

New Information Technologies, Human Behavior in Space-Time and the Urban Economy

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Presentation at the First Focus Group Meeting, STELLA, Focus Group 2, ICT, Innovation and the Transport System, January 15-17, 2002.

This presentation is based on research supported by an NSF-ITR grant (#BCS-0112488) and an Ameritech Faculty Research Grant.

Recent Approaches

- city and regional studies
- studies on specific industries or firms
- social and cultural studies
- network analysis and spatial interaction modeling
- cyberspatial cognition and behavior

Three Relevant Research Areas

- time-use studies
- time-geographic research
- studies on human activity-travel patterns in space-time

New IT and Human Activity Patterns

- the use of new IT will be associated with distinctive patterns of human activities in space-time
- analysis of these patterns could provide insights into the interaction between new IT, everyday life and the urban economy
- how to approach empirical research from this perspective?

Time Displacement

- an important feature of time is its zero-sum property - time displacement
- for example, the time people spend on the Internet takes time away from other activities
- insights into the potential impact of new IT on human activity patterns and on the urban economy may be gained through time-use studies

Time Use Studies

- examine the amount of time people spend on new IT compared to traditional technologies and other ways of using time
- have a long history - Szalai (1972)
- collect data using time-budget or time-diary
- recent time-use studies on the impact of new IT

Space-Time Displacement

- time-use studies often do not explicitly incorporate the spatial dimension in their data collection effort or analysis
- the time displacement perspective needs to be expanded to a space-time displacement perspective
- there are distinctive geographical consequences associated with time displacement

Human Activity Patterns

- new IT may lead to new patterns of activities and travel
- research on human activity patterns emerged in the 1960s and has witnessed a new wave of development in recent years
- recent studies focus mainly on the effect of telecommuting on the number and type of trips people make
- rely on data collected through the use of activity-travel diary

Tele-Substitution (1)

- the impact of new IT on human activity-travel patterns and urban development is highly complex, and substitution tend not to be the dominant effect as often assumed
- a modification of activity-travel patterns rather than a reduction in the demand for travel is more likely

Tele-Substitution (2)

- the increasing use of new IT will lead to changes in human activities patterns in space-time, and this will likely have an impact on urban development in the future.
- empirical research guided by the three perspectives will be helpful

Time Geography (1)

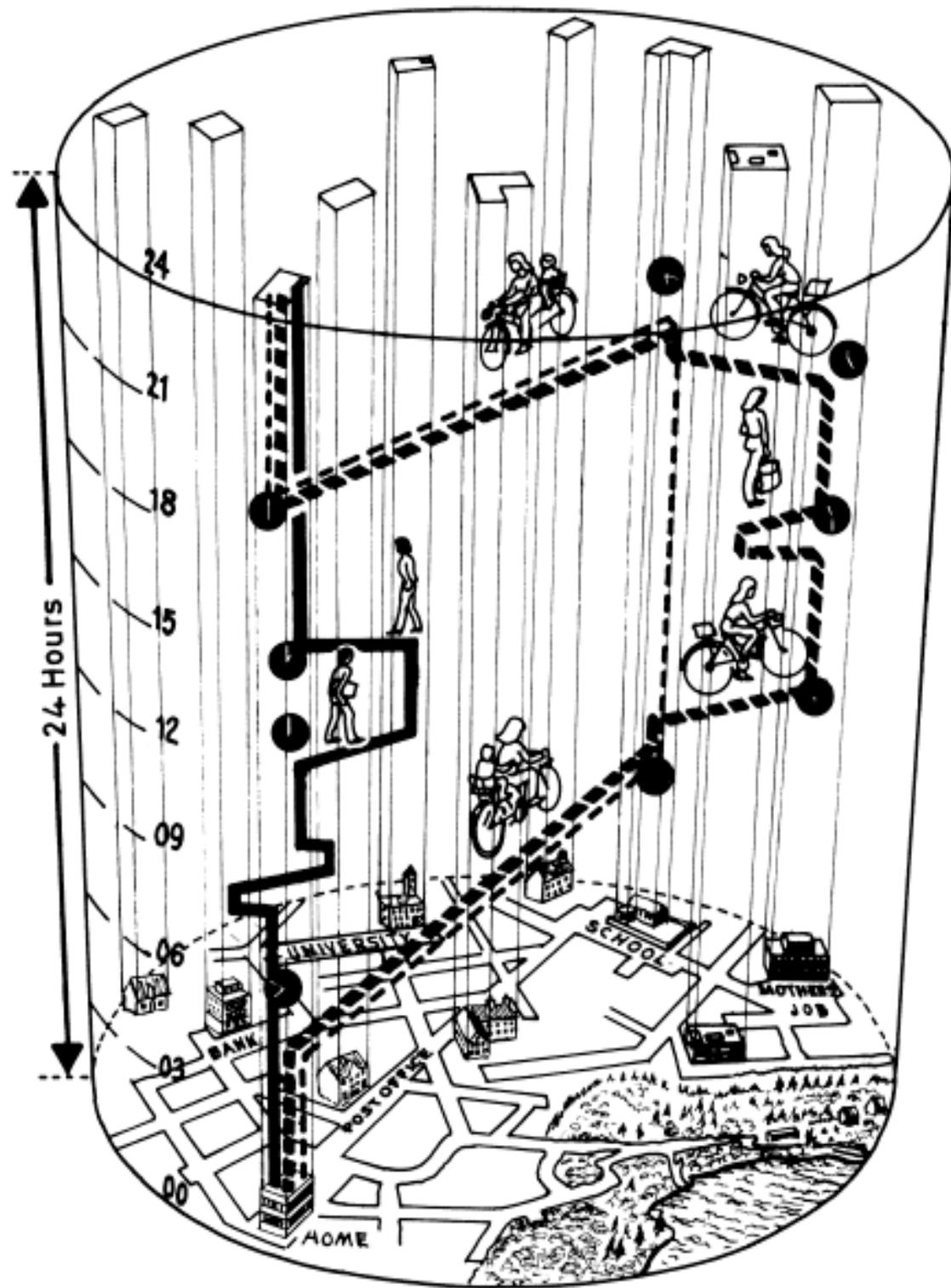
- the time-geographic perspective (Hägerstrand, 1970)
- conceives and represents an individual's activities and travel in a 24 hour day as a continuous temporal sequence of activities in geographical space
- Space-time constraints – limited locational and temporal flexibility of a particular activity that restricts a person's freedom in choosing where and when to perform other activities

