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Censoring Maps in Google China? Visual Analysis through Foucault't Power/Knowledge

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CENSORING MAPS IN GOOGLE CHINA? VISUAL ANALYSIS THROUGH FOUCAULT'S POWER/KNOWLEDGE

by

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Under the Direction of Dr. Jeremy W. Crampton

ABSTRACT

This thesis explores aspects of map censorship in Google China through a theoretical framework based on Foucault's power/knowledge. Comparing results of content analysis of maps in Google Ditu in Google China and Google Maps in Google Dot Com, the thesis analyzes the degree of censorship of maps in the Google geoweb. My findings are a higher density of labeling in Google Ditu in comparison with Google Maps, the absence of VGI in Google Ditu, the limitation of zoom level at Google Ditu, and the absence of Street View in China. This thesis suggests possible explanations to differences in map information between Google Ditu and Google Maps.

INDEX WORDS: Foucault's power/knowledge, Google Maps, Google China, map censorship.

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DEDICATION

To my mother.

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This thesis is not the result of my work only, but also my adviser Dr. Jeremy Crampton, who supported the research idea about map censorship in Google China and then guided and inspired me to develop an understanding of the topic. I am grateful to Dr. Katherine Hankins for teaching me to think critically and to research only interesting topics, and to Dr. Parama Roy for questioning and advising me during my research. I am also thankful to Anton Haimovich, whose love and support inspired me during the writing of this thesis.

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CHAPTER 1 – INTRODUCTION

Maps fascinated me from a young age. As a child growing up in Kazakhstan, one of the former Soviet Union republics, I loved to examine maps to look for places to visit, to study place names, and to underline with a pencil lines of rivers or political boundaries. Every time I would hear about a place I would look for it in my atlases. Once I could not find a town where three of my uncles lived. The small dot for the town was missing. Later, I found out that the town had a strategic importance for the Soviet Union as a military site; consequently, the town was suppressed in school atlases. I felt there was something powerful and unfair about that act of suppression. It became obvious to me that the state had power to let me see or not see things in my atlases, and it was very unfair for residents of the town to be omitted from the school atlases. Since then I used maps with caution, as I knew they were not disinterested representations of space.

My childhood experience with maps has influenced me to search for answers to why maps are politically implicated. In this research I answer my questions by referring to Foucault's theory of power/knowledge. Based on this theory, I discuss the concept of power and its relationship to knowledge. I explore the idea that power is always related to knowledge, thus the construction of knowledge is inherently political. Furthermore, I discuss the importance of Foucault's theory of power/knowledge for evaluating cartographic representations. As power is exercised over space, and maps show spatial phenomena, power has a critical influence on maps. I also discuss the importance of Foucault's theory of power/knowledge for the evaluation of technologies. The technologies enable creation of maps; for example, Geographic Information Systems (GIS), thus, consideration of the role of technologies is critical.

More specifically, I answer my questions by exploring the aspects of power exercise in Google Ditu (Google Maps in Google China). As I use maps for education and navigation, I find Google Maps is the best map site for my needs. Google Maps belongs to a multinational internet technology company, Google Corporation, which progressively develops its geoweb. Geoweb is a connection of virtual reality and physical reality (Udell 2009). Google Maps is an interactive online map that has map, satellite, and terrain layers. It allows Volunteered Geographic Information (VGI) or contributing maps, photos, videos, webcam, real estate ads, and Wikipedia articles to be tagged to related locations around the world. Also, Google Maps has useful functions such as density of traffic along roads during 24 hours 7 days a week, and Street View, that shows photos of streets at human height. More recently, Google Maps includes rotatable maps, latitude and longitude, drag and zoom, aerial imagery, a world geography game, and smart zoom.

As I have rich geospatial experiences in Google Maps I have decided to investigate whether Chinese users have the same experiences in Google Ditu. Since China required that internet searches are censored, Google Corporation developed a separate Google Dot Com internet search engine Google Dot Cn, or Google China, to meet the governmental request of censorship (Zook and Graham 2007 b). Zook and Graham (2007 b) showed search results from Google.com and Google.cn are different. They illustrate that search for "Tiananmen" in Google.com shows pro-democracy protests in 1989, while Google.cn shows smiling faces. They elaborate that Google, by enclosing various sections of the Internet, separated knowledge that was believed unwelcome by the Chinese government. Some websites are blocked in China, such as Google Dot Com, YouTube, Facebook, and Twitter. Media attention has been focused on censorship of search results, but not cartographic data. Thus, is cartographic information in

Google Ditu censored in addition to search queries? The main objective of this thesis is to explore map censorship in Google Ditu through Foucault's theory of power/knowledge. Based on Foucauldian analysis of power/knowledge, I argue that Google Ditu is a domain for power practices. I illustrate which map information on Google Ditu is restricted or censored and suggest a possible rationality for censoring. Also, I discuss the importance of analysis of power/knowledge to assess cartographic representations and geospatial technologies.

In order to investigate aspects of power exercise in maps, this thesis suggests an approach to map analysis as qualitative methods as content analysis of maps. I apply Rose's content analysis of visual data to maps. As qualitative methods for visual data enable exploration of the reflection of power, culture, and society, I suggest that qualitative methods should be central methods for investigation of map implications, in this case in Google Ditu. Moreover, the method of content analysis of maps allows investigating maps' content in a replicable systematic way. Given that, this thesis provides an analysis of Google Ditu through the content analysis of map method. In order to detect implications in Google Ditu I compare my data findings from Google Ditu to Google Maps. My results enable me to discuss power presence in maps and particularly in Google Ditu.

My findings are a higher density of labeling in Google Ditu in comparison with Google Maps, the absence of VGI in Google Ditu, the limitation of zoom level at Google Ditu, and the absence of Street View in China. This thesis suggests possible explanations to differences in map information between Google Ditu and Google Maps. Additionally, due to cyber attacks from hackers in late 2009 Google has withdrawn Google China, replacing it with Google.com in Hong Kong on March 22 of this year (The New York Times news story on March 22). This act is a result of a failure of Google to remain in the mainland China; however, it is also a solution as

Hong Kong is a part of China and administered by a pro-Western political system which does not support censorship rules of China. Thus, comparison of maps in Google Hong Kong with maps in Google China and Google Dot Com is vital in order to determine whether maps are censored in Google Hong Kong. [1]

This thesis is not an attempt to assess the degree of censorship in China or to examine the political situation in China, but rather an attempt to provide empirical data about geographic knowledge and analyze it through Foucault's theory of power/knowledge. As China is rising as an economically powerful country, it is certainly important to collect empirical data about geographic knowledge, which might provide some insight into China's geography, culture, society, economy or power relations.

[1] This thesis stops reviewing the story about the Google's move to Hong Kong on March 31, 2010.

CHAPTER II – LITERATURE REVIEW

2.1. Foucault's theory of power/knowledge

In this thesis the analysis of Foucault's power/knowledge is based on the book *"Power/knowledge: Selected interviews and other writings 1972-1977 by Michel Foucault"* edited by Colin Gordon in 1980. Also, the analysis of power is based on the book *"Discipline and Punish: the Birth of the Prison"* by Michel Foucault in 1977. According to Foucault's theoretical concept of power/knowledge, power and knowledge are inseparable and interdependent, because power produces knowledge, and simultaneously, knowledge produces power (1980). Foucault (1980) explained that exercise of power creates knowledge and assembles new bodies of information; he stated that power will never stop depending on knowledge and can not exist without knowledge, because knowledge produces power. Foucault (1977) states that power exhibits *capillary* operations through a routine of regulations that is penetrating in every detail of everyday day life. Foucault (1980) describes power as "relations, a more-or-less organized, hierarchical, coordinated cluster of relations" (198), which operates through a web of networks of relations. Then he suggests that relations of power are co-extensive with a social body; intertwined in relations of family, kinship, sexuality, and production; exist in multiple forms; dominant in unitary strategic, dispersed, heteromorphous forms that are localized; localized effects of power are reinforced by global strategies of power; importantly, co-existing with resistances by which power relations are always opposed. Thus, power is omnipresent in all forms of social relations and exists as complex networks of relations. The most critical effect of ubiquitous power relations is present through political implications of

construction of knowledges that are always related and dependent on power. As power is everywhere its impact on knowledge is inevitable.

Foucault's approach to understanding power is important for evaluating cartographic representations, because power is exercised over space and maps frame spatial phenomena. Until recently, maps were mostly created by state institutions only. Maps were and still are of particular interest for state power, because of importance of space as territory or domain where state power is exercised. Crampton (2003) states that the political is always spatial, because space is struggled over, thus politics take place. He states that mapping is political, because spatial knowledge is produced through mapping and political implications are unavoidable. Also, Foucault's power/knowledge approach is critical to analyze geospatial technologies. According to Dodge and Kitchin (2005), technologies produce spaces and they control human lives. Thus, technologies are of political interest for power, which means that its political implications are inevitable. As maps and technologies produce spaces, the use of power/knowledge approach is appropriate for evaluation of both maps and geospatial technologies.

2.2. Maps as practices of power

Theoretically, maps are domains for practices of power (Harley 1989, Wood 1992, Crampton 2001, and Pickles 2004). Harley in his article "Deconstructing the map" (1989), called for rethinking maps as objective representations of space and for examination of power presence in cartography. His idea about presence of power in maps is derived from Foucault's theoretical concept of power/knowledge. Harley (1989) stated that power is present as a form of knowledge in cartography and power is exercised through cartography externally and internally. Harley asserted that external power in cartography is linked to political power, while internal power is

linked to map-makers. He explained that external power, or political power, uses maps for maintaining state power and internal power is exercised by map-makers who create biased maps due to human subjectivity. It is important to note that division of power to external and internal could be incomplete.

Crampton (2001) stated that more factors of exercise of power should be considered as the silencing power of maps, such as digital divide, disempowering population like the poor, and the power of maps to create biased knowledge. Moreover, Crampton illustrates that cartographic calculations can be serious problems as results of power relations. In his case study in 2006, Crampton discusses the implication of cartographic calculations that took place at the Paris Peace Conference in 1919. Crampton describes cartographic calculation as a geopolitical technique to rationally map spaces. He describes how politics of space at the conference shaped the history in the Balkans in the twentieth century. Crampton illustrates how the new political map was drawn based on territories, races, and citizenships. Importantly, as the lines on the map were drawn without consideration of culture and political identities, serious political repercussions occurred in the Balkans in the last century (Crampton 2006). Additionally, I think that scopic regime or visuality should be considered as an important factor of power exercise through maps. I discuss visuality below (section 2.5).

Another critical analysis of maps has been provided by Wood in his book "*Power of maps"* (1992). Wood explains how maps work. According to Wood, maps work by serving particular interests because they have authors and themes; thus, maps are not objective, but subjective. Pickles (2004) elaborates that the first problem of scientific cartography is subjectivism of maps. Like Wood, Pickles states that the subjective nature of maps means that maps are subjective due to being created by humans. Furthermore, Wood problematizes that the

interests are disguised because the presence of authors is never obvious. Accordingly, Pickles states that perception of maps as objective is the second problem in scientific cartography. Pickles states that the problem with objectivism is that people believe that maps are objective and the state takes advantages of such false beliefs by influencing map users. Importantly, I think another implication of objectivism is that people, believing that maps are objective, do not question maps. Thus, the state or the map maker can take advantage of maps to exercise power, which will not be resisted. This suggests that power exercised through maps is irresistible due to implications of objectivism. Pickles lists his third and last problem as distortion, error and propaganda maps. He explains that distortion, error, and propaganda maps are serious problems, because they misguide map users. I think this problem relates to the problem of objectivism: as people trust maps they could be easily misguided by distorted or propaganda maps.

Pickles in his book *"A history of spaces: cartographic reason, mapping, and the geo-coded world"* (2004) states that his book is inspired by Harley's theorization of maps as practices of power/knowledge. However, Pickles contrasts his interests in maps to Harley's. He states that while Harley was interested in traditional maps, he is interested in a new type of map that democratizes spatial information, but protects military, state and private property interests. Pickles calls for an analysis of "this double crisis of representation – democratization information while representing specific interests" (13). Similarly, I am interested in exploration of aspects of simultaneous liberalization and limitation of information in China, specifically through Google Ditu. With the emergence of the Internet there were hopes that information flow would become democratic throughout the world. However, even though some countries have decided to allow access to the Internet to their citizens, they have imposed strict regulations, as has China. This thesis investigates censorship that takes place in online maps like Google Ditu.

2.3. Suppression of knowledge on maps or map censorship

Harley (1988) states that censored maps illustrate power exercised in a negative and restrictive way. Harley states that map censorship is less obvious than map distortion. He explains that distorted information is easier to detect on a map than hidden information; for example, dislocation of a military base on various maps is more obvious than hiding of the military base by not showing it. Thus, map users should be more critical while using maps for decision-making or research due to the possibility of hidden information. Monmonier (1996) states that maps in the Soviet Union were intentionally obviously censored to discourage enemies from using them. Soviet map makers relocated obvious map features like rivers, towns, or roads in order to misguide enemies and create mistrust in Soviet maps (Monmonier 1996). Places of military importance such as military bases or towns were never shown on Soviet maps. Even today, map makers hide military bases in public maps by requests of the state (Pickles 2004). Furthermore, Harley (1988) indicates that maps hide environmental pollutions due to embarrassment to the government; for example, "nuclear waste dumps are omitted from official USGS topographical maps" (65). Monmonier (1996) illustrates a similar example about Love Canal, a neighborhood in the state of New York, when maps omitted information about environmental pollution that might embarrass industrial polluters or local government. He explains that these maps, by omitting embarrassing information as environmental pollution, misguided local decision-makers who developed residential infrastructure in a polluted area and created unsafe residential conditions for humans. This example illustrates clearly that suppression of information on maps imposes serious implications to public health; therefore, maps should be read carefully due to map misinformation.

Harley (1988) develops a notion of "silences", or hidden political information, on maps. He states that driven by political agenda, map makers may intentionally suppress map information in favor of a one-sided viewpoint. He explains that governments, political, or religious organizations may require hiding "undesirable" information; for example, people who belong to a discriminated against ethnic group or race, or map features that are associated with poverty like alleys in poor neighborhoods. The wide impact of censored maps could lead to devastating results; when map users are misguided by maps in navigation, traveling, or decision-making, they could expose themselves to danger due to map misinformation. As map censorship can impose negative consequences for map users and decision-makers due to the suppression of politically sensitive information, maps should be read with awareness of censorship. Even in modern times maps are censored due to national security, military purposes, political stability, or commercial security. As Google technologies are very popular among internet users worldwide, examination of censorship in the Google geoweb is important.

2.4. Maps as product of visuality

Rose's analyses of production and use of visual images is related to my research as I am interested in production and use of visual materials as cartographic representations. Importantly, historians of cartography have been discussing how maps are socially and historically constructed representations. In her book *"Visual methodologies: an introduction to the interpretation of visual materials"* (2006), Rose states that visual representations are produced by socially and historically constructed visualities. Thus, I suggest that maps are produced by visualities as well. In addition to analysis of visualities, Rose suggests implications of the visual

as vision, ocularcentrism, and simulacrum. As these concepts are important for the analysis of the visual, they should be considered for the analyses of maps as well.

According to Rose, vision is the physical ability of human eye to see, and visuality is the way vision is constructed by culture, society and power relations. Rose states that modern types of understanding of the world depend on visuality, and visuality associates seeing with knowledge. As visuality is constructed, it is much contested, because of certain degree of political freedom for the human eye to see. As visuality is a social and cultural phenomenon of a certain way of seeing the world, it can impact the production of maps as well. As maps are constructed by powers, societies, and cultures, the visuality of these powers, societies, and cultures is reflected in maps. Furthermore, Rose refers to Jay (1993), who described ocularcentrism as centrality of the visual to the modern Western cultures. The idea of ocularcentrism suggests the importance of the visual, thus the analysis of the visual is vital. As maps are visual representations, their social, cultural, and political significance should not be neglected. Rose states that the term simulacrum, coined by Jean Baudrillard in 1988, means that it is impossible to differentiate between the real and the unreal in postmodernity. She explains further that simulacra or simulations dominate visuality in the postmodern world. As simulacrum dominates visuality, and visuality may influence maps, I suggest that the analysis of simulacrum should be considered for the analysis of the role of maps in postmodernity. Rose particularly problematizes visuality as a very complicated and contested concept which needs to be understood through more empirical investigations. I think that analysis of the connection between visuality and maps can help to conceptualize visuality more fully and explore more aspects of map production. Finally, I consider that Rose's problematization of the visual as vision, visuality, ocularcentrism, and simulacra relates to the analyses of maps in terms of

construction, perception, and use. Importantly, the analysis of visuality through maps is needed to fully understand their interconnection.

