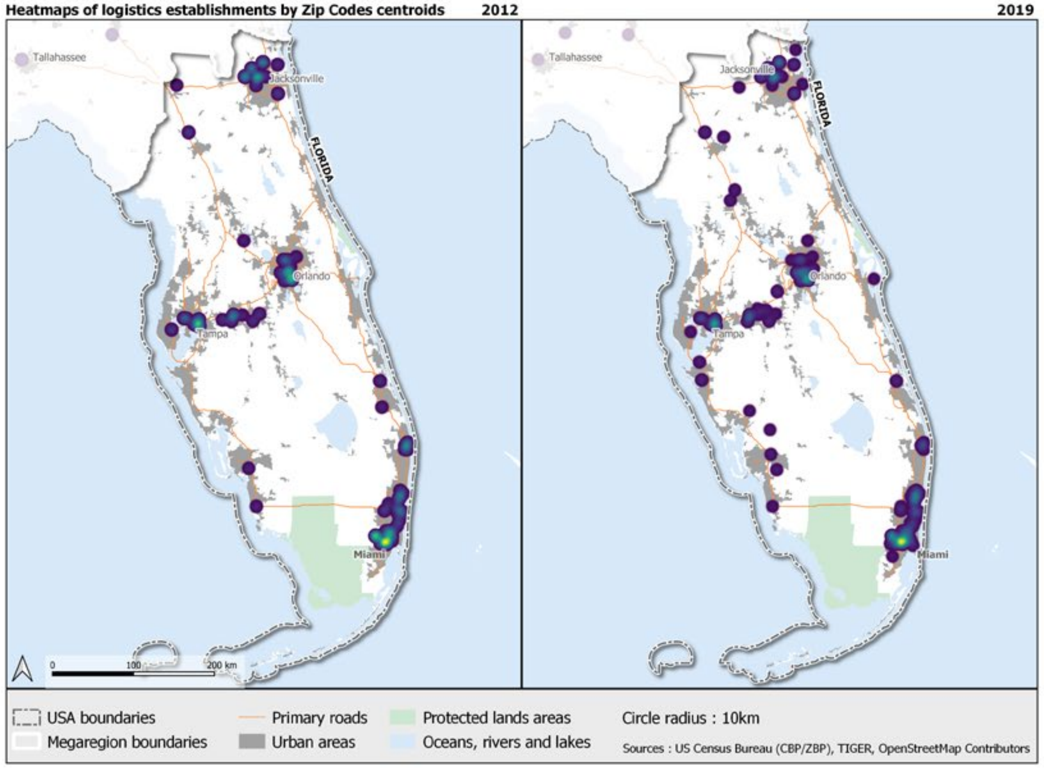
Gross change in the number of logistics establishments by county between 2012 and 2019



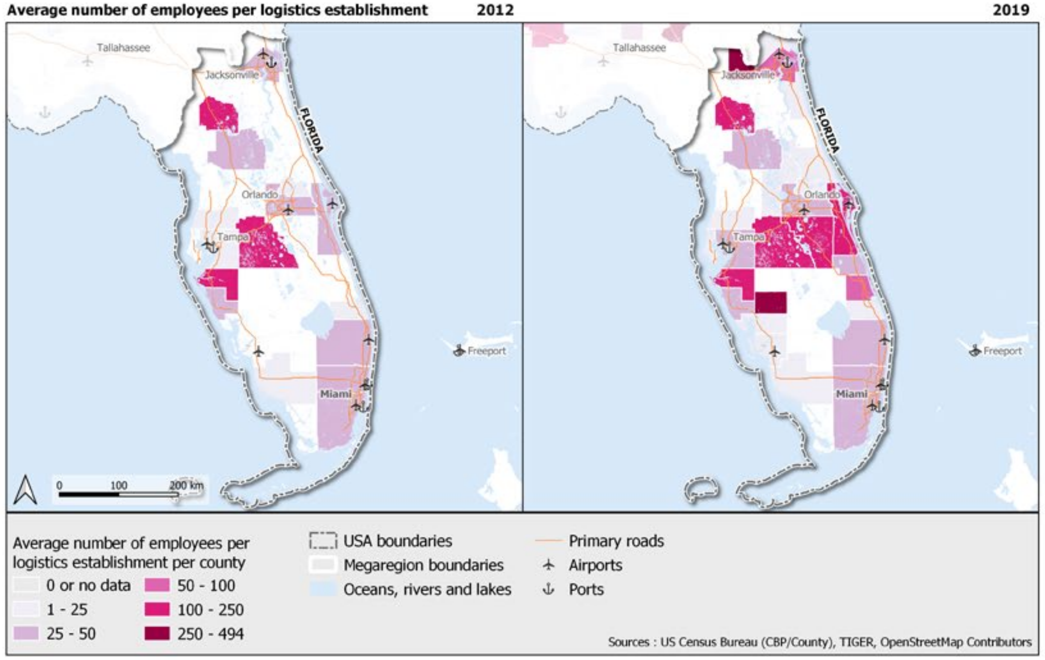
Number of logistics establishments by Zip Codes centroids 2012 2019



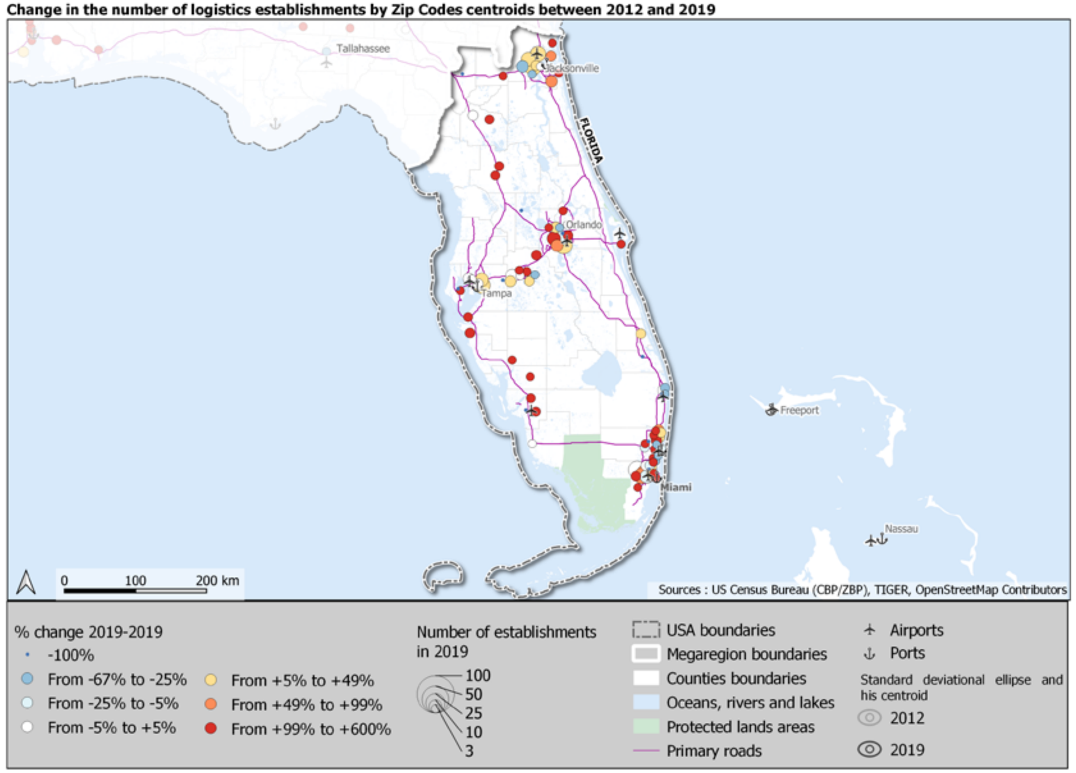
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

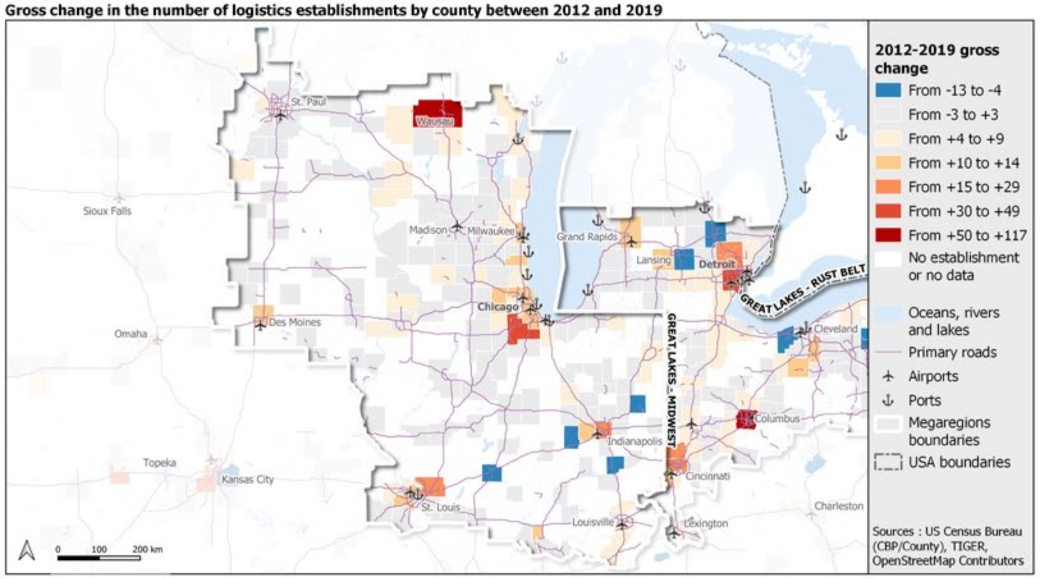


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

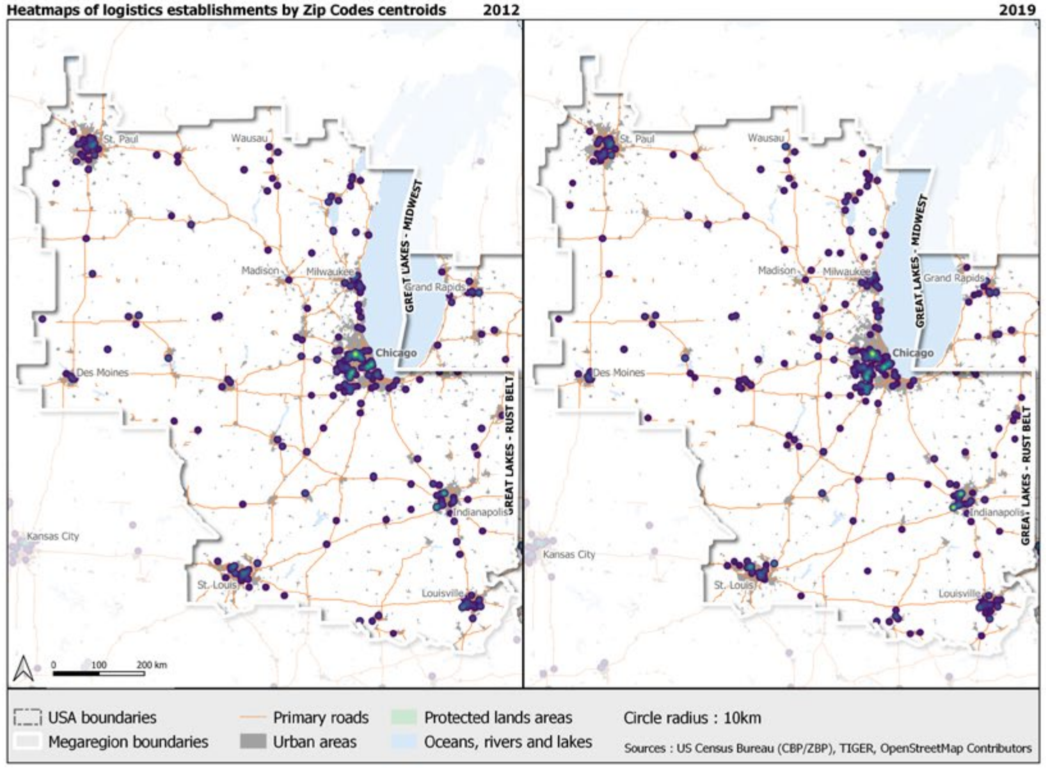


Great Lakes - Midwest

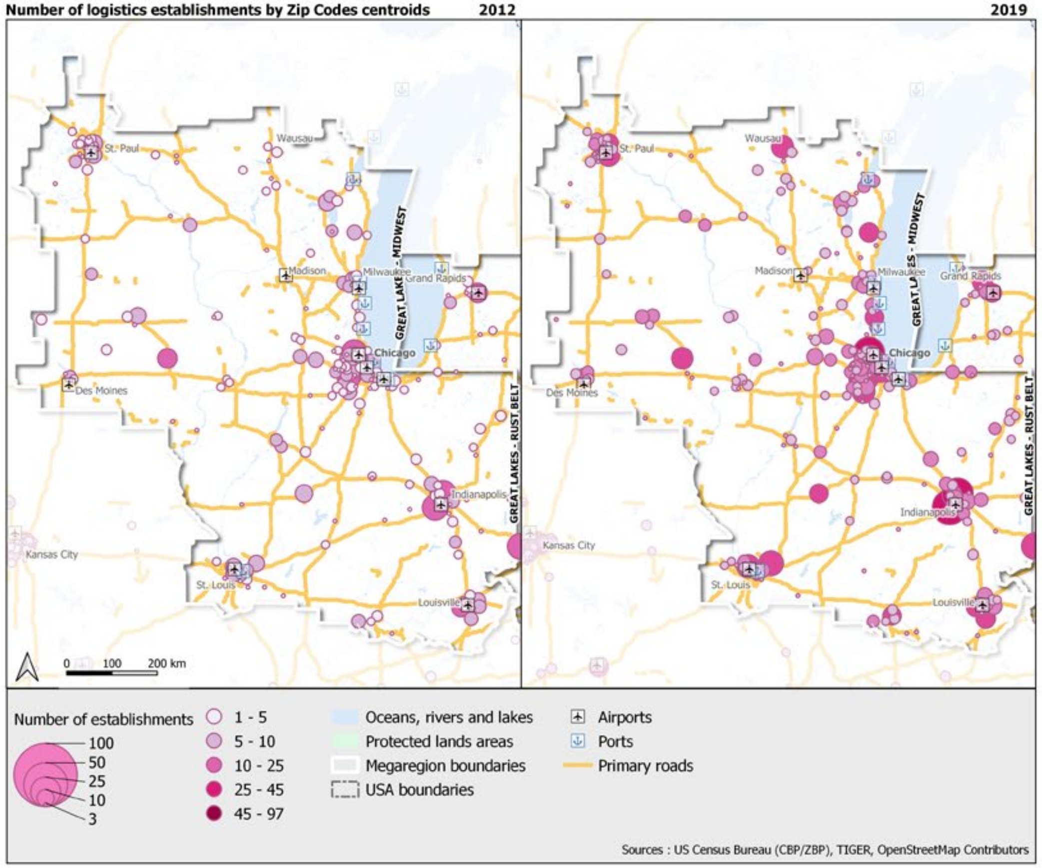
Gross change in the number of logistics establishments by county between 2012 and 2019



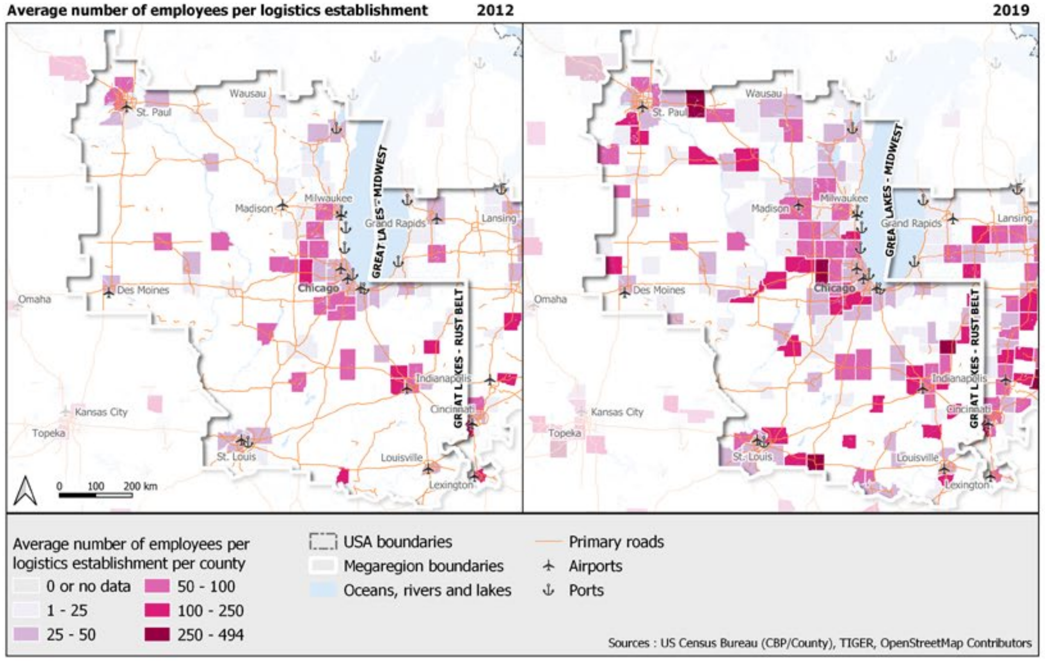
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