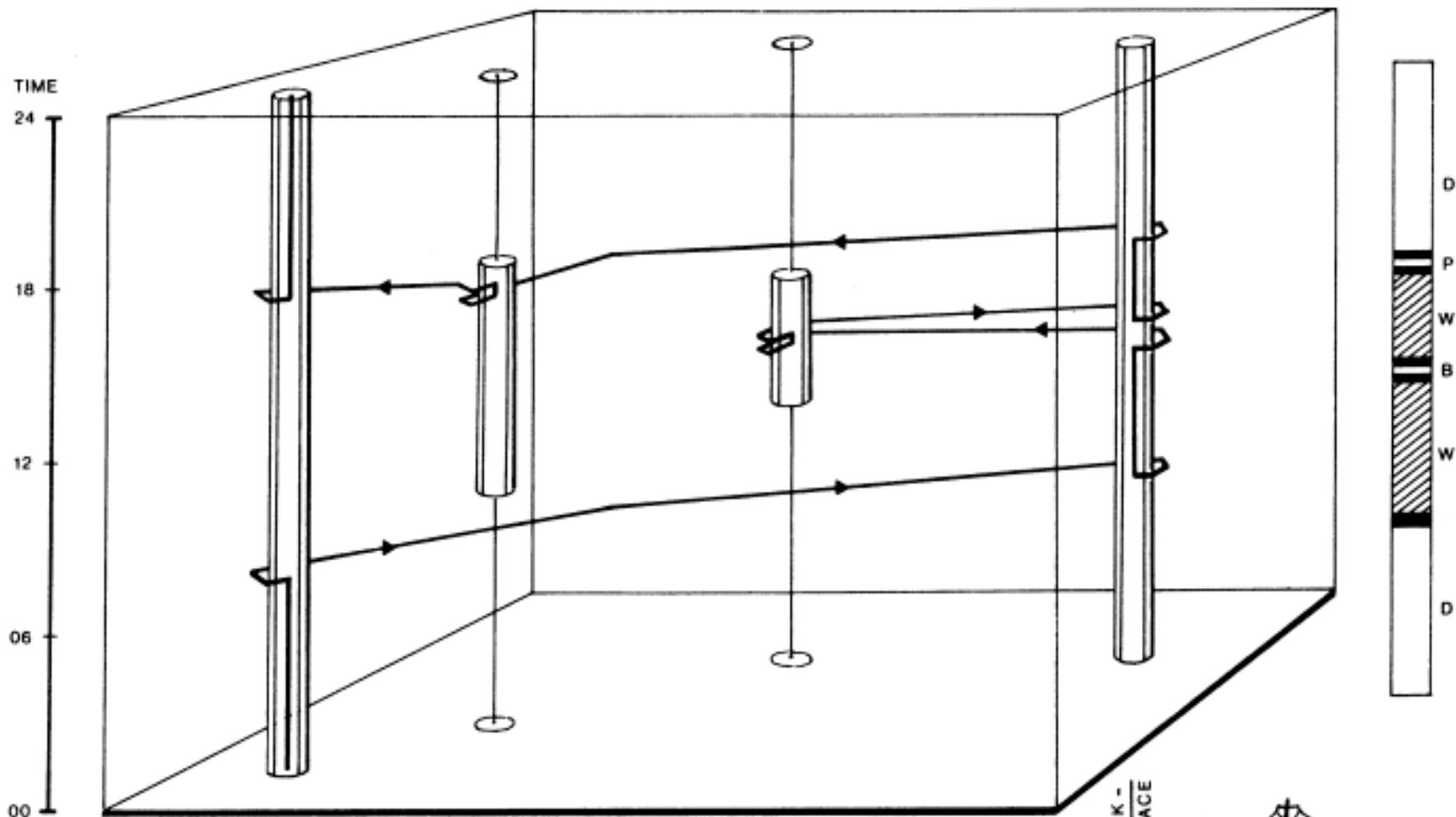
Time Geography (2)

