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新数据环境下的 城市规划实施评价

Evaluation of Urban Planning Implementation in New Data Environment

北京市城市规划设计研究院 龙瀛

北京城市实验室

(BCL2015)

合作者还有韩昊英、赖世刚、涂毅纯和舒贤帆等

城市规划实施评价

- 规划实施评价可以被看作规划评价的一个方面，是在规划实施预评价和规划行为研究、规划影响描述和政策实施分析之后的一项规划评价内容，包含了非定量和定量两种评价方法（Talen 1996）
- 在我国，新版规划法的重要内容（**修改规划的前提**），日益得到学界和业界关注
- 规划实施评价也可以从规划内容或不同专业构成进行分类，如空间控制、交通规划、市政基础设施规划等部分的实施评价，大量研究关注空间控制进行探讨（**城市增长边界UGB**）
- **一致性（conformity）方法**被广为采用（规划边界与实际开发边界的对比），多采用遥感手段解译获得的**城市开发数据**
- **多个中国城市告捷**：毛蒋兴等, 2008 深圳； Han et al 2009 北京；徐毅松等, 2009, 上海； Tian and Shen 2011 广州； Long et al 2012 北京

新数据环境

- 信息通讯技术ICT近年来大力发展
 - 数据存储、数据挖掘和可视化技术日益完善
 - 社会感知，BCL工作论文47 “Social sensing: A new approach to understanding our socio-economic environment”
 - 大数据时代（中国规划界的持续关注）
- 出现了多种开放且细致的数据
 - 从多个维度描绘在微观尺度的人类活动和移动，以及环境要素特征
 - 大数据与开放数据：新时期城市规划和管理的黄金时代
- 大数据：手机信令及通话、公共交通刷卡、信用卡交易等
- 开放数据：政府网站、商业网站、社交网络等



社交网络



专业网站



大模型，《城市规划学刊》



大模型： 城市和区域研究的新范式*

龙瀛 吴康 王江浩 刘行健

提要 提出了大模型这一城市 and 区域的新范式。大模型是在一个大地理区域上建立的相对精细尺度的城市-区域分析与模拟模型。随着大数据和开放数据的广泛使用，以及日益成熟的计算能力和日臻完善的区域和城市模拟分析方法，大模型使得兼顾大地理尺度与精细化单元成为了可能。详细说明了大模型的概念、特征及其潜在的应用方式，并重点采用案例的方式介绍了一系列大模型的应用进展，如推导中国所有城市的城镇建设用地范围、地块尺度的城市扩张模拟、城市增长边界评价等，这些研究大多基于全国尺度开展，并关注精细尺度（如地块、街区、乡镇街道办事处等）。期待在大数据时代，大模型作为一种新的研究方式，能为区域和城市研究提供新的视角和思考。

关键词 大模型；应用城市模型；精细尺度；区域；中国

Big Models: A Novel Paradigm for Urban and Regional Studies

LONG Ying, WU Kang, WANG Jianghao, LIU Xingjian

Abstract: This article proposes the concept of big model as a novel research paradigm for regional and urban studies. Big models are fine-scale regional/urban simulation models for a large geographical area. With the widespread use of big/open data, the increased computation capacity, as well as the advanced regional and urban modeling methodologies, big models make it possible to overcome the trade-off between geographical scale and simulation resolution. In this paper, the concept, characteristics, and potential applications of big models have been elaborated. We also presented several case studies to illustrate the progress of our research and the application of big models. Most of these applications can be adopted across the country, and all of them are focusing on a fine-scale level, such as a parcel, a block, or a township (sub-district). It is expected that big models will mark a promising new era for the urban and regional study in the age of big data.

Keywords: big model; applied urban modeling; fine-scale; large area; China

Geospatial Analysis to Support Urban Planning in Beijing (Springer专著, 2015, 龙瀛和沈振江)

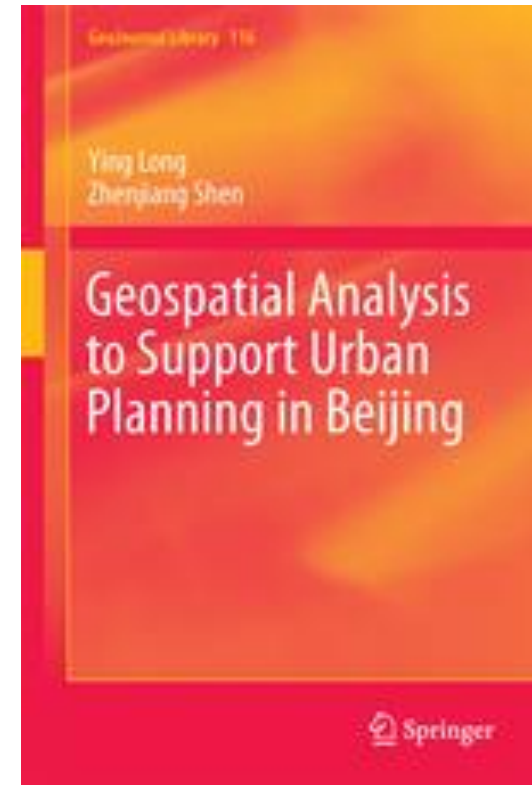
Chapter 12

Big Models: From Beijing to the whole China

Ying Long, Kang Wu, Jiang-hao Wang and Zhen-jiang Shen

Abstract This chapter proposes the concept of big model as a novel research paradigm for regional and urban studies. Big models are fine-scale regional/urban simulation models for a large geographical area. With the widespread use of big/open data, the increased computation capacity, as well as the advanced regional and urban modeling methodologies, big models make it possible to overcome the trade-off between geographical scale and simulation resolution. In this paper the concept, characteristics, and potential applications of big models have been elaborated. We presented several case studies to illustrate the progress of our research and the application of big models. They include mapping urban areas for all Chinese cities, performing parcel-level urban simulation, and several ongoing research projects. Most of these applications can be adopted across the country, and all of them are focusing on a fine-scale level, such as a parcel, a block, or a township (sub-district). It is expected that big models will mark a promising new era for the urban and regional study in the age of big data.