More specifically, Rose (2003) raises concerns about visuality. She states that multiple visualities construct geographical knowledge and argues that "questions of power and performance must be central to thinking about geography's visualities, and that so, too, should questions of space" (214). It is certain that when multiple visualities create geographical knowledge, social, cultural, and political differences are reflected. This thesis reflects the investigation of differences reflected in geographical knowledge in Google Maps and Google Ditu due to multiple visualities. Rose problematizes use of slides at conferences by geographers as the difference between the photographed referent and its image on the slide is never questioned by presenters and audience. She states that the differences between the image's referent and the slide is relational, because, "it has less to do with size, color, stillness, framing and so on, and much more to do with the difference of relation between the geographer and the slide's referent and the geographer and the slide" (216). Based on Rose's concern about different visualities that construct geographical knowledges, I suggest a diagram of relationship among reality, slide, audience, and presenter (Figure 1).

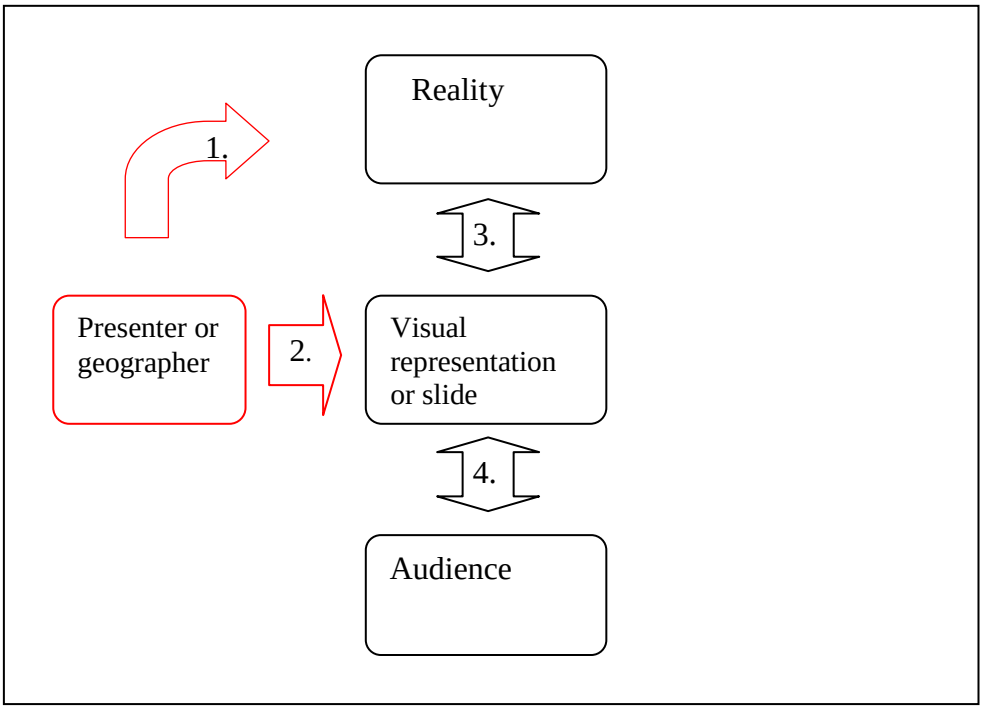

Figure 1. Relationships among reality, visual representation, presenter, and audience.

Figure 1 shows that relationships between various factors in construction and perception of the visual are not equal. Importantly, these visualities are not well explored. Arrow 1 shows how presenter sees reality (subjectivity). Arrow 2 shows what and how presenter shows the reality (choices of color, size, etc). Arrow 3 shows relationship between reality and its image (relational). Arrow 4 shows the connection between image and audience (power of image, reaction of audience). It is clear that the visual never represents true reality, because the visual is created by a presenter who has a certain visuality. Also, the audience's visuality influences how it sees a visual representation, which means that a visual representation is much contested due to the visuality of the audience as well. Importantly, that presenter's visuality may not be clearly reflected in the visual representation if the presenter decides to manipulate the visual to propagate certain ideas.

Epistemological considerations or how data is obtained are critical in analysis of the visual. Stanczak (2007) calls for awareness that epistemological implications of visual data as validity, subjectivity, and rapport should be considered while conducting research. He states that visual data like photographs are biased as produced by the camera, which is a product of positivism. Similarly, aerial images as products of technology like the camera, and maps as products of technologies like GIS are perceived as objective facts from which truth can be inferred and from which reality can be analyzed. Moreover, Stanczak states that subjectivity and the emotional factor in making and reading images should be considered, which raises epistemological concerns about production of images. He discusses techniques of manipulation of image such as crop, light, zoom, pan, content within the frame, angles, and technical consideration in general, such as digital or analog, black and white or color, single-lens reflex (SLR) or automatic. I think that some of these techniques of the manipulation of image production could be used in production and use of aerial images as well; for example, light, zoom, pan, and content within the frame, or in production of maps with color, zoom, pan and content within the frame. Also, Goldstein (2007) agrees that photographs are a brief moment in time and could be manipulated. He argues that all photographs lie and never represent reality, because photographs are created "under the most technically ideal, well-intentioned of circumstances" (64). He states that cameras never replicate human vision because the dimensions and light are not the same as the human eye sees. Finally, the visual is presented by different visual representation like photographs, graphics, and maps; however all are affected by similar factors, such as visuality, ocularcentrism, simulacra and epistemological considerations. I suggest that research of map implications could draw from Rose's conceptualizations of visual.

2.5. Technologies as tools for power practices

It is important to discuss implications of technologies that enable map creation, distribution, and use. Today, maps are created by technology such as GIS for professional use, and by internet technologies such as Google, MapQuest, Microsoft, and Yahoo for public use. I discuss objectivism, production of spaces, and safety as the most critical problems with technologies or code (software). Objectivism is an important problem of technologies, as people mistakenly perceive code as an objective invention. Code is rather a subjective invention, because it is invented by humans. Similarly to objectivism of maps, power takes advantage of objectivism by successfully adapting code for political purposes as people never resist code, believing that it is objective. Thus, people never resist power exercised through code. The second implication of code is production of spaces. Dodge and Kitchin (2005) state that software (code) produces spaces due to technicity and transduction. They explain that technicity is the ability of technology to make things happen and transduction is the ability of technology to transform the way it works. They state that code controls every aspect of human life by producing spaces. Importantly, since code produces spaces, power has particular interest to code, because power is exercised over spaces. The third implication is safety. People perceive code as safe. However, there are implications of code due to the safety of information used or stored by code. Conti (2009) discusses the safety of Google, recalling the incident about the AOL data spill of 2006, when "AOL posted 24 million search queries of 650,000 AOL users on the web" (26), and calls for cautious use of Google services as all searches are stored in Google's servers and could be disclosed.

2.6. Google

In financial terms, Google could be considered one of the largest companies in the world. According to Yahoo! Finance on April 29, 2010, Google's market cap is $167.97 billion, while Microsoft's market cap is $272.12, and Exxon Mobile's market cap is $324.30. Sheppard and Cizek (2008) note that according to Google Corporation, Google Earth was used by over 100 million users during the first year of its release. Zook and Graham (2007 b) consider Google technologies to have the potential to become "killer-apps" of geo-referenced data (1323). Vice and Malseed (2005) state that "by 2003, tens of millions of people daily were searching Google in their native tongues, choosing from a list of nearly a hundred available languages" (142). Udell (2009) recalls that "when Google Maps was introduced in February 2005, it was immediately hailed as a major advance in web mapping" (11). Conti (2009) states that Google Maps are used by 28.9 million users per month. Sauers (2009) mentions that "nearly every Internet user today is familiar with the Google homepage" (57). Additionally, Google Maps encourages development and sharing of annotated personal maps by the function "My maps" and allow printing, sending and linking maps to other websites. Offering free of charge services as searching and mapping, Google has one of the most used online geospatial applications.

Google has created a geospatial web**,** which is a connection of virtual reality with physical reality (Udell 2009). Virtual reality is all information on the Internet referring to geographic locations of geospatial technologies. Geoweb helps to find location-based information. Udell (2009) states that 80 percent of information has a geographic component which could be in data explicitly or implicitly. The geoweb emerged due to mashup. The map mashup was invented by Paul Rademacher in 1995 when he thought of using a single map with all information on it instead of a stack of printouts and maps (Crampton 2010). The mashup is

merging of data from one internet source to another. When Google Maps was "hacked" by programmers to improve its map interactivity in 2005, geo-mashup was developed. Google Maps has become enabled to link geodata from cyberspace to its maps by geo-mashups (Figure 2 and Figure 3). Later, Google released its Maps API (application program interface), and online mapping has become possible.

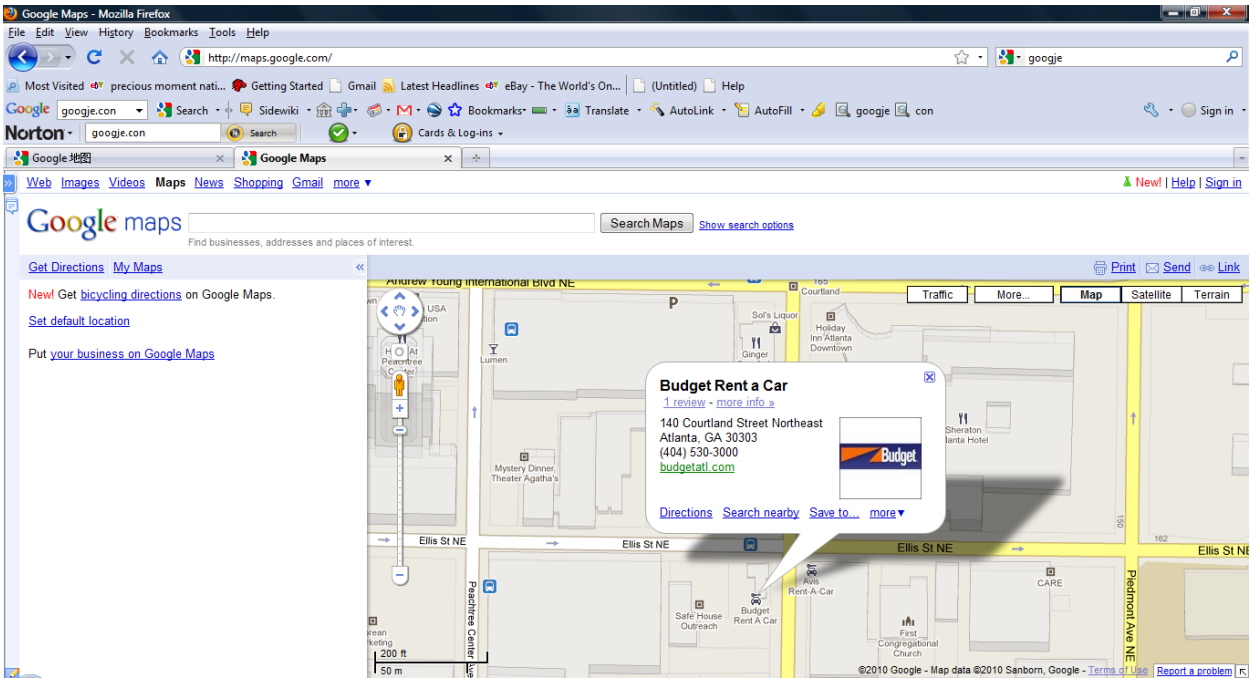

Figure 2. Geo-mashup of "Budget Rent a Car" a business located in downtown Atlanta. (http://maps.google.com/).

Figure 2 shows a geo-mashup for Budget rental car business in Atlanta. Geo-mashups enable users to find place-based information faster and easier. Moreover, geo-mashups enable VGI of photos, videos, real estate and webcams. The term VGI was developed by Goodchild (2007) states that

> "the widespread engagement of large numbers of private citizens, often with little in the way of formal qualifications, in the creation of geographic information, a function that for centuries has been reserved to official agencies. They are largely untrained and their actions are almost always voluntary, and the results may or may not be accurate…..I term this *volunteered geographic information* (VGI), a

> special case of the more general Web phenomenon of *user-generated content*" (2).

As Goodchild terms this phenomenon as VGI, other researchers name it as geoweb (Scharl and Tochtermann 2007), DigiPlace (Zook and Graham 2007 a), neogeography (Turner 2006) or new spatial media (Crampton 2010). As there are various terms for citizen-contributed geographic information, this thesis uses the term VGI. Goodchild (2008) provides his discussions on the effects of VGI for geography. He states that VGI is an opportunity to solve positivist limitations of GIS. GIS was critiqued to be limited as a positivist masculinist result of quantitative revolution, which could be improved through feminist visualizations (Kwan 2002). Elwood (2008) states that research for VGI may relate to theories from participatory, feminist, and critical GIS research. Thus, it is clear that VGI is considered as a potential for expansion of GIS and a subject for research through participatory and feminist approaches.

Google Maps provides an opportunity for user-generated content in the forms of photos, videos, webcams or real estate data (Figure 3). Figure 3 shows Volunteered Geographic Information (VGI), which is enabled by geo-mashups. VGI enables contributing of photos, videos, Wikipedia, bicycling, webcams, and real estate ads by any user. Websites like Panoramio, Flickr, or YouTube allow linking of data to Google Maps. Thus, Google Maps provides an opportunity to organize web information through maps.

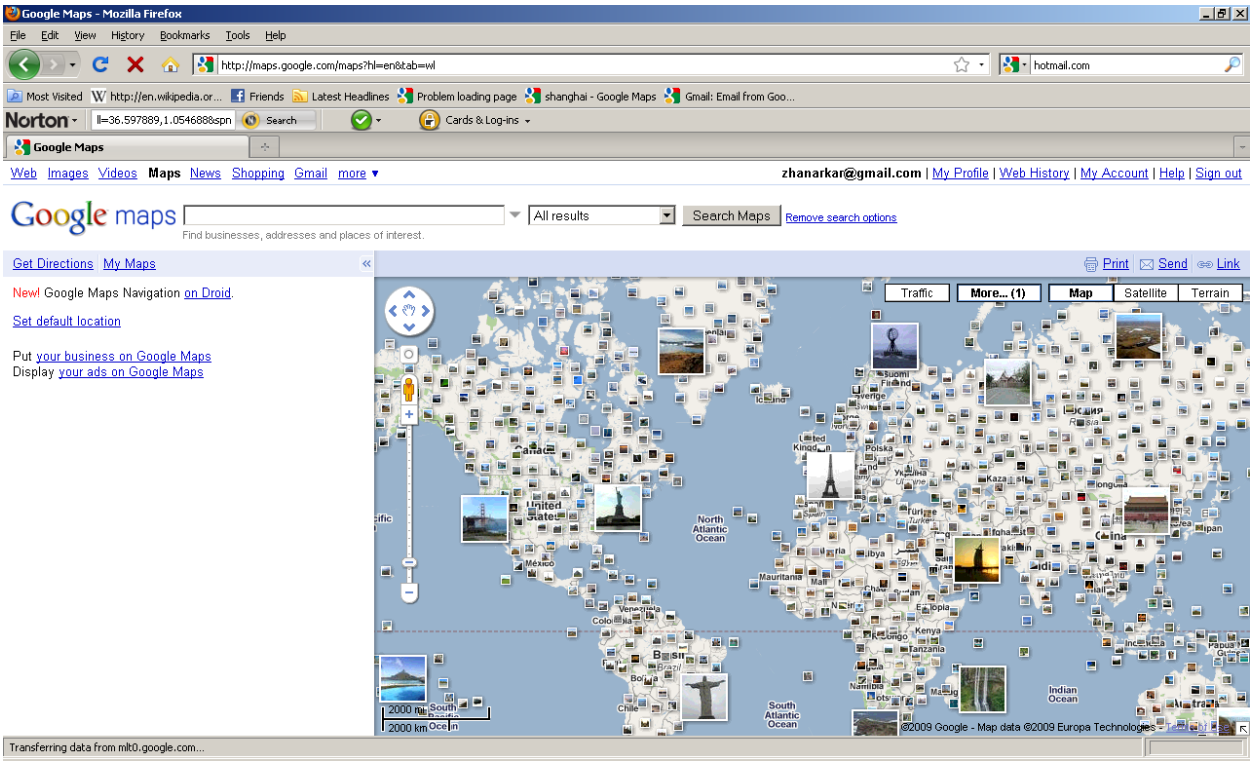

Figure 3. VGI photographs linked to geographic locations on Google Maps are enabled by geo-mashup (http://maps.google.com/maps?hl=en&tab=wl).