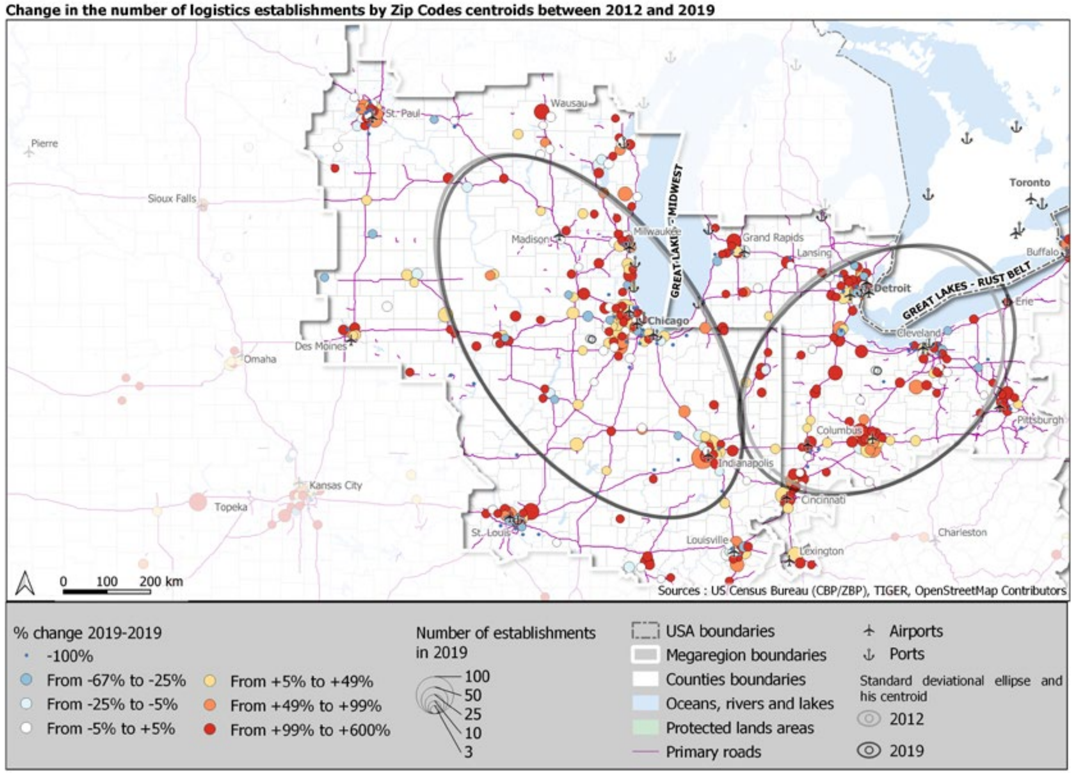
Number of logistics establishments by Zip Codes centroids 2012 2019

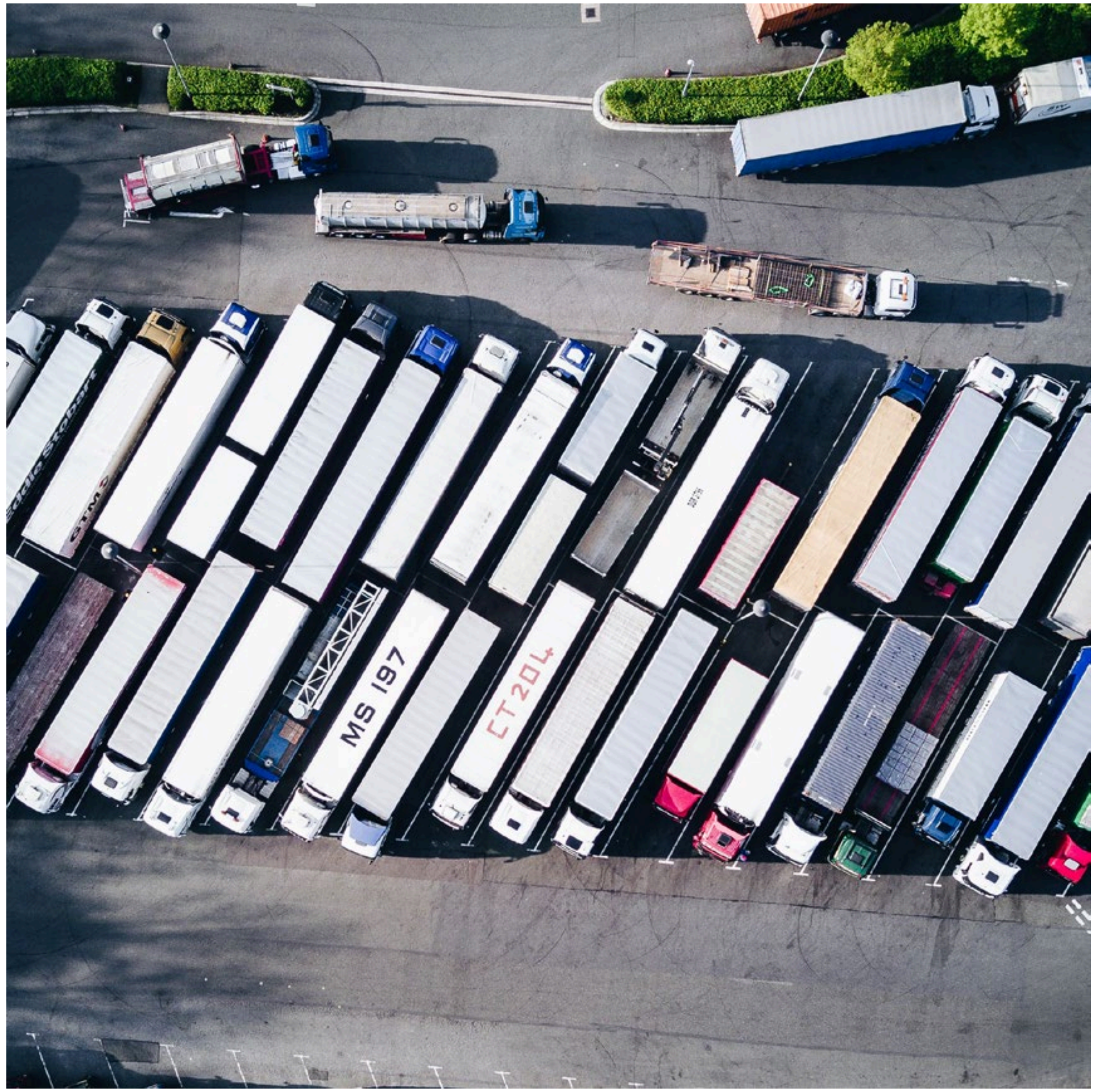


Average number of employees per logistics establishment 2012 2019



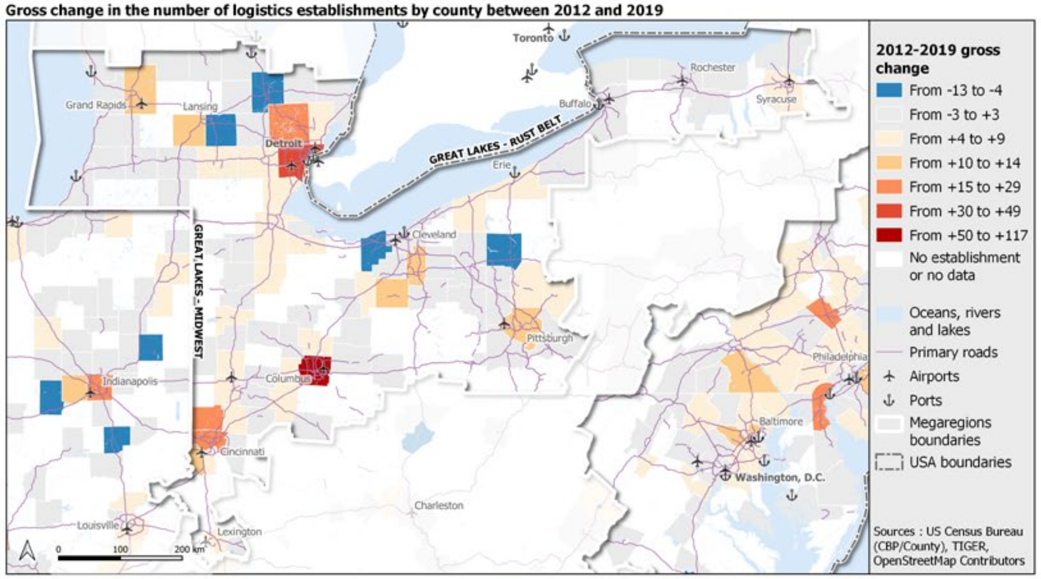
Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019



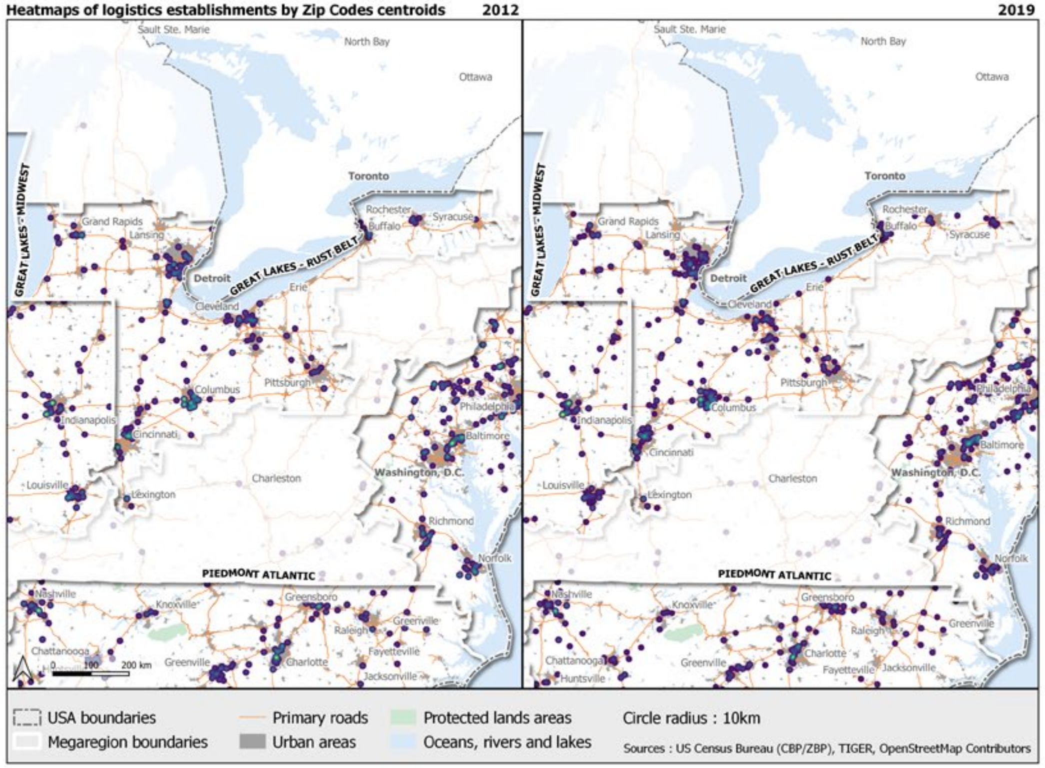


Great Lakes - Rust Belt

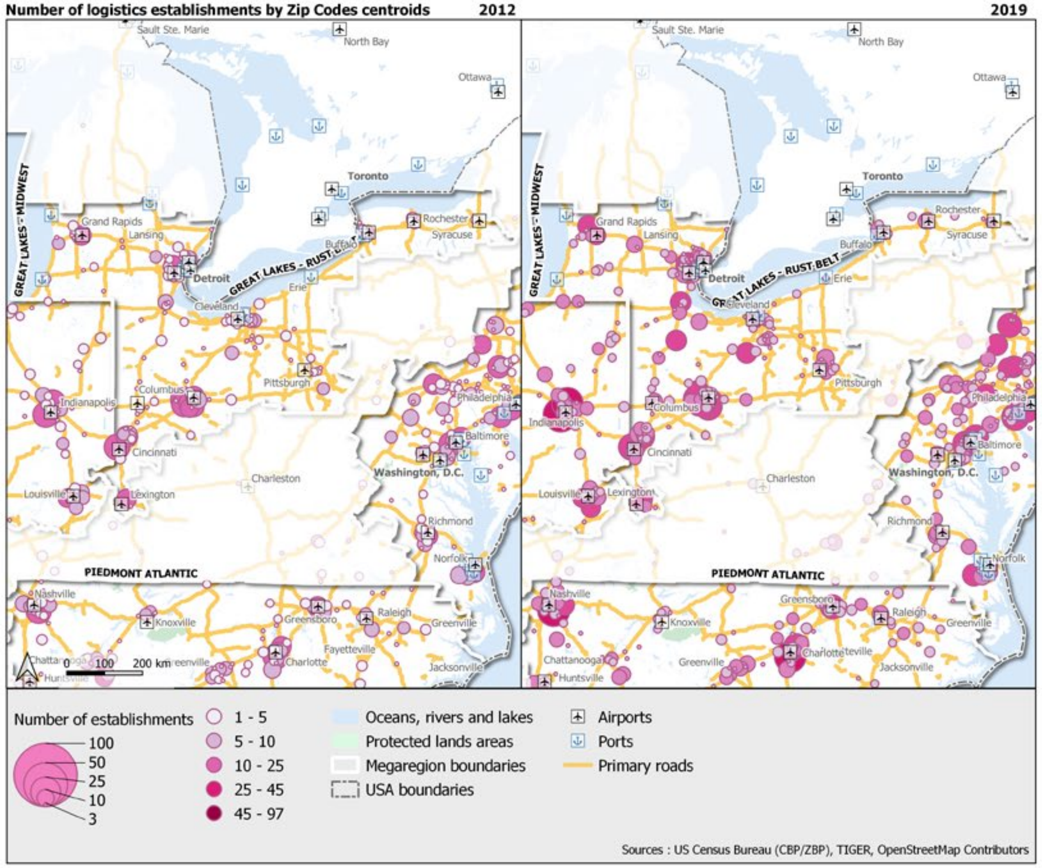
Gross change in the number of logistics establishments by county between 2012 and 2019



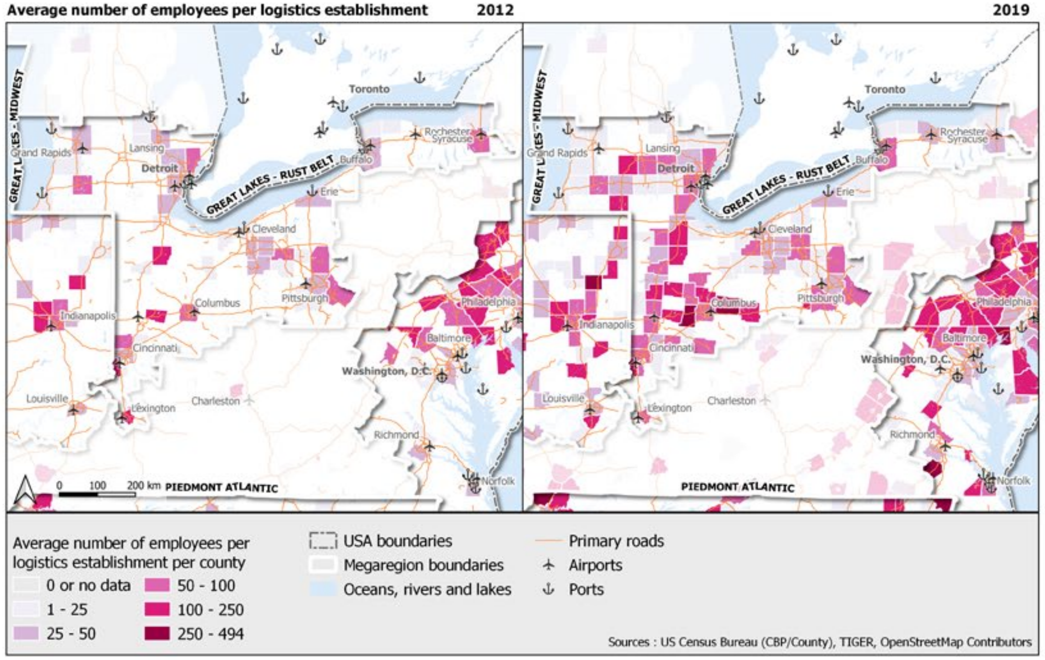
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



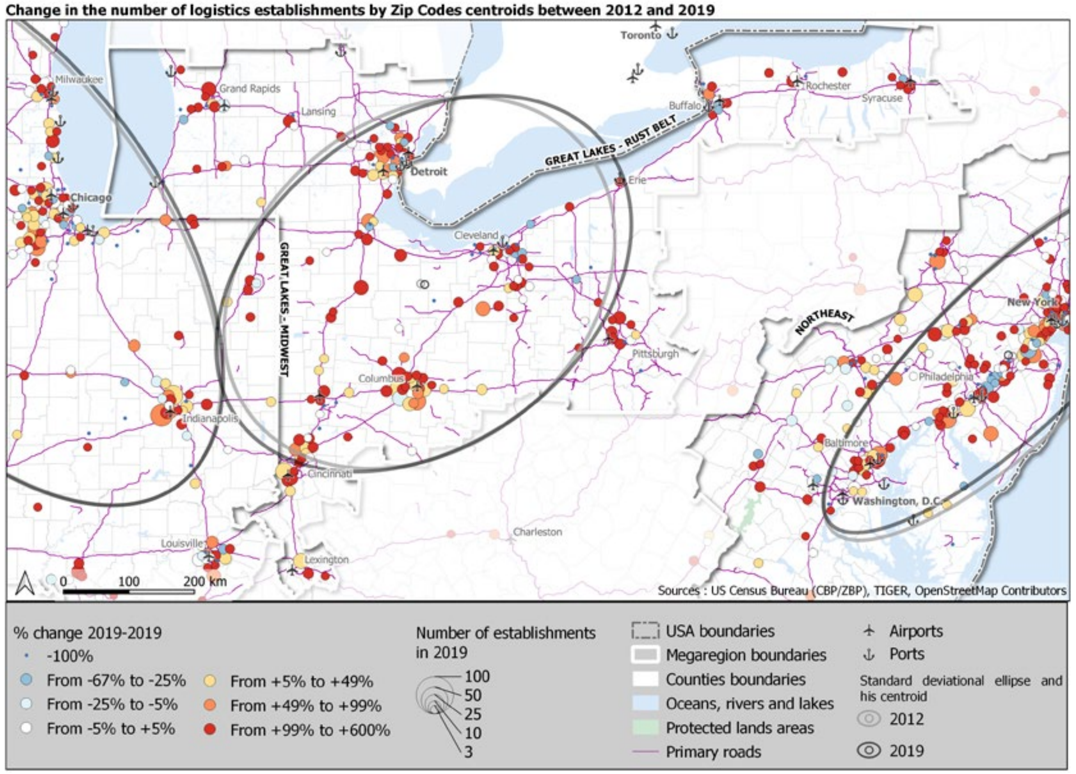
Number of logistics establishments by Zip Codes centroids 2012 2019

