Agent-based simulation for predicting internal displacement and return

Which models and parameters best predict the geographic distribution of internal displacement and return in an agent-based simulation?

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Models of (Forced) Migration

- Gravity

- Radiation (Simini et al 2012), with flux between locations as:

$$T_{ij} = T_i \frac{m_i n_j}{(m_i + s_{ij})(m_i + n_j + s_{ij})}$$
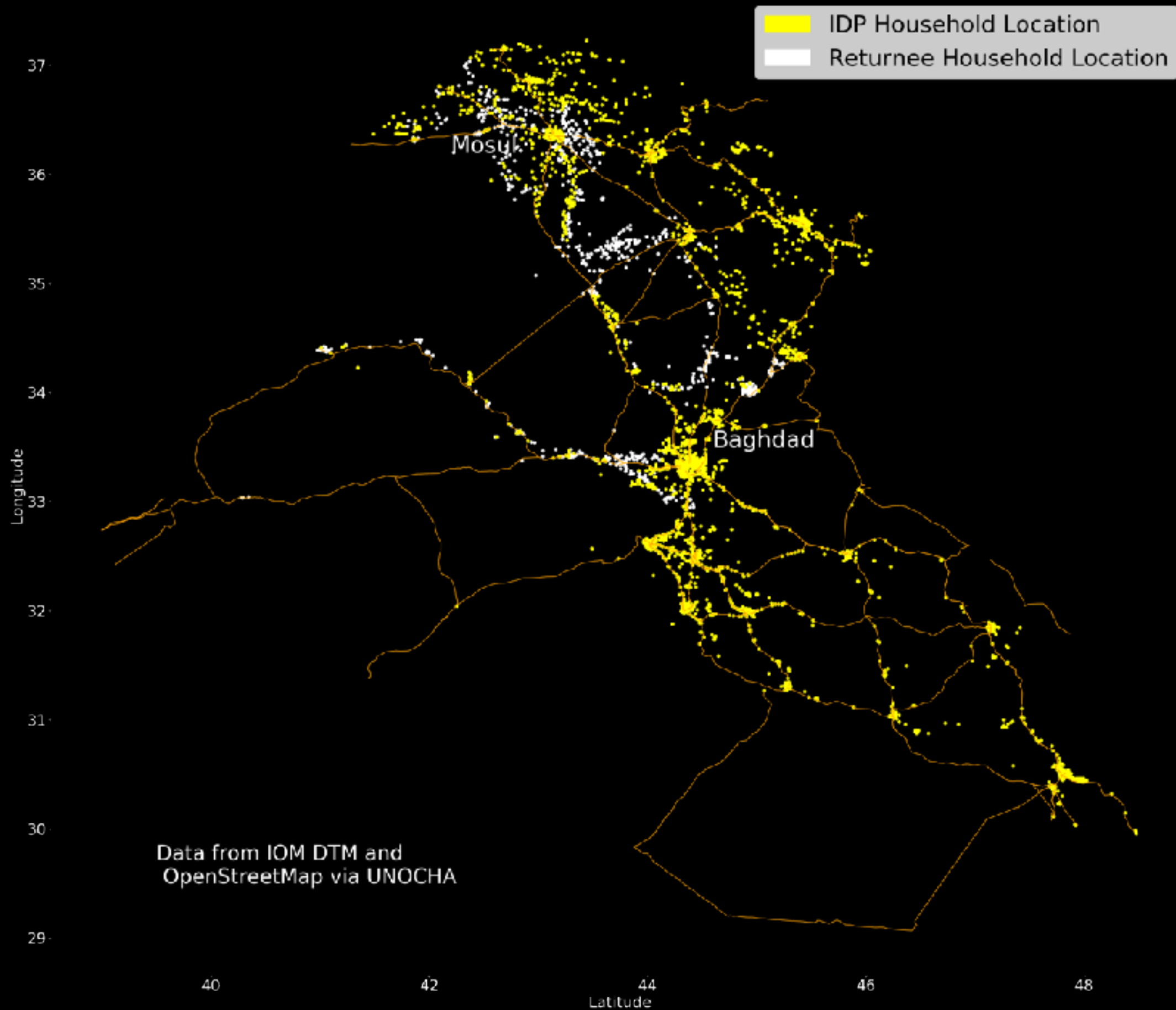
Case Study

Iraq, 2017- Present

Data

- International Organization for Migration (IOM) Displacement Tracking Matrix (DTM)