2.7. Implications of Google geoweb

Spaces are important to state power, because state power is exercised over spaces. As maps show spatial phenomena, power has a particular interest to maps. Conti (2009) illustrates how information on Google Maps has become important for political leaders who have "raised concerns over the system's power to show sensitive facilities" (195) and requested "obscuring" sensitive locations. I agree that obscuring cartographic information is the same as censoring, thus, it is cartographic censorship, which is the deliberate suppression of map information by hiding places of military and political importance. According to Monmonier (1996), "if knowledge is power, an enemy's knowledge of your weakness and strengths is a threat" (133). I suggest that as Google Maps could show sensitive information, the control of online cartography may become one of the main objectives of state powers.

Also, Google geoweb reflects human biases toward race and culture. Presence of human bias in Google geoweb is illustrated by Crutcher and Zook in 2009 as biased spatial annotations on Google Earth that reflect racial practices. Crutcher and Zook state that spatial annotations on geoweb post-Katrina were spatially uneven, showing more annotations in white affluent neighborhoods than in black poor neighborhoods. Zook and Graham (2007 a) reveal implications of Google geoweb because "Google Maps shades the perceptions of the places that it maps" (467). Zook and Graham illustrate that Google Maps search results show local information that reflects culture and perception of the place.

Importantly, like Facebook, Twitter, and YouTube, Google.com is one of the blocked sites in China as Chinese government regulates the Internet by filtering, censoring or blocking politically sensitive information. In order to operate in China Western search engine like Google changed its search engines and the company was criticized for cooperation with the censorship rules (Caso 2008). According to Zook and Graham (2007 b), Google.com is unavailable in China; the only interface to Google available in China is Google.cn.

More technically, Udell (2009) describes web architecture of Google Maps. He states that Google Maps are coded by XHTML (Extensible Hyper Markup Language, which is used for web programming), CSS (Cascading Style Sheets, a programming language used for web document presentation), and JavaScript (programming scripting language to control applications). Udell states that in order to include geographic data in Google Maps all geographic data should have a single programming language. He states that XML (Extensible Markup Language) or GeoXML is used for all geodata, plus, it has standard coding advances for geodata as KML (Keyhole Markup Language) and GeoRSS (standard format for syndication of blogs and news). While KML is used for linking information in cyberspace to geographic locations by

geographic coordinates, GeoRSS is used for linking news stories by geographic aspect. As Google Maps are created by code and various programming languages consideration of implications of code are vital.

Creation of technologies by humans imposes serious political implications due to biases and power relations. For example, computer programmers and managers can manipulate software architecture. Zook and Graham (2007 a) state that "code is almost malleable but is ultimately structured by the desires and constraints imposed by its programmers and managers" (466). Google geoweb is coded by various programming languages; therefore its code could be manipulated. Also, any software could be hacked or broken. It is important to consider not only manipulability of code, but also vulnerability of code due to hacking or cracking (malicious hacking).

CHAPTER III – METHODOLOGY

3.1. Research question

Broadly, applying Michael Foucault's theory of power/knowledge, I inquired in what way political implications in cartography are expressed in Google Ditu. Specifically, in my empirical investigation of Google Ditu, I searched for the limitations of map data within China's borders.

3.2. Case study – Google China

China remains the only country in the world that has a Communist government where economic reforms led to significant economic progress during past thirty years. The Chinese government has liberalized economic reforms, bringing foreign direct investment to the country and making a transition from a bureaucratic to a market-oriented economy. As a result of the reforms China emerged as a country of economic and geopolitical importance in the regional and the global scale, and became attractive for foreign investors as well as for Google. Vice and Malseed (2005) quote one of the Co-founders of Google, Larry Page, saying that "China is obviously a very exciting market in general and also for Google" and "there's tremendous opportunity for us there with our existing market share to make money through adverting" (271). Gorman and McLean (2009) state that Google's goal is expansion of the Internet that will lead to making profit through advertising (Google's revenue from advertising was $10.5 billion in 2006). According to *The New York Times* in March 24, 2010 Google revenue is $173.7 billion. However, Google has faced difficulties entering the Chinese market. China's censorship rules have become a barrier for the successful operation of Google in China, which have led Google to self-censoring (Jeanneney 2007). Liberalization of the economy did not bring them liberalization

of the Chinese society in this respect, but rather the increase of the traditional state control. The government controls the society through media censorship, which is important for the Communist party as "the media are supposed to act as mouthpieces for the Communist party" (Jernow 1993, 228). Atkins (2003) asserts that information-sensitive states like China use state power to restrict media openness. Kalathil (2003) examined the centralized media sector in China and revealed that local and foreign media and internet companies complied with censorship rules, avoiding political content "while providing a variety or 'softer' content designed to attract advertising and readership" (489). Kalathil states that some companies have been testing boundaries of censorship rules; however, the boundaries remained determined by the central government.

Researchers problematize the lack of global regulations for the use of the Internet. Ellison (2000) states that "technologies of the Internet have developed in the climate of moral responsibility" (27), because there is no global set of regulations for the Internet and only a few countries, such as China, Singapore, and Australia have attempted to regulate the Internet by strict regulations. Miller (2009) analyzes concerns of the American government about censorship by Google in China and states that the relationship between state and Multinational Corporations (MNCs) is based on state-firm diplomacy. Miller states that the American government is obligated to protect the interests of American MNCs even at the international scale; however, "there is no written doctrine in the American Constitution addressing corporate responsibility" (287), and private companies are independent and free due to deregulation of the market economy. Miller suggests that American government should exercise soft power or a method of embarrassment, when limited to exercise hard power or a method of direct involvement over corporations by legislations.

3.3. Method

In order to identify political implications as intentional limitations of Google Ditu, I used visual methodologies as content analysis of visual data. As Google Ditu is visual, employment of visual methodologies is appropriate for analysis of Google Ditu. Rose (2006) suggests several visual methodologies for analysis of visual materials as semiology, psychoanalysis, content analysis, and discourse analysis.[2] I choose content analysis of visual data as it aims to analyze and decode visual representations through systematic and replicable ways by seeking patterns throughout categorized data. I propose to apply this method to maps. I agree use of the content analysis of visual data method to analyze maps in critical cartography is appropriate as critical cartography seeks to analyze and decode maps. As Google Ditu is constructed by visual materials such as maps, aerial images, and terrain maps, application of content analysis of visual data for analysis of Google Ditu is appropriate.

According to Ball and Smith (1992), content analysis is a major systematic and empirical method for analyzing documentary data. The authors state that the content analysis method was codified in Berelson's "Content analysis of communication research" in 1952. The authors point out that the method was used for written material rather than for audio or visual data, which are also forms of communication. Ball and Smith propose application of the content analysis technique for visual representations such as photographs and propose six steps for using the method: selecting a topic; selecting a documentary source; designing a set of categories; creating a set of instructions for using the categories to code the material; creating a basis for sampling the documents; and counting the frequency of a given category in the document sampled. Rose (2006) proposed Four-step instructions for using content analysis of images as finding images,

[2] Rose indicates that she studies photographs, but not maps.

devising categories for coding, coding, and analyzing data. I applied Rose's Four-step instructions to use content analysis of visual data for content analysis of Google Ditu.

Importantly, Ball and Smith (1992) indicate that content analysis is limited to data that is expressed in communication rather than to hidden meanings of the communication data or motives of construction of that data. I believe that analysis of hidden meanings or motives of construction of communication data is very challenging due to lack of relevant data about the purpose of the creation of a communication material in particular ways. I think that the comparison of results of the content analysis of geospatial data from Google Ditu with the results of the content analysis of data from Google Maps enables the investigation of differences. The detection of differences in the same type of data from different sources will allow hypothesizing hidden meanings or motives of the construction of data. Thus, I think that comparison of data from Google Ditu and Google Maps is an appropriate technique to analyze hidden meanings.

Rose's four-step instructions for use of the content analysis method for Google Ditu and Google Maps:

1) Rose's first step involves finding images and sampling. I took images from Google Ditu http://ditu.google.cn and Google Maps http://maps.google.com. As I needed to obtain the same data on Google Ditu that is seen from China, I decided to use a Chinese Internet Protocol (I.P.) address. However, the comparison of the cartographic data from Google Ditu accessed showed no difference whether accessed through U.S. I.P address or the Chinese I.P. address (see Figure 4. and Figure 5). Thus, I decided to use my local I.P. address (U.S. I.P. address). The comparison of Google data accessed via U.S. and Chinese I.P. addresses was necessary to examine if the I.P. server was filtering.

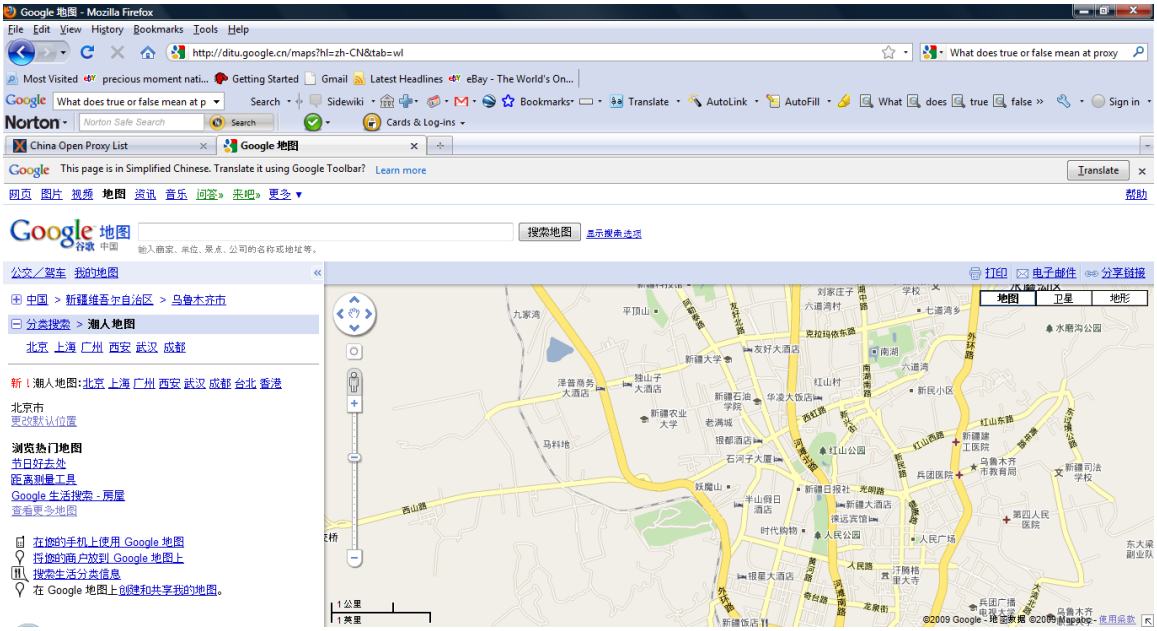

Figure 4. Urumqi. The map accessed through the U.S. I.P. address (http://ditu.google.cn).

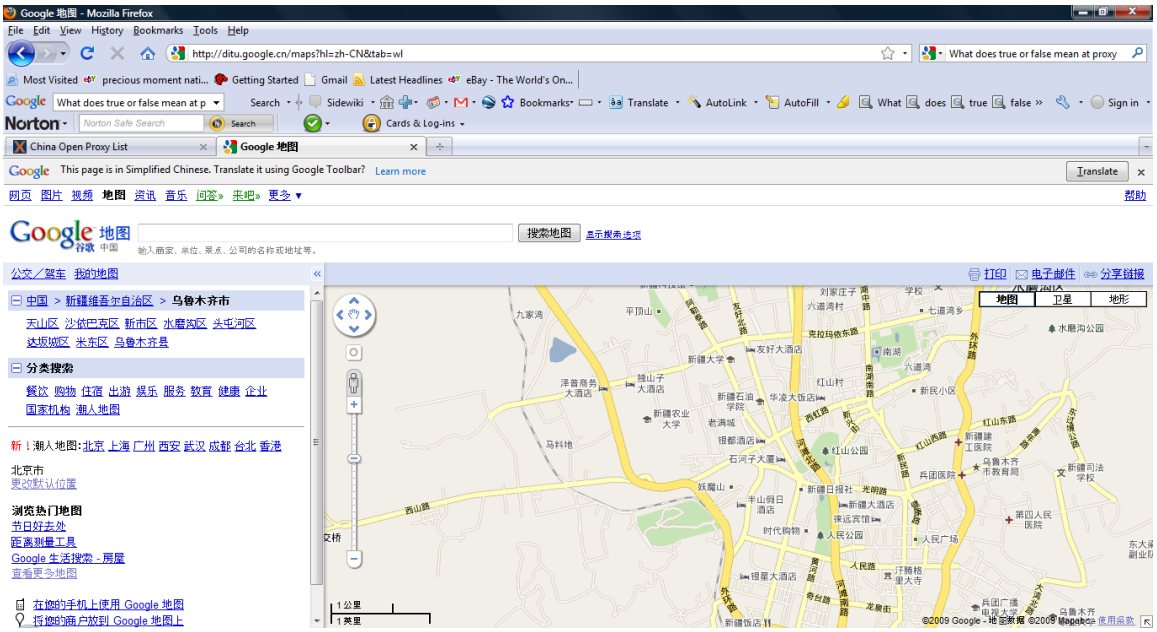

Figure 5. Urumqi. The map accessed through a Chinese I.P. address (http://ditu.google.cn).

As there are no differences between Figure 4 and Figure 5, and both figures show the same maps, I accessed Google Ditu through my local U.S. I.P. address. I went to Google Ditu http://ditu.google.cn via my local I.P. address and took samples from ten places within China's boundaries: five major cities and five small towns (Table 1.) I took five samples for each place

from map layer at different scales as 20m, 50m, 100m, 1km, 5km, and five samples from satellite layer at scales at 20m, 50m, 100m, 1km, and 5km.[3] I took the same samples from Google Maps http://maps.google.com. The total of samples from both Google Ditu and Google Maps is 200. Even though my data is limited to these five zoom levels, I believe it accurately reflects the degree of detail in Google Ditu and Google Maps, because these zoom levels show smaller regional units as neighborhoods.

Table 1. Ten places for sampling.

	Places	Population	Geographic Coordinates
1	Urumqi	over million	43.8054 N, 87.5922 E
2	Shanghai	over million	31.2149 N, 121.4847 E
3	Beijing	over million	39.9071 N, 116.3745 E
4	Guangzhou	over million	23.1196 N, 113.2446 E
5	Chongqing	over million	29.5191 N, 106.5189 E
6	Dayu	under 100.000	25.3958 N, 114.3501 E
7	Hubin	under 100.000	34.7789 N, 111.2022 E
8	Boleshi	under 100.000	44.9048 N, 82.0728 E
9	Nuingchi	under 100.000	29.6522 N, 94.3593 E
10	Genge	under 100.000	20.7766 N, 121.5186 E

2) My second step of devising a set of categories for coding for the map layers:

a) density of labeling for fixed categories (see Table 2);

b) mapping company;

c) date of a map information;

d) Volunteered Geographic Information (VGI);

e) map mashups;

f) Street View;

[3] I did not sample maps at all existing zoom levels. I sampled five maps at the (if available) closest zoom levels including 20m, 50m, 100m and two zoom levels as 1km and 5km for each city.

Table 2. Categories of label densities [4]

1	street	street name, railway name, highway label
2	transp	bus stop, subway station, railway station, airport, wharf
3	label	any place or area label
4	med	hospital, health clinic, drug store
5	edu	school, university, library
6	wors	temple, places of worship
7	water	reservouir, river, lake
8	park	park, mountain
9	serv	services: hotel, restaurant, coffee shop, tea house, bank, car repair/rent, hair cuttery, store, shopping plaza, gas st
10	gov	government buildings: congress, ministry
11	priv	private company
12	build	building, (a small dot is used as a symbol), building could be public or private organization
13	publ	public services: phone, post office, restroom, police station, parking
14	A/S	arts and sports: museum, exhibition, aquarium, gymnazium, theatre, movie theatre

A set of categories for coding for the satellite imagery layers:

a) density of labeling for fixed categories (same as Table 2);

b) company that provided an image;

c) date of an image;

d) VGI;

e) map mashups;

3) My third step is coding of the material by attaching codes to images; organizing codes in Excel table.

4) The last step is analyzing results such as counting codes and searching for differences between content analyzed data from Google Ditu and Google Maps.

Finally, I suggest the method of content analysis of maps is the most appropriate to analyze political implications of censorship in Google Ditu. It enables explorations of various details in Google Ditu through comparison with Google Maps.

[4] The categories are created by me, thus; implications due to researcher's subjectivity should be considered.

CHAPTER IV – DISCUSSING RESULTS

Following the four-step instructions for content analysis of maps method, I have gathered data, coded data based on coding categories, and analyzed the results. My analysis allows me at least partially to answer my research question about the degree to which power is exercised through Google Ditu. Moreover, specific aspects of power exercise through Google Ditu have been determined that enable me to discuss not only the fact the power is exercised, but how it is exercised through Google Ditu.