Key words Big model • Applied urban modeling • Fine-scale • Large area • China



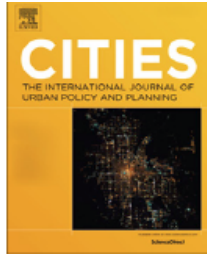
Understanding urban China with open data



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Understanding urban China with open data

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ARTICLE INFO

Article history:
Available online xxxx

Keywords:
China
Open data
Urban analytics

ABSTRACT

A solid understanding of urbanizing China – the world's largest and most rapidly transforming urban society – calls for improved urban data provision and analysis. This paper therefore looks at major technological, social-cultural, and institutional challenges of understanding urban China with open data, and showcases our attempt at understanding Chinese cities with open urban data. Through our showcases, we hope to demonstrate the usefulness of open urban data in (1) mapping urbanization in China with a finer spatiotemporal scales; (2) reflecting social and environmental dimensions of urbanization; and (3) visualizing urban China at multiple scales.

**Big/open data in Chinese urban studies and
planning: A review** (LONG Ying, LIU Lun)



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**WATER
AND CITIES**

新数据环境下定量城市研究的四个变革

（国际城市规划，投稿中）

新数据环境下定量城市研究的四个变革

龙 瀛¹ 刘 伦²

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摘 要：本文阐述了近年来新数据环境下的城市研究变革。首先介绍了大数据和开放数据形成的新数据环境和国内外定量城市研究概况，然后围绕典型案例对当前定量城市研究的四项变革及相关实践展开讨论，最后提出相关思考。本文认为，新数据环境推动了定量城市研究的四大变革：①空间尺度上由小范围高精度、大范围低精度到大范围高精度的变革，②时间尺度上由静态截面到动态连续的变革，③研究粒度上由“以地为本”到“以人为本”的变革，④研究方法上由单一团队到开源众包的变革。在变革的同时，当前定量城市研究也面临着数据有偏、多现状研究少远景判断、多客观认识少规划启示，以及规划理论和学科发展相关问题。

关键词：大数据，开放数据，城市规划，大模型，众包

上海城市规划，2015年第3期

数据增强设计*

——新数据环境下的规划设计回应与改变

Data Augmented Design: Urban Planning and Design in the New Data Environment

龙 瀛 沈 尧

文章编号1673-8985 (2015) 02-0081-07 中图分类号TU981 文献标识码A, B

摘 要 由大数据和开放数据构成的新数据环境,对城市的物理空间和社会空间进行了更为精细和深入的刻画。新数据环境下所开展的定量研究较多,但多为针对城市系统的现状评价和问题识别,少有面向未来的规划和设计的研究与应用。提出了数据增强设计(DAD)这一规划设计新方法论,它以定量城市分析为驱动,通过数据分析、建模、预测等手段,为规划设计的全过程提供调研、分析、方案设计、评价、追踪等支持工具,以数据实证提高设计的科学性,并激发规划设计人员的创造力。从数据增强设计的定义、理论和实践的维度、内涵、设计流程、特点与概念辨析、常用方法与工具,以及应用场景等角度,阐述了对DAD的认识;最后给出了关于DAD的研究案例和设计案例。

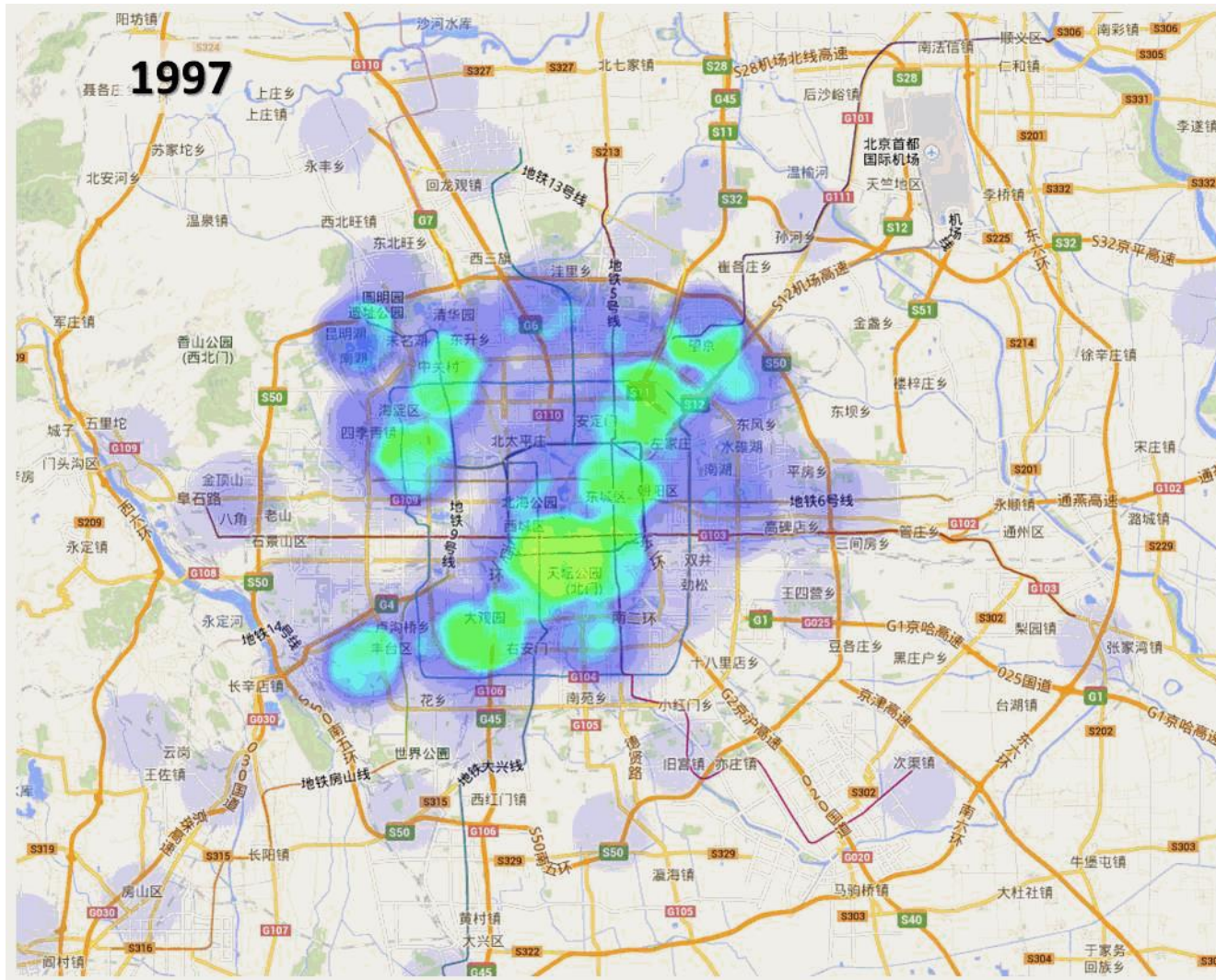
Abstract The new data environment composed by big data and open data has described urban physical and social space in a more detailed way. Currently, numerous quantitative urban studies have been conducted under new data environment. However, most studies concentrated on status quo evaluation and problem identification of urban system, and few of them have a perspective into future-oriented urban planning and design. This paper presents Data Augmented Design (DAD) as a new methodology for urban planning and design. DAD provides a systematic framework for the entire design process, including data collection, analysis, design, evaluation and tracking, to improve the scientificity of design and inspire the creativity of planners. From the dimensions of its definition, theory and practice, connotation, design process, characteristics and concept analysis, common methods and tools, as well as application scenarios, this paper elaborates on the understanding of DAD. Finally, research cases and design cases of DAD are presented in this paper. **5:15-5:30, 郑晓伟, 西安建筑科技大学, 城市规划与设计变革实践中的DAD技术响应初探 (Case studies of Data Augmented Design in Urban Planning & Design)**

