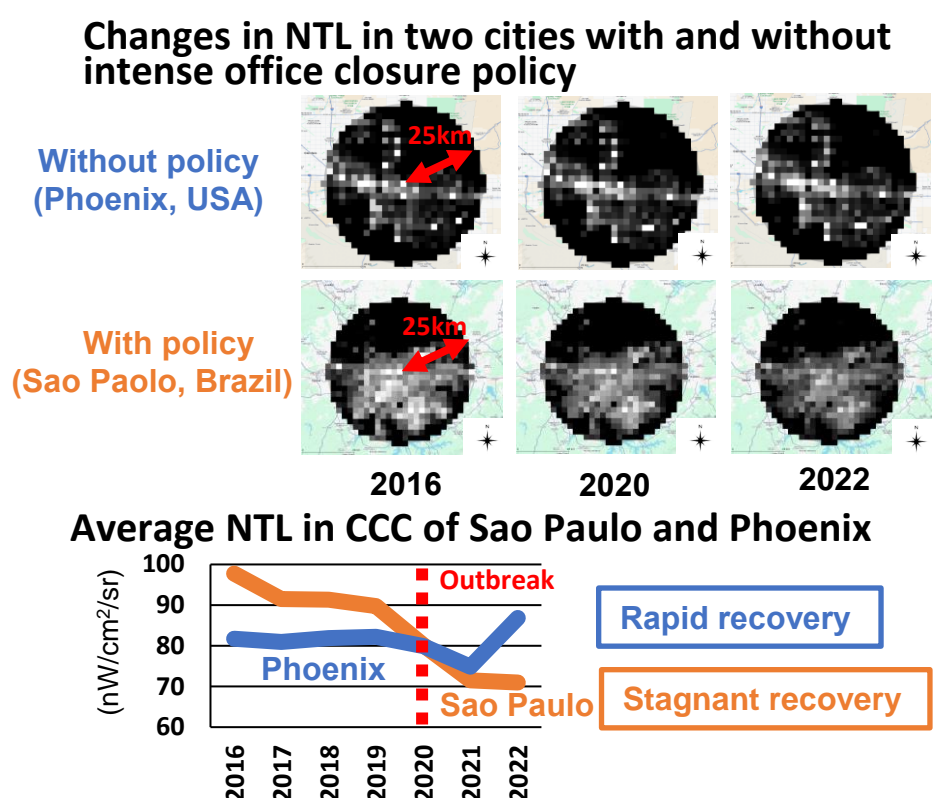
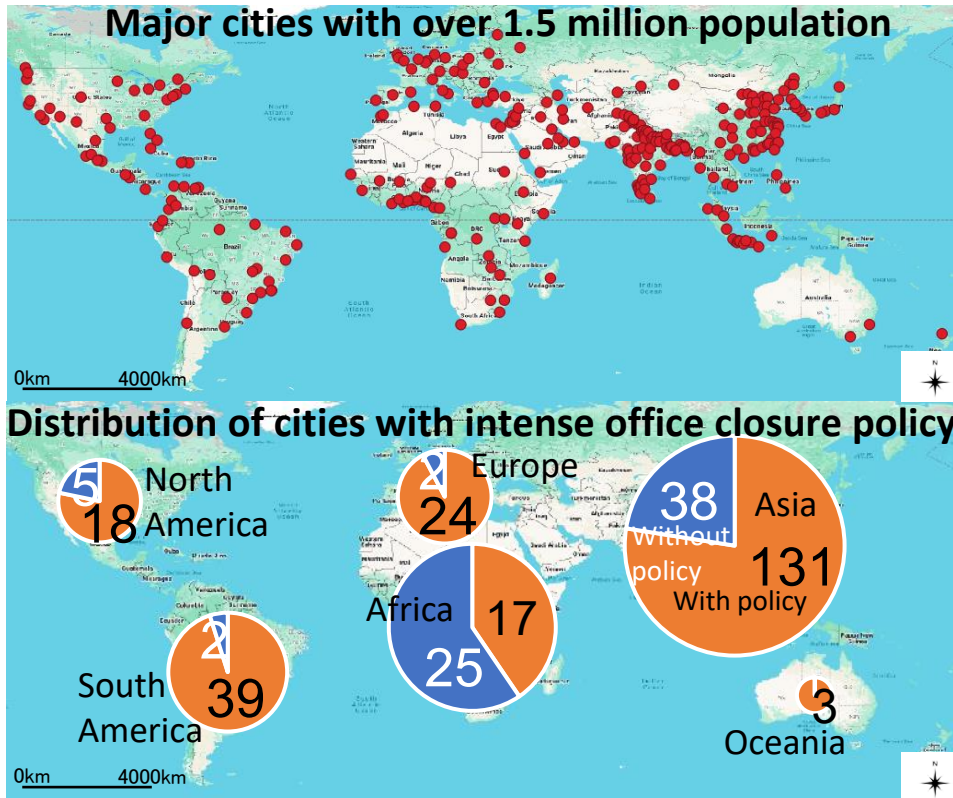


Impacts of Movement-Restriction Policy under Pandemic on Post-pandemic Urban-Activity Level in Large Cities

大都市圏におけるパンデミック下の行動制限政策が
パンデミック収束後の都市活動水準に与えた影響

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1 Background

Movement-restriction policy during COVID-19 pandemic

- National and regional-level movement-restriction policies were introduced globally to reduce infection risks. (Huang et al., 2014)

Influence on post-pandemic lifestyle

- Increase of online activity rate such as remote work and eCommerce globally. (Becker Friedman Institute, 2023; International Trade Admin., 2023)

Research question

To what extent did movement-restriction policy affect post-pandemic urban-activity level?

2 Goals

This study aims to:

- Globally observe urban-activity levels in major cities before and after the pandemic;
- Examine the impact of movement-restriction policy on urban-activity levels;
- Discuss policy implications

3 Methods

- Assumption:** Observed nighttime light (NTL) intensity explains human activity levels. (Huang et al., 2014)
- Study Process**

Understand global trend of NTL intensity in city center cluster

Global analysis: Matched difference-in-differences (DID) analysis

- Treatment group: 69 cities matched from 232 cities with Level 3 office closure during pandemic
- Control group: 69 cities matched from other 72 cities with over 1.5 million population

Discussion on policy implications

- Data:** EU Urban Centre Database (2015); Nighttime light imagery from NASA VIIRS DNB VNP46A4 (2016-2022); Oxford Covid-19 Government Response Tracker (2020-2022)

4 Results

Global trend of NTL before/ during/after the pandemic

Average NTL in city center cluster (CCC) declined in 2020 but slightly recovered in 2021 globally.

Impacts of intense office closure policy on NTL

Estimated average treatment effects on the treated (ATT) showed intense office closure significantly reduced NTL both during and after the pandemic.

Multi time-frame DID estimates revealed **intense office closure reduced NTL after pandemic by 9.4% on average** and 10.0% in cities with metro lines.

Average NTL in CCC

Year	Average NTL (nW/cm ² /sr)
2016	~51
2017	~53
2018	~54
2019	~55
2020	~52
2021	~53
2022	~53

Outbreak (2020)

Impacts of intense office closure policy on NTL

Year	ATT (nW/cm ² /sr)
2020	~-0.205
2022	~-0.09

ATT of office closure estimated as NTL change rate from 2016

***: p<0.01 **

All cities Cities with metro

5 Conclusions

- Introduction of intense office closure policy had negative impact on urban-activity level after pandemic, especially in cities with metro lines.
- Intense movement-restriction policy may be effective in reducing infection but may harm urban growth in a longer term.

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