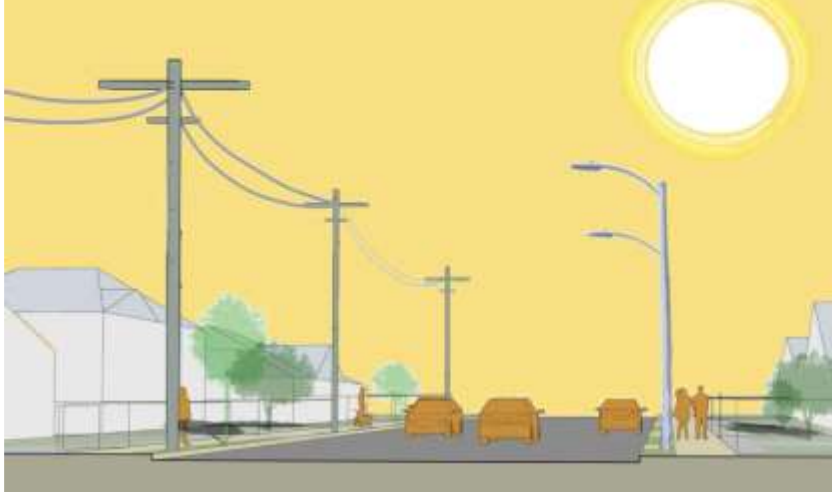




# Building vibrant urban tree canopies ...

Existing street parkway with few private or public trees



**Develop design solutions** to overcome constraints

**Lean on the community** to inform the research and designs

**Promote shade equity** via the strategic allocation of benefits based on need

Proposed “cool” street



**John P. Wilson, Ph.D.**

*Professor and Founding Director, Spatial Sciences Institute*

*Professor of Architecture, Civil & Environmental Engineering, Computer Science, Population & Public Health Sciences, & Sociology*

*University of Southern California*

Climate Resilience and Disaster Management Seminar, Geospatial World Forum 2026, Amsterdam, NL

**USC Dornsife**

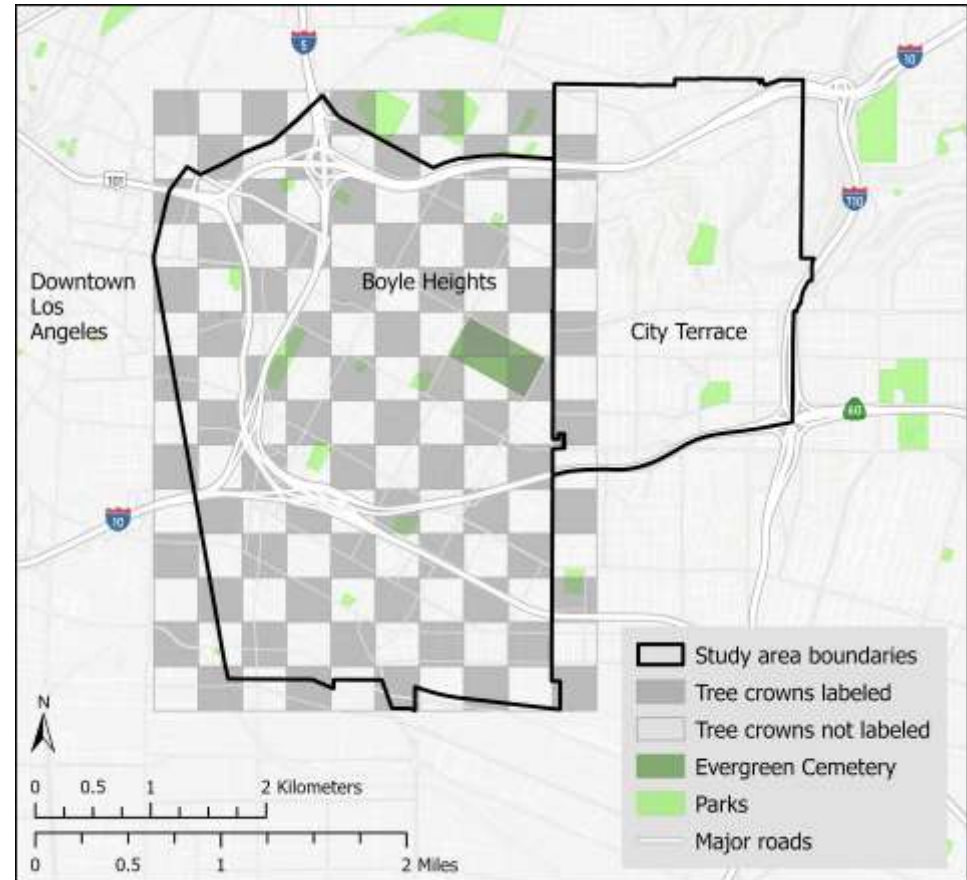
Dana and David Dornsife  
College of Letters, Arts and Sciences