大数据→大模型→大设计 (DAD)

大数据催生大模型：一种基于精细化大覆盖的城市定量研究模型

大模型催生DAD：一种基于细尺度设计但精准了解和评价各个尺度效应的设计模式

从一个数据说起



- 10 Land use planning permits in Beijing 1997-2013, 李栋博士提供
- <http://www.beijingcitylab.com/data-released-1/data1-20/>

基于规划许可数据的城市增长边界实施评价

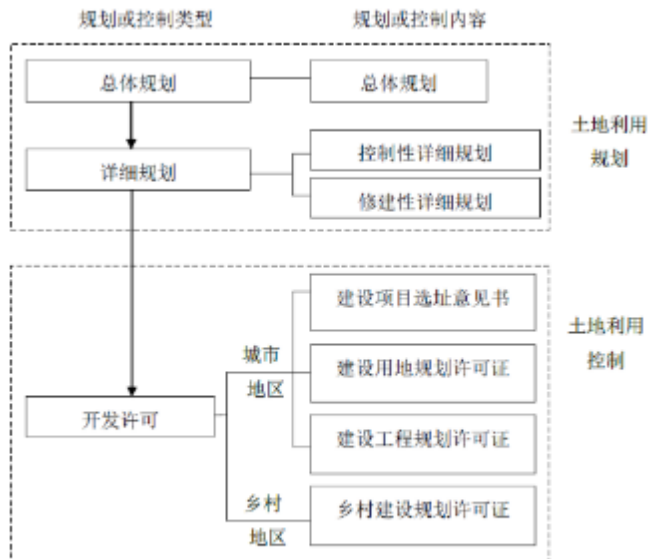


图 1. 中国城市土地利用规划和控制系统的框架，笔者绘制

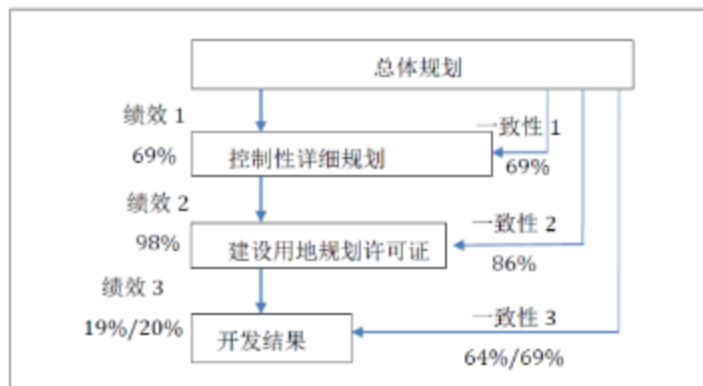
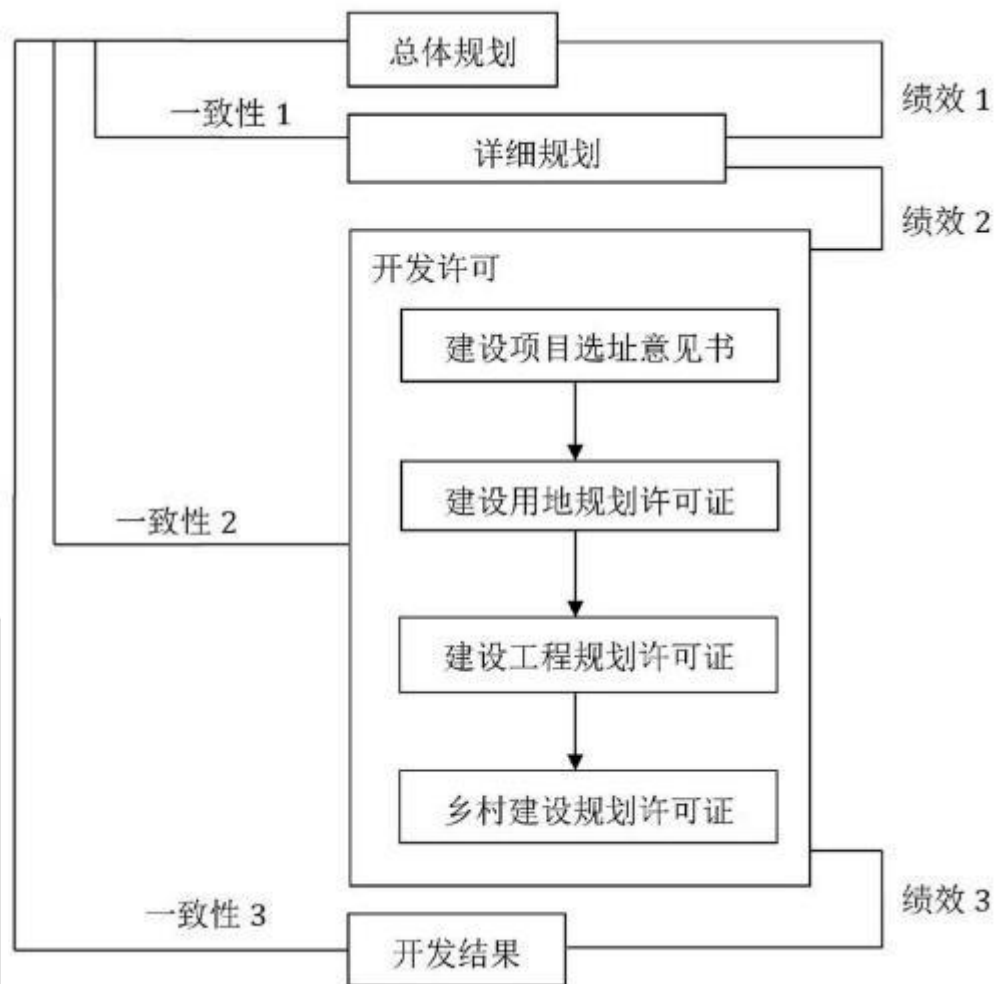
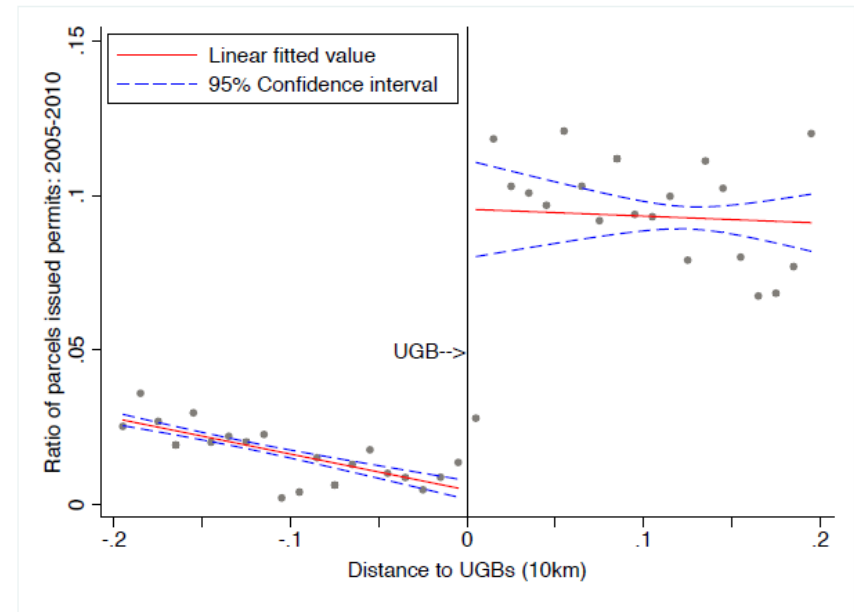
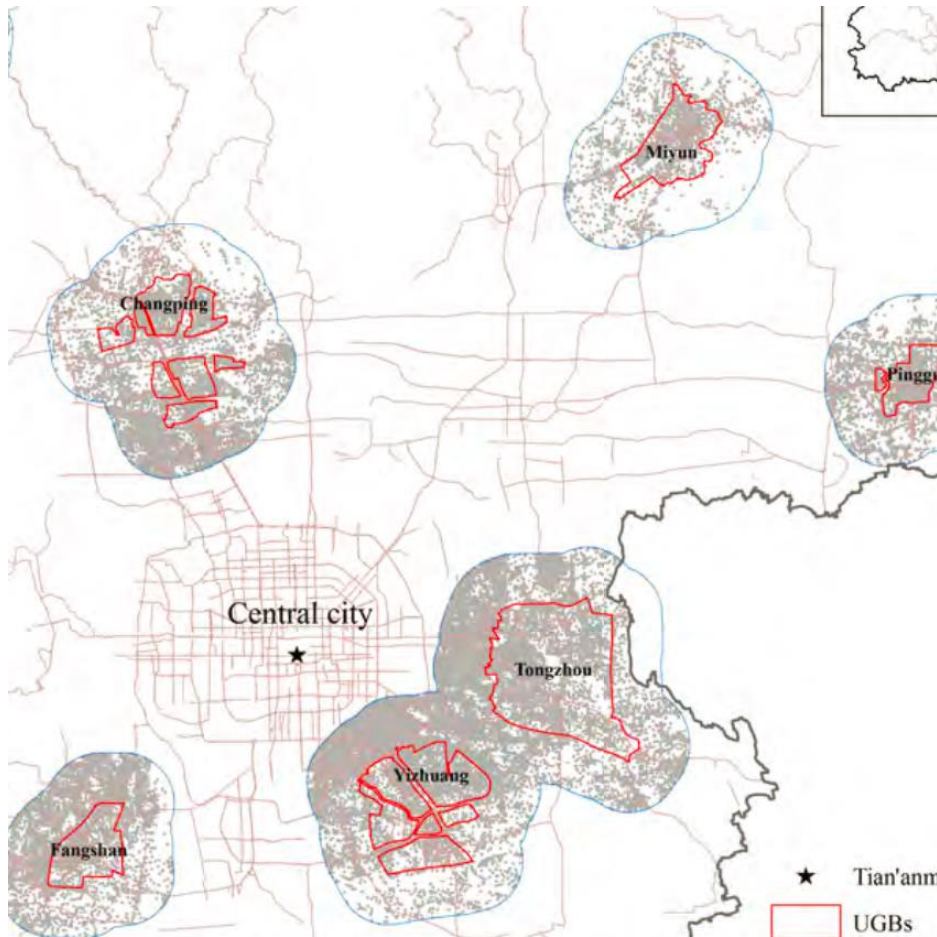


图 10. 一致性和绩效的匹配率，笔者绘制



- 一套完整的城市增长边界实施评价：总规->控规->许可->开发
- 适合于具备了大规模规划许可（一书三证、planning permits）数据的城市（很多中国的大城市的规划局网站已经共享了多年的规划许可）
- 城市规划学刊，2015年第1期，115-122

