Understanding fine-scale human movement patterns within a complex urban environment by using GPS and semi-structured interviews

Grant funded by NIH to Thomas W. Scott, UC-Davis; John Elder, SDSU, Co-Investigator; Steve Stoddard, UC-D, Conceptual Model

Background

- Complexity associated with measuring activity space
- Opportunity in this study to contribute to this literature due to rich data
- Significance: *People's movement patterns, despite being hard to measure, clearly contribute to their health and risk for disease, including their potential exposure to disease/ disease vectors.*

Previous Dengue Research Efforts: Malaysia Cleanup Campaign

Barbados Tire Control

Laos Container Control

Laos Trash Challenges

Brazil Breeding Site Reconstruction

Brazil Breeding Site Coverage

Brazil and Managua House to House Campaign

Managua Cleanup Campaign

Managua Surveillance

Iquitos, Peru


Columbia
Ecuador
Loreto
Amazon River
San Antonio
Iquitos
Brazil
Tarapoto
Peru
Lima
Cusco
Bolivia
Pacific Ocean
Chile

Objective

- We know very little (or nothing) about fine-scale movement of humans within complex urban environments - partly because of the limitations in the methods used, but partly because of the lack of such high-resolution data.
- We use two methods to capture fine-scale human movement patterns: global position system (GPS) units and semi-structured interviews.
- **Main goal of research: compare and contrast the information obtained through these two methods – neither ideal – to generate a discussion on issues associated to measurement of fine-scale human movement patterns.**

Research Methods - 1

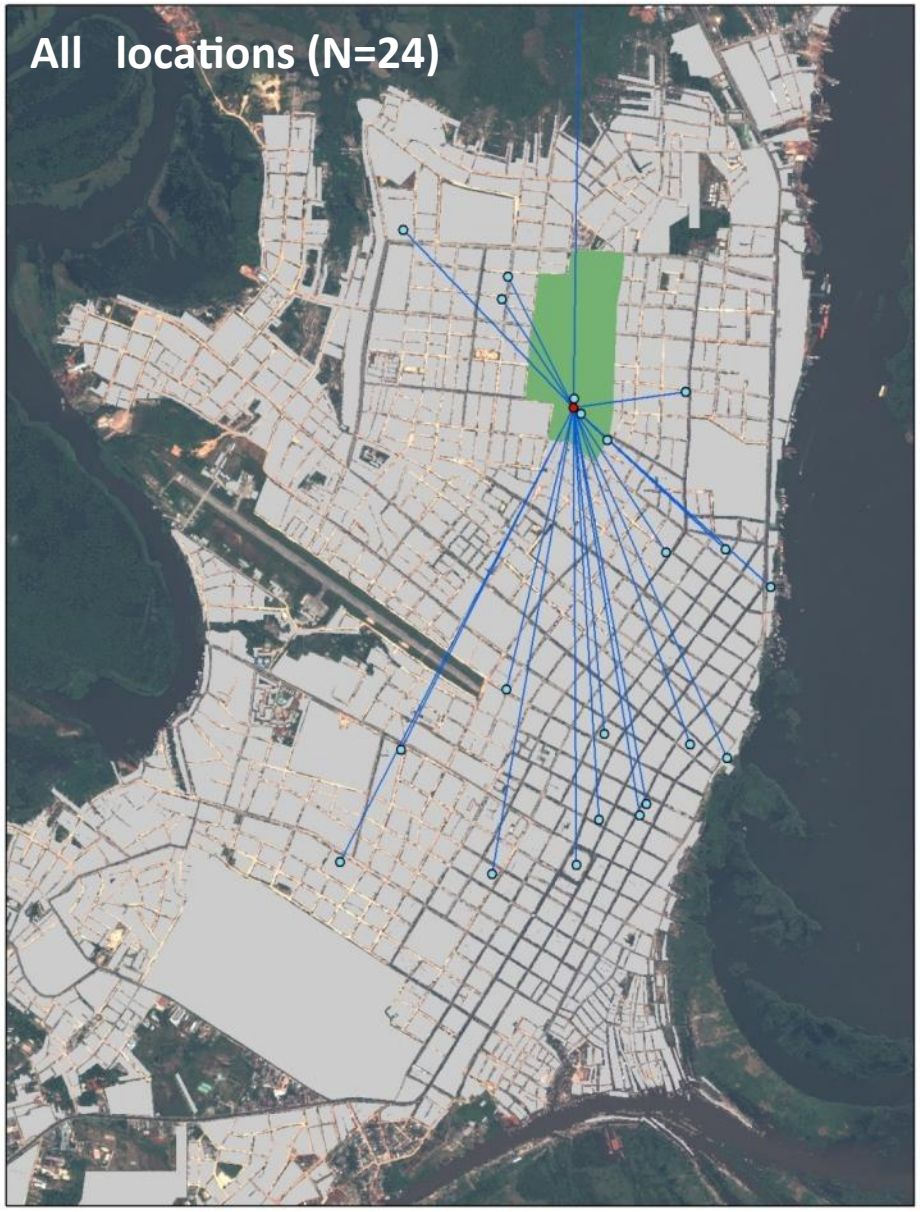
- Detailed description of data collection process
  - **GPS units:** reference to Steve, Gonzalo and Valerie papers describing selection process, resolution and maximizing user acceptability
  - **Semi-structured interviews (SSI):** development process, including reference to focus groups in 2008; structure