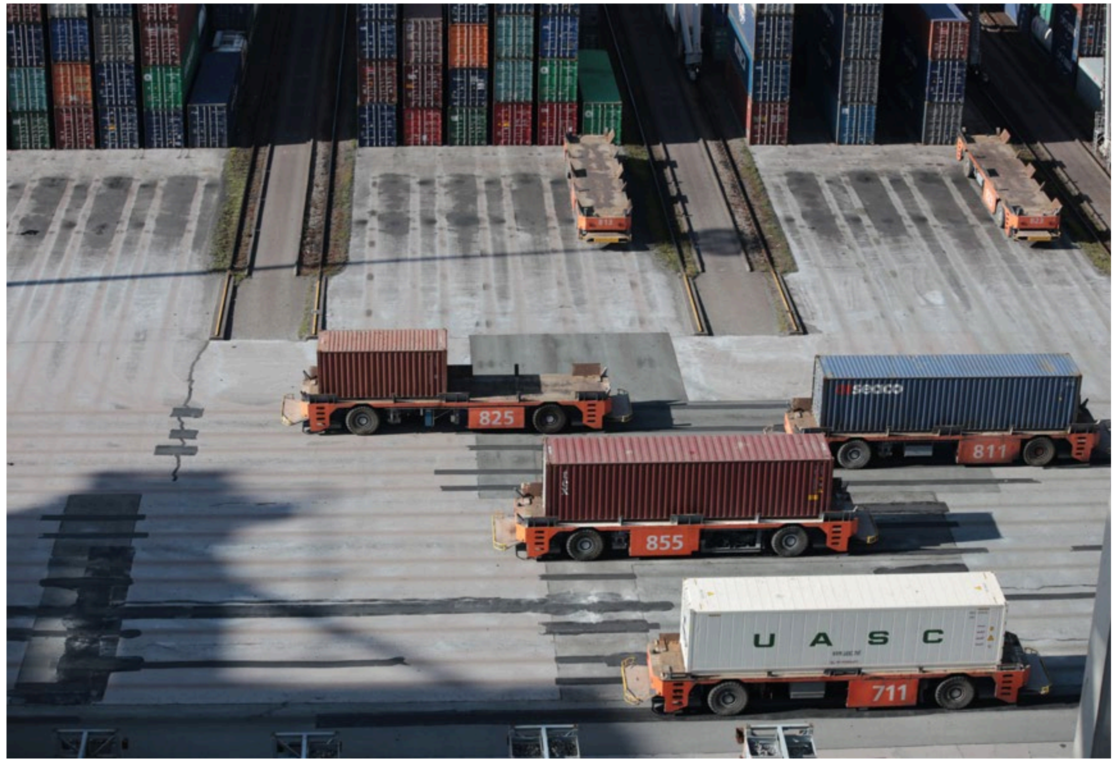


Average number of employees per logistics establishment 2012 2019



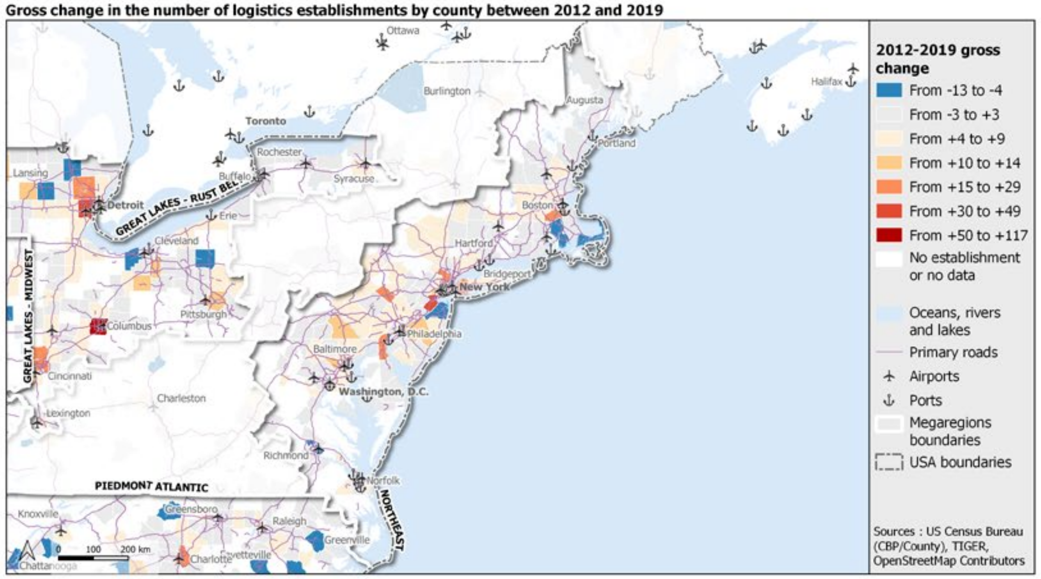
Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019



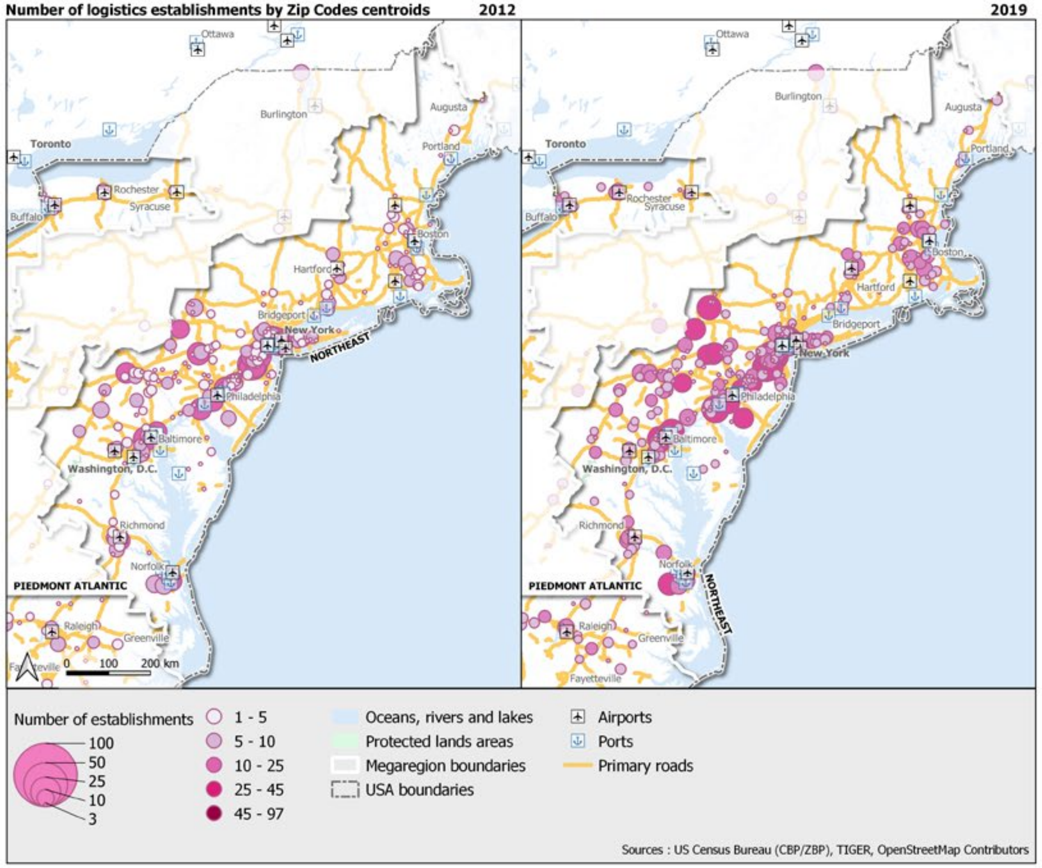


Northeast

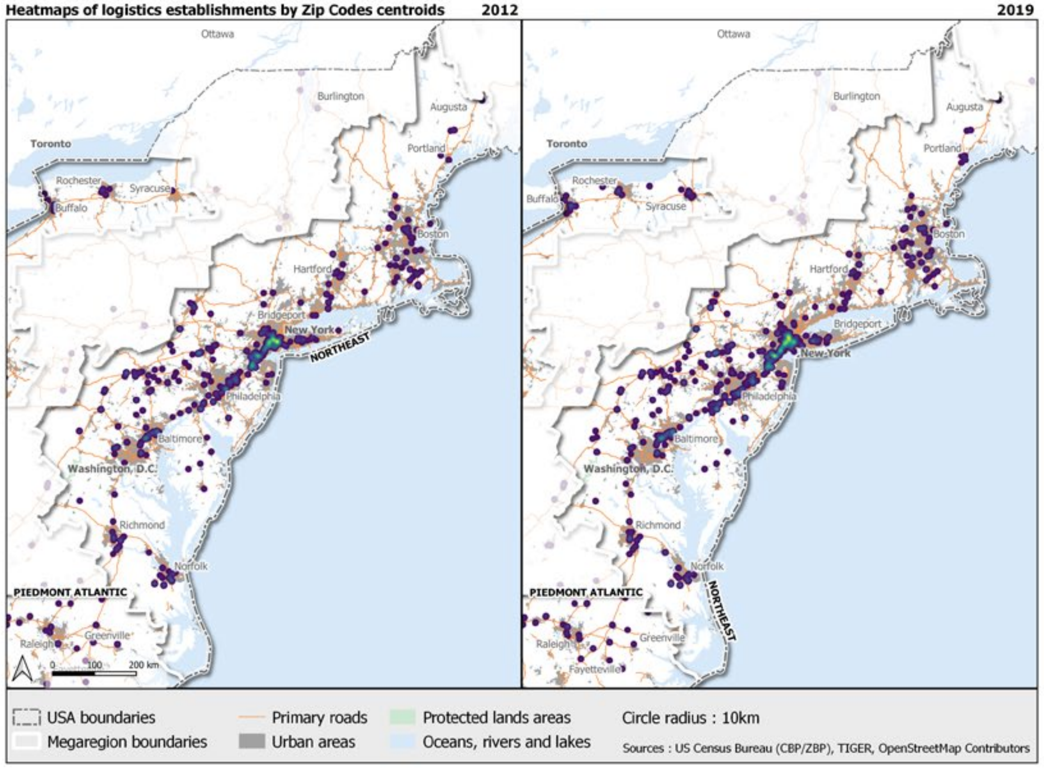
Gross change in the number of logistics establishments by county between 2012 and 2019



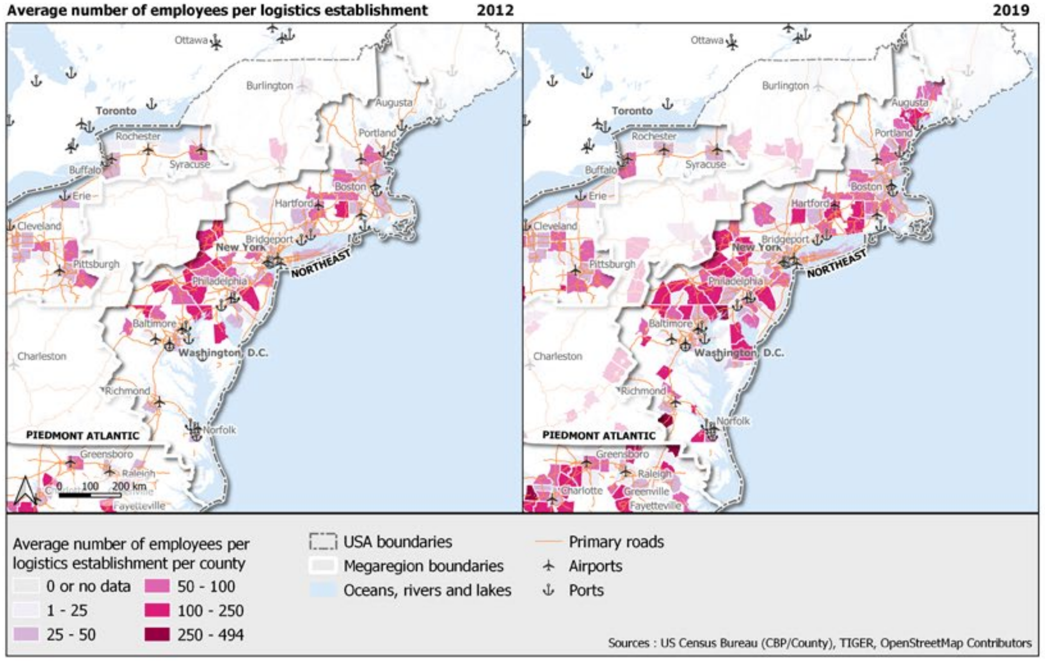
Number of logistics establishments by Zip Codes centroids 2012 2019



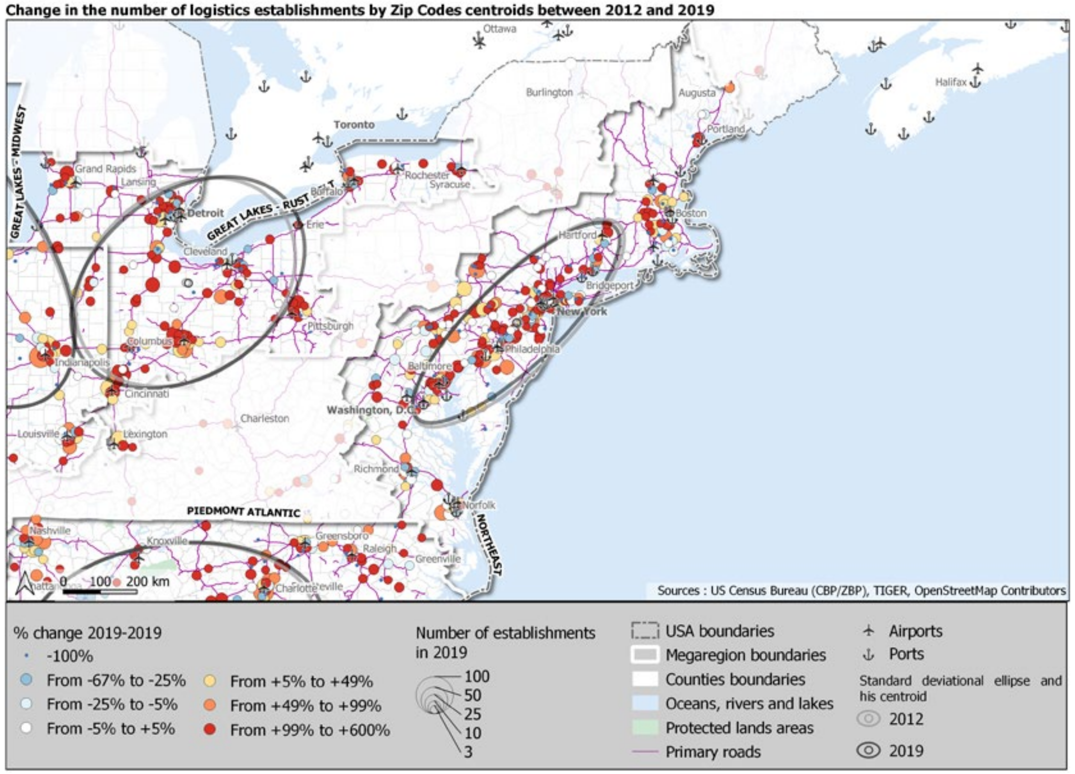
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