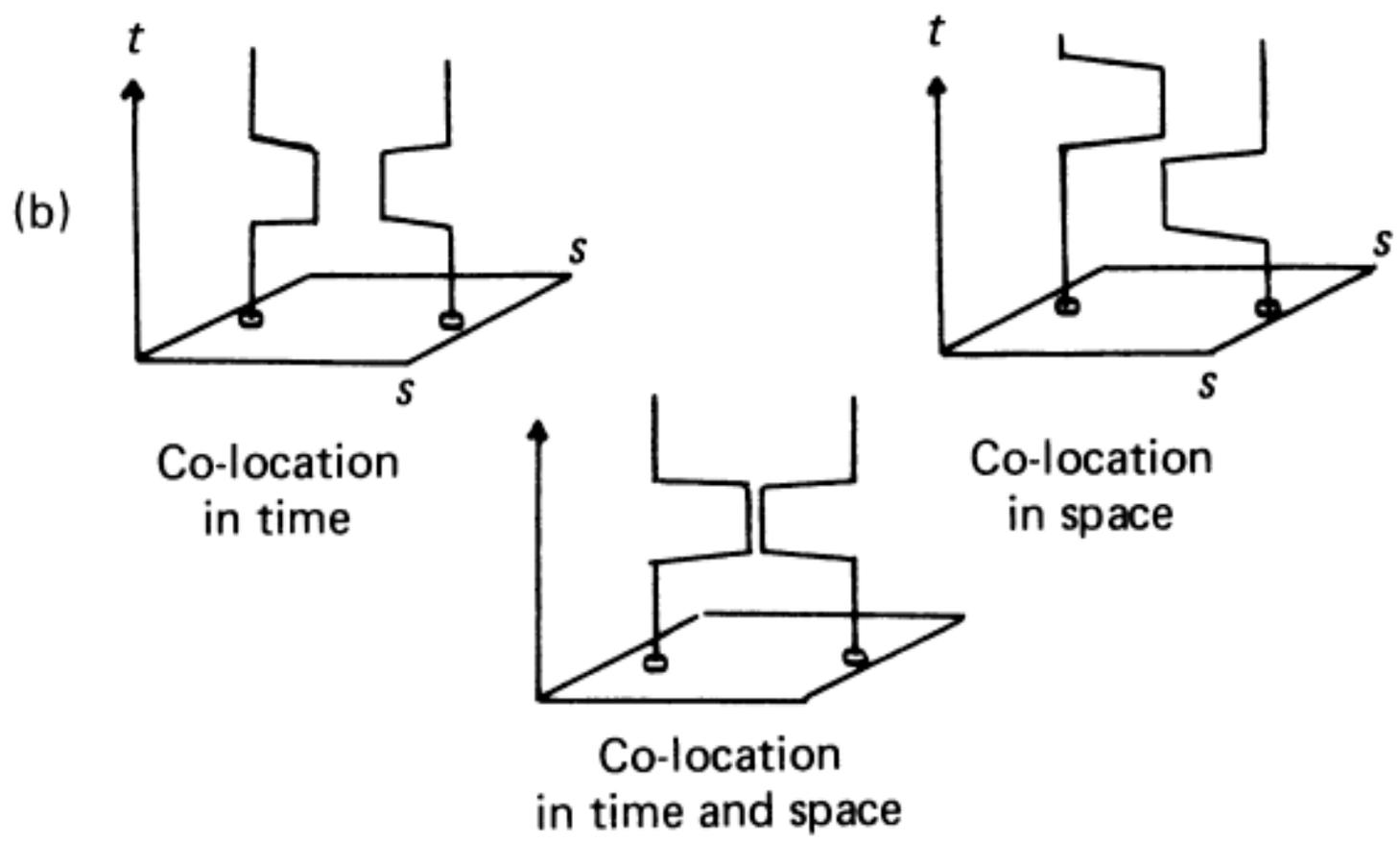
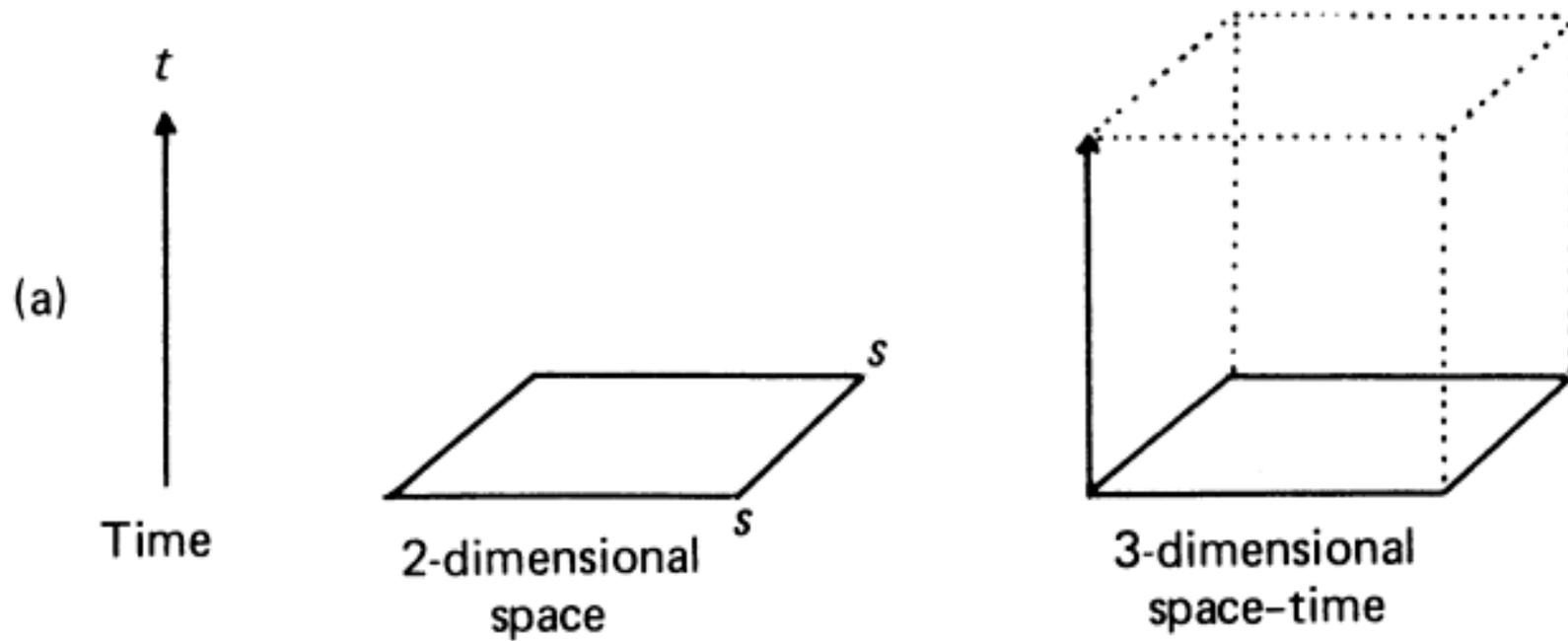
- an important transformation that may result from new IT is the relaxation of many traditional space-time constraints that limit human spatial mobility and activity space
- research on the effect of new IT use on individuals' space-time constraints and activity patterns will help debunk the myth concerning the “death of distance” in the information age

Time Geographic Research (1)

- Janelle (1995) and Black (2000) - larger activity space and relaxation of space-time constraints
- Janelle (1973) – human extensibility refers to the ability of a person to overcome the friction of distance through space-adjusting technology
- Adams (1995) - a new model of the person; the extensibility diagram, using Hagerstrand's space-time aquarium