Defining “Key” sites

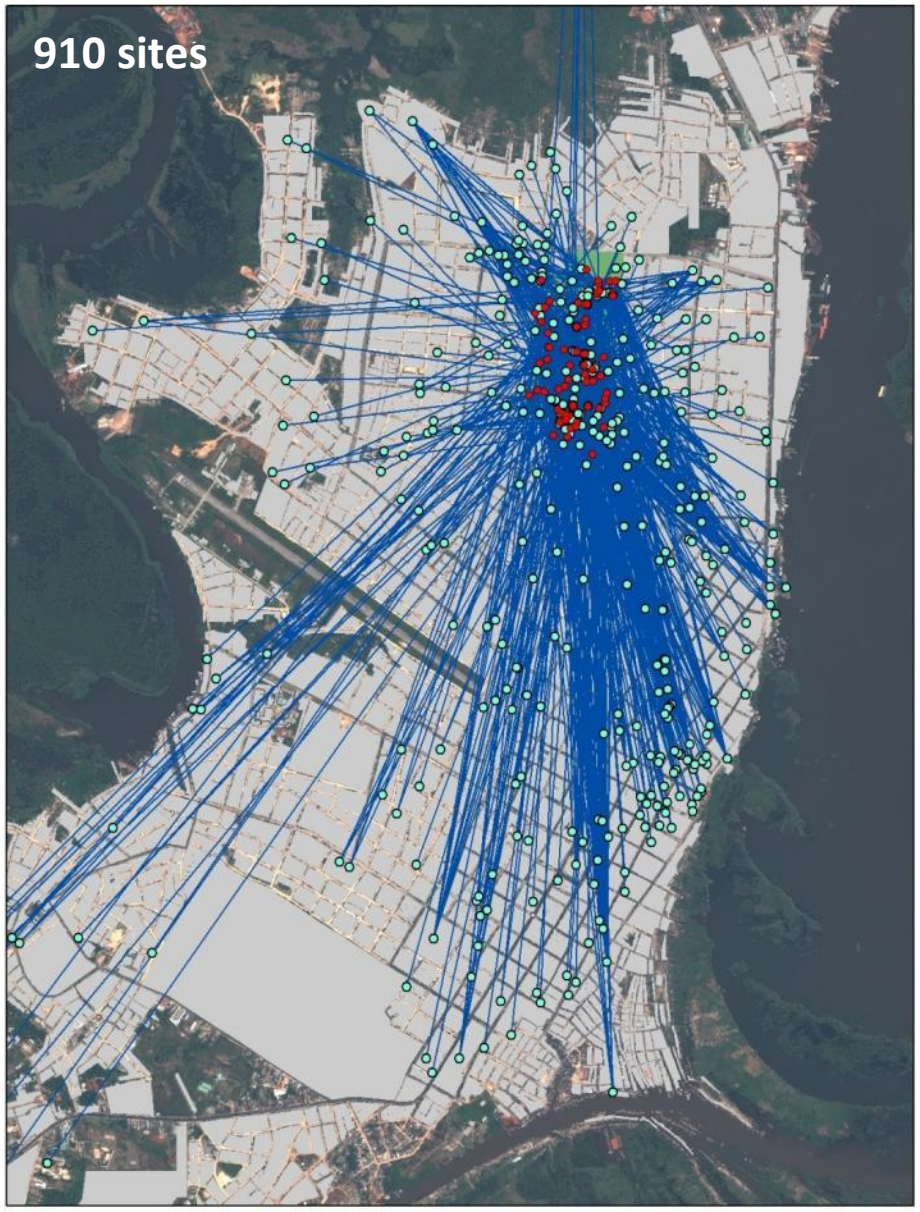
We used:

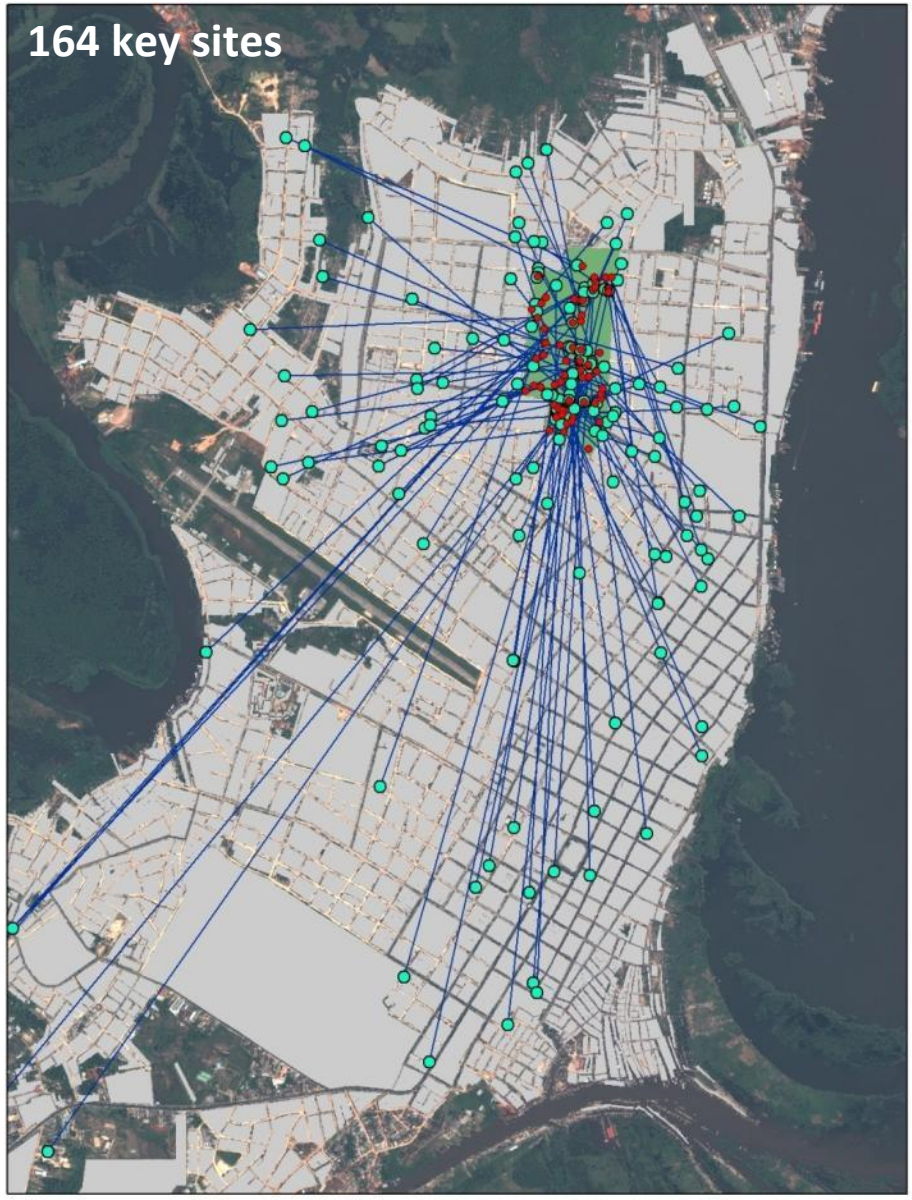
Residential or mixed use places visited regularly (>1 wk) and for more than 15 minutes

An example with one participant (MY034AP14)