- Armed Conflict Location and Event Database

- Empirical Studies of Conflict ethnic/religious mapping

- UNOCHA (e.g., Open Street Map, 4W's NGO operation mapping)

Validation Set

- DTM 03-2018 - 05-2018

Iraq Displacement & Return, March 2018

Legend:
- IDP Household Location
- Returnee Household Location

Mosul

Baghdad

Data from IOM DTM and
OpenStreetMap via UNOCHA
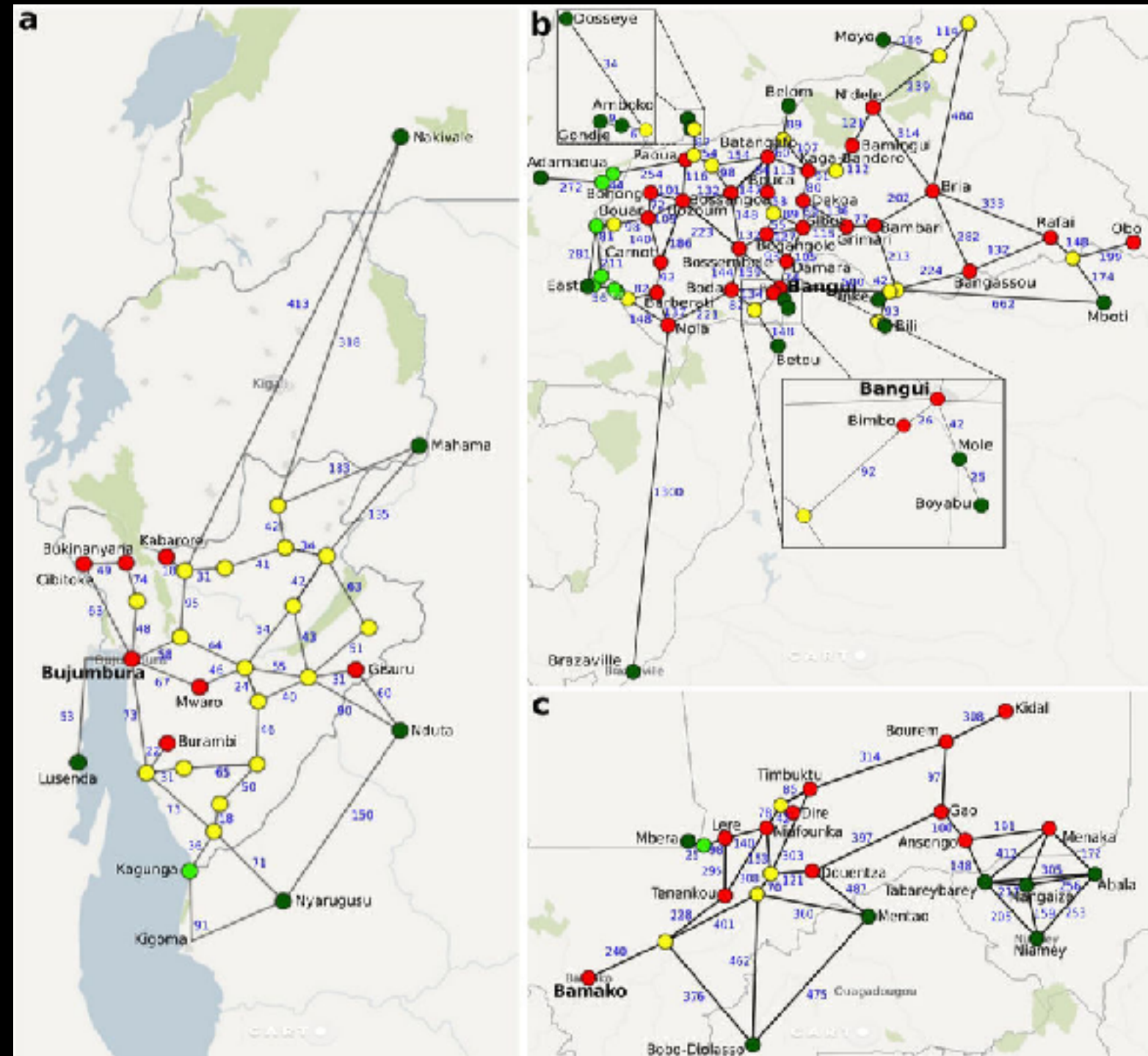
Interesting Progress in Simulation