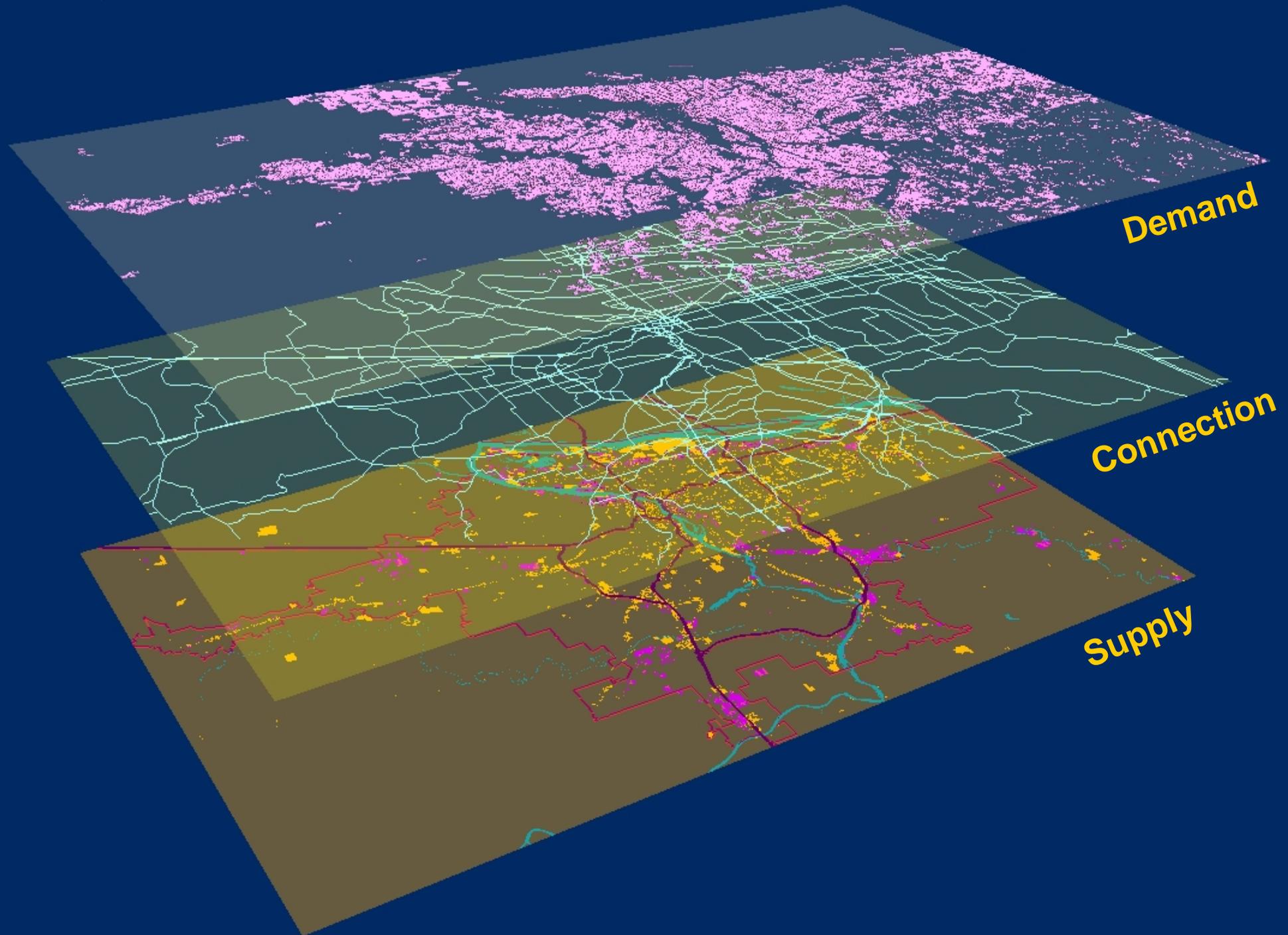




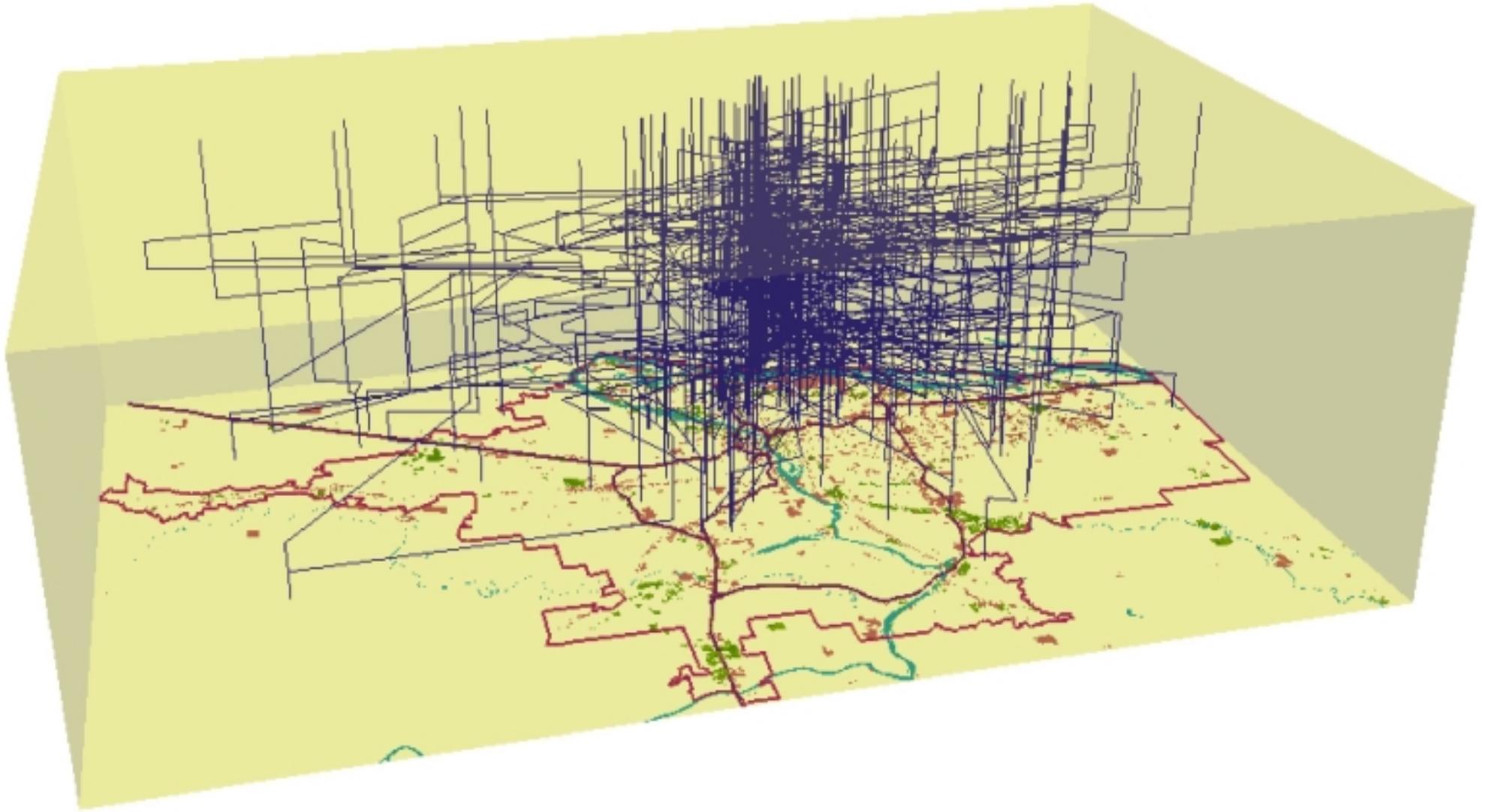
Data and Methods

- Activity-travel diaries record location, timing, duration, frequency and sequence of activities
- GIS – georeferencing, geocomputation, geovisualization