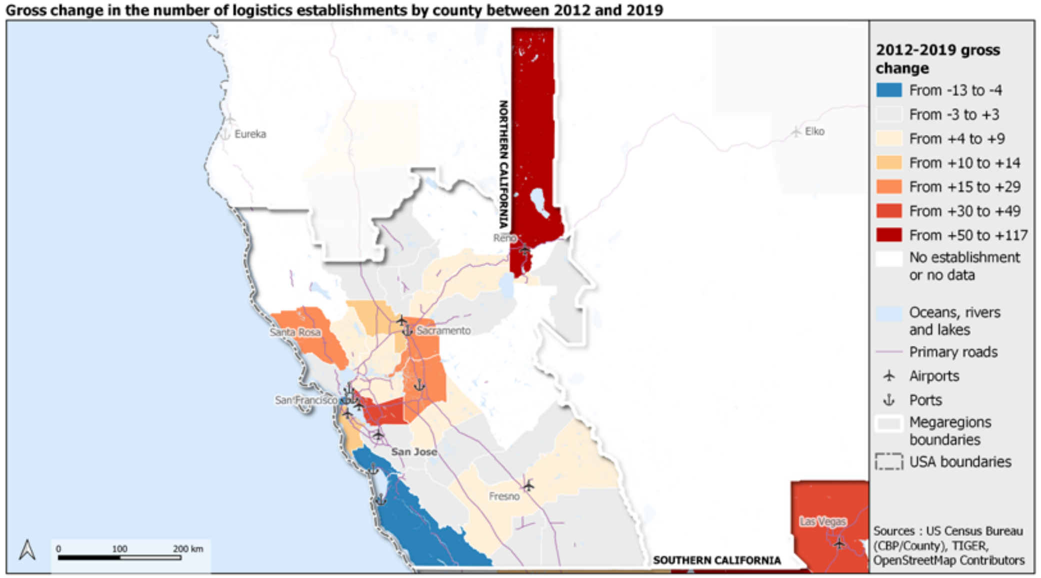


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

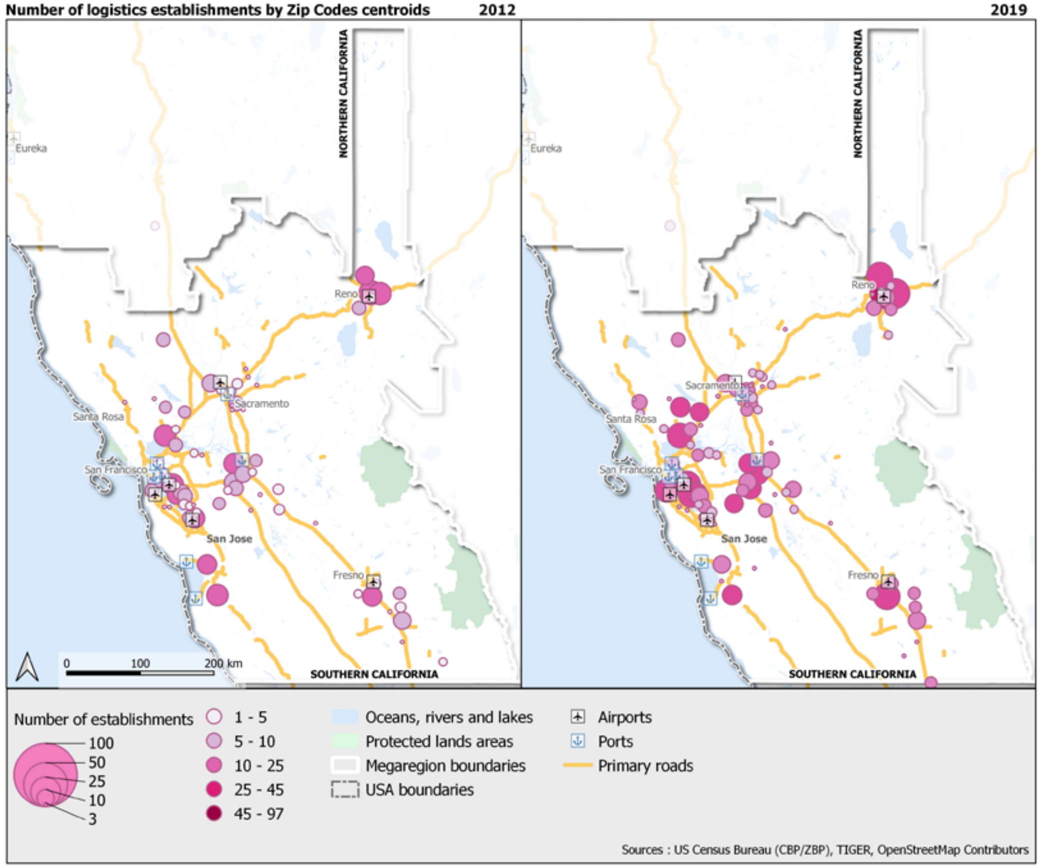


Northern California

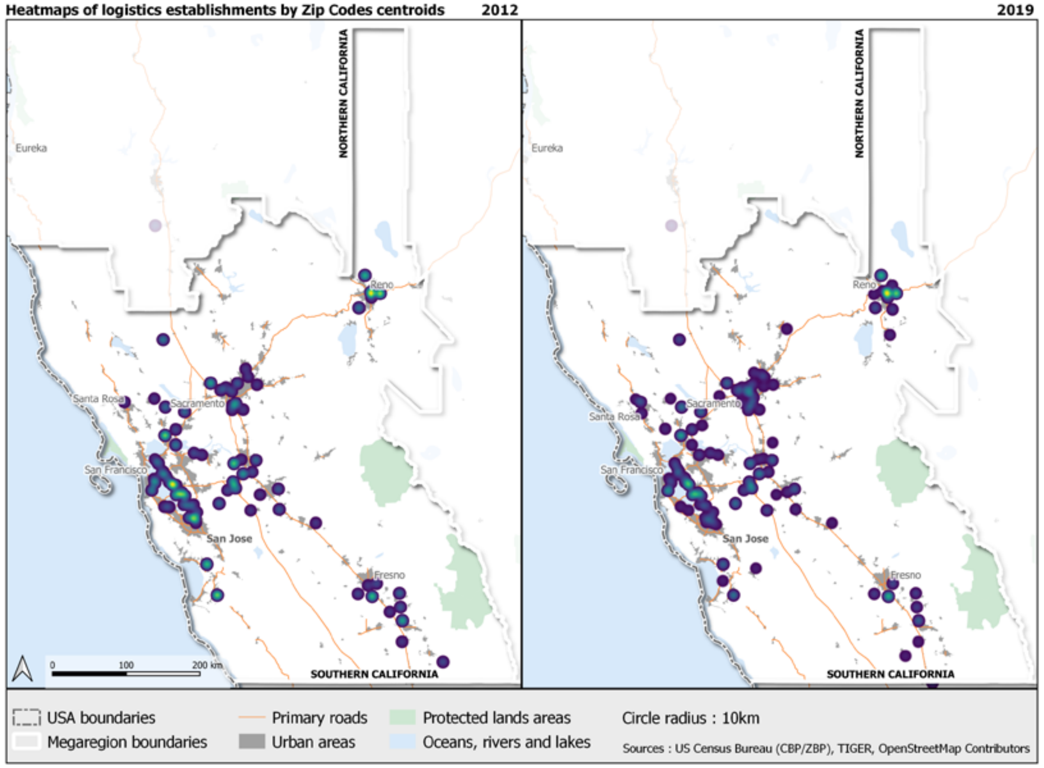
Gross change in the number of logistics establishments by county between 2012 and 2019



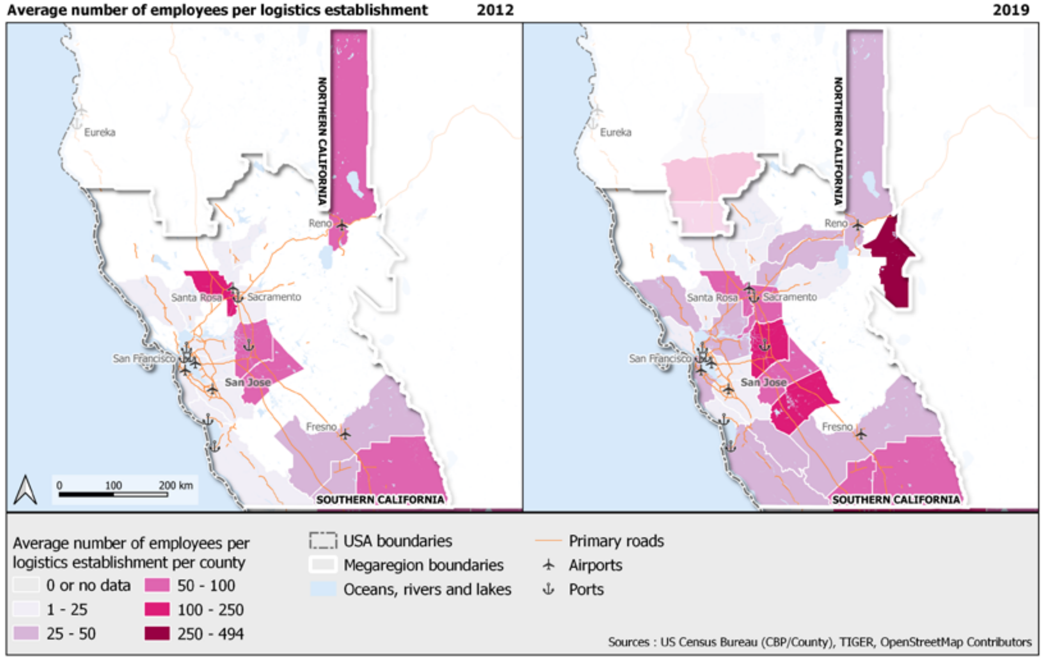
Number of logistics establishments by Zip Codes centroids 2012 2019



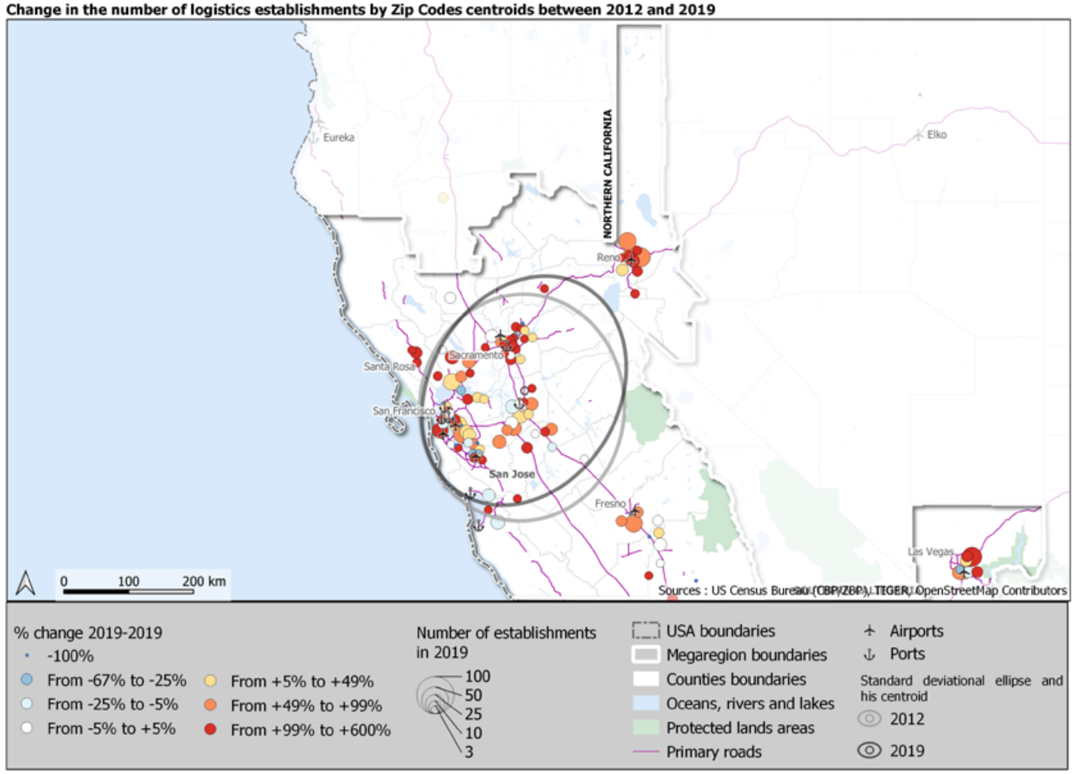
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

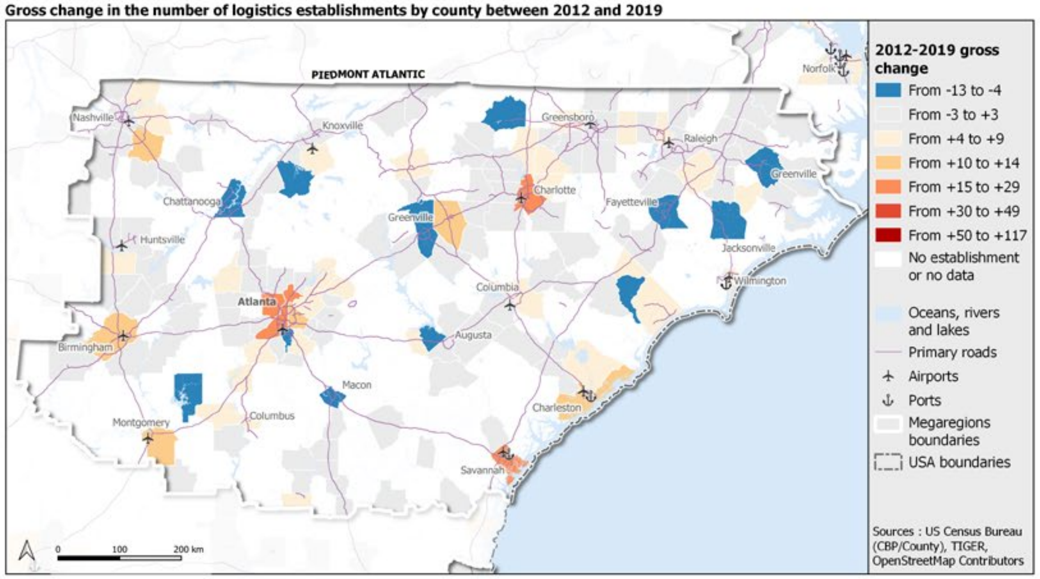


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

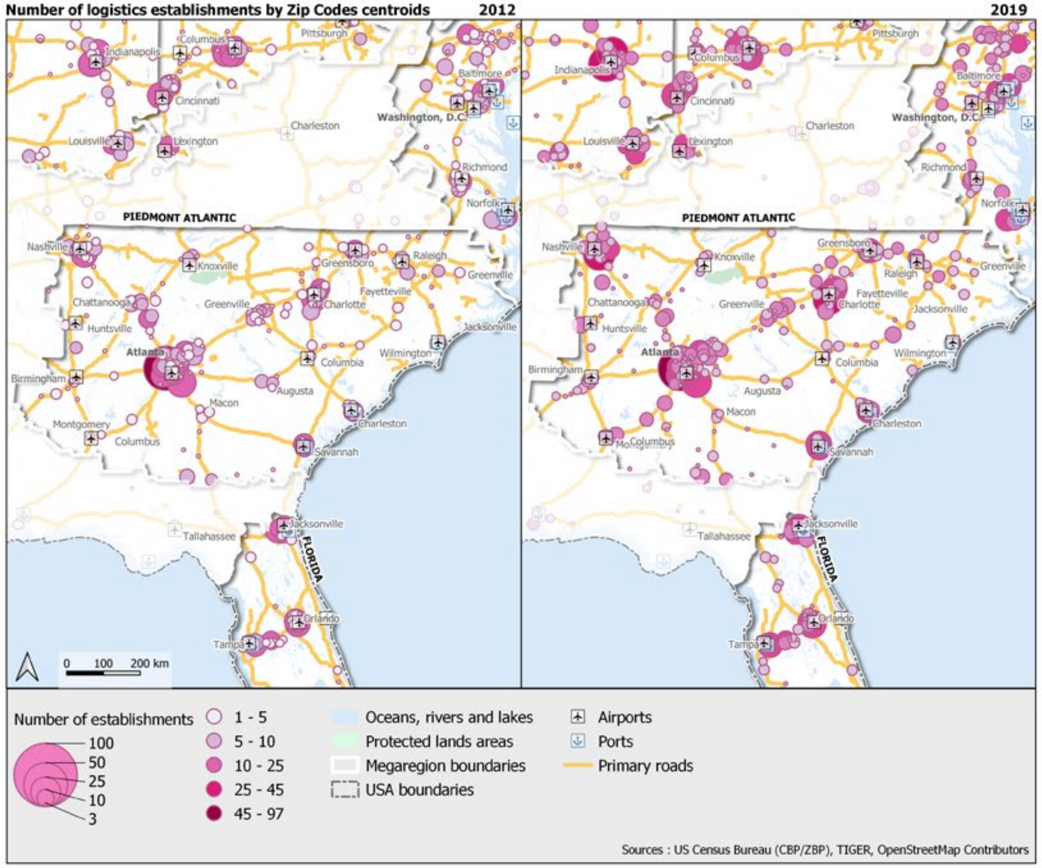


Piedmont Atlantic

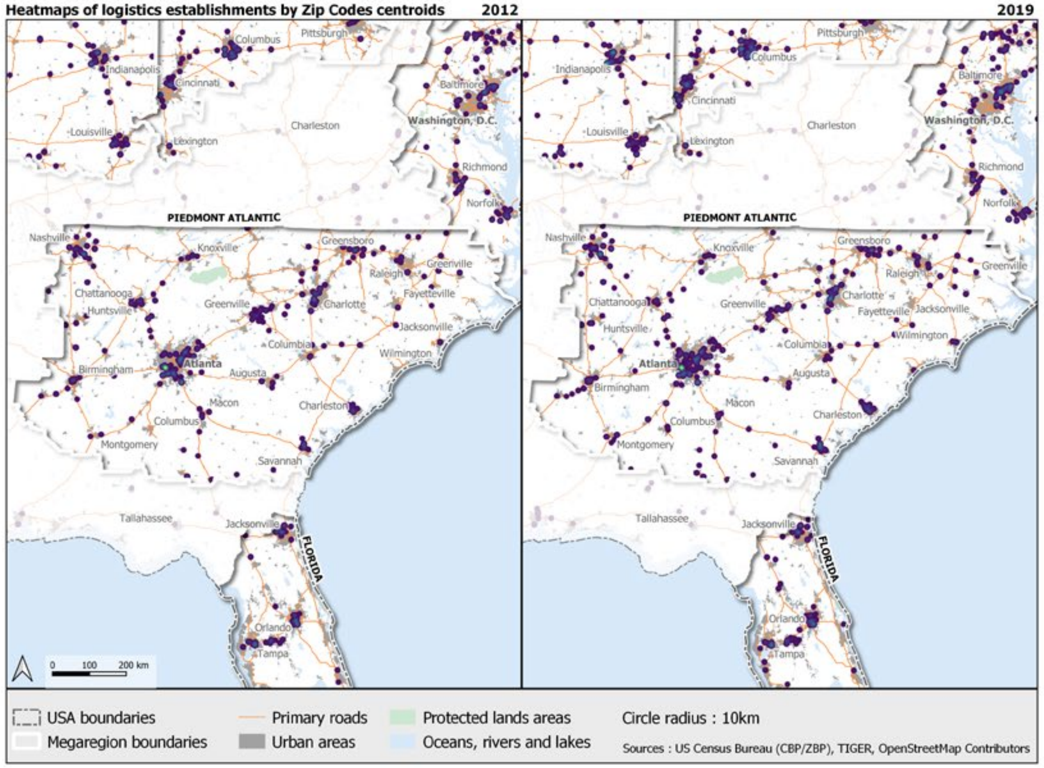
Gross change in the number of logistics establishments by county between 2012 and 2019



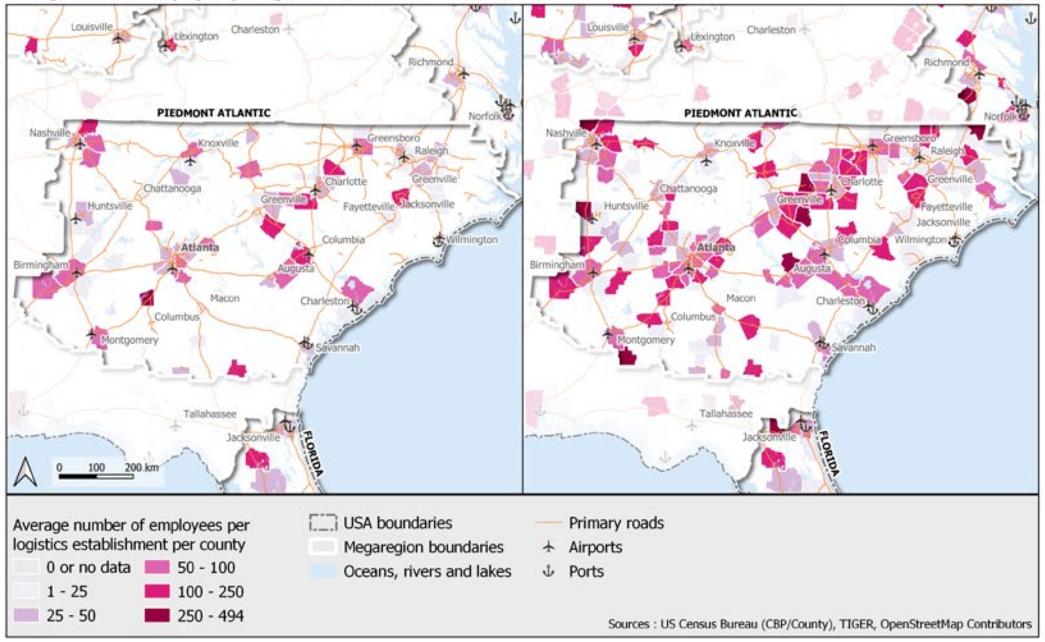
Number of logistics establishments by Zip Codes centroids 2012 2019



