Urban Mobility Networks Under Shock: Evidence from Bike-Sharing

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MOTIVATION

- Cities as **key economic** and **population centers**
- Rising **mobility demand** and limits of car-based transport
- Growth of **shared mobility** and bike sharing systems (Fishman, 2019)
- Strong dependence on **network design** for system performance (Hu et al., 2021)
- Open question: How do shocks **reshape transport networks**?

METHODS

- Case study: **Zaragoza bike-sharing system**
- Build daily temporal networks (Holme & Saramäki, 2012)
- Compute **network structure metrics**
- Combine:
  - **Interrupted time series**

$$Y_t = \beta_0 + \beta_1 t + \beta_2 \text{Lockdown}_t + \beta_3 \text{TimeAfterLockdown}_t + \beta_4 \text{DeEsc}_t + \beta_5 \text{TimeAfterDeEsc}_t + \beta_6 \text{NewNormal}_t + \beta_7 \text{TimeAfterNewNormal}_t + \beta_8 \text{SecondWave}_t + \beta_9 \text{TimeAfterSecondWave}_t + \mathbf{X}_t' \gamma + \varepsilon_t$$

  - Robustness: Bayesian Structural Time Series

Objectives

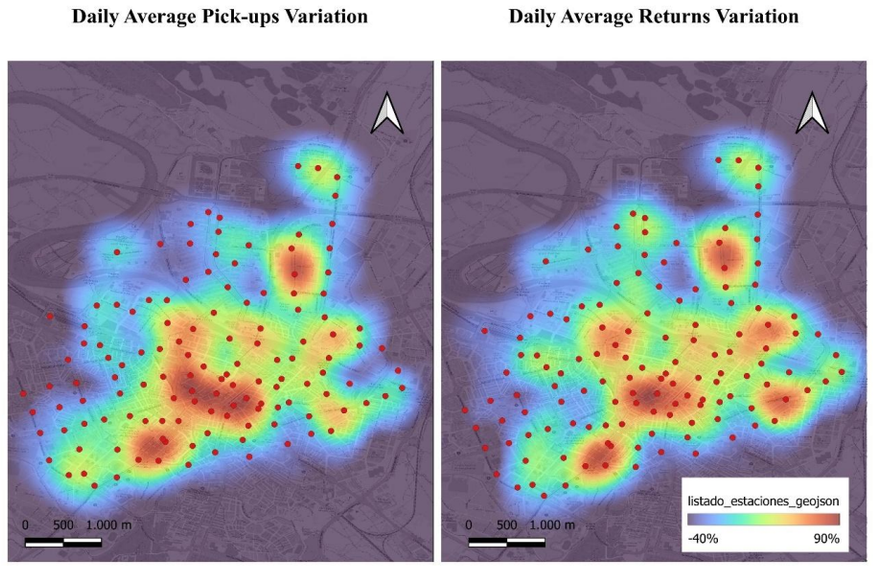
Study how **bike-sharing networks evolved** during COVID

Move beyond static comparisons: **dynamic evolution.**

Identify **when** changes occur, **how** they evolve over time, and whether they **persist**

MAIN RESULTS

Bike-sharing networks t**emporarily reorganize after COVID-19**, becoming more **cohesive and localized**, with some **persistent changes**.



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