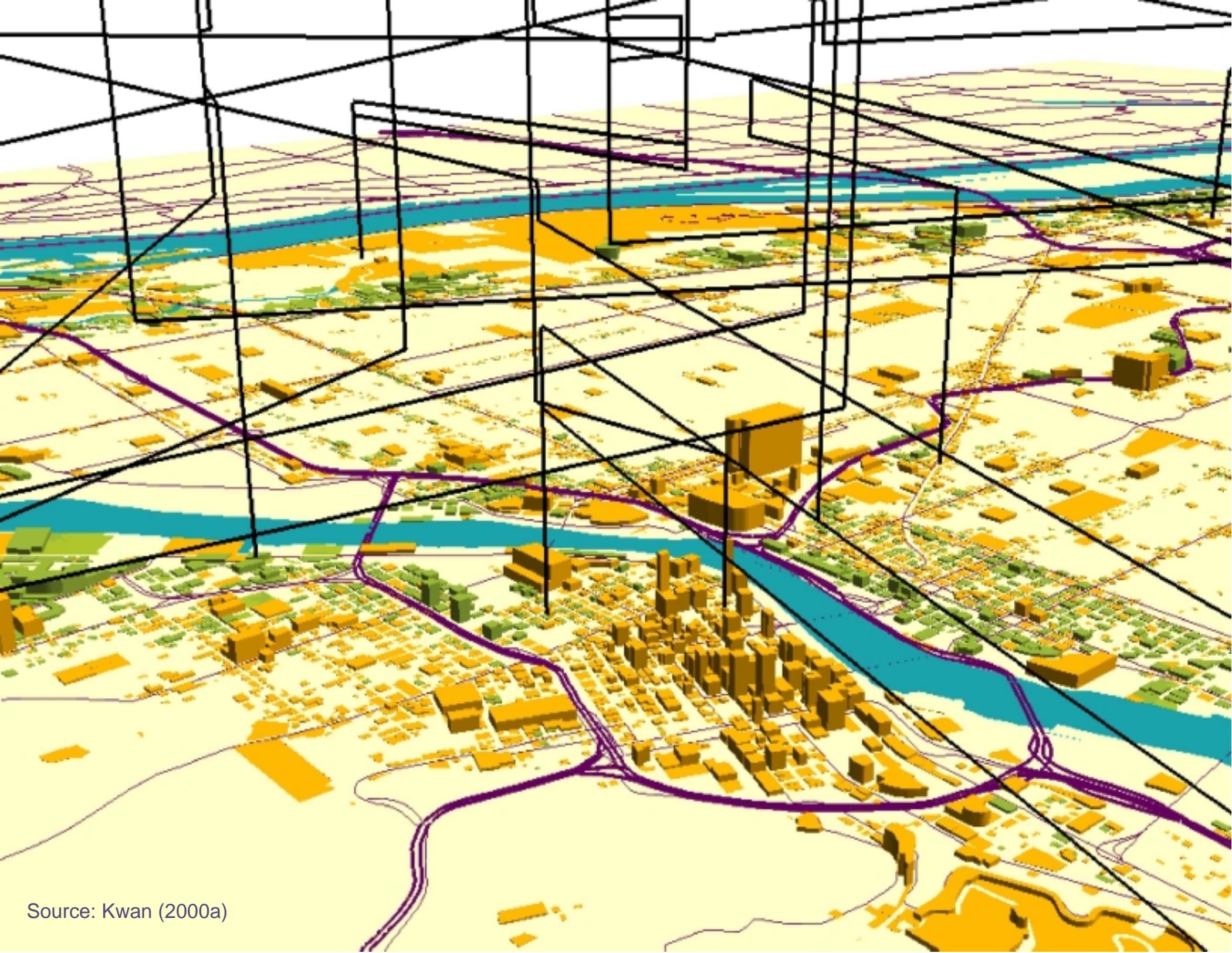
Source: Mei-Po Kwan and Jiyeong Lee. 2002. "Geovisualization of human activity patterns using 3D GIS: A time-geographic approach. In *Spatially Integrated Social Science: Examples in Best Practice*, eds. Michael Goodchild and Donald Janelle. Oxford: Oxford University Press.



