Climate Adaption Effectiveness across a Coastal to Desert Climate Gradient in the Los Angeles, CA Megacity

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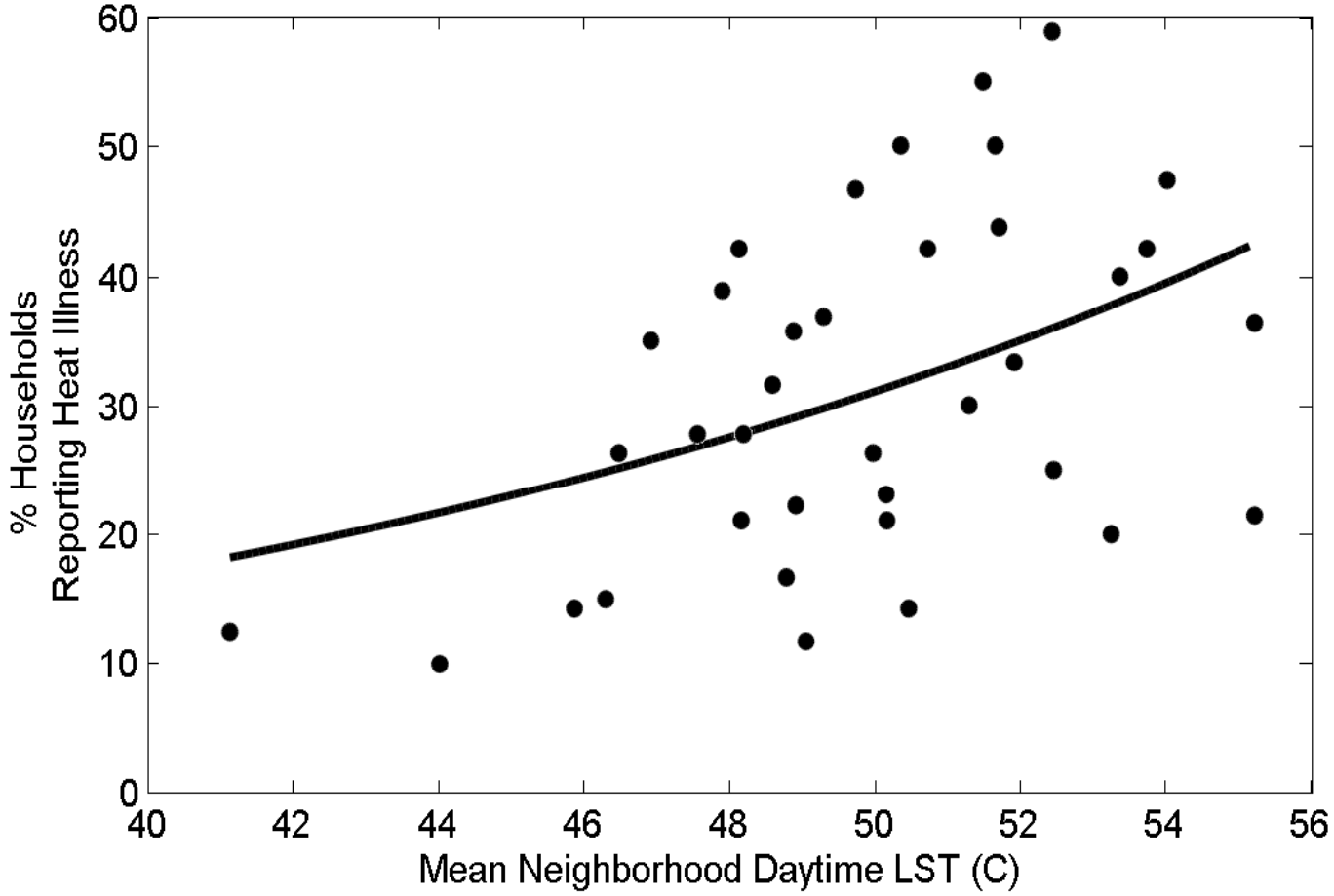
Problem Statement

- Urbanization
  - ✓ Climate -> 2.5°C higher
  - ✓ Human health
  - ✓ Economic -> $100 million per year
  - ✓ Water
  - ✓ Air pollution

- Managing climate change

- Urban heat
  - ✓ Climate, vegetation, altitude, adjacency to water bodies, and socio-economic conditions

Urban Surface Warming



Jenerette et al. *In Press*. Landscape Ecology

Questions

- How does the effectiveness of vegetation as LST cooling mechanism vary?
- How does the socioeconomic influence on vegetation availability vary?
- What influences the variation in neighborhood income on LST?