The Effects of Beijing's Urban Growth Boundaries on Urban Development

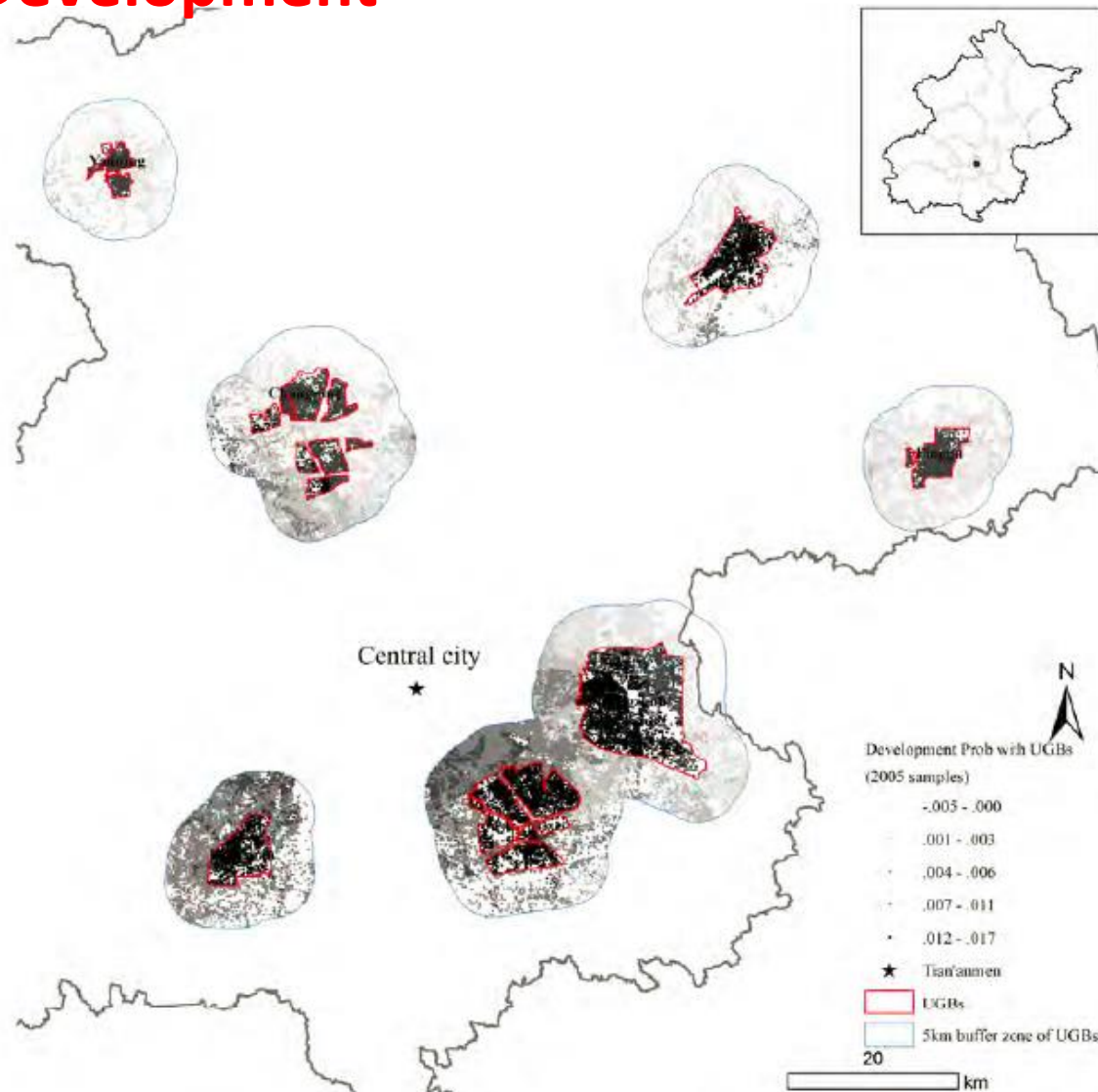


Note: Standard errors clustered by new town. Different spatial trends allowed.

Figure 4: The average ratio of parcels issued a land use permit from 2005 to 2010

- 考虑影响城市开发的多项因素，利用difference in differences (DID)和regression discontinuity design (RDD)方法，发现UGBs起到了显著的影响开发的作用
- Long et al 2012 Landscape and Urban Planning也证明，2004版总规是建国后的五版总规中引导城市开发最好的一版
- BCL Working Paper 49

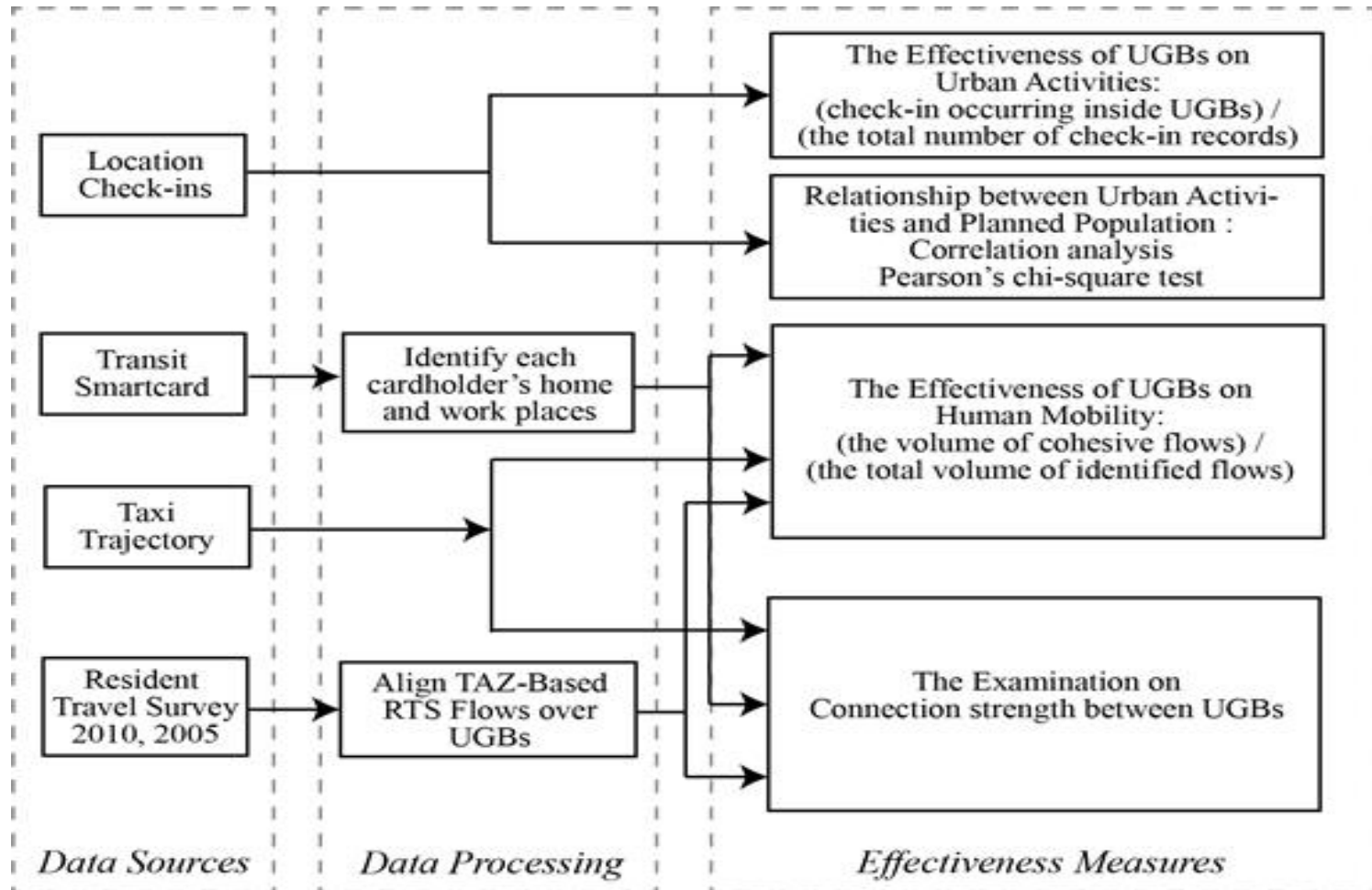
The Effects of Beijing's Urban Growth Boundaries on Urban Development