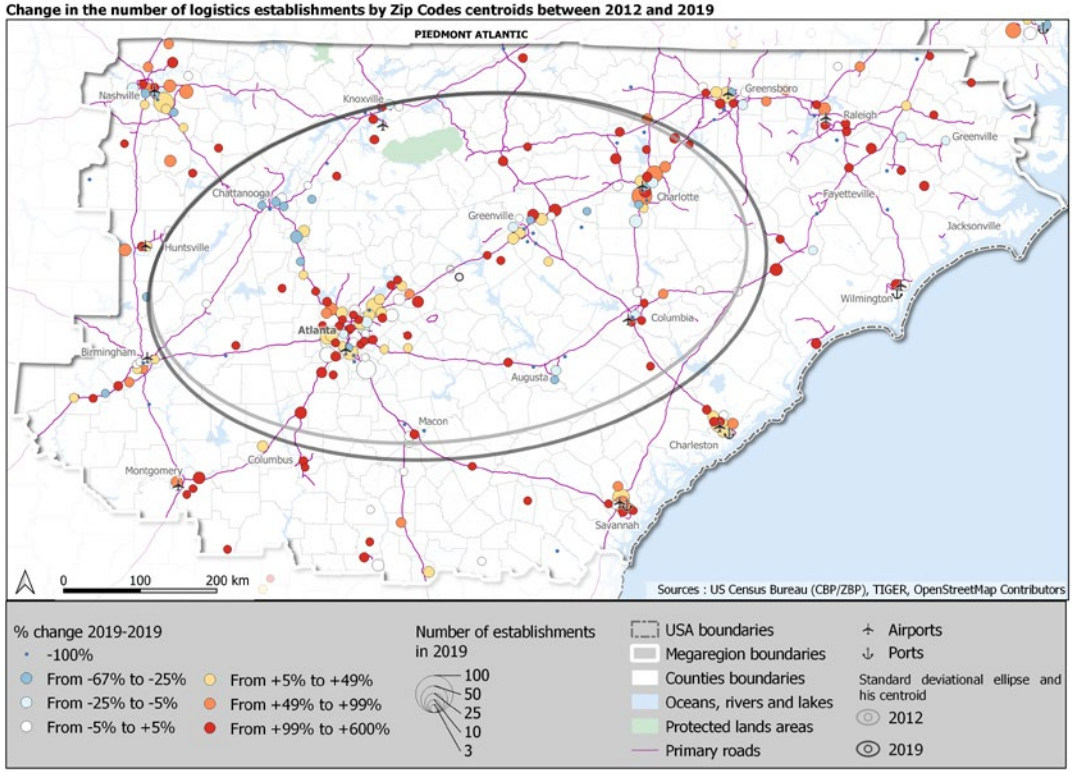
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

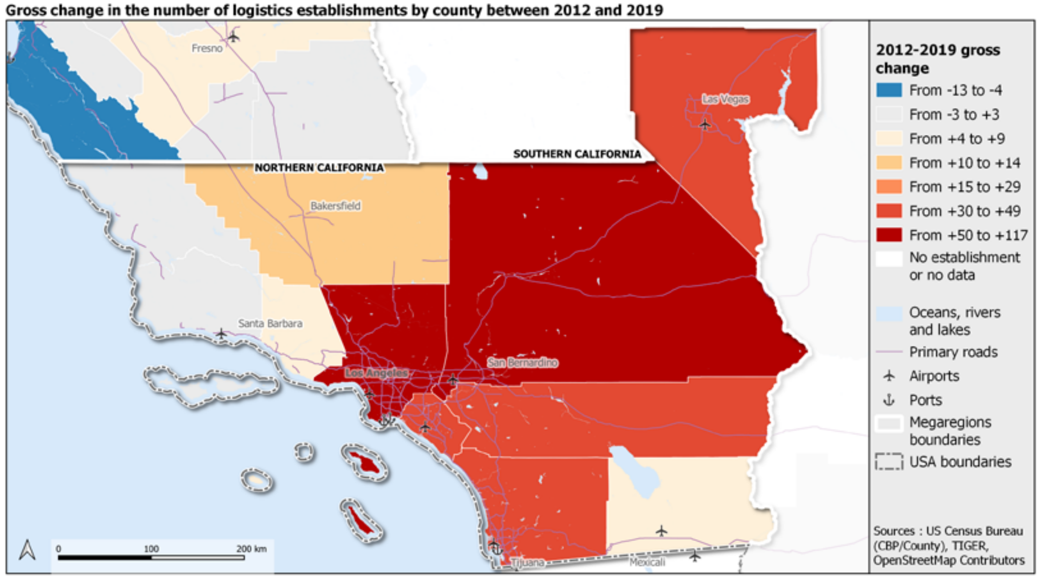


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

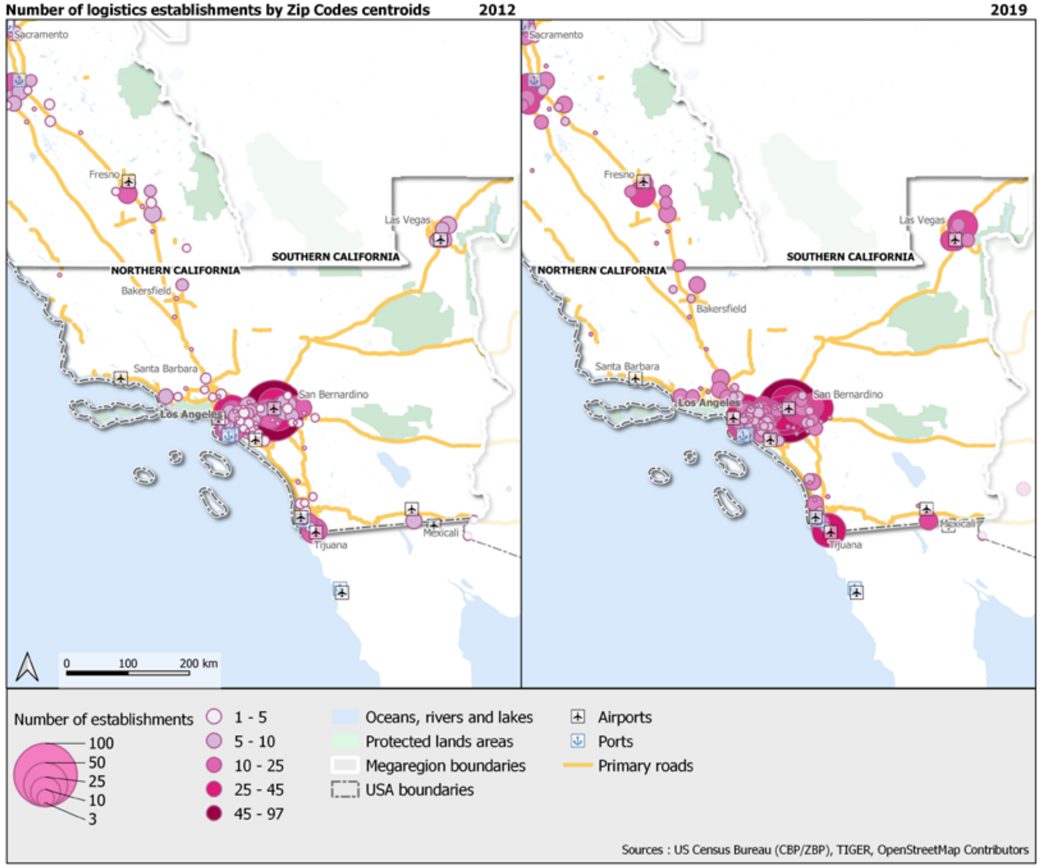


Southern California

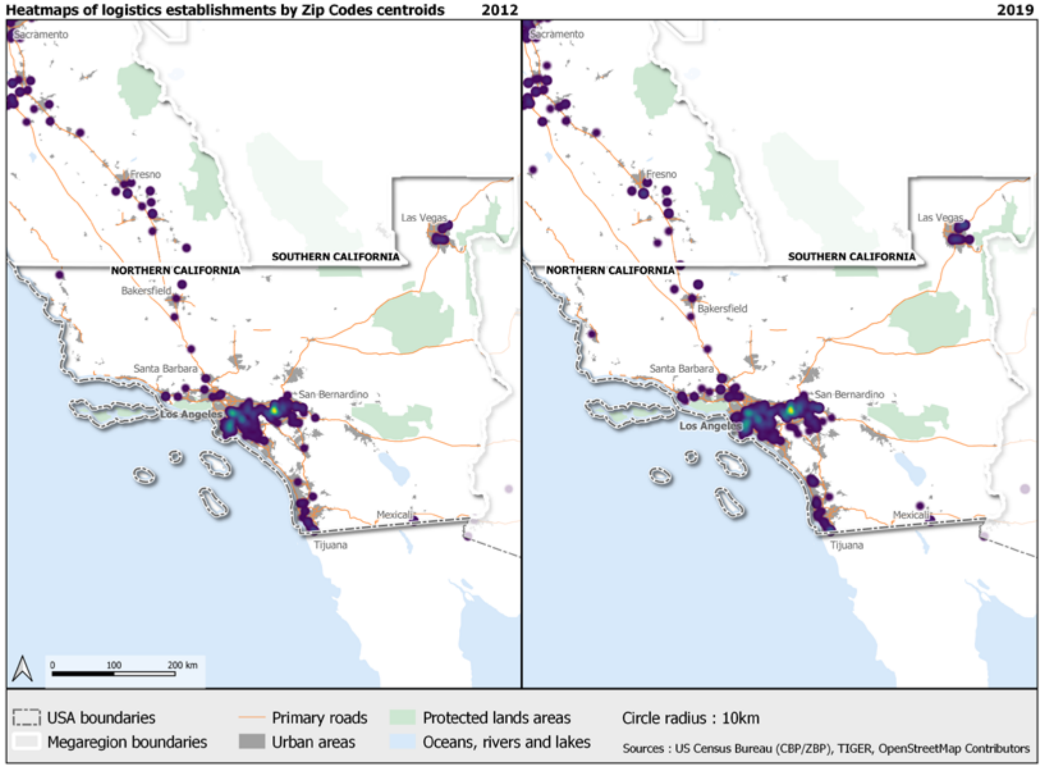
Gross change in the number of logistics establishments by county between 2012 and 2019



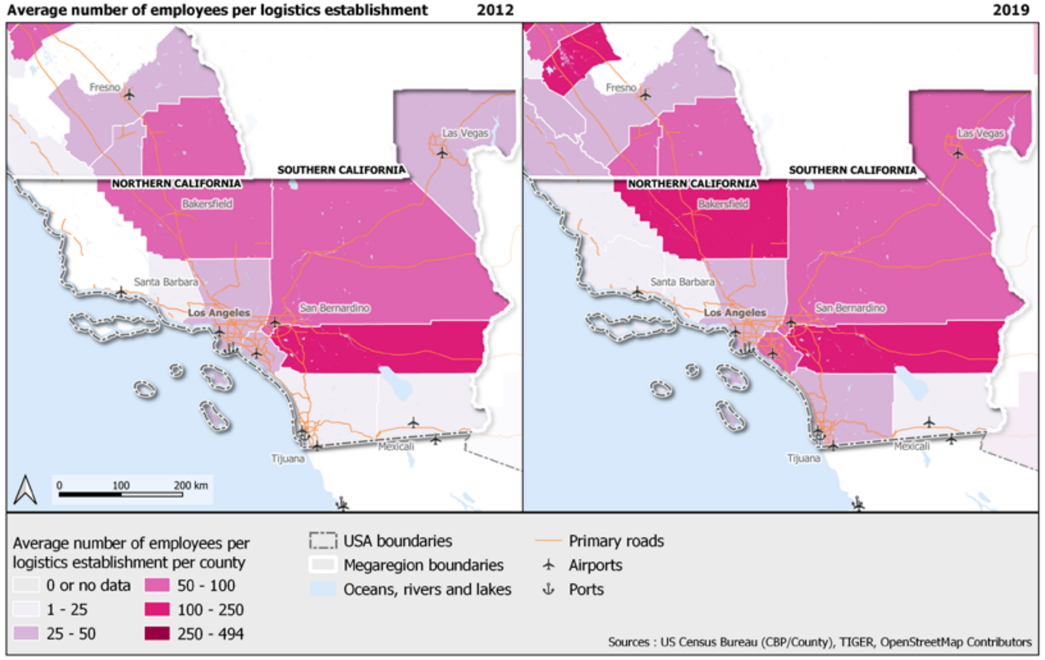
Number of logistics establishments by Zip Codes centroids 2012 2019



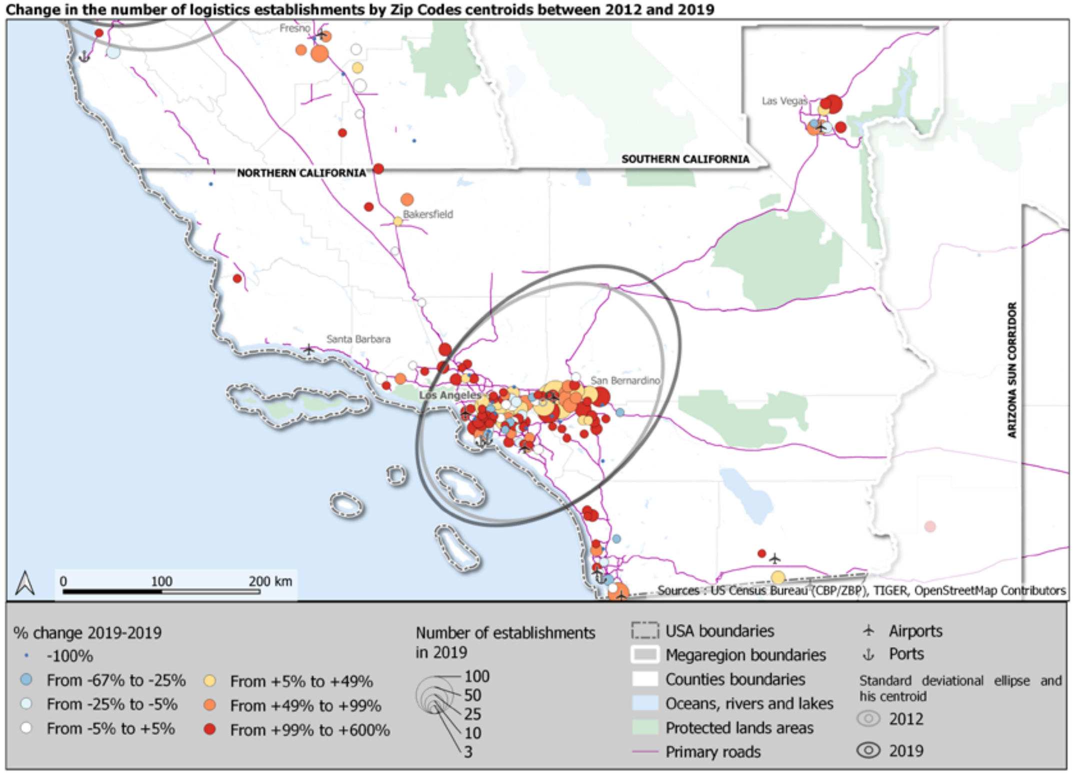
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019