Tayyebi, A., and D. Jenerette (In review) ***Science of Total Environment***

Hypothesis

- Vegetation has a greater LST cooling effect in hotter and drier conditions
  - ✓ Through increased evaporative potentials

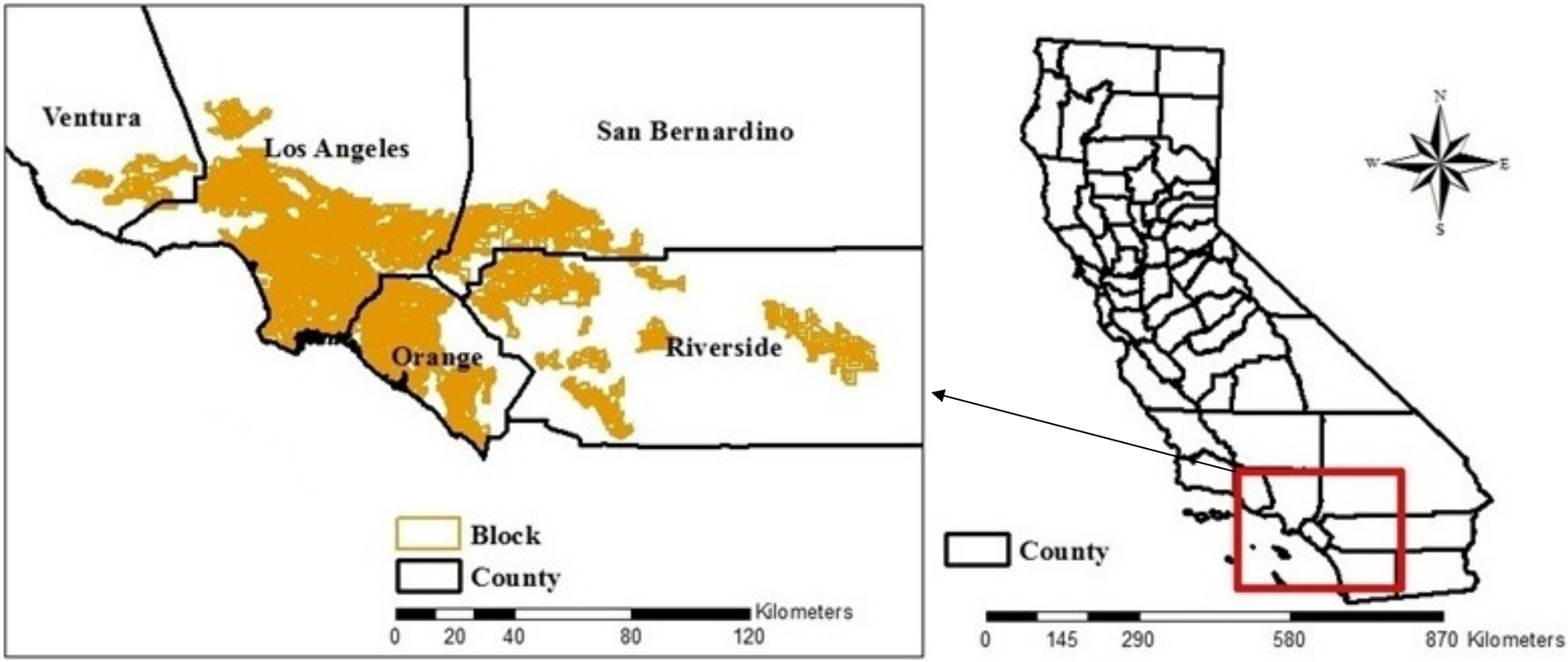
- The neighborhood income is more strongly related to vegetation in drier environments
  - ✓ As management (i.e. irrigation) can have increasingly larger effects