Note: Quadratic fit of a multi-dimensional RDD model. Standard errors clustered by new town.

Figure 9: The predicted development probability of parcels in 2005

基于人类活动和移动数据的城市增长边界实施评价



- 基于大量的人类活动和移动大数据，可以从社会视角评价北京的UGB，比如基于大量的出租车轨迹、公交刷卡记录、位置微博/照片、出行调查数据等，发现**95%**以上的人类活动和移动位于规划边界内

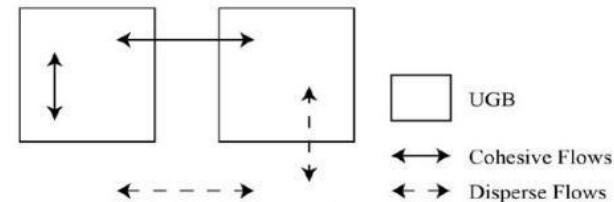


Fig.4. An Illustration of Cohesive and Disperse Flows

基于人类活动和移动数据的城市增长边界实施评价

Flows Structure by Four Data Sources

Flows	SCD	Taxi	RTS (2010)	RTS (2005)
Inside CC*	31,475,282 (73.6%)	2,120,745 (94.1%)	39,934.9 (70.8%)	58,814.5 (84.2%)
Inside NC*	1,259,984 (2.9%)	13,827 (0.6%)	2,635.8 (4.7%)	569.9 (0.8%)
Between <u>NCs</u>	51,388 (0.1%)	346 (0.0%)	249.4 (0.4%)	117.8 (0.2%)
Between CC and <u>NCs</u>	2,813,781 (6.6%)	21,635 (1.0%)	5,055.9 (9.0%)	4,041.1 (5.8%)
Between CC and OU*	2,607,835 (6.1%)	63,985 (2.8%)	4,158.8 (7.4%)	4,785.0 (6.9%)
Between NC and OU	2,825,294 (6.6%)	6,587 (0.3%)	3,150.5 (5.6%)	933.4 (1.3%)
Two ends OU	1,878,338 (4.4%)	26,312 (1.2%)	1,249.6 (2.2%)	566.0 (0.8%)
Beyond Beijing**	0	631 (0.0%)	0	0

* "CC" stands for "central city", "NC" for "new cities", and "OU" for "outside UGBs";

** It refers to a flow with origin or destination located outside Beijing.

- 除了人类活动和移动与UGB的较为经典的一致性评价外，我们还开展了：
 - 评价各个组团的人类活动强度与规划人口的关系（相关性较低）
 - 评价各个功能组团之间的联系（单中心城市结构、顺义副中心而不是通州副中心）
- Long et al. 2015. Cities. Evaluating the Effectiveness of Urban Growth Boundaries Using Human Mobility and Activity Records.