Suleimanova, Bell, Groen (2017), Groen (2016)

- Cases: CAR, Burundi, Mali

- Claim accurate prediction of > 75% of refugee pop. after 12 "days"
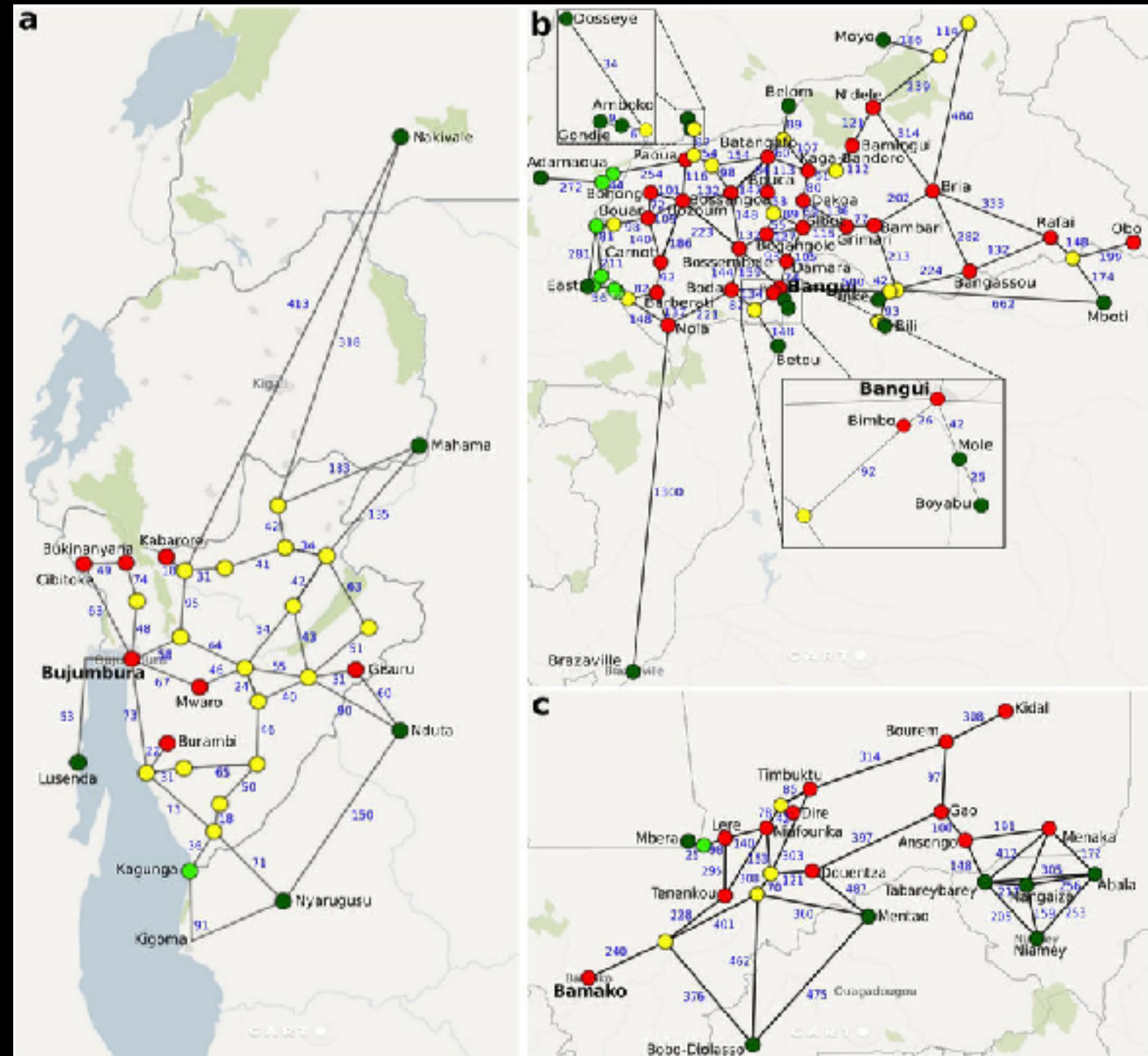
Graphic from Suleimanova et al. 2017

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Value of Contribution

A. Displacement & return —> integrated response

B. More sophisticated parameter estimation (e.g., Bayesian Network, reinforcement learning) —> more robust justification for parameter choices

C. Ties to current forced migration studies —> social scientists' added value

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