- Cooling effect associated with neighborhood income should be higher in more inland than coastal climate gradient

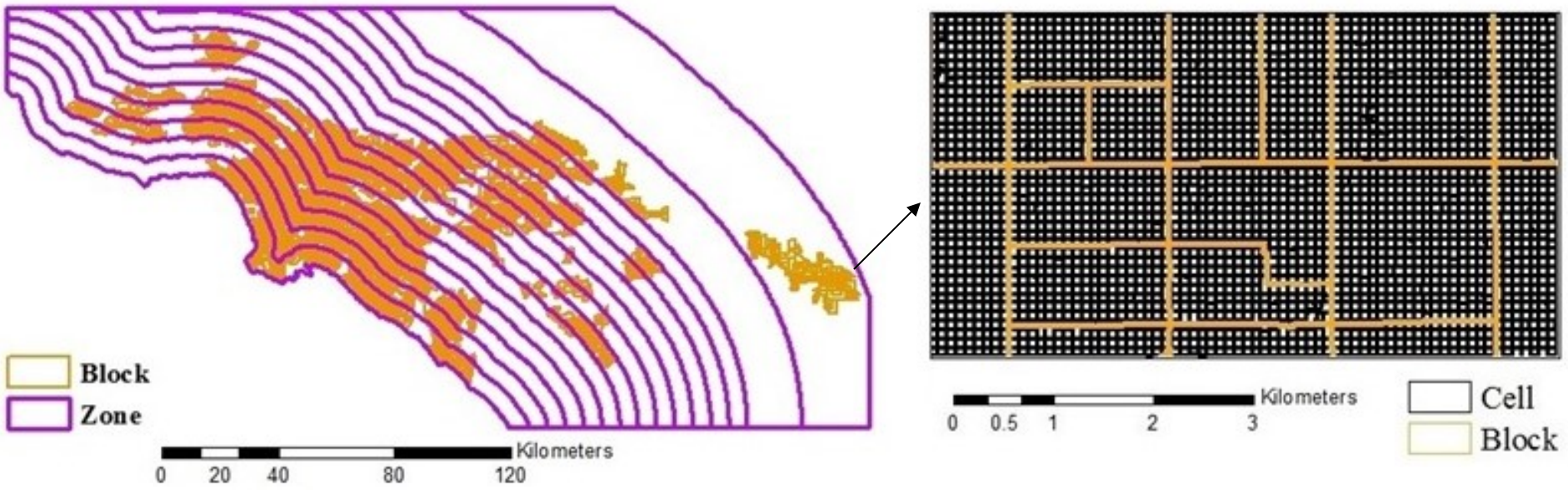
Data Sources

- May 22, 2013
- HyspIRI data
  - ✓ MASTER -> LST
  - ✓ AVIRIS -> Land cover and NDVI
- Census -> Median income
- SRTM -> Elevation