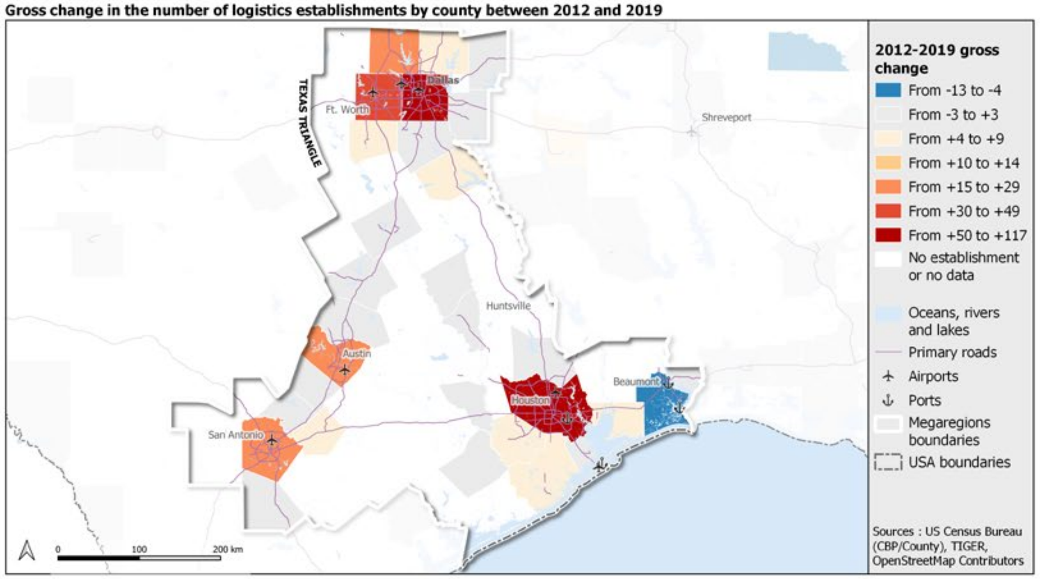


Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019

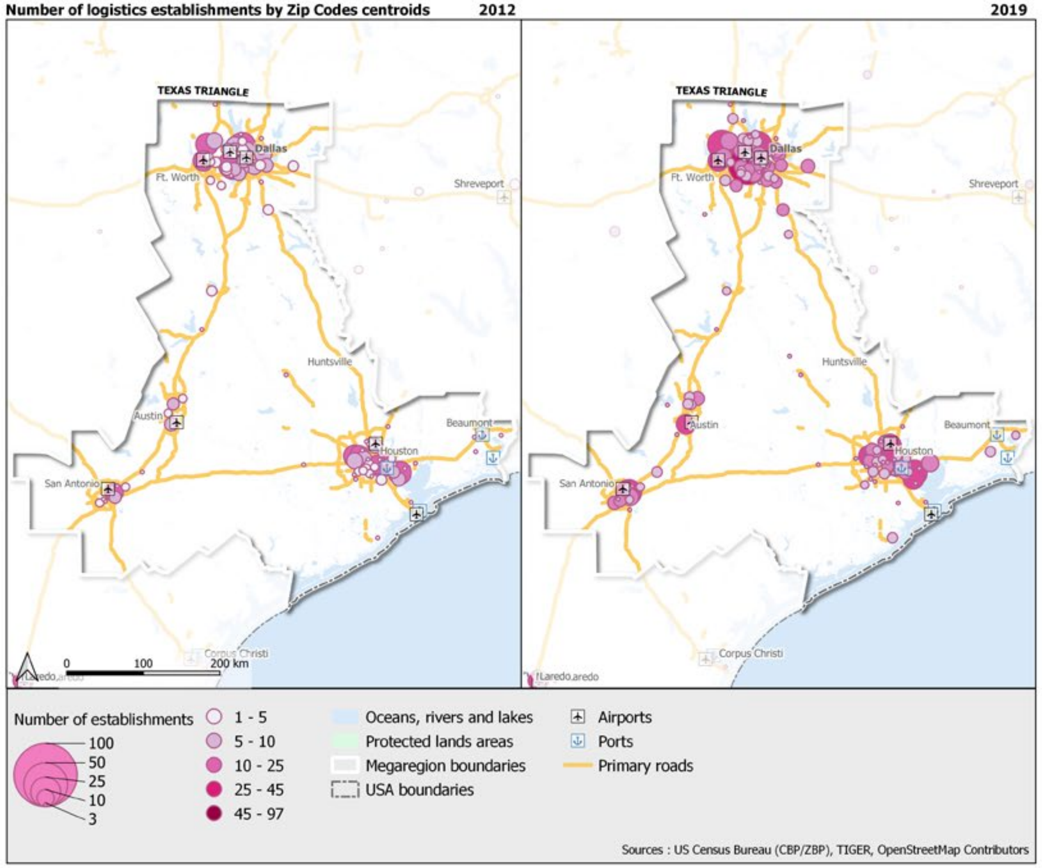


Texas Triangle

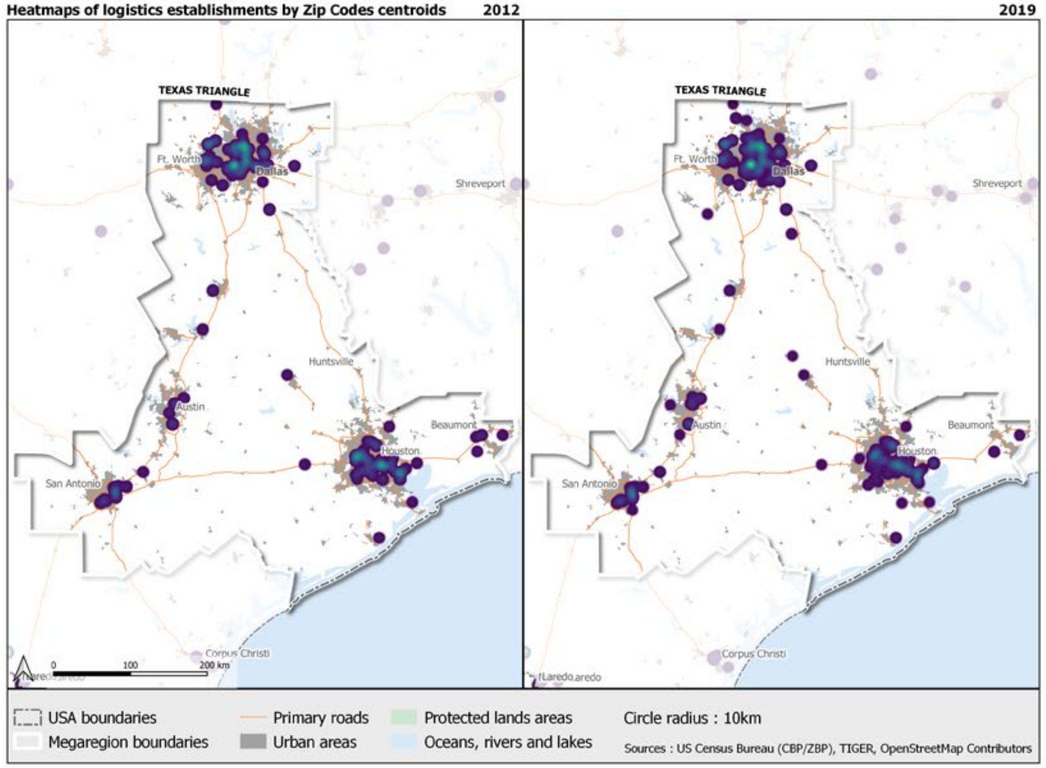
Gross change in the number of logistics establishments by county between 2012 and 2019



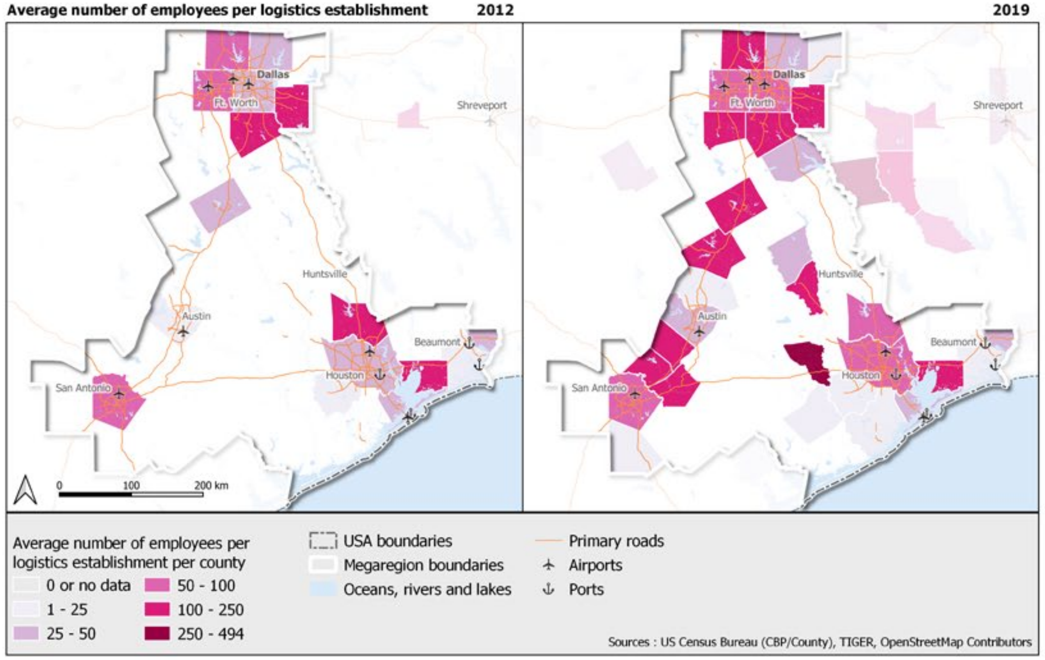
Number of logistics establishments by Zip Codes centroids 2012 2019



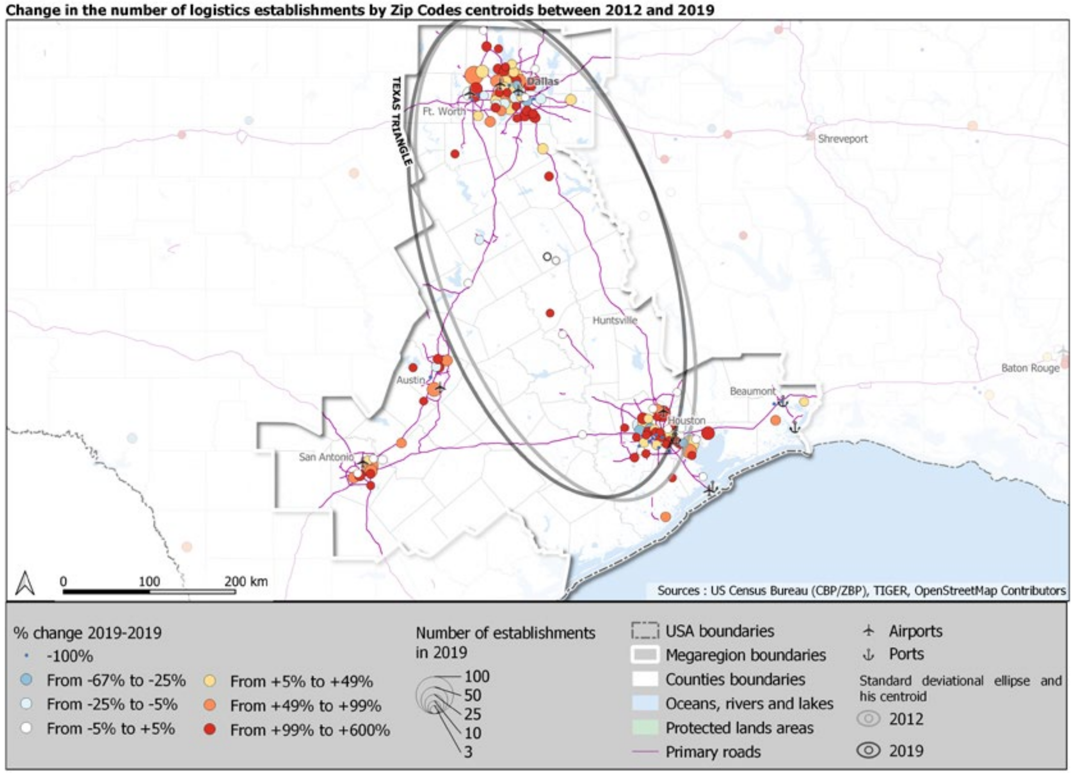
Heatmaps of logistics establishments by Zip Codes centroids 2012 2019



Average number of employees per logistics establishment 2012 2019



Change in the number of logistics establishments by Zip Codes centroids between 2012 and 2019



7.

EXPLORING A NEW METHOD
FOR MAPPING WAREHOUSES USING OPENSTREETMAP

Elements of a methodology for mapping from OpenStreetMap data

Database extraction and cleaning

The data on logistics warehouses were extracted from a world OSM file covering the whole of the United States. For reasons of processing cost, the extraction of relevant data could not be done using GIS software but was carried out directly in command lines with the Osmosis software: we extracted all the polygons in the territories of the 3 CSAs studied (Chicago, Los Angeles, New-York) having the following key-value pairs:

- **building = warehouse**
- **building = warehouses**
- **building = industrial AND usage = warehouse**
- **building = industrial AND usage = warehouses**

The layer thus created was imported into QGIS. From this layer, the area of all buildings was calculated and then cleaned. The maximum values were observed, and for outliers each building was checked by satellite view. When the polygon did not correspond to a building but to a logistics zone, a polygon was created for each building and its area was calculated. We removed all buildings smaller than 500m² to eliminate geometric anomalies and small ware-houses attached to stores (sometimes badly tagged warehouses).

For Los Angeles in particular, we observed a very large number of buildings extracted from the database. After checking by satellite view, they appear to consist largely of stores with a storage area. This is probably a massive input error for that city. In order to remedy this, we realized that most (but not all) of these small buildings have a "start_date" in their attributes, unlike most other correctly tagged warehouses. We therefore chose to remove from the database all buildings with a non-zero "start_date" value AND a surface area of less than 2000m². We therefore retained in the database buildings with a smaller surface area but no "start_date"; we also retained the large buildings with a "start_date".

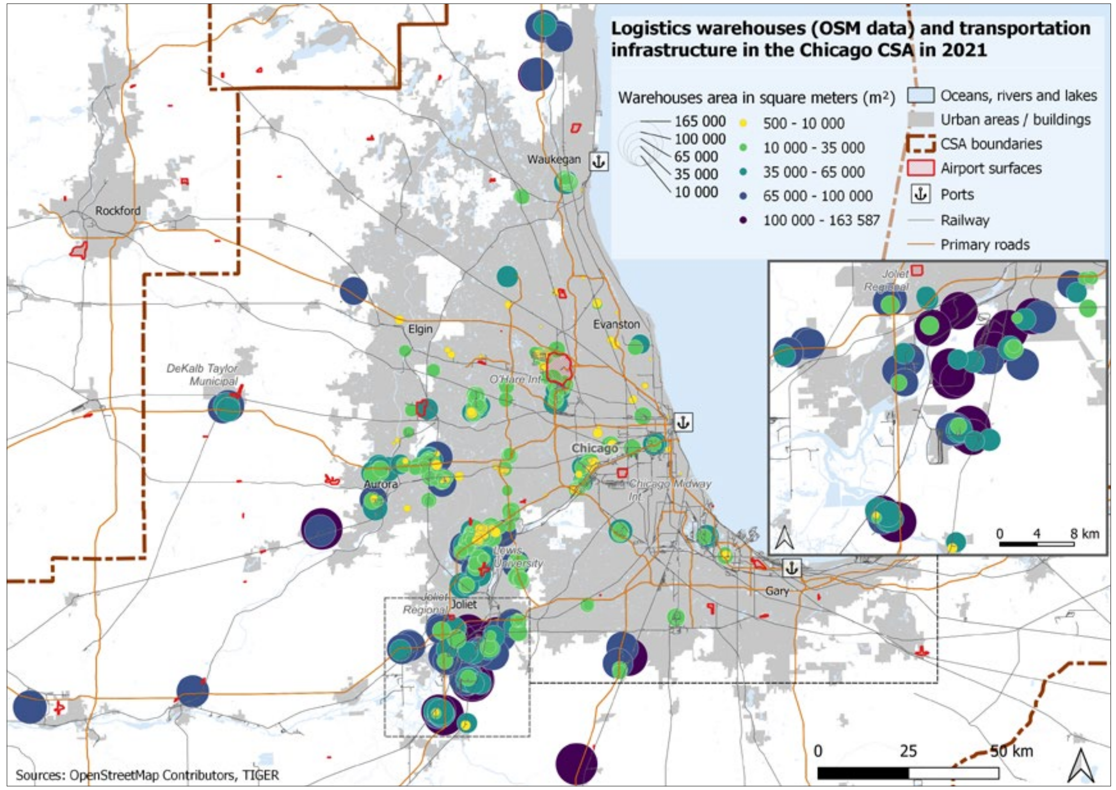
Mapping choices

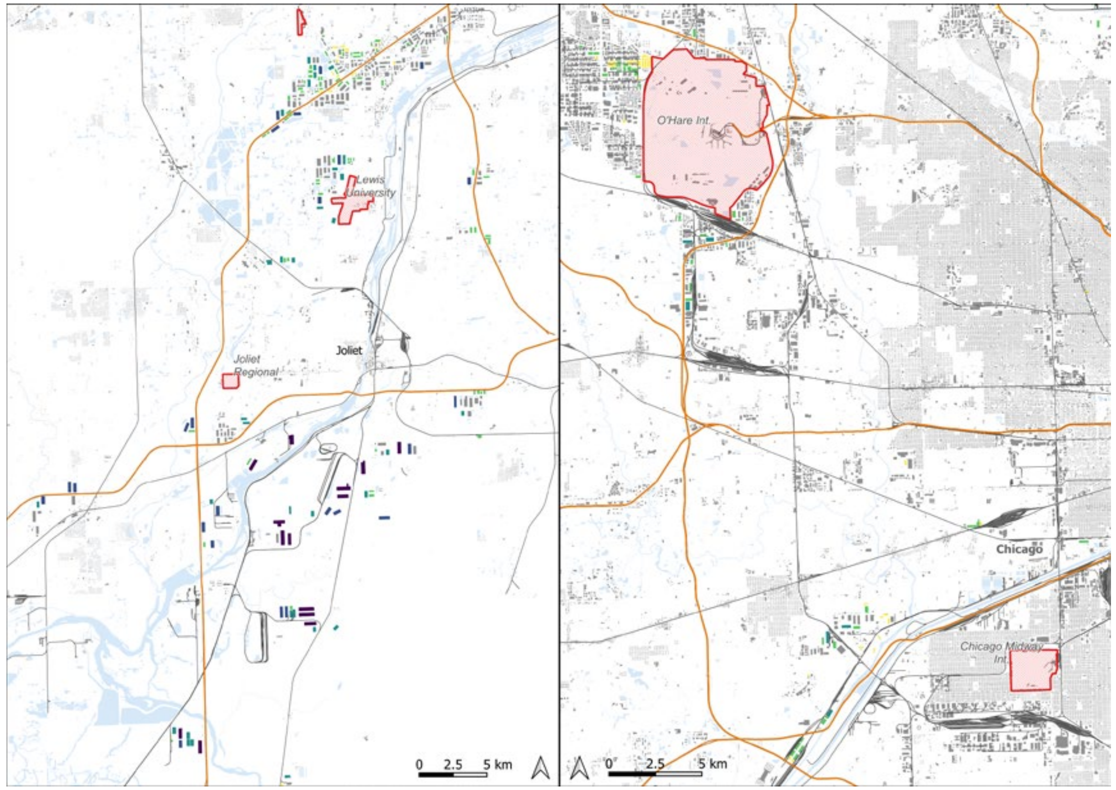
The advantage of OSM data over CBP data is that OSM allows the location of warehouses to be pinpointed precisely at street and building scale. It also makes it possible to visualize the size and orienta-tion of buildings. The downside of these data is that they are incomplete and not necessarily up-to-date (e.g. when a warehouse closes). Maps based on OSM data must therefore be read with care, and in conjunction with maps based on CBP data, in order to avoid misunder-standing.

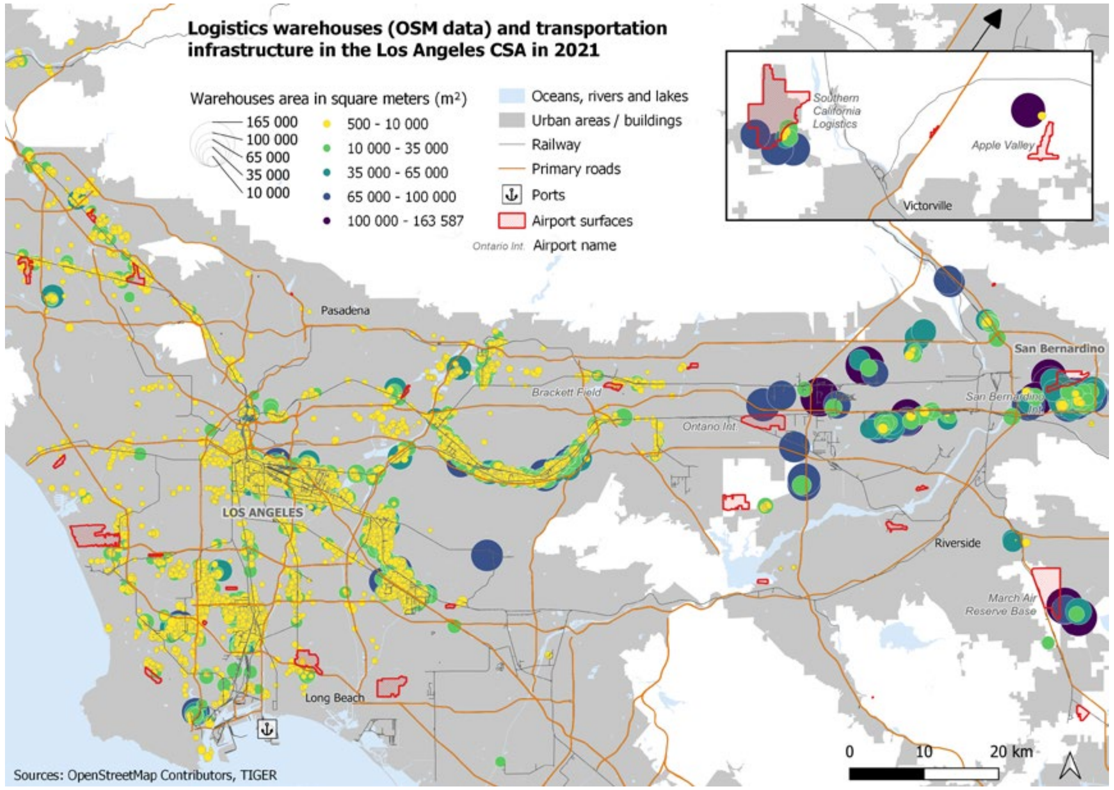
The size and color of the proportional circles refer to the size of the facilities. A large circle does not indicate a large number of establishments, but a large establishment. This graphic choice is debatable, but it has the advantage of making it possible to visualize the location of warehouses classified by size at the scale of a CSA. If only the color of the circles had been used to discrimi-nate between warehouses, the few large warehouses would have been drowned in the mass of small facilities and thus become invisible.