基于人类活动和移动数据的城市增长边界实施评价

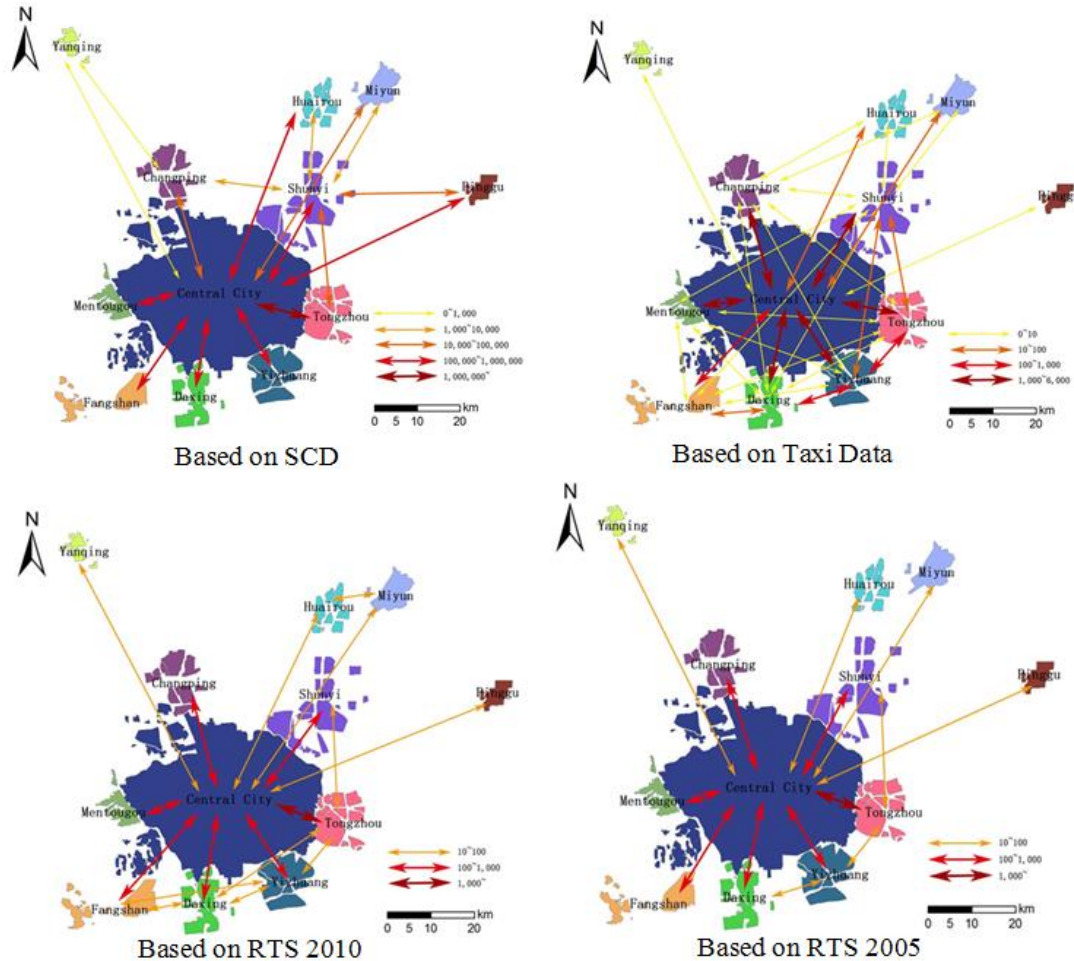


Fig. 6. Connections between UGBs by Four Data Sources

- 除了人类活动和移动与UGB的较为经典的一致性评价外，我们还开展了：
 - 评价各个组团的人类活动强度与规划人口的关系（相关性较低）
 - 评价各个功能组团之间的联系（单中心城市结构、顺义副中心而不是通州副中心）