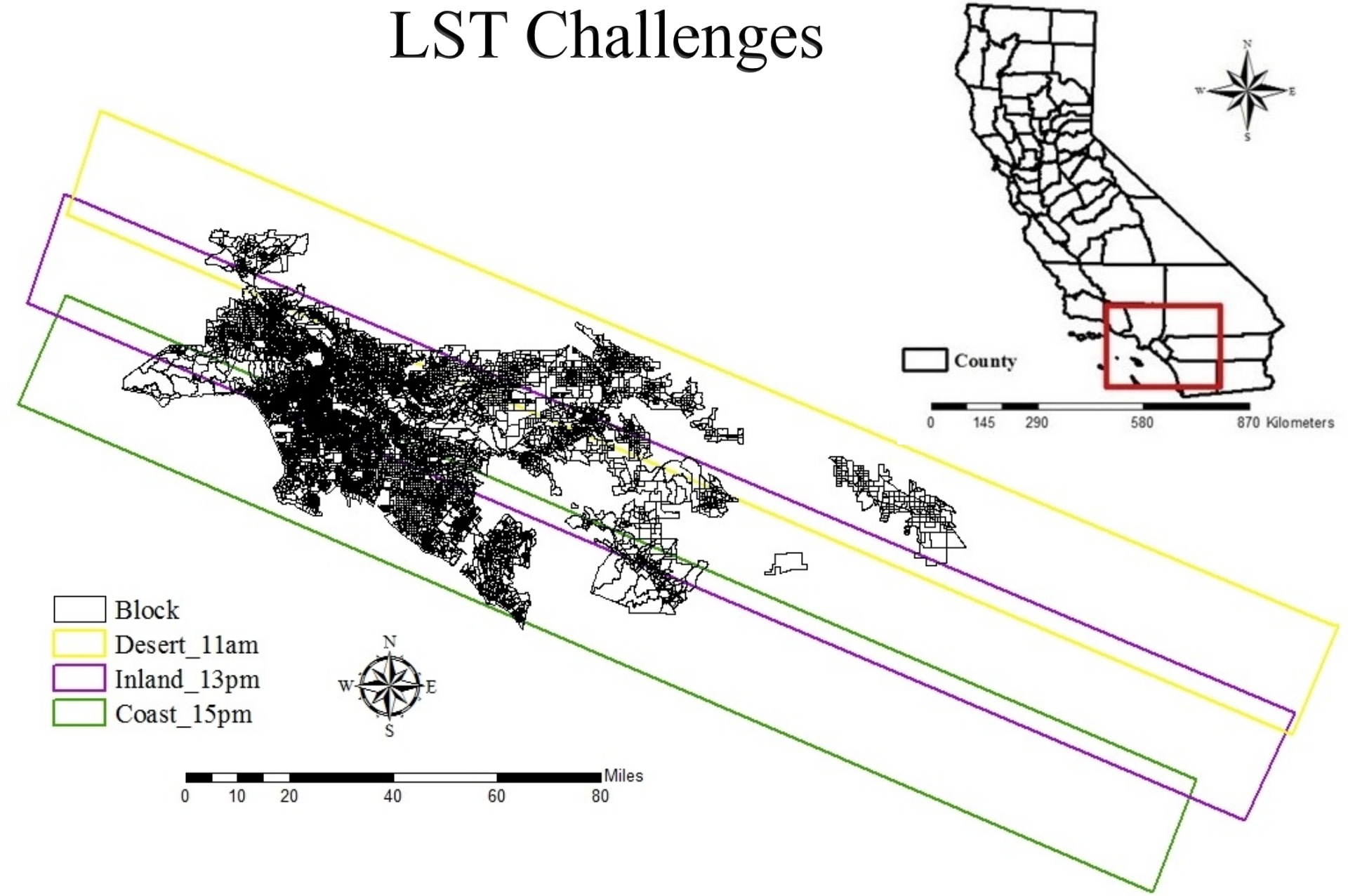
Study Area


Ventura
Los Angeles
San Bernardino
Orange
Riverside
Block
County
Kilometers
0 20 40 80 120
N
W
E
S
County
0 145 290 580 870 Kilometers