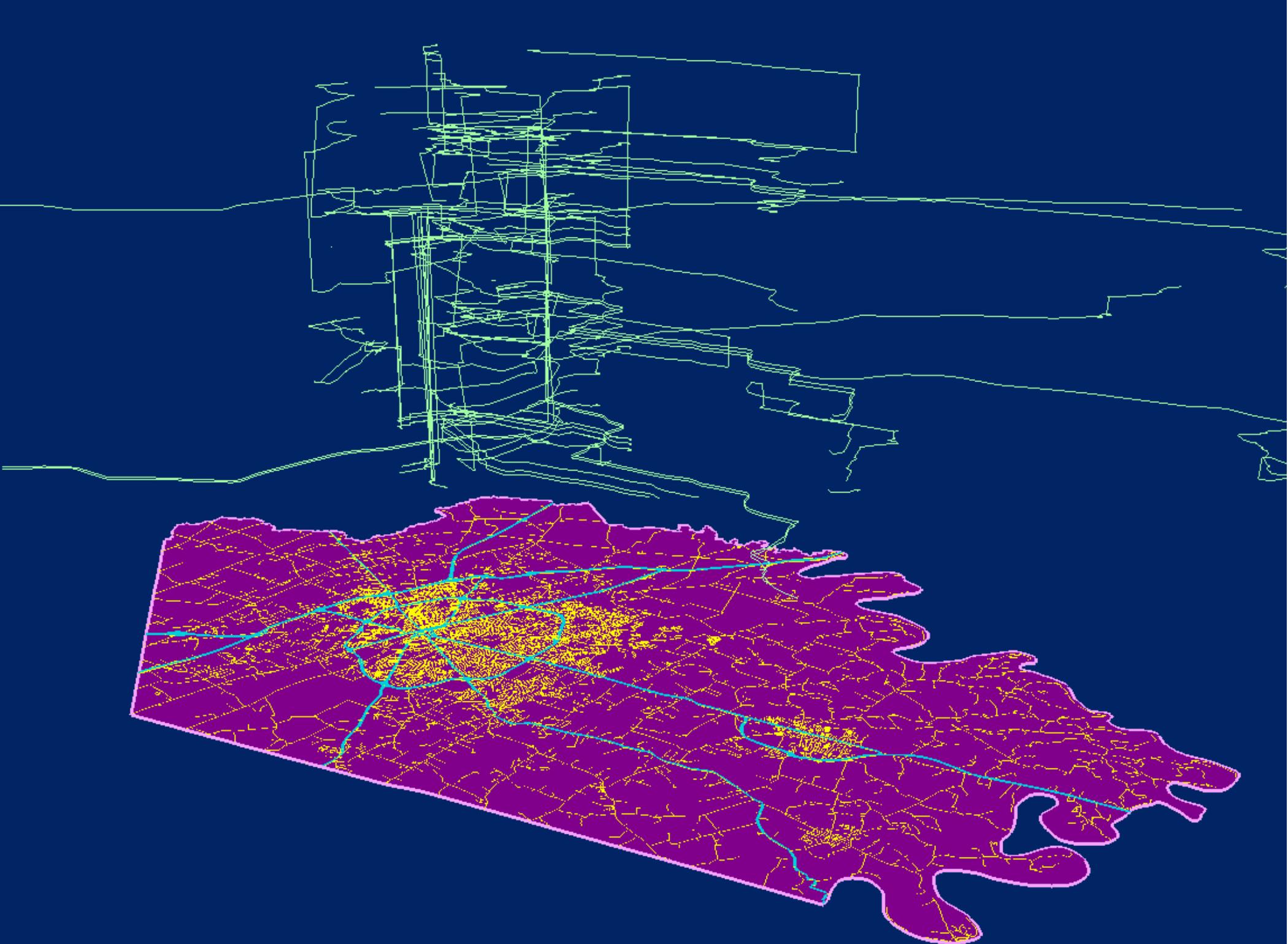




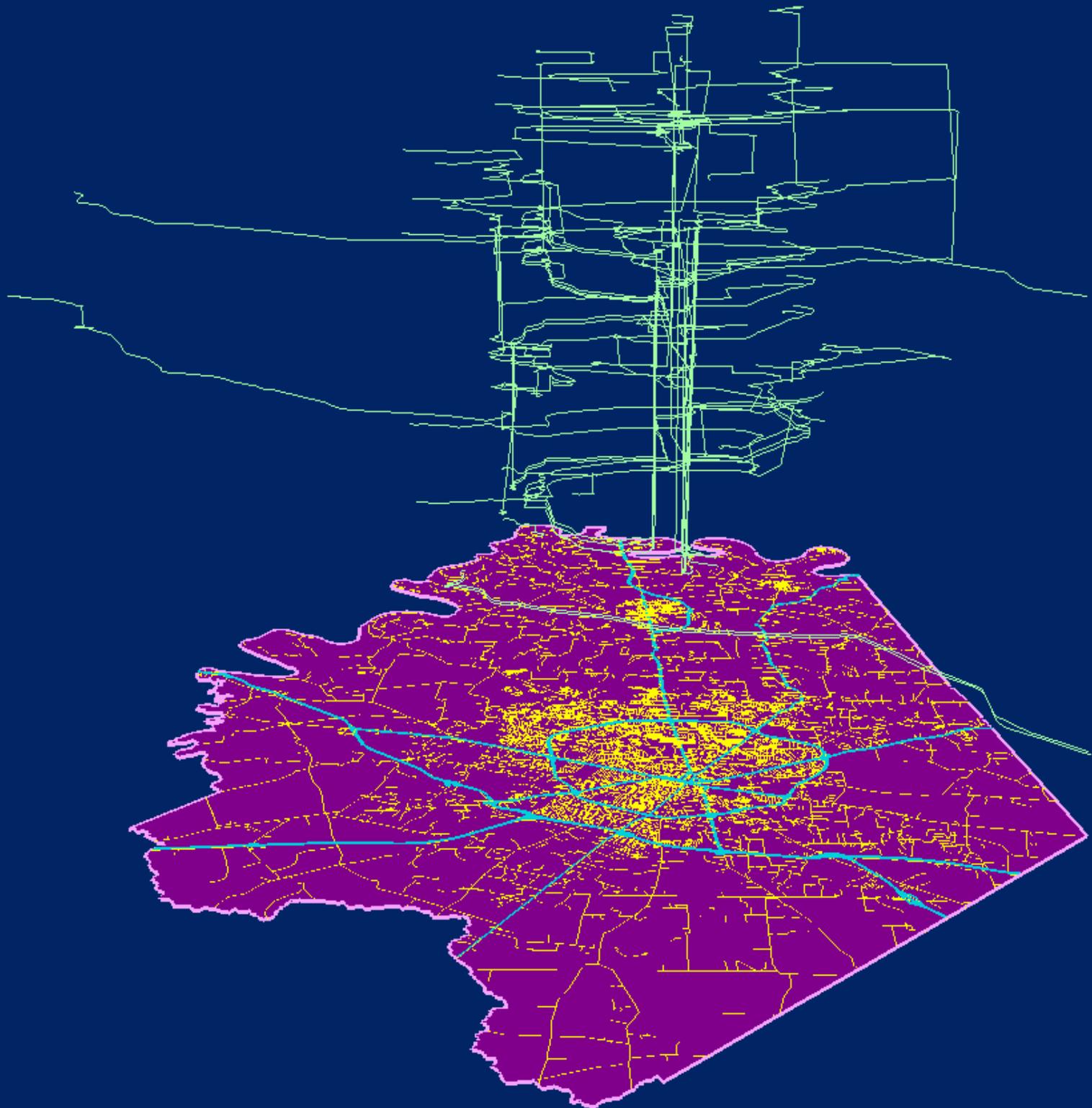
Source: Mei-Po Kwan. 2000a. "Interactive geovisualization of activity-travel patterns using three-dimensional geographical information systems: A methodological exploration with a large data set." *Transportation Research C*, 8:185-203.

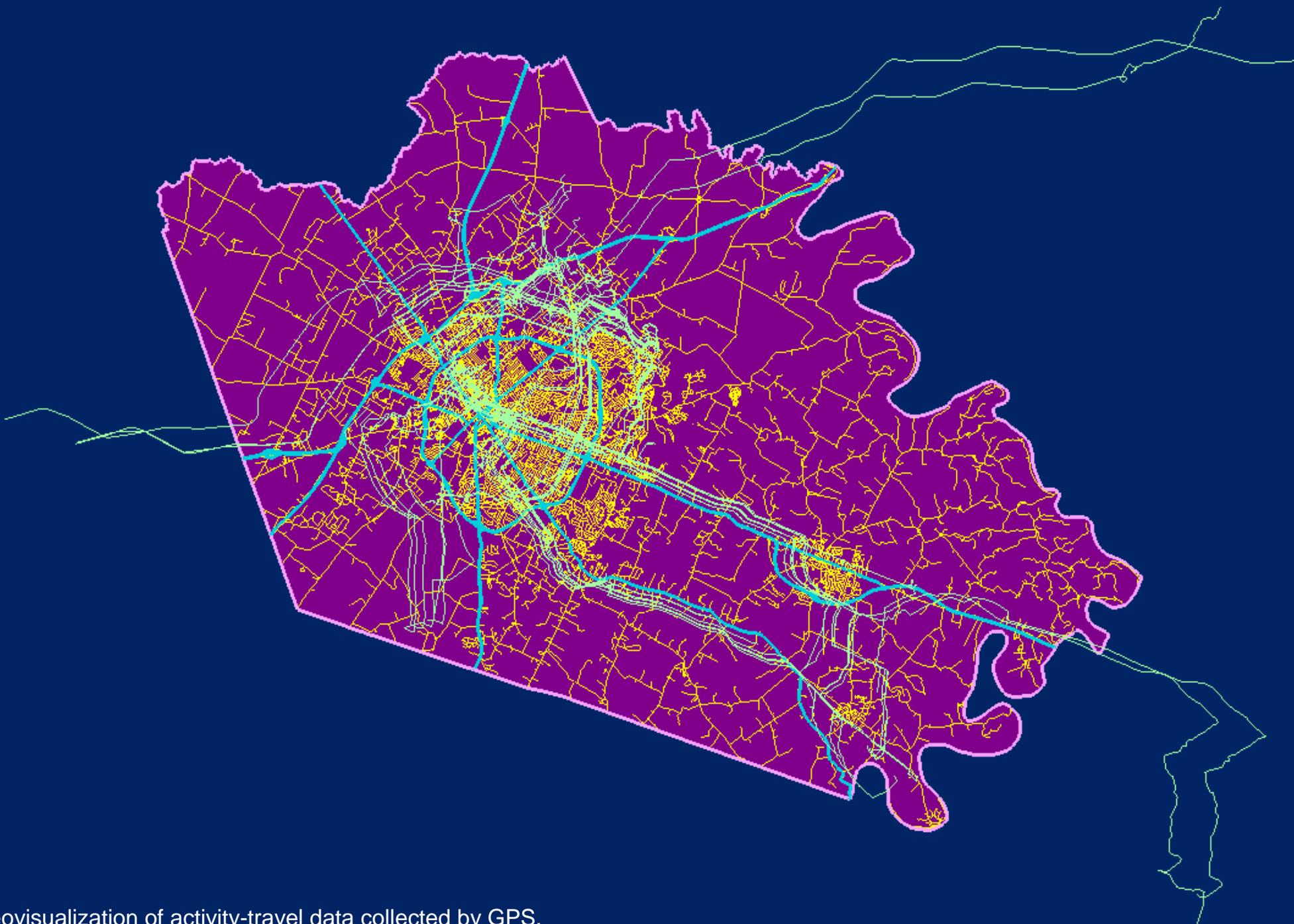


Source: Kwan (2000a)



Geovisualization of activity-travel data collected by GPS.