- Long et al. 2015. Cities. Evaluating the Effectiveness of Urban Growth Boundaries Using Human Mobility and Activity Records.

梁陈方案的反现实模拟

http://m.thepaper.cn/newsDetail_forward_1329271?from=timeline&isappinstalled=0

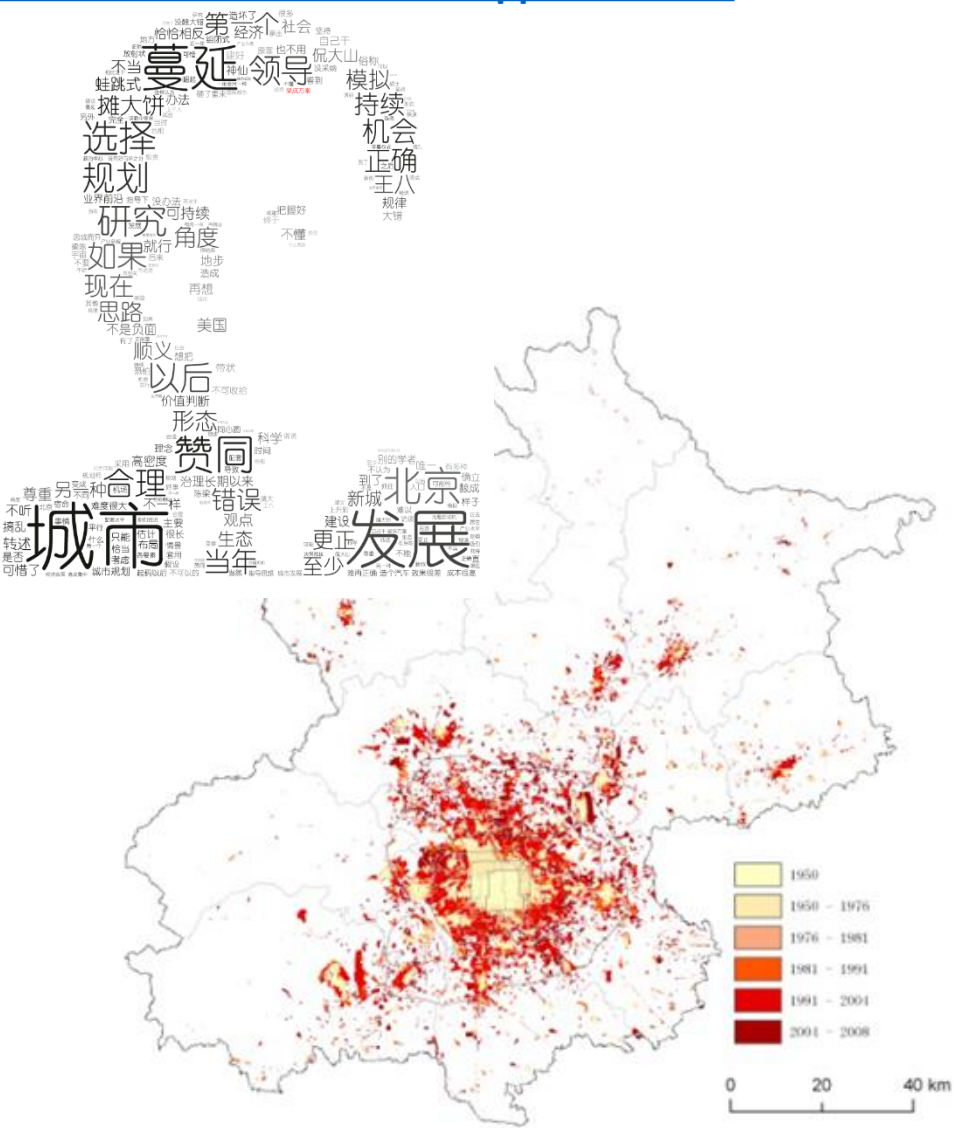
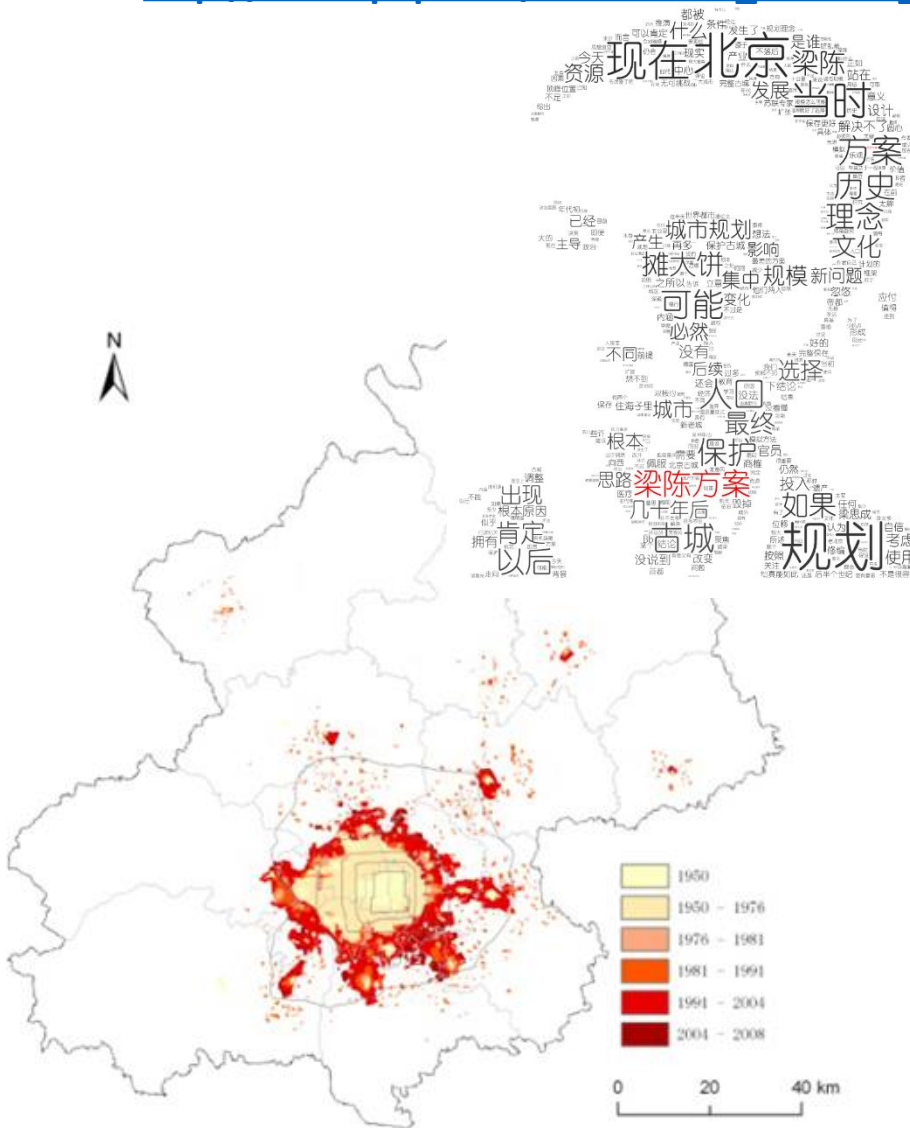