4.1. Finding - Higher density of labels in Google Ditu versus Google Maps

Based on the first step of the method of content analysis of maps, I collected 200 samples from Google Ditu and Google Maps. The samples from Google Ditu are from ten places in China from map and satellite layers at five different zoom levels. The same samples were taken from Google Maps. The data is organized in graphs and Excel tables.[5] The summary of label density counts is presented in Table 3.

Table 3. Total of coded results for ten places.

	Places	CN map	COM map	CN satellite	COM satellite
1	Urumqi	200	163	169	44
2	Shanghai	313	247	270	72
3	Beijing	290	277	289	69
4	Guangzhou	414	282	292	78
5	Chongqing	211	183	195	69
6	Dayu	182	148	101	0
7	Hubin	245	192	213	0
8	Boleshi	194	143	157	0
9	Nuingchi	173	112	101	26
10	Genhe	103	78	99	7
	Total	**2325**	**1825**	**1886**	**365**

[5] See the graphs on pages 57-60.

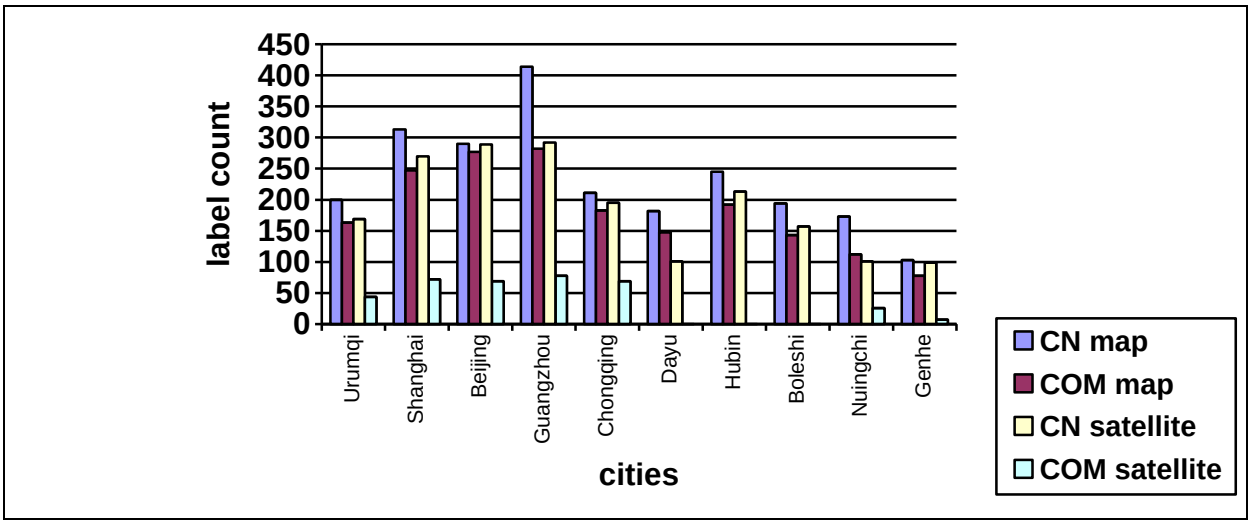

Figure 6. The graphical representation of the Table 3.

Table 3 shows the total count of all labels from Google Ditu (CN) map and satellite layers and Google Maps (COM) map and satellite layers. It shows that there is *more* labeling in Google Ditu maps with 2325 labels total versus 1825 labels total at Google Maps map layer. The more significant difference is between satellite layers with 1886 labels total at Google Ditu and 365 labels total at Google Maps satellite layers. Based on Table 3, it is clear that there is more labeling in map layers of Google Ditu than in map layers of Google Maps by 12%, and more labeling in satellite layers of Google Ditu than in satellite layers of Google Maps by 67%. Thus, from Table 3 we can infer that there is more labeling in Google Ditu rather than in Google Maps.

The higher density of labels in Google Ditu indicates several aspects of map creation in Google Ditu. Firstly, it means that map information is not limited in regard to labels, thus, it is very probable that state power is not exercised regarding labels. The map labels are needed to show geographic information as names of human and physical features which help in navigation, directions, transportation, or education. The map labels show where places are and what is around these places. Also, the map labels show names of places or map features, for example, Shanghai (Figure 7).

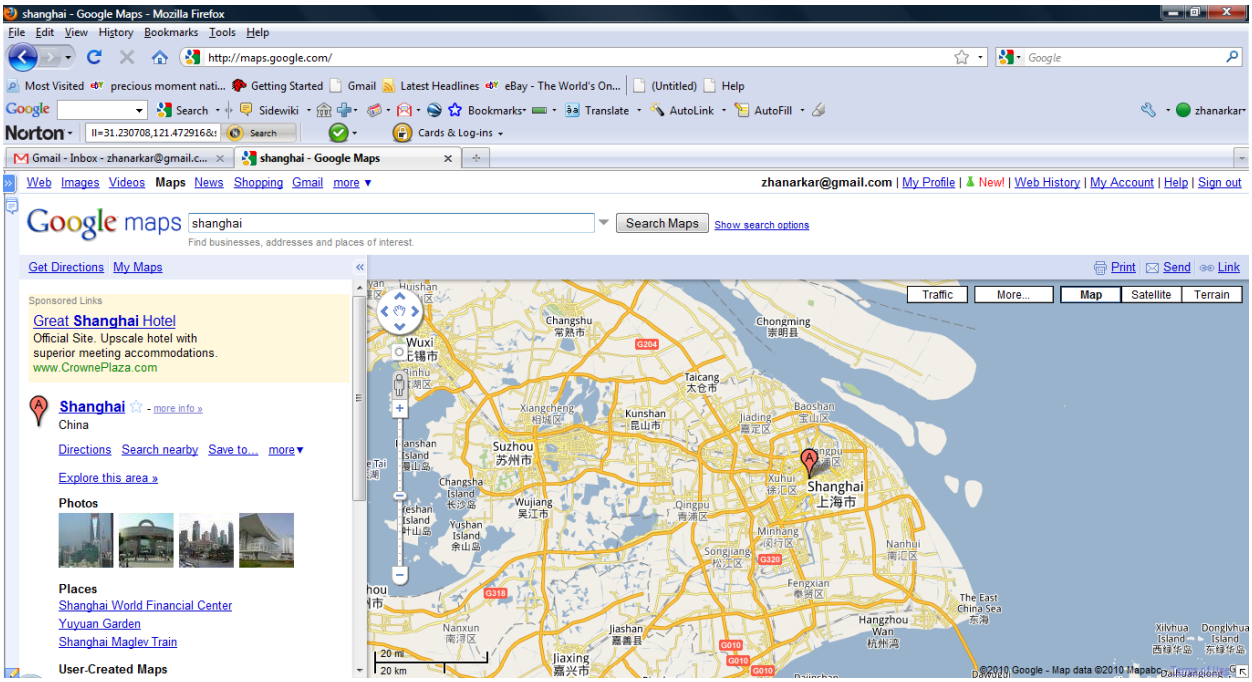

Figure 7. Google Maps map layer showing Shanghai, China (http://www.maps.google.com).

Figure 7 shows the location of Shanghai in China. The place label is placed in downtown Shanghai. Google Maps search bar can find Shanghai if it is typed in the search bar. It means that place labels play an important role in place finding through Google search.

It is also important to differentiate between place names and place-symbols. The place names are just names of places, usually for places stretched over some area, for example, a city or district, while place *symbol* refers to a particular place, for example, restaurant, school or park. Universally, the "fork and knife" symbol is used for restaurant, "school board" for school, "tree" for park, "bed" for hotel, "teapot" for tea house, etc. Google Ditu and Google Maps use place symbols for most places; however, some places in the same category can have a different symbol. For example, Kentucky Fried Chicken (KFC) restaurant has its brand symbol on Google

Ditu and Google Maps (Figure 8).

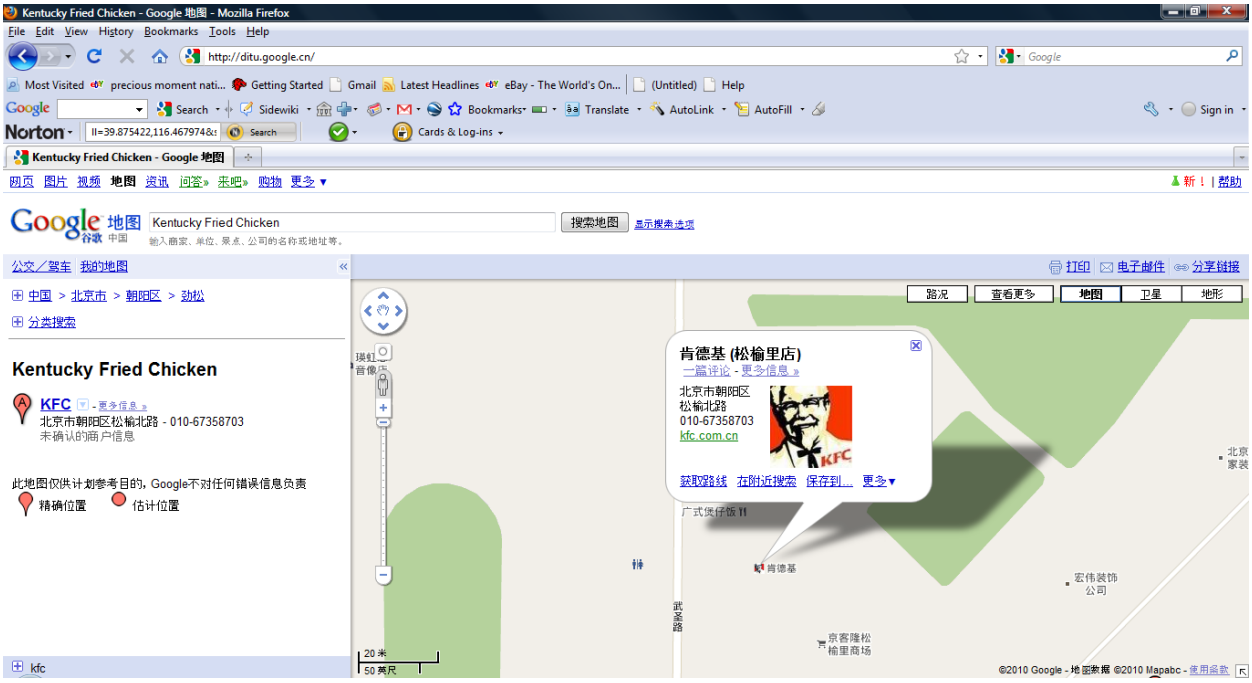

Figure 8. Google Ditu map layer showing a KFC restaurant in Beijing and its geo-mashup (http://www.ditu.google.cn).

Figure 8 shows a KFC restaurant in Beijing. The restaurant is shown with the KFC brand symbol. It is interesting to observe the difference in labeling of places within the same category, in this case in the restaurant category. The symbols for banks create a similar example (Figure 9). Some banks in Google Ditu and Google Maps are shown with a symbol of "four stories building," but some banks are shown with their brand symbols, which are usually composed of bright colors like red, blue or green. In my opinion, the use of brand symbols on a map is a marketing technique that differentiates places from other similar places. The brand symbols show that a place is exclusive and different, not like other places in the same category.

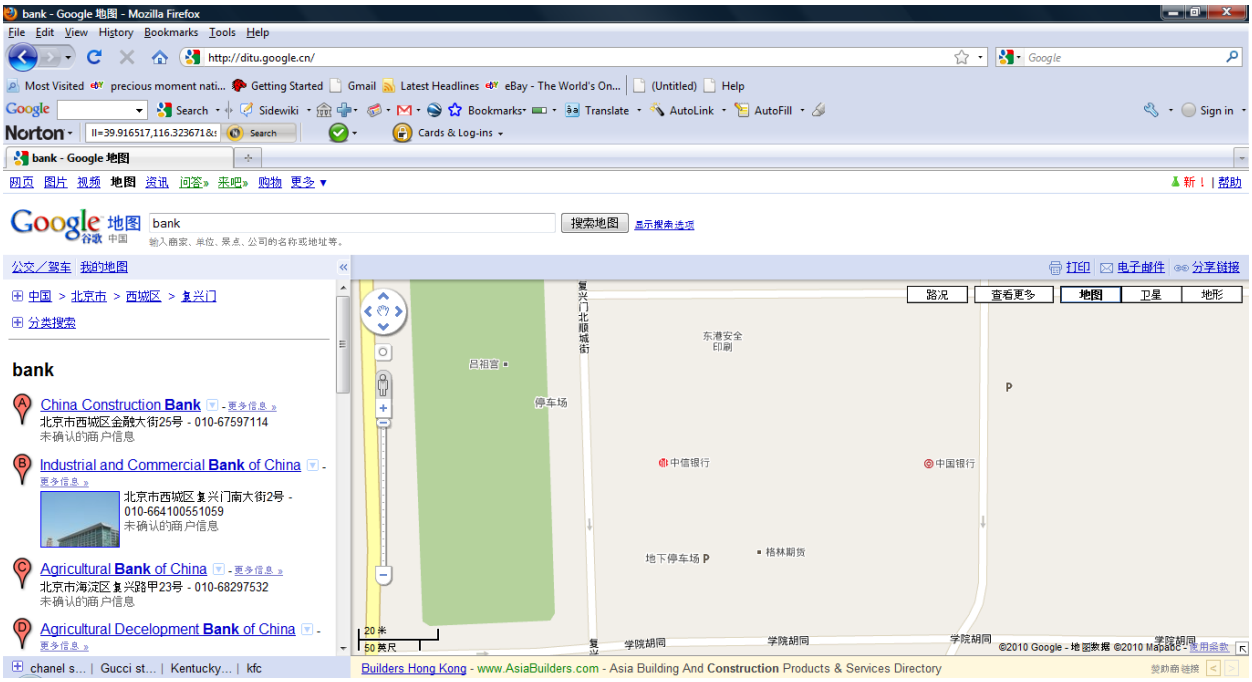

Figure 9. Google Ditu map layer showing two banks in Beijing (39.912514 N, 116.358164 E) (http://www.ditu.google.cn).

Figure 9 shows two different symbols for places within the same category, in this case, for banks. The symbols for the banks are of different design. Also, the bank on the left is bright red and the bank on the right is burgundy. Google online services are the most used in the world, thus it is critical for businesses to be shown in Google geoweb. Google provides its services to users for free, but it generates profit through advertising. It is interesting to observe that advertising takes place in Google Maps not only through showing businesses, but through showing brand symbols of businesses. It is important to note that not all places are shown by their brand symbol; some places are shown just by a generic symbol referring to a certain category.

My observations led me to discover how users can advertise through Google. Any user who has an account with Google can advertise through Google AdWords (Google AdWords – online advertising by Google). Businesses advertised through Adwords are shown on Google

Maps. Interestingly, businesses can choose to advertise locally or globally depending on types of services or products. Thus, advertising locally in China results in more map symbols in China visible for Google Ditu users only. I argue that higher density of labeling in Google Ditu than in Google Maps is the result of higher advertising locally in China. Advertising through maps shows how map creation shifted from state controlled to commercial controlled by a company such as Google. I suggest that advertising through labels implies a neoliberal aspect of map creation. Based on Foucauldian analysis of power/knowledge, it is certain that state power is not exercised through Google Ditu in regard to labels, because labels show advertising. Instead, I suggest that commercial power is exercised, which uses labels for commercial interests. The rise of commercial power in maps suggests that economic development is becoming a higher priority than traditional state control.

4.2. Absence of VGI in Google Ditu

My findings show that Google Ditu omits VGI. It is common to see VGI in Google Maps as it allows experiencing places through other peoples' geographic experiences and sharing our own geographic experiences with others. For example, anyone can tag photographs, videos, webcams, Wikipedia articles, and real estate (Figure 10).

Figure 10 shows VGI of videos from YouTube on the world map in Google Maps. Google Maps shows that videos are available for the entire world in all countries, including some islands. We can see that there are videos in China as well. In contrast to Google Maps, Google Ditu does not have VGI, and it is very likely that Google Ditu deliberately excluded that feature (Figure 11 and Figure 12).