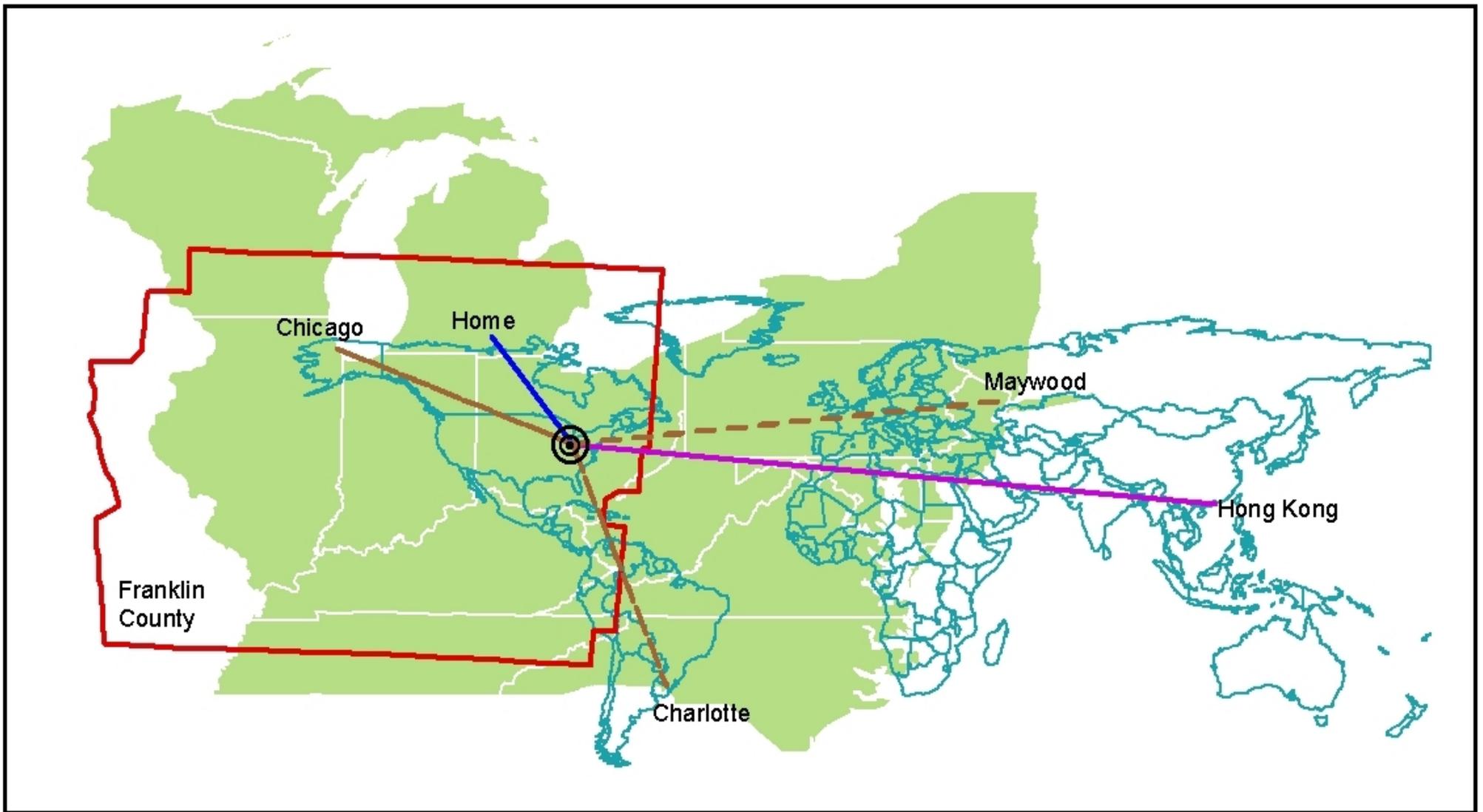




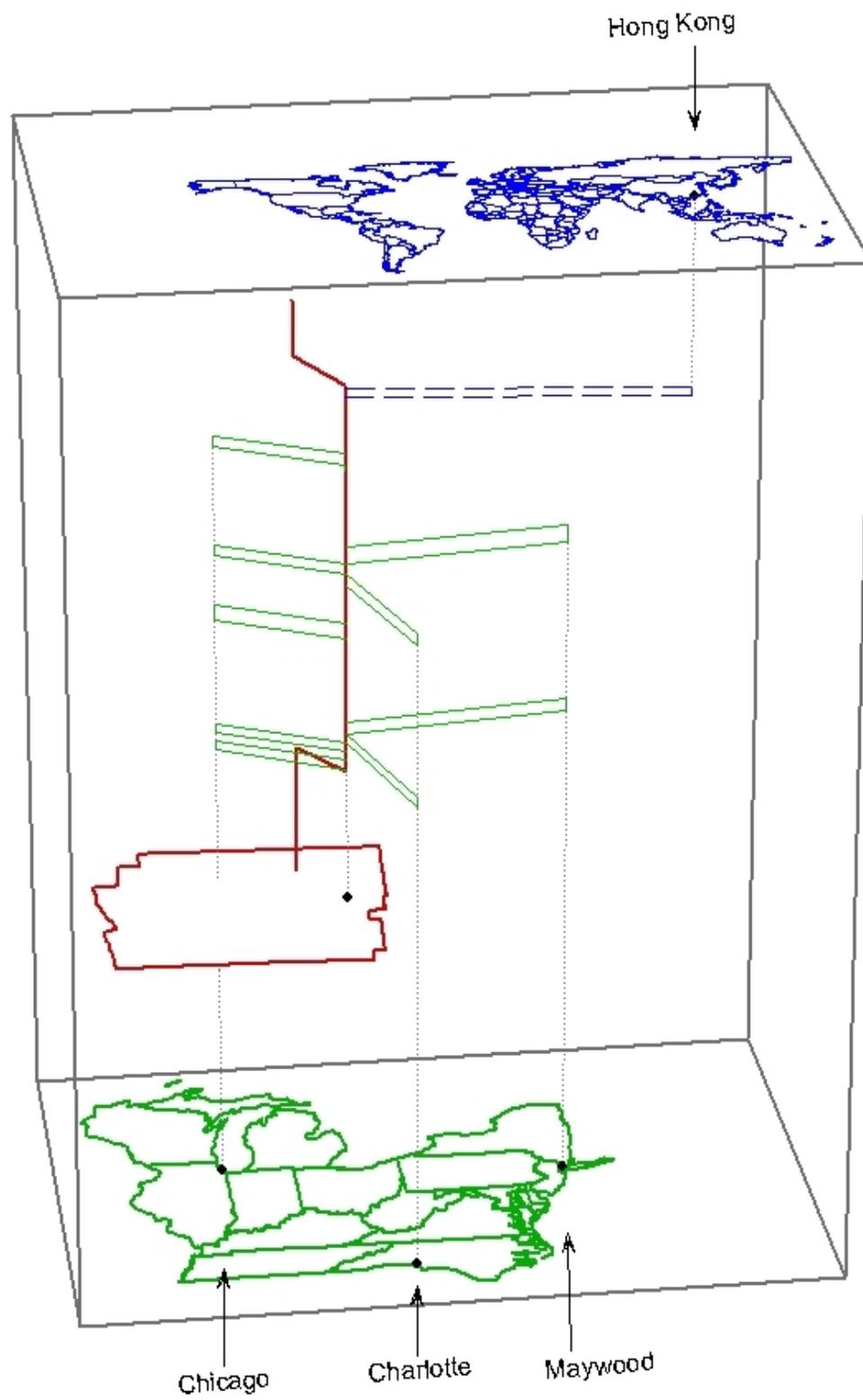
Geovisualization of activity-travel data collected by GPS.