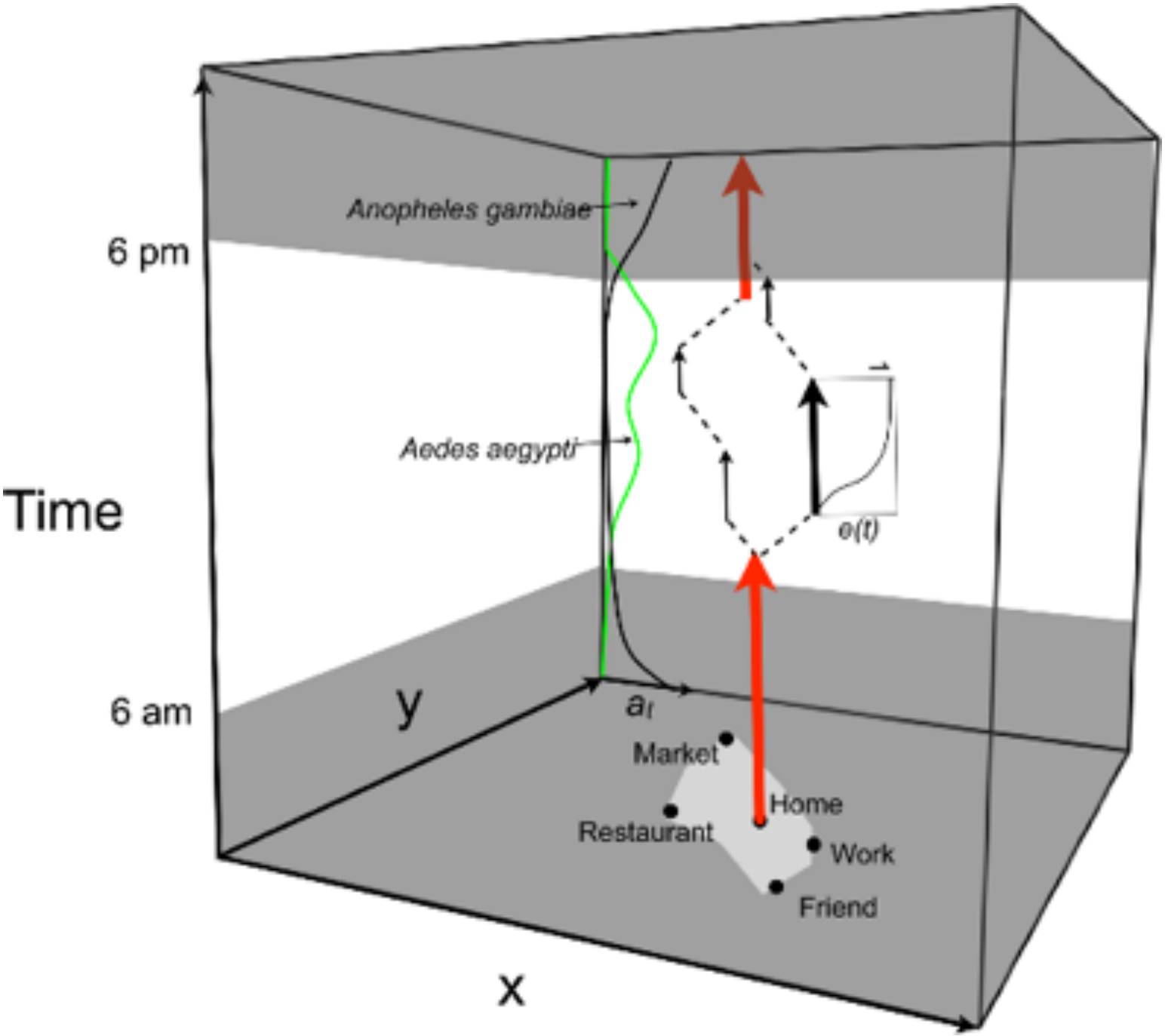


Scaling up to 62 participants in Maynas





- The activity space model. Space is plotted in the xy plane and time on the z axis. In this example daily movements for a week are represented. Points in the xy plane are sites visited and the polygon depicts the activity area. Vertical arrows show time at a site. Grayed-out regions of the cube represent night-time. Angled lines represent movement between sites. Thickness of arrows indicates frequency of visitation and length shows duration. Red arrows are for the home, black


Anopheles gambiae
6 pm
Aedes aegypti
Time
e(t)
6 am
y
a_t
Market
Home
Restaurant
Work
Friend
x

Currently..

- Using GPS data to search for places in participants that did not report key locations
- Identify key locations visited by more than one participant

- mosquito collections in key sites
- Preliminary Results: HUMANS, and not aedes Aegypti, are the ‘vectors’ for dengue