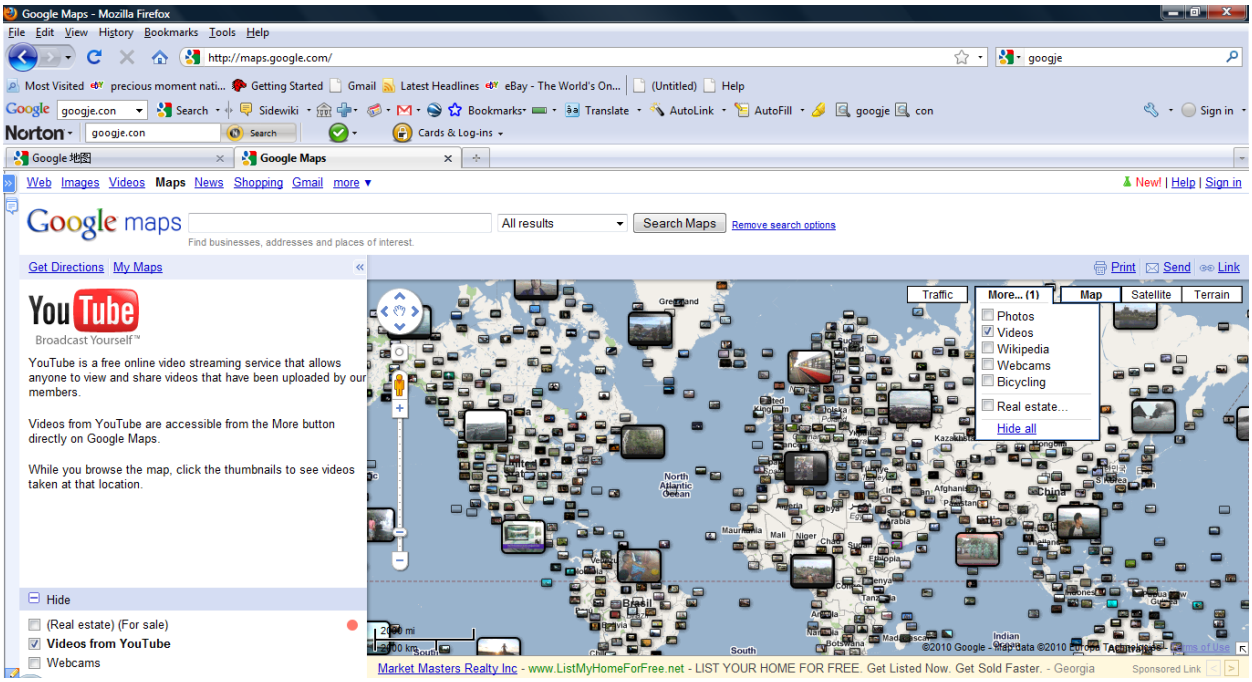

Figure 10. VGI of videos from YouTube (http://maps.google.com/).

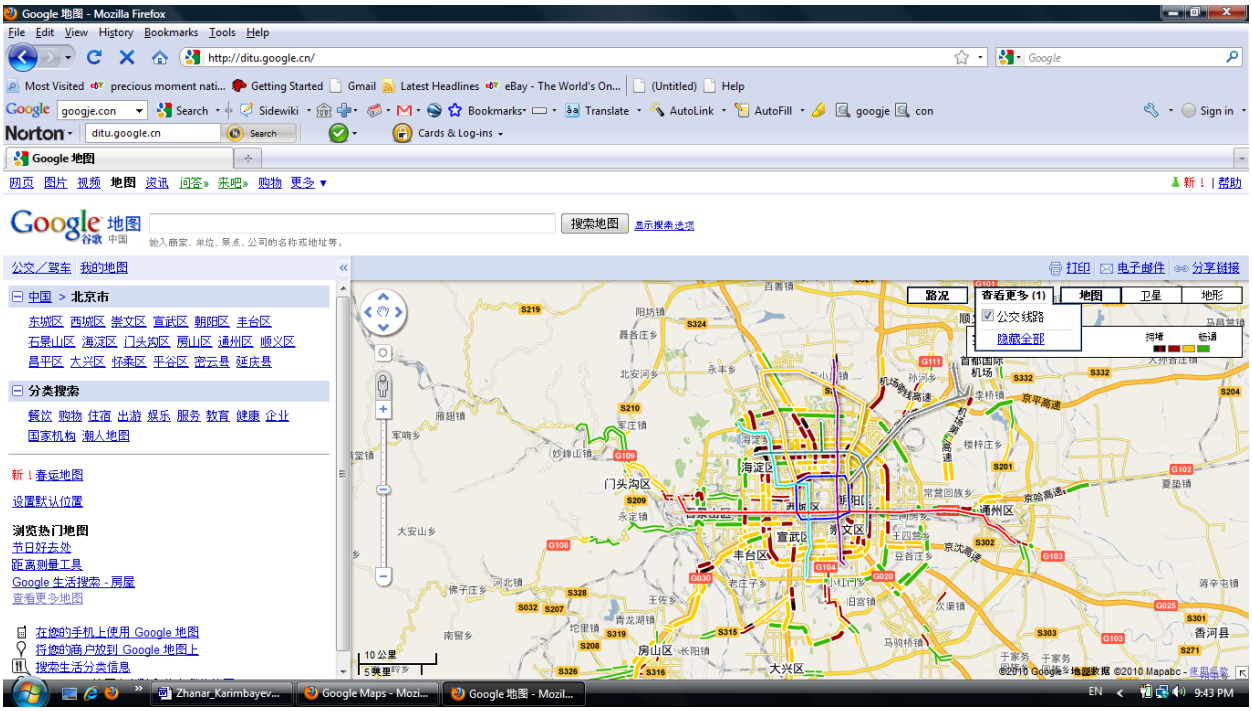

Figure 11. Google Ditu map of Beijing shows transit routes and traffic only. (http://ditu.google.cn).

Figure 11 shows that Google Ditu has traffic and transit route features available, which are available on Google Maps as well. However, VGI of photographs, videos, webcams, and real

estate are unavailable on Google Ditu. It is a very critical difference between Google Maps and Google Ditu, as it shows that VGI is banned in Google Ditu. It is not clear by whose decree it is banned, whether the Chinese government or Google Corporation, but it is highly likely that power is exercised through Google Ditu by blocking VGI. Absence of VGI indicates that the tagging of places by citizens with quality data including photos, videos, webcams, Wikipedia articles, and real estate is not available. Quality data provides deeper insight into a location by telling stories through photos or videos; moreover if historical images or videos are tagged, they can tell history of places. The block of VGI in Google Ditu means that Google Ditu users in China see maps that show urban and natural environment data, but they can not see the same maps with user generated information such as photos or videos that can provide qualitative information. Moreover, it is important to note that VGI is unavailable not only for China in Google Ditu, but for the entire world as well (Figure 12). If VGI was available for some regions while being unavailable in China, it would raise questions why it is unavailable in China. It is likely that VGI was blocked for the entire world to avoid questioning.

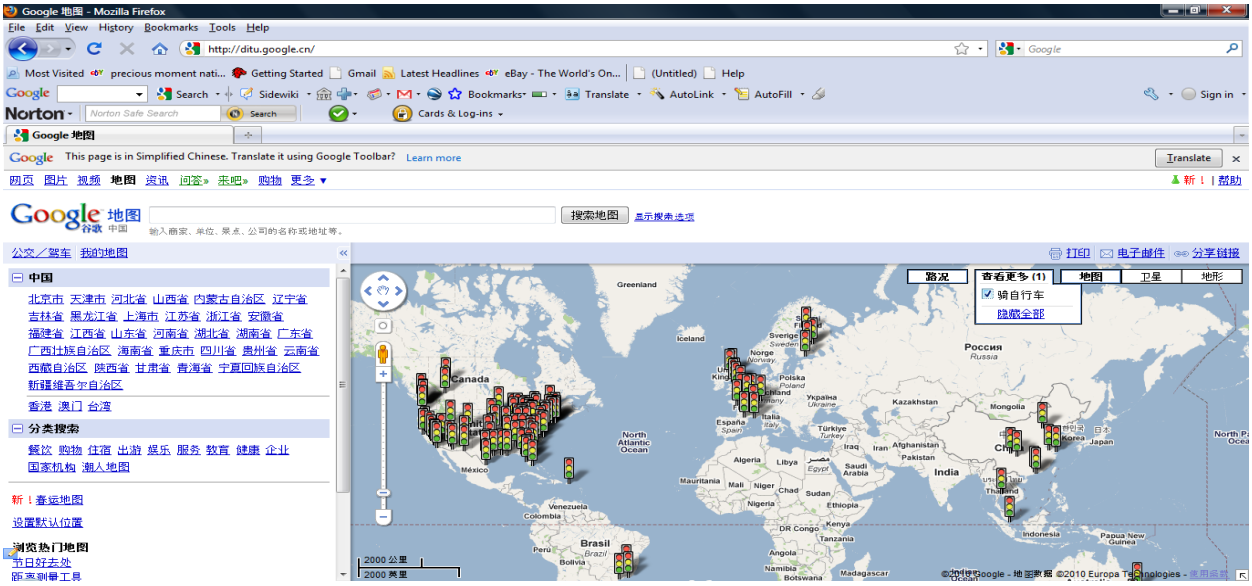

Figure 12. Google Ditu map layer for the world showing traffic and transit routes (http://ditu.google.cn).

Figure 12 shows that VGI is unavailable for the entire world in Google Ditu. The only available features are traffic and transit routes. I suggest that by blocking VGI for China, Google blocked VGI for the world as well, so Google Ditu users would not see VGI at all. Blocking of VGI in Google Ditu is censoring of data that could have been available for Google Ditu users. Also, it is important to imagine why VGI would be blocked in China. One possible explanation is political stability achieved by showing people "safe" information that will enable state power to maintain control. The method for stability is prevention of VGI with political content that may be of political concern for the Chinese government; for example, photos or videos of Tiananmen protests in 1989 tagged to the Tiananmen Square. That type of information is considered as "dangerous" as it reminds people about the political events that have been oppressed by the totalitarian regime (Gorman and McLean 2009). Other possible explanation is to prevent dispersion of power through VGI. It is likely that state power continues maintaining concentration of power that works from top-down. It is certain that user-generated content is currently unavailable in China and all online mapping must be approved by the state. Overall, I

suggest that the blocking of VGI in Google Ditu is a significant indicator that exercise of power takes place through Google geospatial technologies in Google China.

As VGI is enabled by geo-mashup, investigation of geo-mashup for physical locations in Google Ditu is vital. Geo-mashup of locations can show important information about a certain location such as a restaurant or school. By clicking on any place symbol on Google Maps we can see all necessary information that is needed at first, including address, website address and photo of a place. Google Ditu allows that feature for any place (Figure 13).

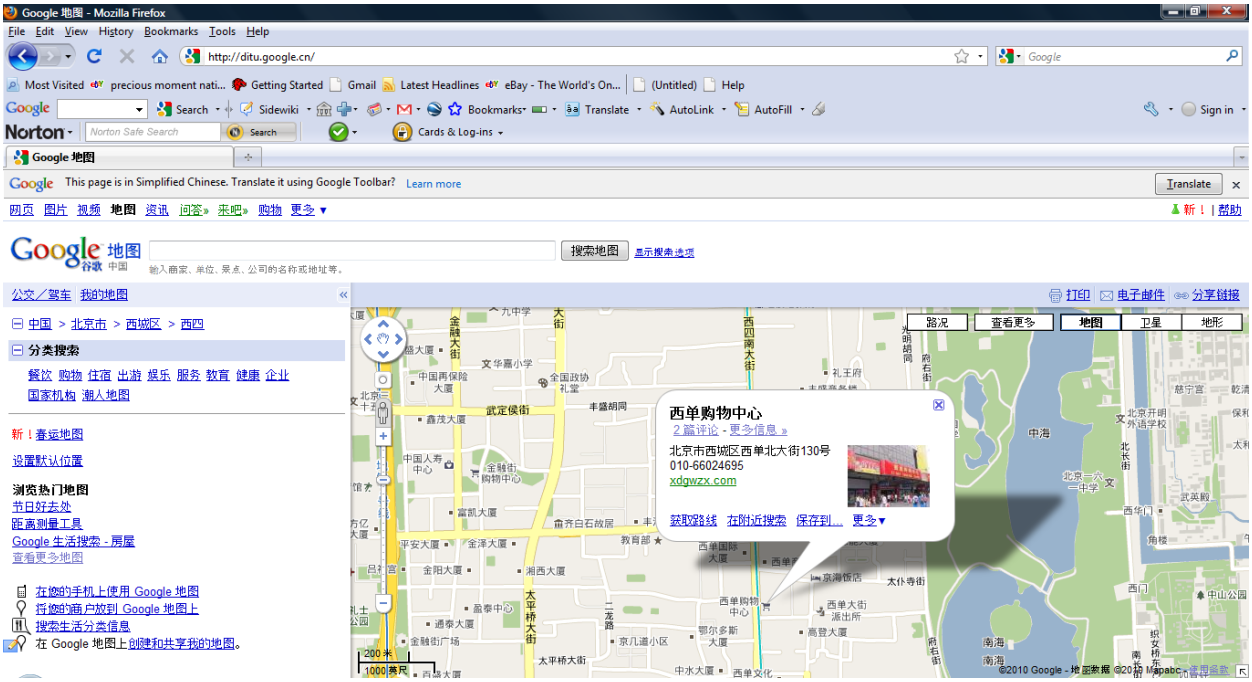

Figure 13. Google Ditu map layer shows downtown Beijing and a geo-mashup for a supermarket (http://ditu.google.cn).

Figure 13 shows geo-mashup for the supermarket in Beijing in Google Ditu. I think it is an important feature that allows Google Ditu users to find location-based services and businesses to advertise themselves in Google Ditu. Moreover, Google Ditu users (potential travelers) can navigate to any country and find location-based services (Figure 14). Figure 14 shows a geo-mashup for a hotel in New York in Google Ditu. It means that geo-mashups for physical

locations are available in Google Ditu for any country where geo-mashups are created in Google Maps. Geo-mashups for physical locations are very useful features that help Google Ditu and Google Maps users to find location-based information faster and easier by using Google geoweb. I suggest this feature is not blocked because it does not impose any threat to the state power as it links place symbols on maps to place information like address, phone, website, and a photo.

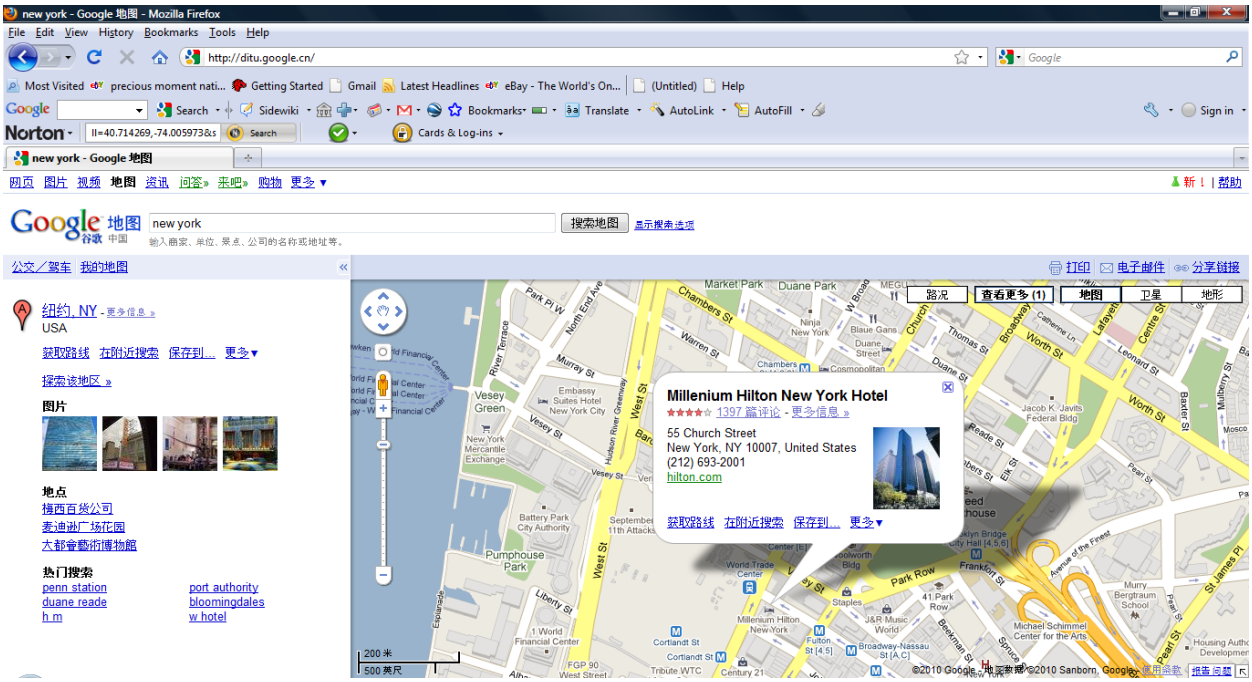

Figure 14. Google Ditu map layer shows Manhattan, New York and a geo-mashup for Millennium Hilton New York Hotel (http://ditu.google.cn).