Time Geographic Research (2)

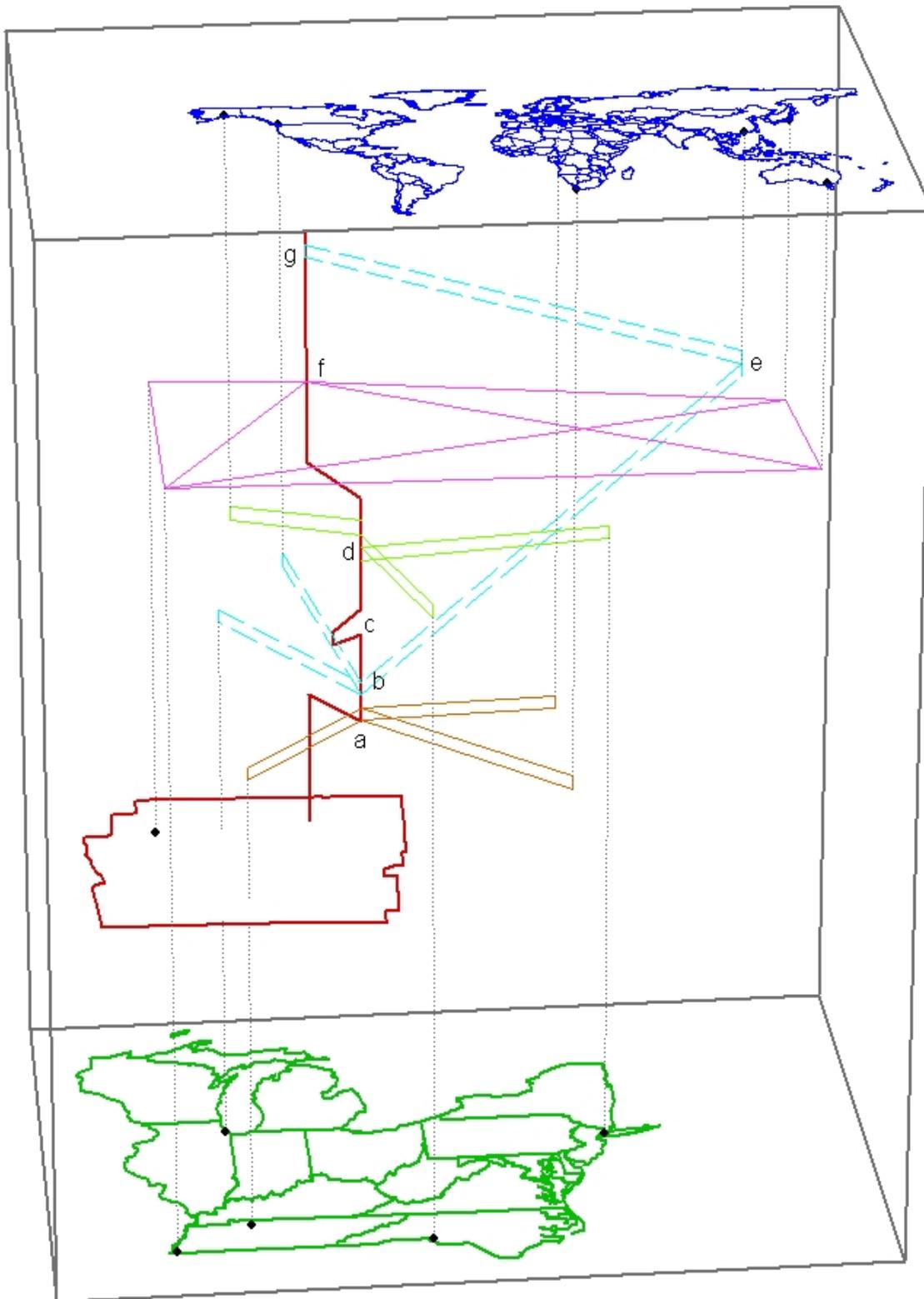
- Kwan (2000) - implemented the extensibility diagram as an analytical tool within a 3D GIS using data from Web browser history and personal interview
- Adams (2000) - provided a narrative of five persons' daily lives using CAD and with data collected through personal interviews and detailed records of their communications activities
- Kwan (2001) - proposed a conceptual framework of human cyberspatial behavior and cognition based on the time-geographic perspective



Source: Mei-Po Kwan. 2000b. "Human extensibility and individual hybrid-accessibility in space-time: A multi-scale representation using GIS." In *Information, Place, and Cyberspace: Issues in Accessibility*, 241-256, eds. Donald Janelle and David Hodge. Berlin: Springer-Verlag.



Source: Kwan (2000b)



Source: Kwan (2000b)

Complex Interaction Patterns

- simultaneity and temporal disjuncture
- temporally coincidental (real time chat)
- temporally non-coincidental (e-mailing)
- one-way (web browsing)
- two-way (e-mailing)
- multi-way (chat room)
- in-coming transactions (Web casting)
- out-going transactions (e-mailing)

Implications for Future Research

- the importance of individual- and firm-level research
- the need for georeferenced data
- the need to examine the interaction among household members
- the role of the social and geographical context