图 7 “梁陈方案”城市扩张 1950-2008

图 8 实际城市扩张 1950-2008

全国176个城市的城市增长边界UGBs评价，开展中



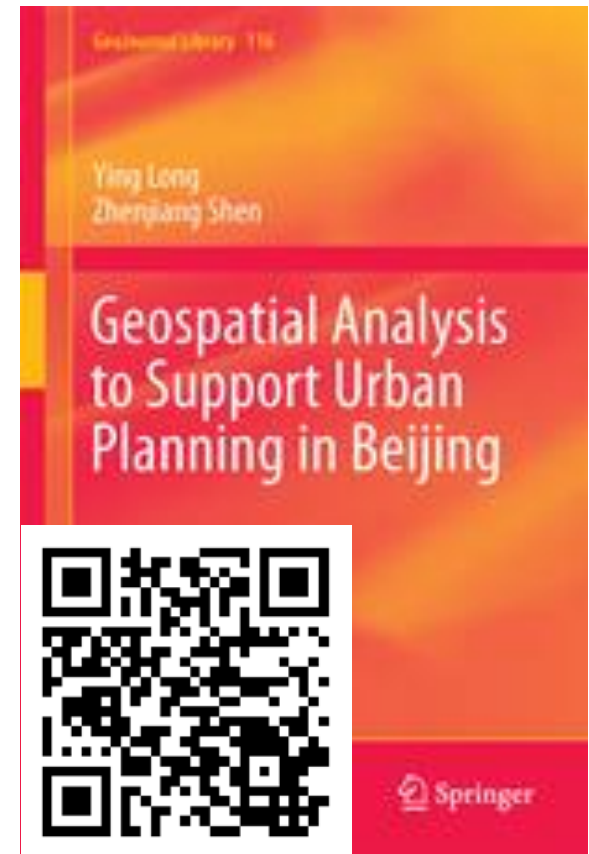
- 物理空间：城市扩张、城市再开发
- 社会空间：人类活动与移动（微博、照片、百度热力图等）

全国176个城市的城市增长边界UGBs评价，开展中



新数据环境为城市规划实施评价提供了新的视角

- 关于城市增长边界评价的发表物
 - 2015. Evaluating the Effectiveness of Urban Growth Boundaries Using Human Mobility and Activity Records. **Cities**
 - 2013. Urban Growth Boundaries of the Beijing Metropolitan Area: Comparison of Simulation and Artwork. **Cities**
 - 2012. Retrieving Spatial Policy Parameters from Alternative Plans Using Constrained Cellular Automata and Regionalized Sensitivity Analysis. **Environment and Planning B: Planning and Design**
 - 2012. Spatiotemporal Heterogeneity of Urban Planning Implementation Effectiveness: Evidence from Five Master Plans of Beijing. **Landscape and Urban Planning**
 - 2015. 城市增长边界实施评估: 分析框架及其在北京的应用. 城市规划学刊
- 更多, 请关注北京城市实验室网站的Projects频道的Project 2 UGBs
 - <http://www.beijingcitylab.com/projects-1/2-urban-growth-boundaries/>



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新浪微博: 龙瀛a1_b2

北京城市实验室BCL

微信公众号: beijingcitylab