4.3. Limitation of zoom level in satellite layers of Google Ditu

Analysis of data from Table 4 shows that 20m satellite layer is unavailable in Google Ditu. It means that satellite layers of Google Ditu start showing at 50m zoom level versus 20m zoom level in Google Maps. However, Table 5 shows that not all places have 20m satellite layer at Google Maps. Urumqi, Beijing, Chongqing, Hubin, and Genhe have 20m satellite layer, while Shanghai, Guangzhou, Dayu, Boleshi, and Nuingchi do not. Comparison of Table 4 and Table 5 suggests that Google Ditu satellite layers are set for minimum 50m zoom level and Google Maps

satellite layers are set for minimum 20m zoom level. It seems that Google Ditu demonstrates that there is one consistent minimal closest zoom level for its satellite images, while Google Maps show that there is inconsistent minimal zoom level for its satellite images. I think by showing available 20m satellite images Google Maps demonstrates that its geoweb could be developed further through addition of closer satellite layers.

Like Table 4 and Table 5, Figure 15 and Figure 16 show that the same satellite image could be available in Google Maps and unavailable in Google Ditu. It is clear that limitation to 50m zoom level in Google Ditu is intentional. The possible reasons for limitation of zoom level in Google Ditu could be security or ethical considerations; however, it is not clear by whom it is requested whether the Chinese government or Google.

Table 4. Google Ditu satellite layer availability

	Places	20m	50m	100m	1km	5km
1	Urumqi	no	yes	yes	yes	yes
2	Shanghai	no	yes	yes	yes	yes
3	Beijing	no	yes	yes	yes	yes
4	Guangzhou	no	yes	yes	yes	yes
5	Chongqing	no	yes	yes	yes	yes
6	Dayu	no	no	no	yes	yes
7	Hubin	no	yes	yes	yes	yes
8	Boleshi	no	yes	yes	yes	yes
9	Nuingchi	no	yes	yes	yes	yes
10	Genge	no	yes	yes	yes	yes

Table 5. Google Maps satellite layer availability

	Places	20m	50m	100m	1km	5km
1	Urumqi	yes	yes	yes	yes	yes
2	Shanghai	no	yes	yes	yes	yes
3	Beijing	yes	yes	yes	yes	yes
4	Guangzhou	no	yes	yes	yes	yes
5	Chongqing	yes	yes	yes	yes	yes
6	Dayu	no	no	no	yes	yes
7	Hubin	yes	yes	yes	yes	yes
8	Boleshi	no	yes	yes	yes	yes
9	Nuingchi	no	yes	yes	yes	yes
10	Genge	yes	yes	yes	yes	yes

Another important difference is that 50m, 100m, 1km, and 5km satellite layers at Google Ditu are digitized while only starting 5km satellite layers at Google Maps are digitized. Thus, Google Ditu provides digitizing for all available satellite layers (Figure 15), while Google Maps digitizes only starting from 5km zoom level. In my opinion, the absence of digitizing up until 5km satellite layer in Google Maps doesn't seem intentional, but rather undeveloped (Figure 16).

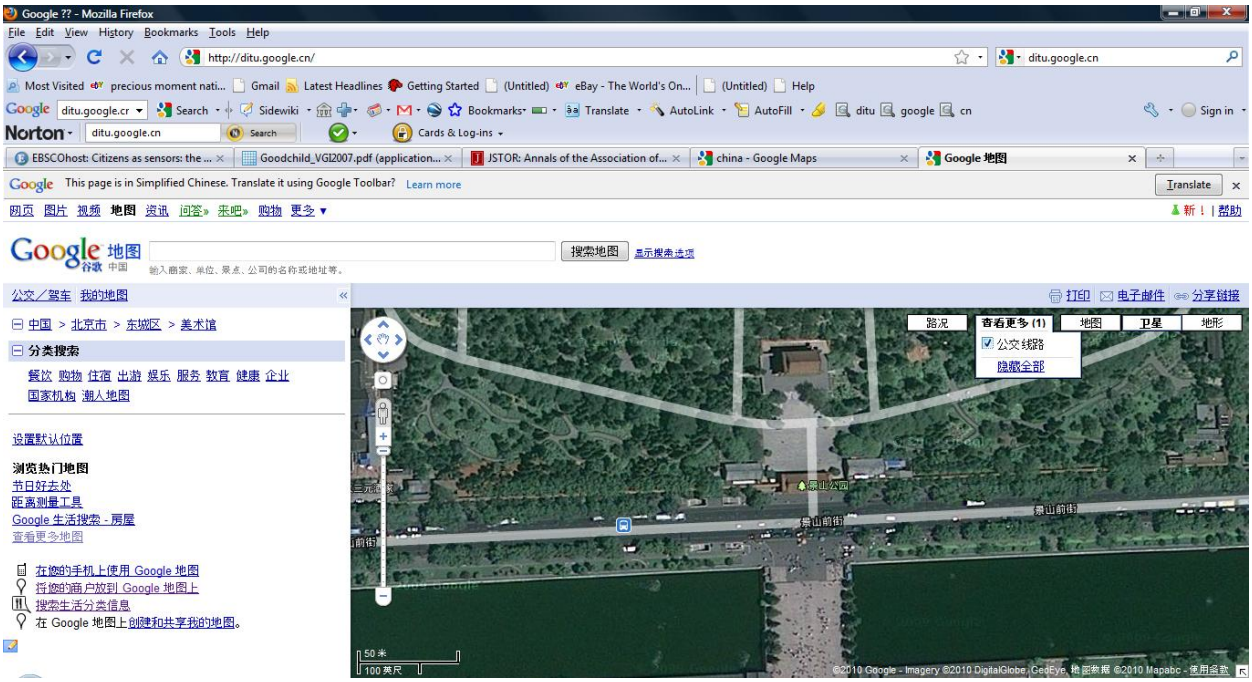

Figure 15. Google Ditu 50m satellite layer shows the entrance to the Forbidden City in Beijing. (http://www.google.cn).

Figure 15 shows a satellite layer at 50m zoom level at Google Ditu. As the image is digitized it is very probable that all images are digitized in Google.

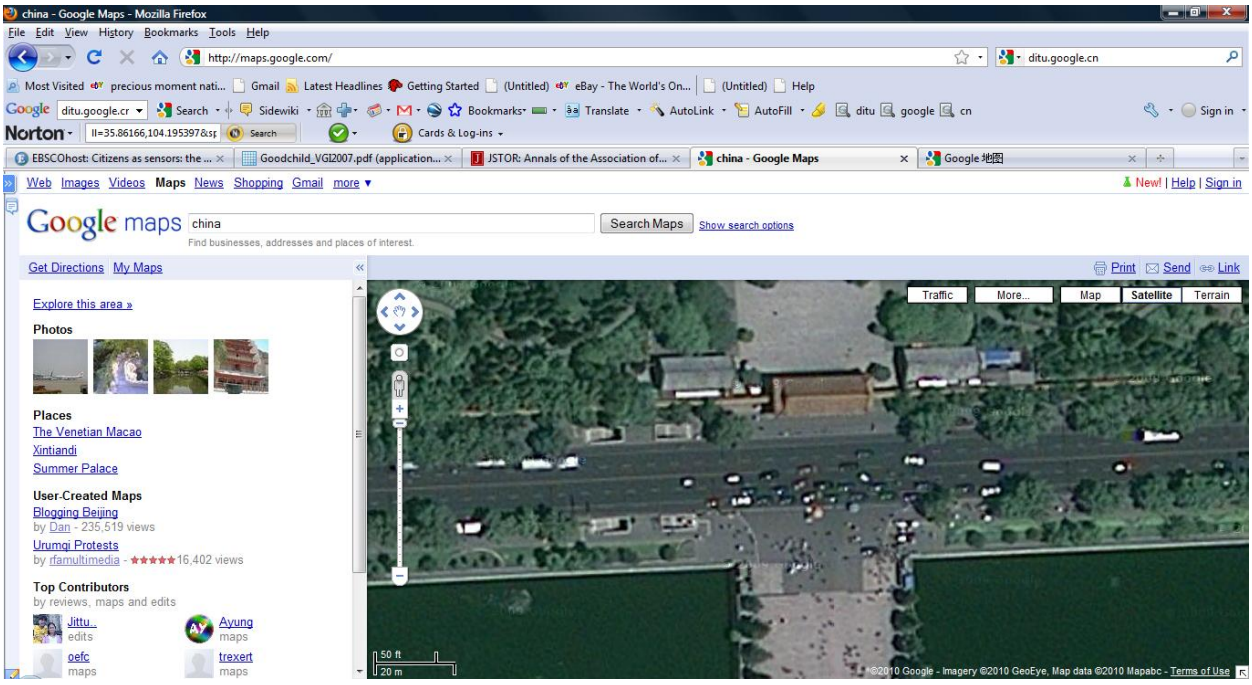

Figure 16. Google Maps 20m satellite layer shows the entrance to the Forbidden City in Beijing (http://www.google.com).

Figure 16 shows the same satellite layer as in Figure 15 in Google Maps but at 20m zoom level. The image for Google Maps (Figure 16) is undigitized. I suggest that absence of digitizing in Google Maps is undeveloped. Also, I suggest this is unintentional because undigitized images show a lot of geographic information

4.4. Absence of Street View in China

From Figure 17 and Figure 18 it is clear that Street View in Google Ditu is unavailable for the mainland China; however, it is available in Hong Kong and Taiwan. It is interesting to observe that Google Ditu shows that Hong Kong has Street View. Availability of Street View for Hong Kong in Google Ditu could be explained by the fact that Hong Kong is under a different political system even though it is a part of China. Also, Google Ditu shows that Taiwan has Street View. Taiwan is a part of China; however, it uses a different political system than the mainland China.

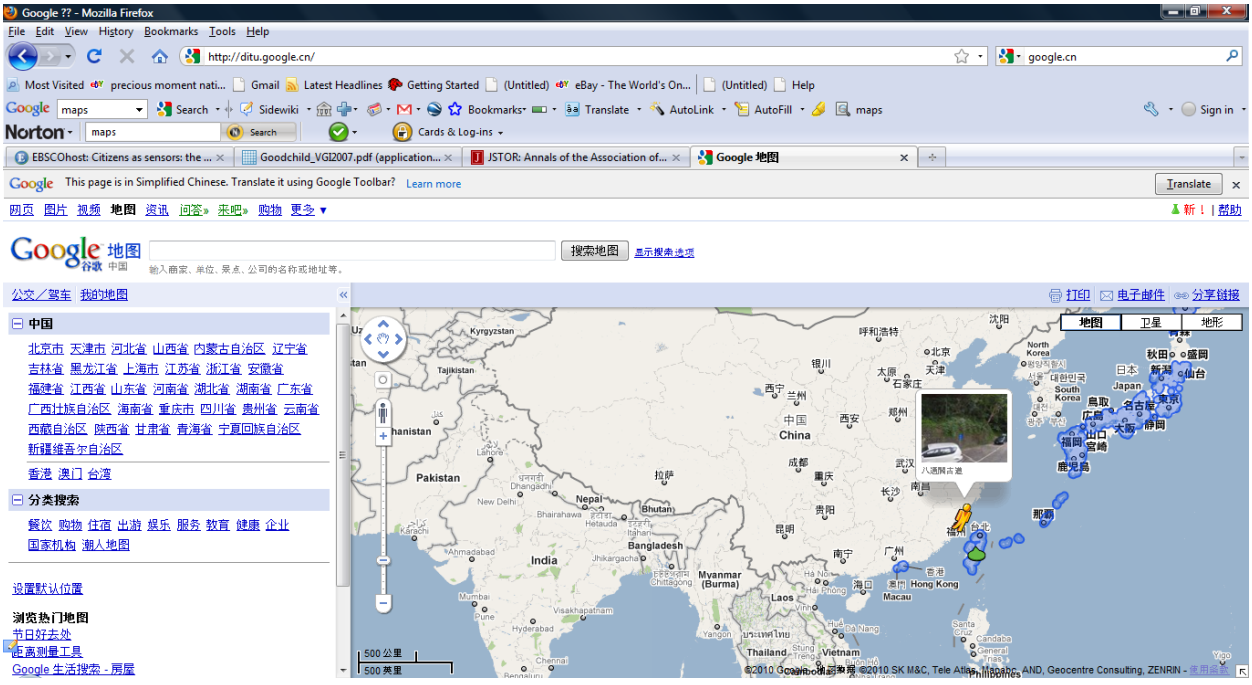

Figure 17. Google Ditu showing map layer and Street View in Taiwan.

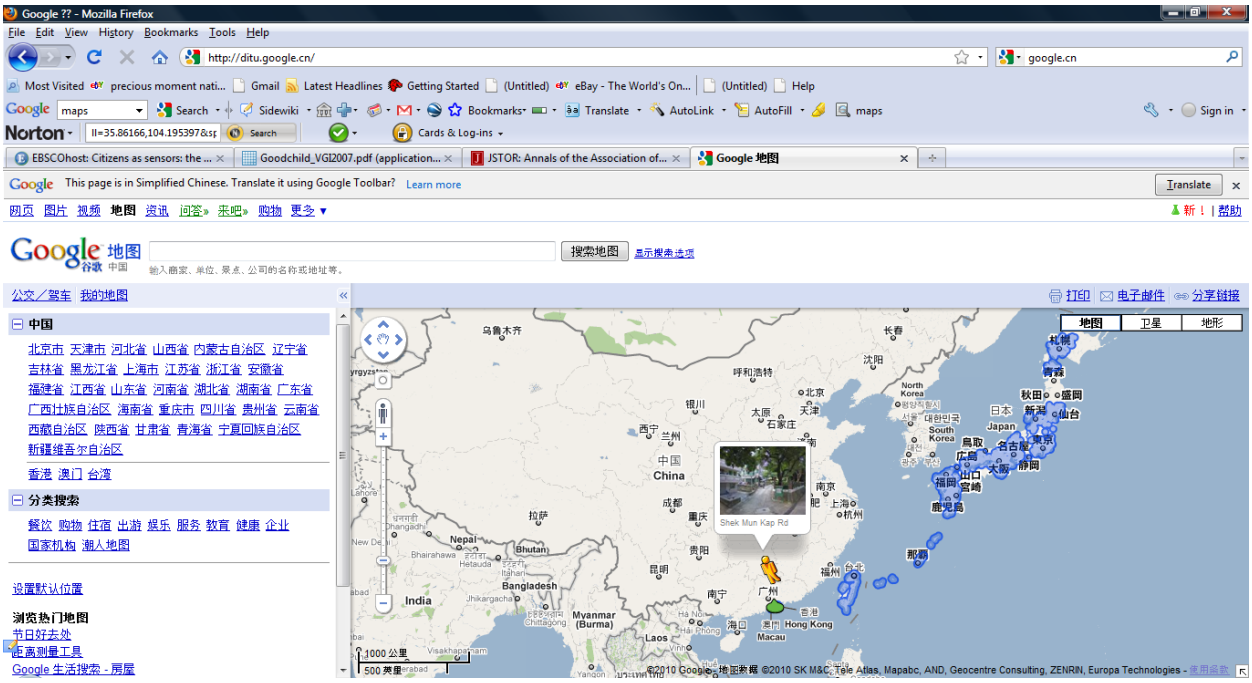

Figure 18. Google Ditu showing map layer and Street View pointed to Hong Kong.

Figure 17 and Figure 18 show Google Ditu maps with Street View. As is seen, Street View is available for Japan, some smaller islands including Taiwan, and Hong Kong. Street View is unavailable for the mainland China. Availability of Street View in Hong Kong and Taiwan demonstrates that these places are under special status even though they are parts of China. This is a very interesting political factor that indicates that the same information may flow freely in Hong Kong and Taiwan, while likely censored in the mainland China.

4.5. Exactly the same data in both Google Ditu and Google Maps

Based on Appendices A-J, all maps and satellite images in Google Ditu and Google Maps are provided by the same mapping company, such as Mapabc and Europa Technologies, and by the same satellite companies, such as Digital Globe, Geoeye, Cnes/Spot image and TerraMetrics. Also, all satellite images in Google Ditu and Google Maps are from 2009 and 2010. One possible explanation why dates and companies that provide map and satellite data are not censored in

Google Ditu is that dates and satellite companies do not impact much data quality at 50m zoom level. Google Ditu limits satellite layers to 50m versus Google Maps to 20m. Thus, Google Ditu does not censor dates and map and satellite companies, because different date and satellite companies have little difference on landscape views at 50m zoom level.

4.6. Google Hong Kong versus Google China

Since March 22, 2010, Google China has been closed and replaced with Google Hong Kong. Google started redirecting google.cn to google.com/hk, which is uncensored. *The Wall Street Journal* in March 25, 2010 interviewed one of the Co-founders of Google Sergey Brin who said that the move by Google to Hong Kong was a compromise. Reporters from *The New York Times* in March 22, 2010 also interviewed Sergey Brin, who stated that "There's a lot of lack of clarity. Our hope is that the newly begun Hong Kong service will continue to be available in the mainland China". From Brin's statement it is clear that Google attempts to provide uncensored search results for Chinese users in the mainland China. However, it is believed that search results will come back censored to the mainland China as the Chinese government censors all searches (BBC news story on March 23). As this is an ongoing topic, the future of Google Hong Kong is hard to predict now. As Google China is redirected to Google Hong Kong, I have decided to test whether Google Maps Hong Kong is similar to Google Ditu or similar to Google Maps.