*Spatial Sciences Institute*



# Mapping tree canopy at scale

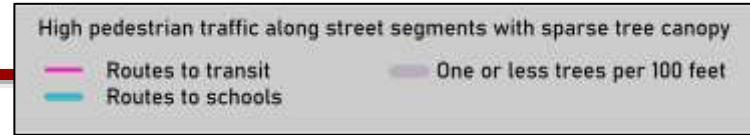
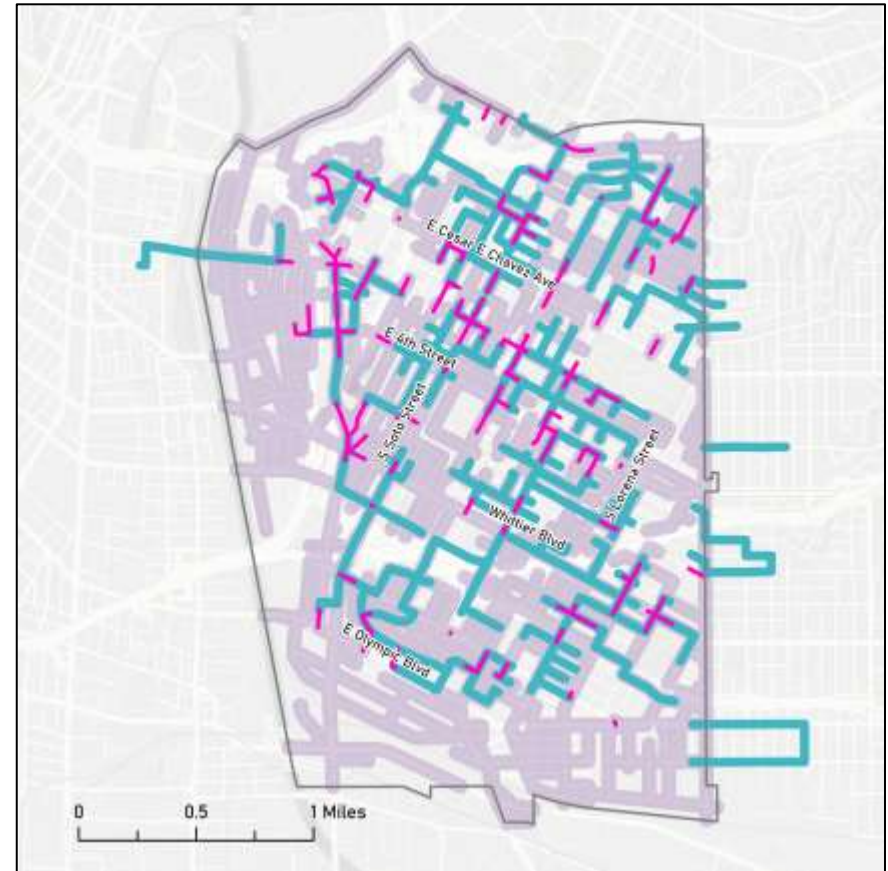
- We developed an open and reproducible and transferrable deep learning framework that combined a U-Net segmentation model, a YOLOv9e object detector, and 28,020 manually annotated tree crowns in Boyle Heights to map urban tree canopy from four-band National Agricultural Imagery Program (NAIP) imagery



# Modeling high priority streets for cooling



- We built simple geospatial workflows (models) with publicly available data to delineate streets with high pedestrian traffic and sparse tree canopy
- The data included street networks, household locations, elementary school locations, entrances, and enrollments, and transit riders and stops as well as the tree canopy described on the previous slide



# Urban Tree Segmentation with NAIP imagery



This deep learning model is designed for urban tree canopy segmentation and performs pixel-based classification using aerial imagery from NAIP, a publicly available dataset covering the entire U.S. and provided by the U.S. Department of Agriculture. The model is built on a U-Net architecture and was trained with NAIP Color Infrared (CIR) imagery. It accurately identifies areas covered by trees and supports applications in environmental planning, urban forestry, and watershed management.

**Description:** This deep learning model segments urban tree canopy areas from NAIP Color Infrared (CIR) imagery. It is based on a U-Net architecture with a ResNet-50 backbone, performing semantic segmentation at the pixel level. The model is packaged as an ArcGIS Deep Learning Package (.dlpk) and can be applied using the Classify Pixels Using Deep Learning geoprocessing tool in ArcGIS Pro.

**No. of downloads:** 8,378 (as of 2/24/26).

<https://www.arcgis.com/home/item.html?id=a44398820d1a4fbaa6bfeedb8d1559a5>