In the zooms to neighborhood level, on the other hand, proportional circles are no longer used: it is the buildings them-selves that are colored using the same color code as before (gray for non-logis-tics buildings). These zooms correspond to areas where warehouse density is high or which are otherwise distinctive (for their integration into urban centers, for example).

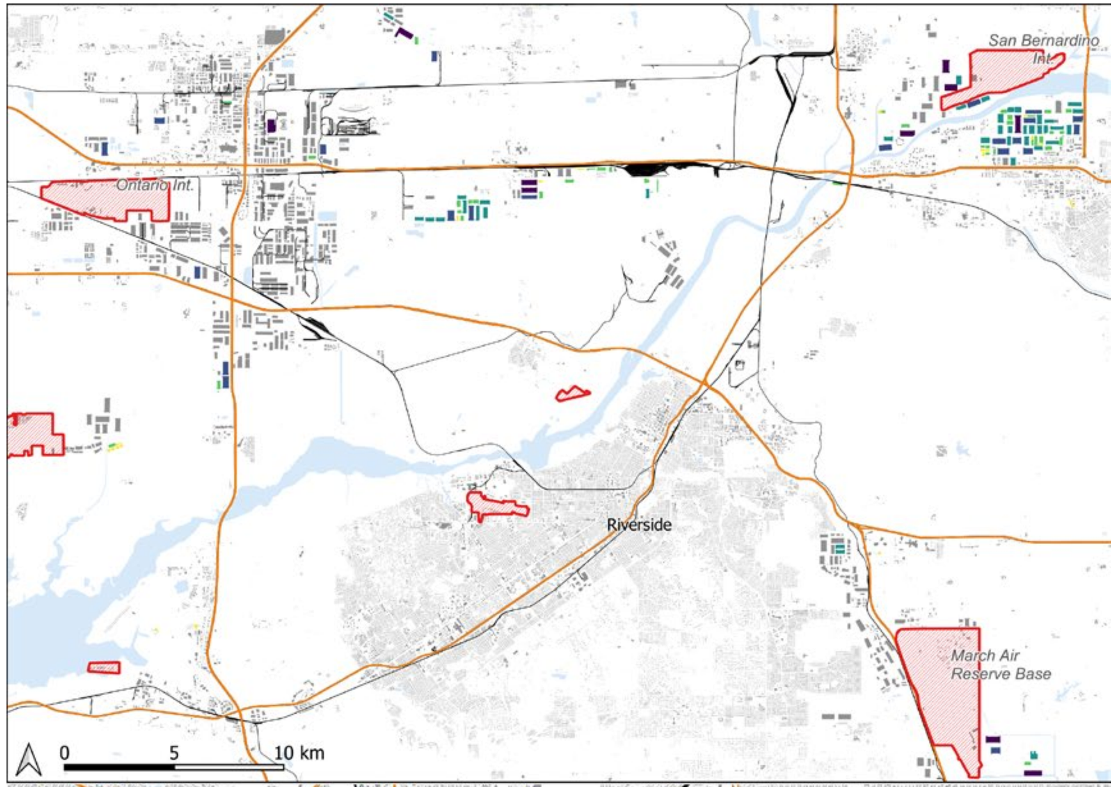
The maps produced previously (States, CSA/MSA, Zip Codes, Amazon) used the airport points layer provided by Natural Earth (which aggregates OSM data). For these maps, we went directly to the OSM database to obtain the data, for two reasons: to include all airports, even secondary, cargo or military airports; to get the polygonal layer to represent the surface area of the airports.


Logistics warehouses (OSM data) and transportation infrastructure in the Chicago CSA in 2021
Warehouses area in square meters (m²)
165 000
100 000
65 000
35 000
10 000
500 - 10 000
10 000 - 35 000
35 000 - 65 000
65 000 - 100 000
100 000 - 163 587
Oceans, rivers and lakes
Urban areas / buildings
CSA boundaries
Airport surfaces
Ports
Railway
Primary roads
Waukegan
Rockford
Elgin
Evanston
DeKalb Taylor Municipal
O'Hare Int
Chicago
Chicago Midway Int
Aurora
Joliet
Gary
0 4 8 km
0 25 50 km
Sources: OpenStreetMap Contributors, TIGER

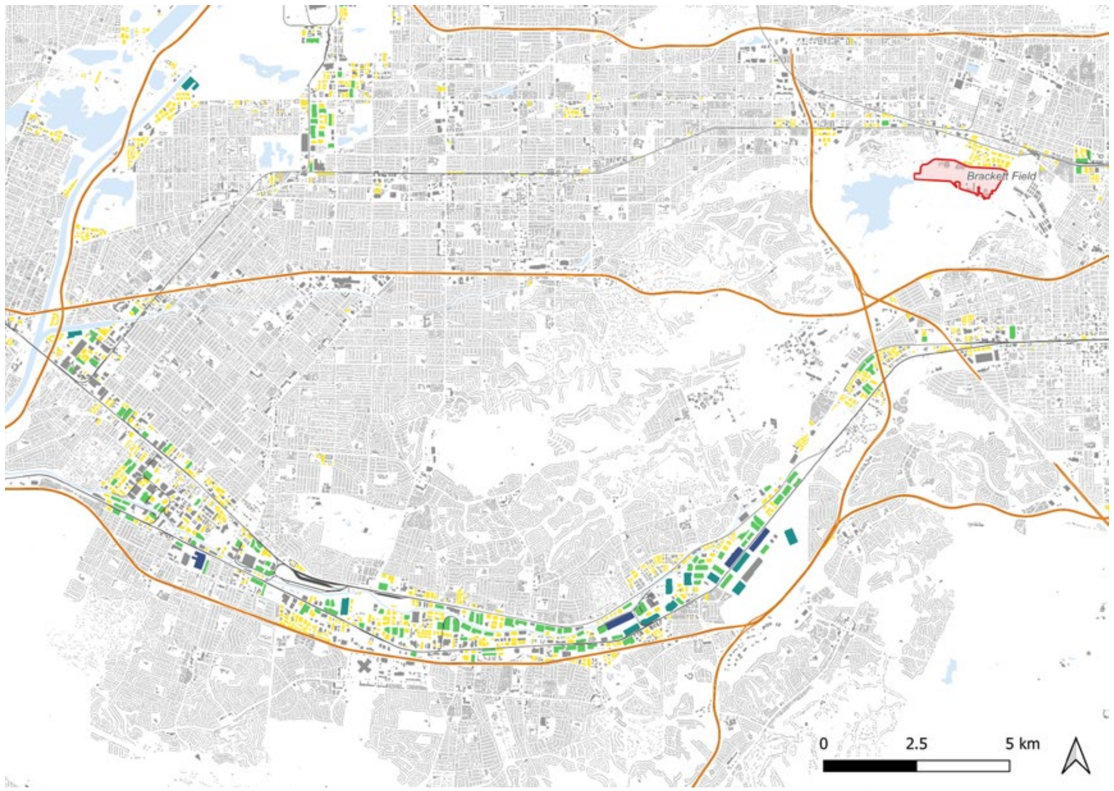

Lewis University
Joliet
Joliet Regional
O'Hare Int
Chicago
Chicago Midway Int
0 2.5 5 km
0 2.5 5 km



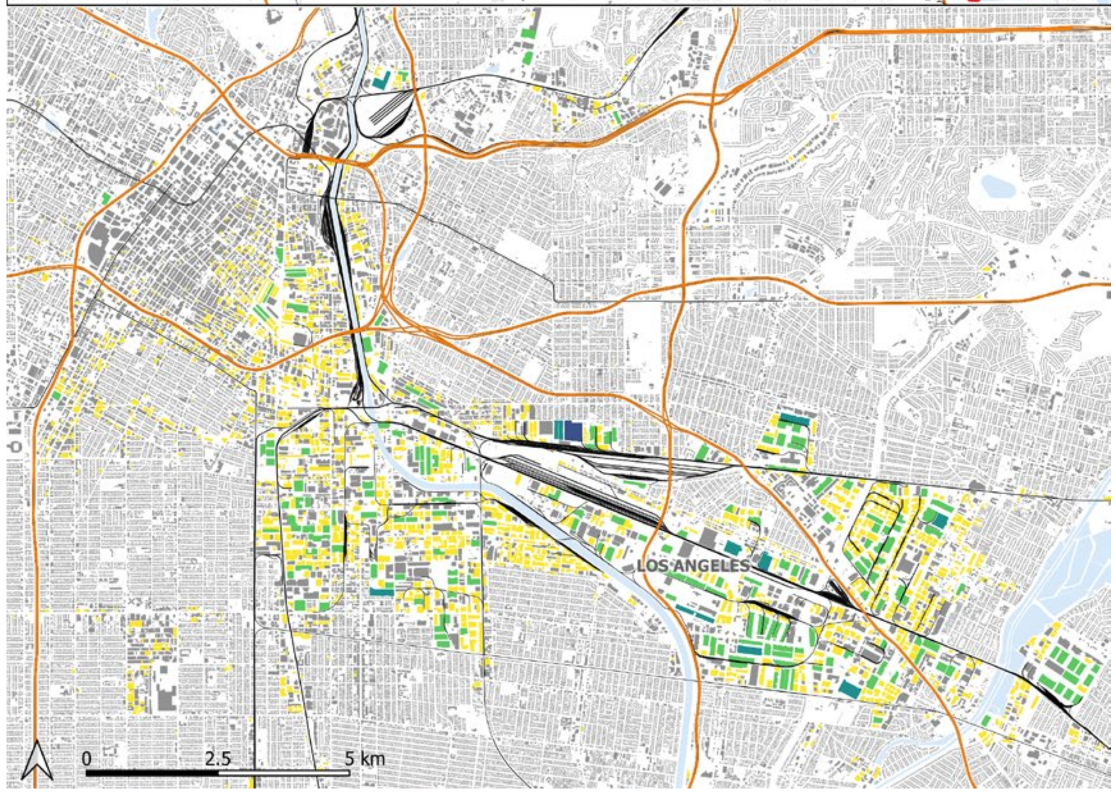
Logistics warehouses (OSM data) and transportation infrastructure in the Los Angeles CSA in 2021
Warehouses area in square meters (m²)
165 000
100 000
65 000
35 000
10 000
500 - 10 000
10 000 - 35 000
35 000 - 65 000
65 000 - 100 000
100 000 - 163 587
Oceans, rivers and lakes
Urban areas / buildings
Railway
Primary roads
Ports
Airport surfaces
Ontario Int.
Airport name
Southern California Logistics
Apple Valley
Victorville
Pasadena
San Bernardino
Brackett Field
Ontario Int
San Bernardino Int.
LOS ANGELES
Riverside
March Air Reserve Base
Long Beach
0
10
20 km
Sources: OpenStreetMap Contributors, TIGER



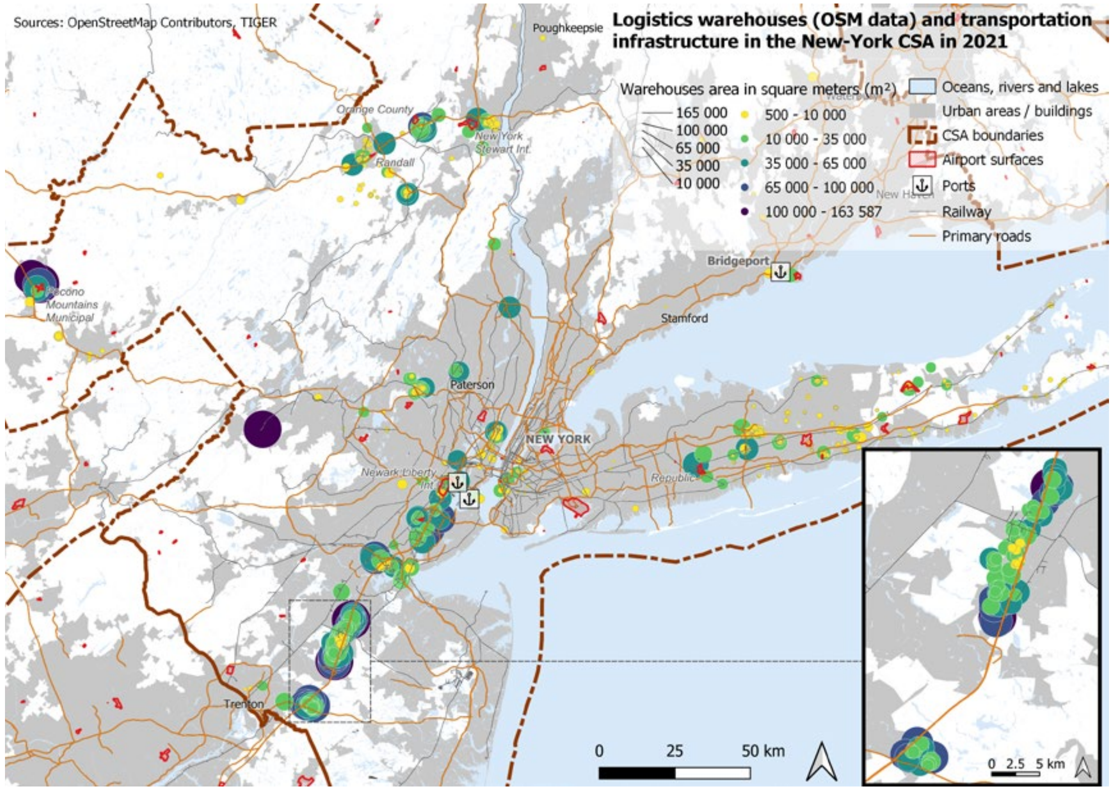
San Bernardino Int.
Ontario Int.
Riverside
March Air Reserve Base
0
5
10 km