I have discovered that the major differences of Google Ditu with Google Maps that may indicate censorship, such as absence of VGI and limitation of zoom level do not exist in Google Map Hong Kong (Figure 19, 20).

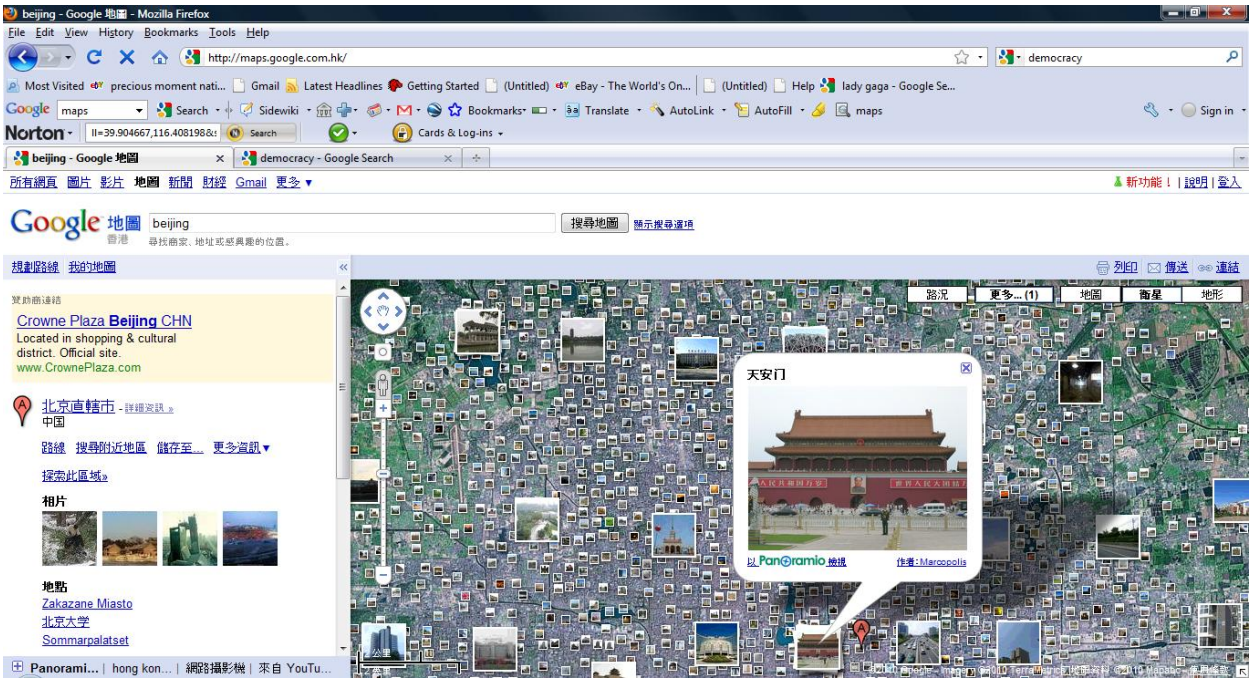

Figure 19. Google Maps Hong Kong showing Beijing with VGI of photos turned on (http://www.google.cn/hk accessed on March 25, 2010).

Figure 19 shows Google Maps Hong Kong showing the Beijing area with VGI of photos. As Google Ditu blocked VGI, availability of VGI in Google Maps Hong Kong is a major difference. It shows that Google Maps Hong Kong allows VGI. Figure 20 shows Google Maps Hong Kong showing satellite layers at 20m zoom. Google Ditu showed satellite layers from 50m zoom only. It means that, in this case Google Maps Hong Kong shows the same cartographic information as Google Maps.

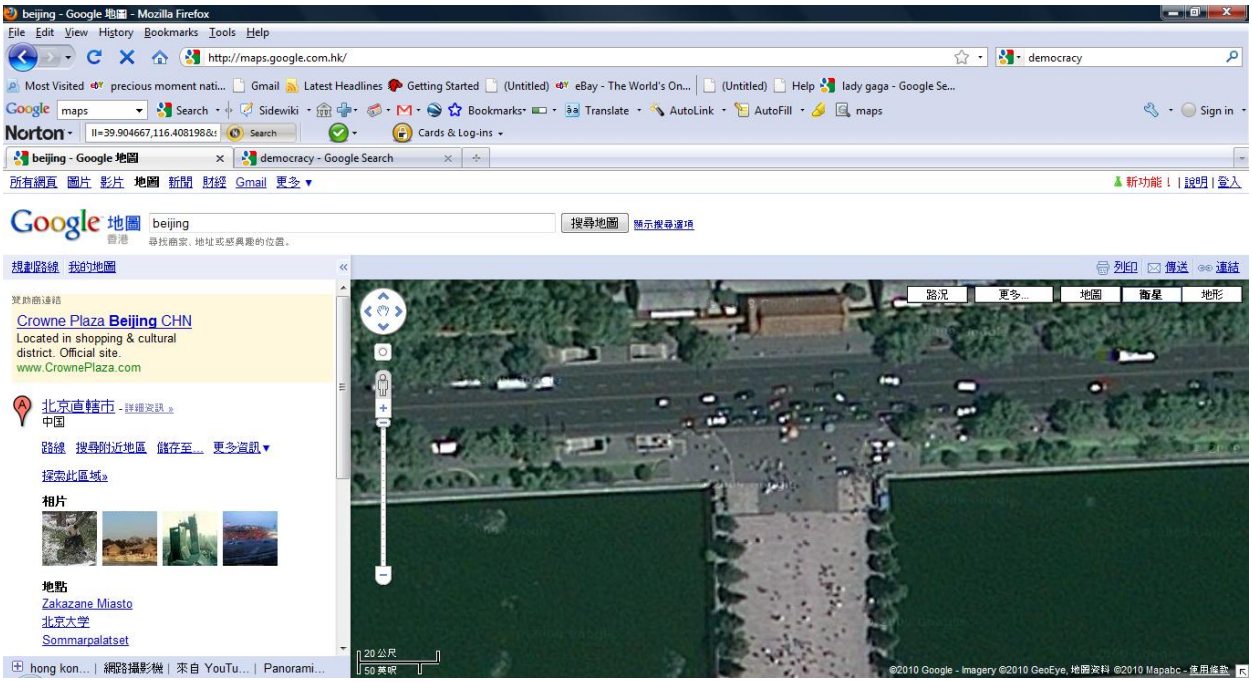

Figure 20. Google Maps Hong Kong showing 20m satellite layer zoomed to the entrance to Forbidden City, Beijing (http://www.google.com/hk accessed on March 25, 2010).

This analysis shows that Google Maps Hong Kong shows exactly the same results as Google Maps. During the week after the Google's move, I tested how Google Ditu is seen via the Chinese I.P. address. The results were the same as if it were accessed through the U.S. I.P. address. It means that internet users in the mainland China can see the same data as in Google Maps. In my opinion, moving Google China to Hong Kong where information is uncensored is a significant political act by Google, which most likely will be reacted to by the Chinese government. As a response to Google redirecting Google China to Hong Kong, on March 25, 2010, the Chinese government has posted instructions on Google reporting (The Washington post, March 25, 2010).

> "A. News section:
>
> 1. Only use Central Government main media (website) content; do not use content from other sources.
>
> 2. Reporting must not change title.
>
> 3. News recommendations should refer to Central government main media websites.

4. Do not produce relevant topic pages; do not set discussion sessions; do not conduct related investigative reporting.

5. Online programs with experts and scholars on this matter must apply for permission ahead of time. This type of self-initiated program production is strictly forbidden.

6. Carefully manage the commentary posts under news items.

B. Forums, blogs and other interactive media sections:

1. it is not permitted to hold discussion or investigation on the Google

2. Interactive sections do not recommend this topic; do not place this topic and related comments at the top.

3. All websites please clean up text, images and sound and videos which attack the Party, State, government agencies, Internet policies with the excuse of this event.

4. All websites please clean up text, images and sound and videos which support Google, dedicate flowers to Google, ask Google to stay, cheer for Google and others have a different tune from government policy.

5. On topics related to Google, carefully manage the information in exchanges, comments and other interactive sessions.

6. Chief managers in different regions please assign specific manpower to monitor Google-related information; if there is information about mass incidents, please report it in a timely manner" (the Washington post March 25, 2010).

The rules indicate a very strong reaction by the Chinese government to Google's move to Hong Kong. It is clear that the state is afraid of destabilizing the political situation in China with Google's move. Thus, it applies stricter restrictions on information flow in the mainland China. I think that Google has little chance to remain in China after negative reactions of the state to Google's move to Hong Kong.

4.7. Google imitation websites

As Google is one of the popular search engines in China, many people support it and use its products. When Google announced its withdrawal from China several Google imitation websites emerged in China such as Goojje.com for Google.com (Figure 21), and Youku.com for YouTube.com (Figure 22).

Figure 21. Google imitation web site Goojje (http://www.goojje.com).

Figure 22. YouTube imitation website Youku (http://www.youku.com).

Emergence of Goojje and Youku shows that Google websites had popularity in China and when Google announced its withdrawal from China, such websites popped up as possible

replacements. It is not clear now how the state will react to these websites as they are imitations of Google. As of March 26, 2010, these web sites are still available in China.

4.8. Future research

As Google web services are popular in many countries and Google provides search engines in different languages with different URLs, investigation of power/knowledge effects in different countries' Google Maps is a great research idea. Countries like North Korea and South Korea may be concerned with cartographic data on Google due to national security. Russia, as the former USSR, a country where maps were heavily censored, may still be censoring its maps. Also, Israel may request limiting its map information on Google Maps due to protection and national security. In order to detect map limitation, the investigation of VGI and closest zoom level is critical. Analysis of power/knowledge effects is important not only for Google China, but for many other countries' Google services as well. Finally, investigation of power/knowledge effects in Google Maps in various languages could explore how information is politically implicated in different geographic countries and regions.

CHAPTER V – CONCLUSION

It was determined that search queries of Google China are censored (Zook and Graham 2007b), this thesis inquires whether maps of Google China are censored as well. The goal of this thesis is the examination of map censorship in Google China through visual analysis as content analysis of maps. Comparison of content analysis of maps from Google Ditu and Google Maps enables exploration and examination of aspects of the exercise of power. Foucault's theory of power/knowledge provides a theoretical base for analysis of political implications of knowledges as cartographic data. It explains that any knowledge is politically implicated and maps particularly implicated due to their importance to power (Harley 1989). I suggest that power presence in Google Ditu is inevitable. This thesis inquires into map censorship in Google Ditu.

The results of content analysis of maps enable me to discuss what particular aspects of map information are politically implicated in Google Ditu. By comparing data from Google Ditu and data from Google Maps, I have determined significant differences that indicate particular aspects of power exercise through Google Ditu. Also, these differences indicate politically implicated map information in Google Ditu which allows discussing how power is exercised. Moreover, I suggest an explanation as to why certain map information is limited.

I have established that Google Ditu is likely to be censored in regards to certain aspects of map information that exists in Google Maps as VGI, 20m zoom level of satellite images, and Street View, and not censored in regards to labeling, date of satellite images, and companies that provide maps and satellite images.

VGI as a new development in cartography is very promising in terms of democratization of information. It allows contribution of geographic information by any internet user and

provides a great potential for reduction of limitation of maps in GIS (Goodchild 2007). Elwood (2008) states that research for VGI should draw from feminist and participatory research. Kwan (2007) states that geospatial technologies (GT) could be improved if feminist approaches as politics of emotion were used. VGI as user-generated information contains subjective data where an emotional factor is unavoidable, thus, it has a great potential for improvement of geospatial technologies. Traditionally, maps are perceived as objective scientific documents and critical cartographers argue that maps are not objective, but subjective due to human bias and political uses by power, culture or society. New developments in web cartography such as VGI allow subjective information and show that construction of maps is subjective.

Blockage of VGI in Google Ditu seems to suggest that maps are construed as objective documents where any subjective factor is eliminated. It is almost certain that by controlling maps in Google China, state power shows maps as objective documents. It could be argued as China strictly controls the media sector by allowing only state-approved content in the media, VGI as a new spatial media concerns state power due to its liberal content. It is highly likely that VGI is blocked in Google Ditu, because it is subjective user presented information.

Also, VGI implies information gathering from regular internet users, which means that the users are empowered to construct media knowledge. This concept contradicts the notion of the totalitarian regime where the state controls construction of knowledge. Thus, VGI is blocked in China as it could reduce the state power due to dispersion of power to regular internet users for information gathering.

Another finding that suggests the exercise of power is limitation of the zoom level in Google Ditu satellite layers to 50m. Google Maps started showing satellite layers at 20m zoom level (if a satellite image at that level is available for a location), but Google Ditu shows a

maximum of 50m level for all locations. Google Maps is inconsistent in terms of availability of the closer zoom level of 20m satellite layers for locations: for some locations 20m satellite images at Google Maps are unavailable and for other locations 20m satellite images are available. I suggest that Google Maps show being developing by providing satellite images at closer zoom as they become available, which means that Google Maps show progress in gathering and providing its data. In contrast Google Ditu is consistent in terms of showing satellite layers at the closer zoom level of 50m. I argue that the difference in zoom levels is critical between Google Ditu and Google Maps, because it indicates not only intentional limitation of zoom level in Google Ditu, but certain representation of Google Ditu as developed and standardized.

The last finding that indicates the limitation of map information is the unavailability of Street View in the mainland China. Street View is currently unavailable in the mainland China; however, it is available in Hong Kong and Taiwan in both Google Maps and Google Ditu. Even though Hong Kong and Taiwan are part of China, they are administered by different political systems than in the mainland China political system as pro-Western system. As the political system is different, information flows differently in Hong Kong and Taiwan. The availability of Street View in Hong Kong and Taiwan suggests that information flow is more democratized.

Aspects of map information that are not censored in Google Ditu are labeling, date, and companies of maps and satellite images. Google Ditu has higher density of labeling that indicates a vanishing of state power in regards to labeling and a rising of commercial power. I suggest possible reasons to explain this fact. Firstly, place symbols and place labels show geographic information as physical locations that help in place-finding in urban and natural environments. As I have discussed that maps in China are presented as objective by blocking subjective

information such as VGI, censoring of objective information seems irrelevant. Moreover, as China is economically booming country business advertising is critical for its market economy. Google generates its income through advertising and Google Adwords help do that. Advertisements through Google Adwords show up in Google Maps as well as in Google search index. Advertisers can choose to advertise locally or globally depending on their products or services. Higher density of labeling in Google Ditu could be explained by advertising more locally through Google Adwords in China. Also, it means that state power allows shifting from state power to economic power when higher labeling is determined by a stronger market. I suggest that state power allows the rise of economic power so economic development would be possible. It is likely that this shift of power is reflected in Google Ditu through higher density of labels.

Other aspects of map information that are not censored are date and companies of satellite images. Google Ditu and Google Maps have the same date of images and the same companies that provide those images. In my opinion, there is one explanation of why date and companies of satellite images are the same. Google Ditu censors zoom level to 50m for all locations. I argue that this is a relatively high zoom level to view much detail on the earth surface, thus different date of image and different satellite company are not necessary to hide important information. Thus, power is not exercised in regards to date of images and satellite companies.

This thesis suggests what aspects of map information are politically implicated and what map information is not implicated. It also suggests possible reasons for censoring and not censoring certain aspects of map information in Google Ditu. The comparison of content analysis of visual data such as maps from Google Maps and Google Ditu enables analysis of map content

to determine what map information could be censored and what could not be censored. I think that qualitative methods like visual methods have a great potential for exploring and analyzing the political implications of the exercise of power and reflection of multiple visualities that construct geographical knowledge.