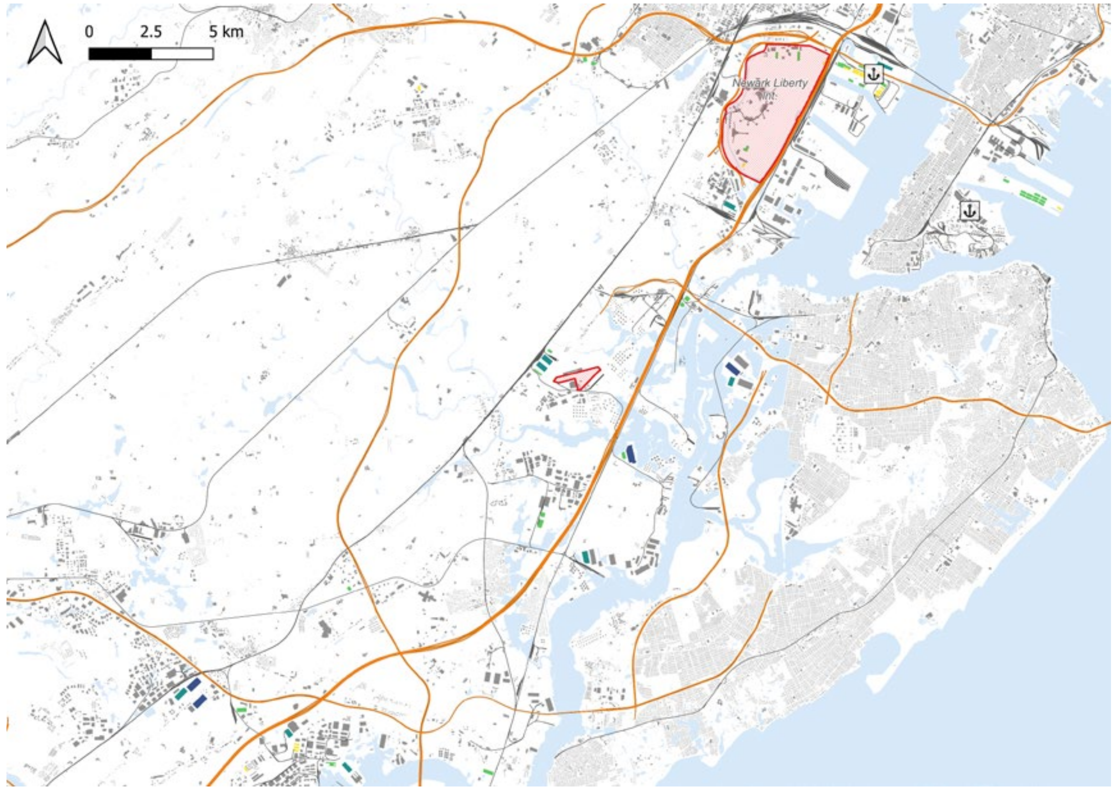


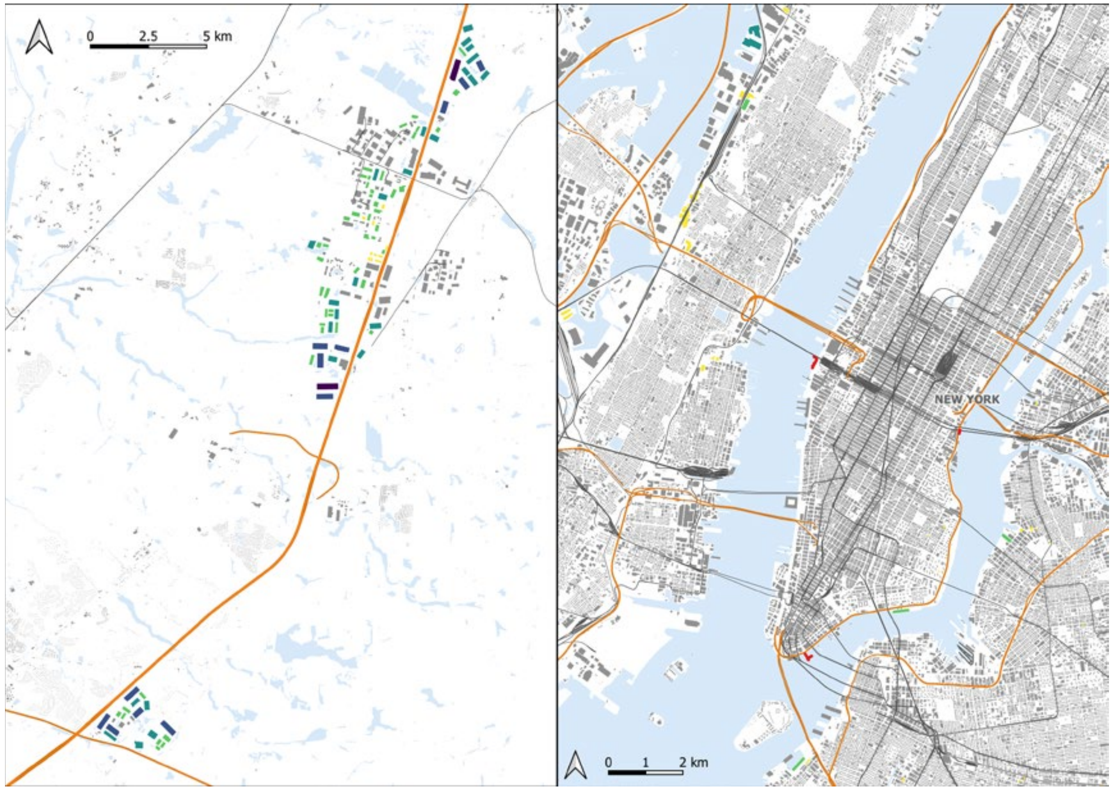
Brackett Field
0
2.5
5 km

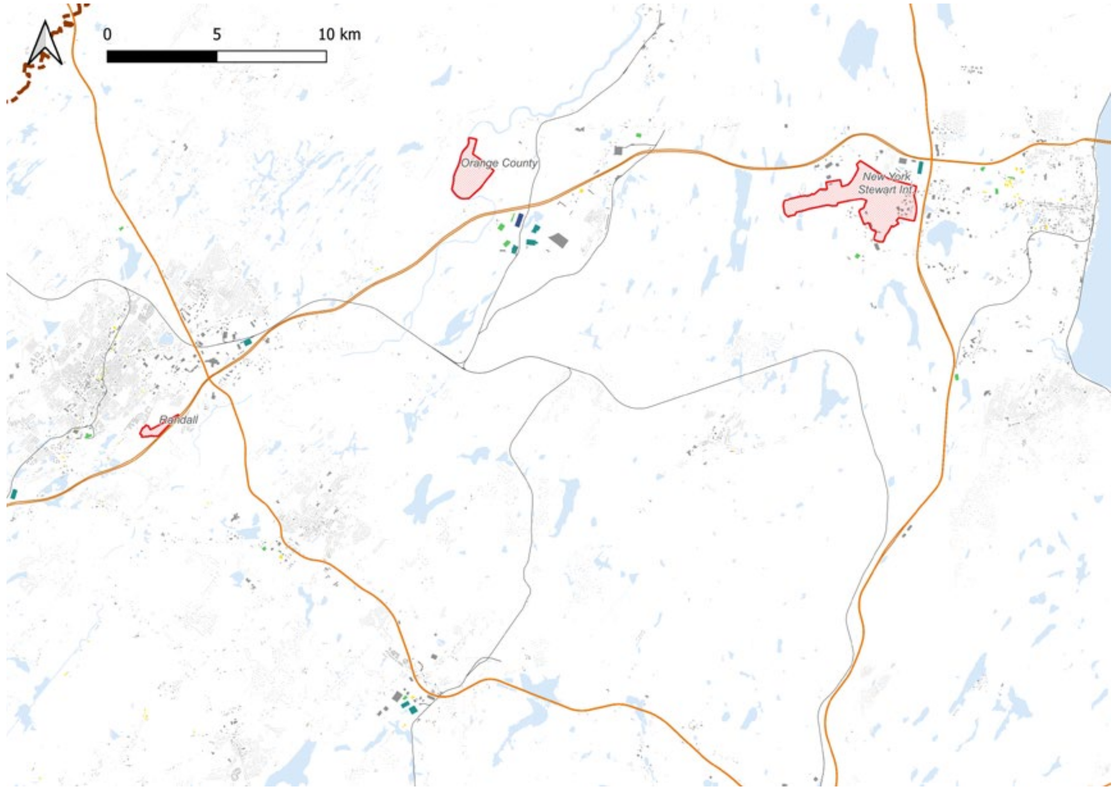


LOS ANGELES
0
2.5
5 km


Sources: OpenStreetMap Contributors, TIGER
Logistics warehouses (OSM data) and transportation infrastructure in the New-York CSA in 2021
Warehouses area in square meters (m²)
165 000
100 000
65 000
35 000
10 000
500 - 10 000
10 000 - 35 000
35 000 - 65 000
65 000 - 100 000
100 000 - 163 587
Oceans, rivers and lakes
Urban areas / buildings
CSA boundaries
Airport surfaces
Ports
Railway
Primary roads
Poughkeepsie
Orange County
New York Stewart Int.
Randall
Bridgeport
Stamford
Paterson
NEW YORK
Newark Liberty Intl
Republic
Trenton
0
25
50 km
0
2.5
5 km


0
2.5
5 km
Newark Liberty Intl


0
2.5
5 km
NEW YORK
0
1
2 km


0
5
10 km
Orange County
New York Stewart Intl
Randall

8.

REFERENCES

Allen, J., Browne, M., (2010) Considering the Relationship Between Freight Transport and Urban Form. Green Logistics.

Andreoli, D., Goodchild, A., Vitasek, K., (2010) The Rise of Mega Distribution Centers and The Impact on Logistical Uncertainty. Transportation Letters, 2 (2), pp. 75-88.

Bowen, J., (2008) Moving Places : The Geography of Warehousing in the US. Journal of Transport Geography, 16, pp. 379-387.

Bowen, J., (2012) A Spatial Analysis of FedEx and UPS: Hubs, Spokes and Network Structure. Journal of Transport Geography, 24, pp. 419-431.

Browne, M., Behrens, S., Woxenius, J., Giuliano, G., Holguin-Veras, J., (2019) Urban Logistics : Management, Policy and Innovation in a Rapidly Changing Environment. Kogan-Page, London.

Buldeo Rai, H., (2019). Environmental Sustainability of the Last Mile in Omnichannel Retail, VUBPRESS.

Cidell, J., (2010) Concentration and Decentralization : The New Geography of Freight Distribution in US Metropolitan Areas. Journal of Transport Geography, 18, pp. 363-371.

Christopherson, S., Belzer, M., (2009) The Next Move: Metropolitan Regions and the Transformation of the Freight Transport and Distribution System in Urban and Regional Policy and its Effects, 2, pp. 194-222.

Dablanc, L., Rakotonarivo, D., (2010) The Impacts of Logistics Sprawl: How Does the Location of Parcel Transport Terminals Affect the Energy Efficiency of Goods' Movements in Paris and What Can We Do About It? Procedia Soc. Behav. Sci., 2 (3), pp. 6087-6096.

Dablanc, L., Ross, C., (2012) Atlanta: a Mega Logistics Center in the Piedmont Atlantic Megaregion (PAM). Journal of Transport Geography, 24, pp. 432-442.

Dablanc, L., Ogilvie, S., Goodchild, A., (2014) Logistics Sprawl: Differential Warehousing Development Patterns in Los Angeles, California, and Seattle, Washington. Transport Research Records, 2410, pp. 105-112.

Dablanc, L., Morganti, E., Arvidsson, N., Woxenius, J., Browne, M., Saidi, N., Dablanc, L., Morganti, E., Arvidsson, N., & Woxenius, J., (2017) The Rise of On-demand ' Instant Deliveries ' in European cities. Supply Chain Forum: An International Journal.

Dablanc, L., Palacios-Argüello, L., De Oliveira, L., (2020) Locational Patterns of Warehouses in 74 Cities around the World, a Comparative Meta-Analysis, Working Paper, Research Chair Logistics City [Online : https://www.lvmt.fr/wp-content/uploads/2022/01/Dablanc-Palacios-Arguello-De-Oliveira-2020.pdf].

Dablanc, L., (2018) E-commerce Trends and Implications for Urban Logistics in Browne, M., Behrends, S., Woxenius, J., Giuliano, G., & Holguin-Veras, J., (Eds.) Urban Logistics: Management, Policy and Innovation in a Rapidly Changing Environment, Kogan Page Publishers, pp. 187-195.

De Lara, J., (2013) Goods Movement and Metropolitan Inequality: Global Restructuring, Commodity Flows and Metropolitan Development in Hall, P., Hesse, M., (Eds.) Cities, Regions and Flows, Routledge, New York.

Dubie, M., Kuo K., Giron-Valderrama, G., Goodchild, A., (2020) An Evaluation of Logistics Sprawl in Chicago and Phoenix. Journal of Transport Geography, 88, 102298.

Glaeser, E., Kohlhase, J., (2004) Cities, Regions and the Decline of Transport Costs. Papers in Regional Science, vol. 83, pp. 197-228.

Giuliano, G., O'Brien, T., Dablanc, L., Holliday, K., (2013) NCFRP Project 36(05) Synthesis of Freight Research in Urban Transportation Planning, Washington D.C.: National Cooperative Freight Research Program.

Giuliano, G., Kang, S., Yuan, Q., (2016) Spatial Dynamics of the Logistics Industry and Implications for Freight Flows in NCST Project USC-CT-TO-004. METRANS Transportation Center, Sol Price School of Public Policy, University of Southern California, Los Angeles (CA).

Guerin, L., Vieira, J., De Oliveira, R., De Oliveira, L., De Miranda Viera H., Dablanc, L. (2021) The geography of warehouses in the Sao Paulo Metropolitan Region and contributing factors to this spatial distribution, Journal of Transport Geography, vol. 91, 102976.

Hagberg, J., Sundström, M., Nicklas, E-Z., (2016) The Digitalization of Retailing : An Exploratory Framework. International Journal of Retail Distribution Management, 44(7), pp. 694-712.

Heitz, A., Dablanc, L., (2015) Logistics Spatial Patterns in Paris: Rise of Paris Basin as Logistics Megaregion. Transportation Research Records, 2477, pp. 76-84.

Heitz, A., Launay, P., & Beziat, A., (2017) Rethinking Data Collection on Logistics Facilities: New Approach for Measuring the Location of Warehouses and Terminals in Metropolitan Areas. Transportation Research Record: Journal of the Transportation Research Board, 2609.

Heitz A., Launay P., Beziat A., (2019) Heterogeneity of Logistics Facilities: An Issue for a Better Understanding and Planning of the Location of Logistics Facilities, European Transport Research Review, 11/5, [Online].

Heitz, A., Dablanc, L., Tavasszy, L.A., (2017) Logistics Sprawl in Monocentric and Polycentric Metropolitan Areas: The Cases of Paris, France, and the Randstad, the Netherlands. Region, 4, pp. 93–107.

Heitz, A., (2017) La Métropole Logistique : structure urbaine et enjeux d'aménagement. La dualisation des espaces logistiques métropolitains. Thèse de doctorat, Université Paris-Est.

Hesse, M., (2004) Land for Logistics: Location Dynamics, Real Estate Markets and Political Regulation of Regional Distribution Complexes. Tijdschrift voor Economische en Sociale Géographie, vol. 95, n° 2, pp. 162-173.

Hesse, M., (2008) The City as terminal. Logistics and Freight Distribution in an Urban Context. Ashgate publishing.

Hesse, M., Rodrigue, J-P., (2004) The Transport Geography of Logistics and Freight Distribution. Journal of Transport Geography, vol. 12, n° 3, pp. 171-184.

Houde, J-F., Newberry, P., Seim, K., (2017) Economies of Density in E-commerce: A Study of Amazon's Fulfillment Center Network In National Bureau of Economic Research, Working Paper 23361.

Lieb, R.C., Leib, K.J., (2016) 3PL CEO Perspectives on the Current Status and Future Prospects of the Third-Party Logistics Industry in North America: the 2014 Survey. Transportation Journal, 55(1), pp. 78-92.

Movahedi, B., Lavassani, K., Kumar, V., (2009) Transition to B2B E-marketplace Enabled Supply Chain: Readiness Assessment and Success Factors. The International Journal of Technology, Knowledge and Society, vol. 5, n° 3, pp. 75-88.

Oliveira, R., Schorung, M., Dablanc, L., (2021) Relationships among urban characteristics, real estate market, and spatial patterns of warehouses in different geographic contexts. Research Report, Research Chair Logistics City, Université Gustave Eiffel, [halshs-03369462v2].

Raimbault, N., (2014) Gouverner le développement logistique de la métropole : périurbanisation, planification et compétition métropolitaines, Thèse de doctorat, Université Paris-Est.

Ramcharran, H., (2013) E-commerce Growth and the Changing Structure of the Retail Sales Industry. International Journal on E-Business Research, 9(2), pp. 46-60.

Rodrigue, J-P., (2004) Freight, Gateways and Mega-Urban Regions: The Logistics Integration of the BostWash Corridor. Tijdschrift voor economische en sociale geographie, vol. 95, n° 2, pp. 147-161.

Rodrigue, J-P., (2017) The Freight Landscape: Convergence and Divergence in Urban Freight Distribution. Journal of Transport and Land Use, 10(1), pp. 557-572.

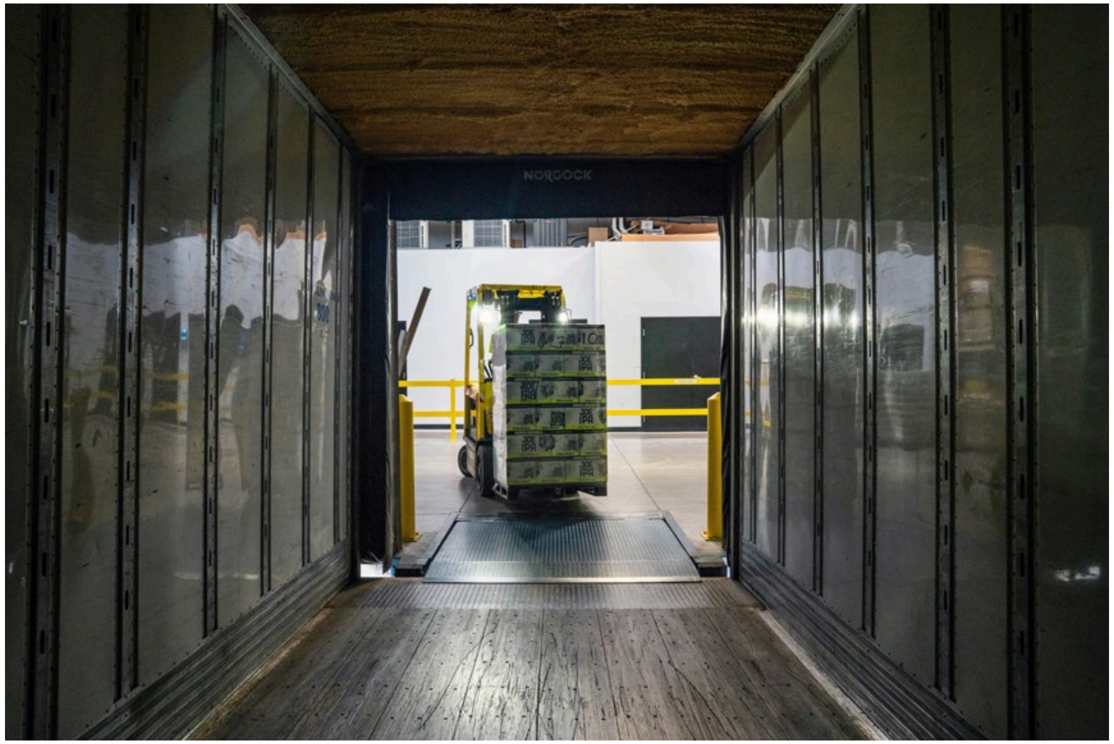
Rodrigue, J-P., (2020) The Distribution Network of Amazon and the Footprint of Freight Digitalization. Journal of Transport Geography, 88, 102825.

Sakai, T., Kawamura, K., Hyodo, T., (2016) Logistics Facility Distribution in Tokyo Metropolitan Area: Experiences and Policy Lessons. Transportation Research Procedia, 12, pp. 263-277.

Sakai, T., Beziat, A., Heitz, A., (2020) Location Factors for Logistics Facilities: Location Choice Modeling Considering Activity Categories. Journal of Transport Geography, 85, 102710.

Schorung, M., Lecourt, T. (2021) Analysis of the spatial logics of Amazon warehouses following a multiscalar and temporal approach. For a geography of Amazon's logistics system in the United States. Research Report, Research Chair Logistics City, Université Gustave Eiffel, [halshs-03489397].

Woudsma, C., Jakubicek, P., Dablanc, L., (2016) Logistics Sprawl in North America: Methodological Issues and a Case Study in Toronto. Transportation Research Procedia, 12, pp. 474-488.



Chaire
LOGISTICS
CITY

ATLAS OF WAREHOUSE GEOGRAPHY IN THE US

GRAPHIC DESIGN BY STUDIOBW.COM / OLIVIER WAISSMANN

THIS VERSION WAS TRANSLATED IN ENGLISH BY MATTHIEU SCHORUNG WITH USE OF DEEPL TRANSLATOR AND WAS PROOFREAD BY LINC LANGUAGES OÜ.

PHOTO CREDITS
BULDEO RAI / DABLANC / SCHORUNG / FROM UNSPLASH:
MITCHELL LUO, AVI RICHARDS, MARCIN JOZWIAK, SIMONE HUTSCH, CHRISTIAN CHEN, BERND DITTRICH, SOLOMEN TW, NIGEL TADYANEHONDO, ISMAIL ENES AYHAN

THE CHAIR "LOGISTICS CITY" IS CO-FINANCED BY

Université Gustave Eiffel · sogaris La logistique urbaine du Grand Paris · POSTE IMMO · Région îledeFrance

ATLAS OF WAREHOUSE GEOGRAPHY IN THE US

MATTHIEU SCHORUNG

GIS EXPERT
THIBAULT LECOURT

SUPERVISION
LAETITIA DABLANC

Chaire LOGISTICS CITY

Université Gustave Eiffel