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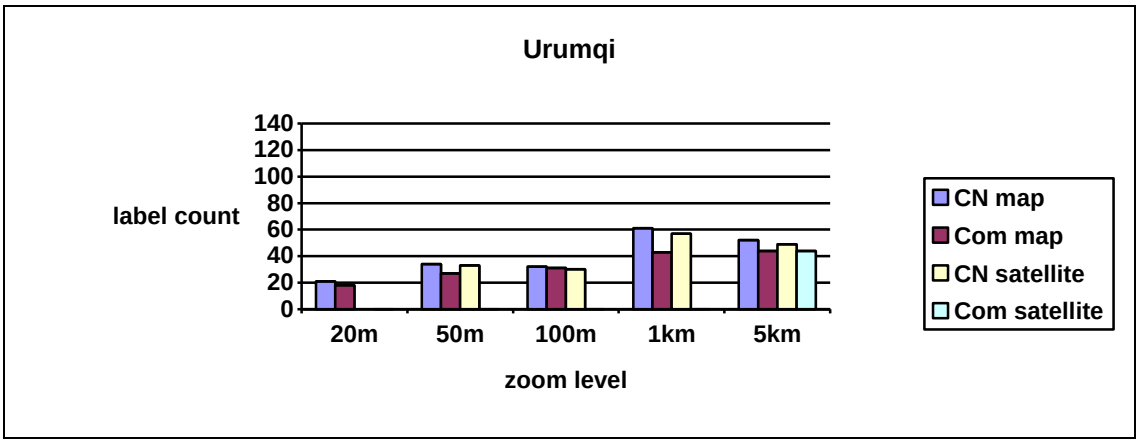

Figure 23. Label density for Urumqi.

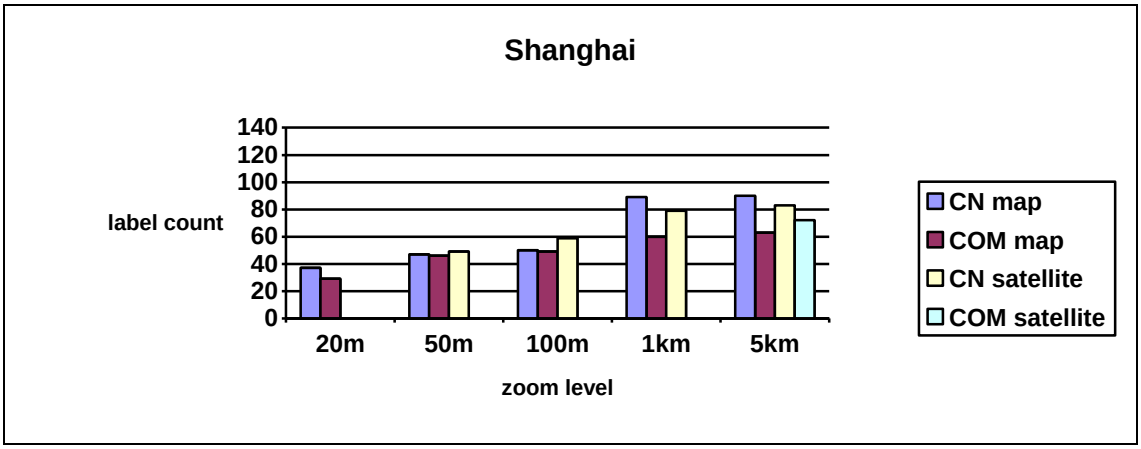

Figure 24. Label density for Shanghai.

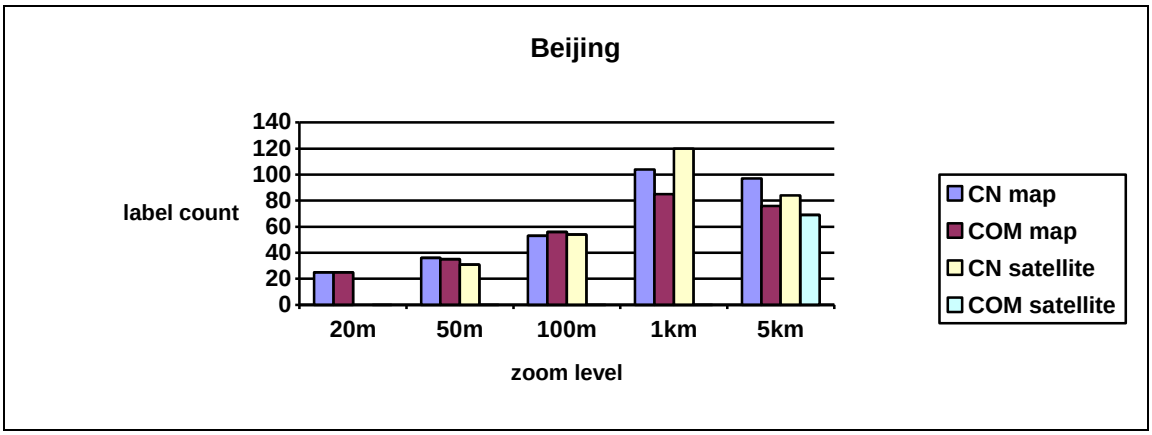

Figure 25. Label density for Beijing.

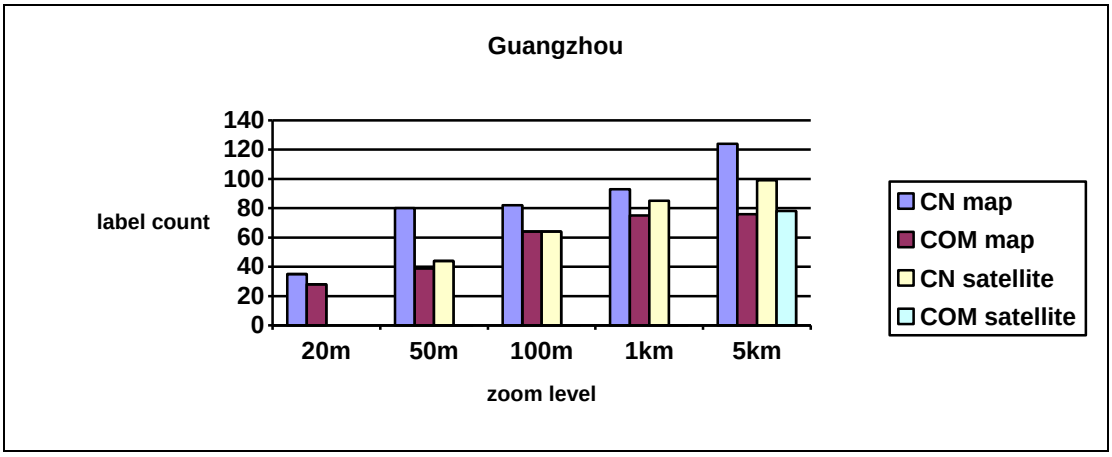

Figure 26. Label density for Guangzhou.

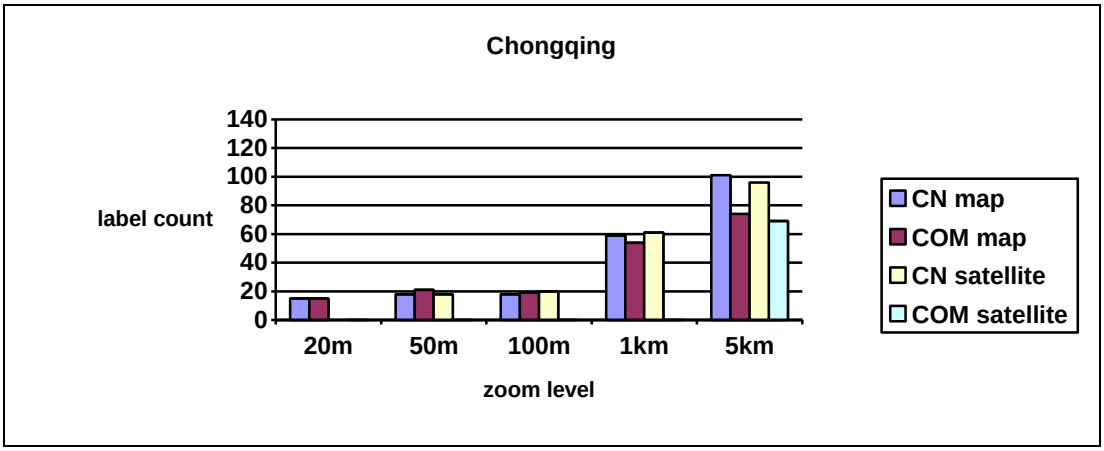

Figure 27. Label density for Chongqing.

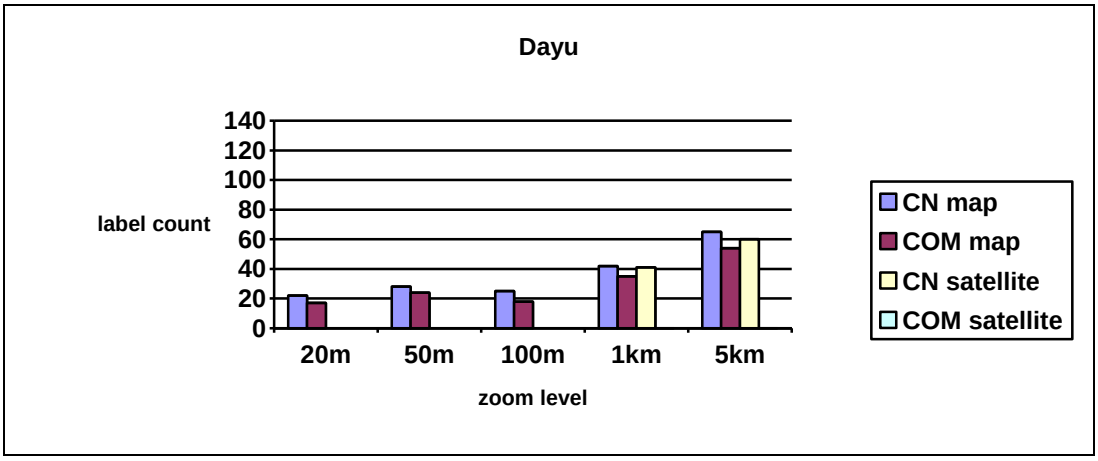

Figure 28. Label density for Dayu.

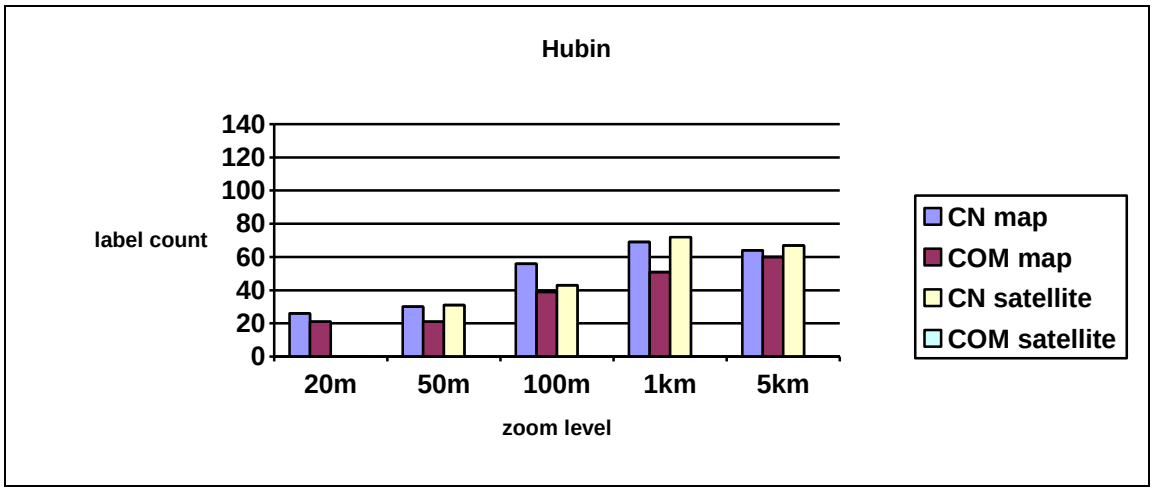

Figure 29. Label density for Hubin.

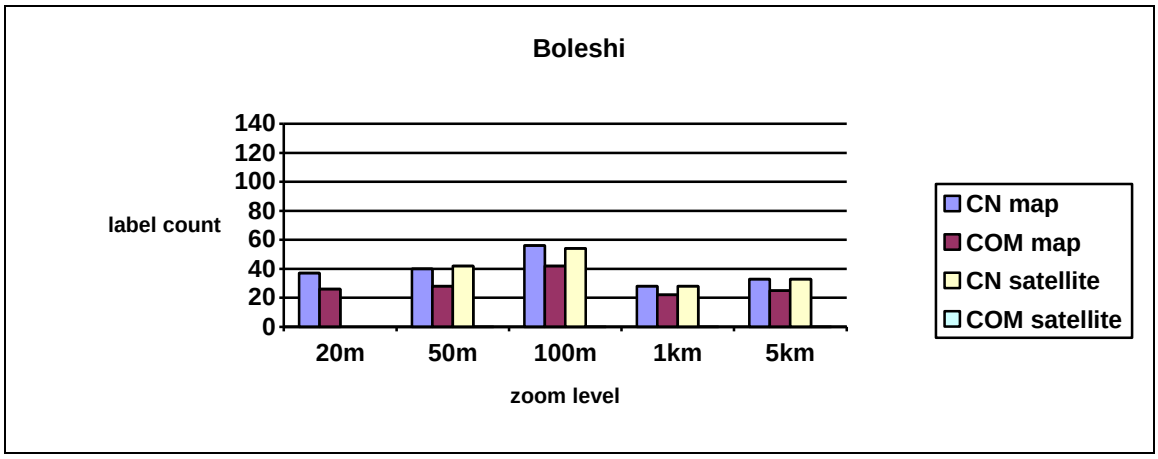

Figure 30. Label density for Boleshi.

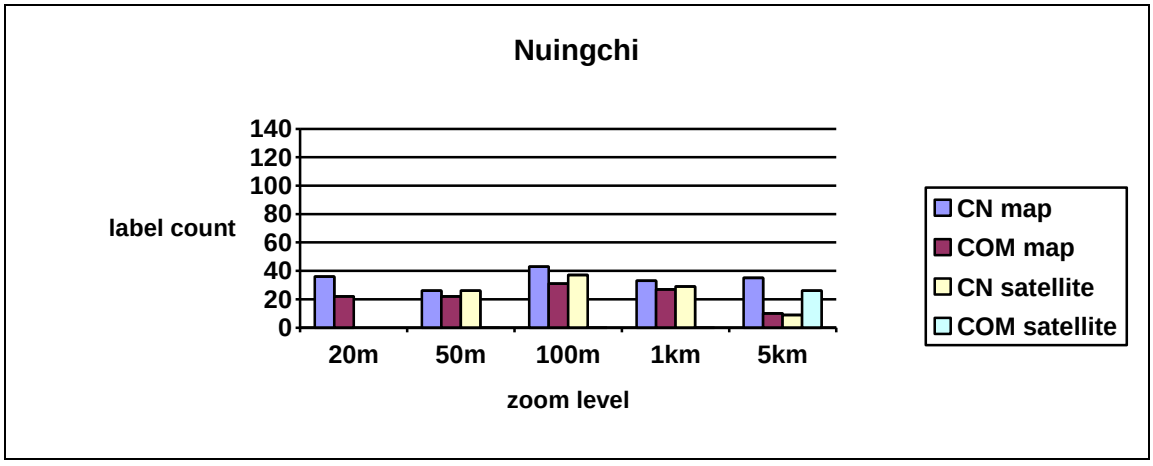

Figure 31. Label density for Nuingchi.

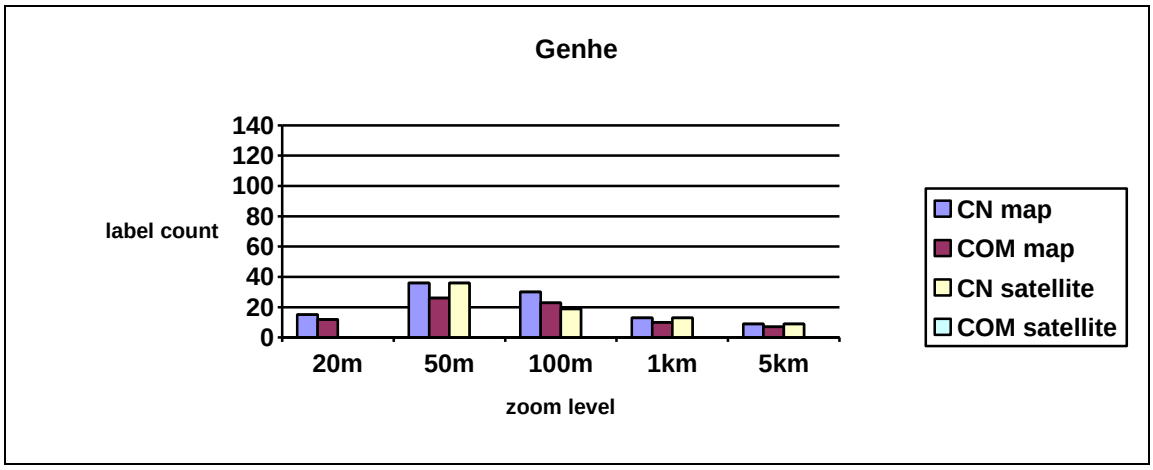

Figure 32. Label density for Genhe.