Spatial Scales and Climate Zones



LST Challenges



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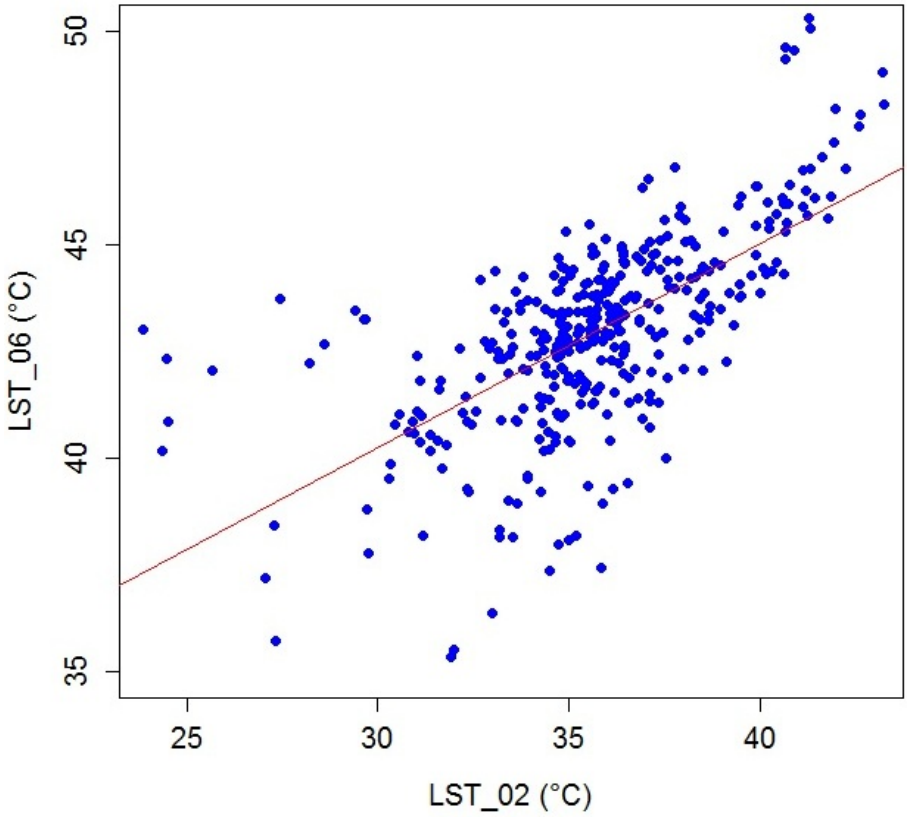
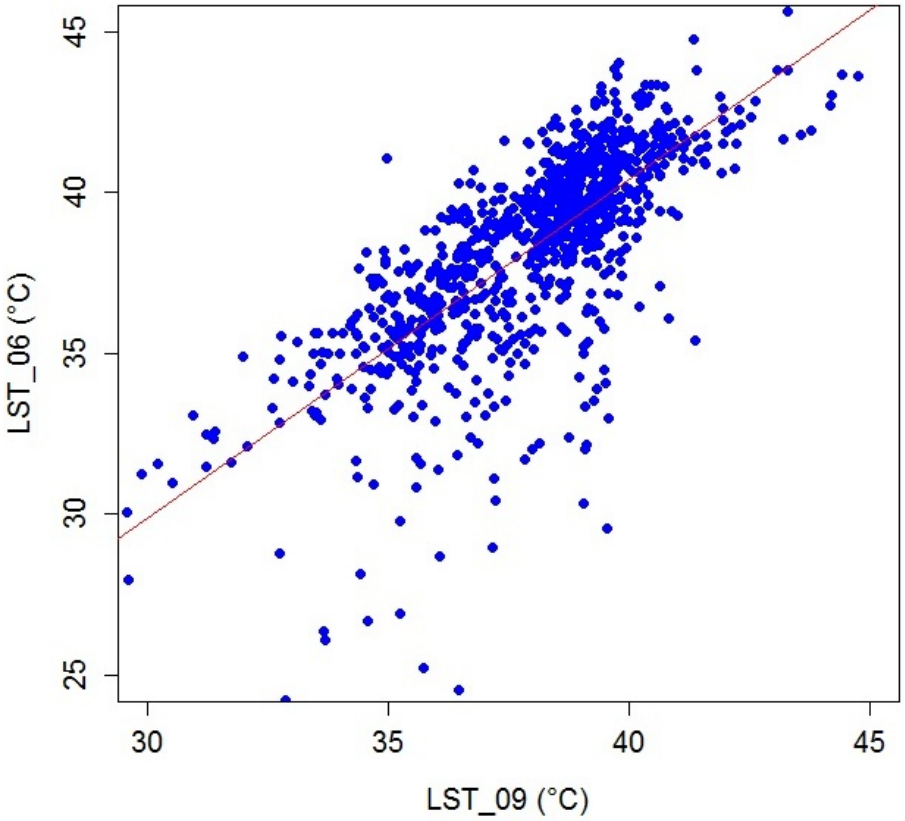
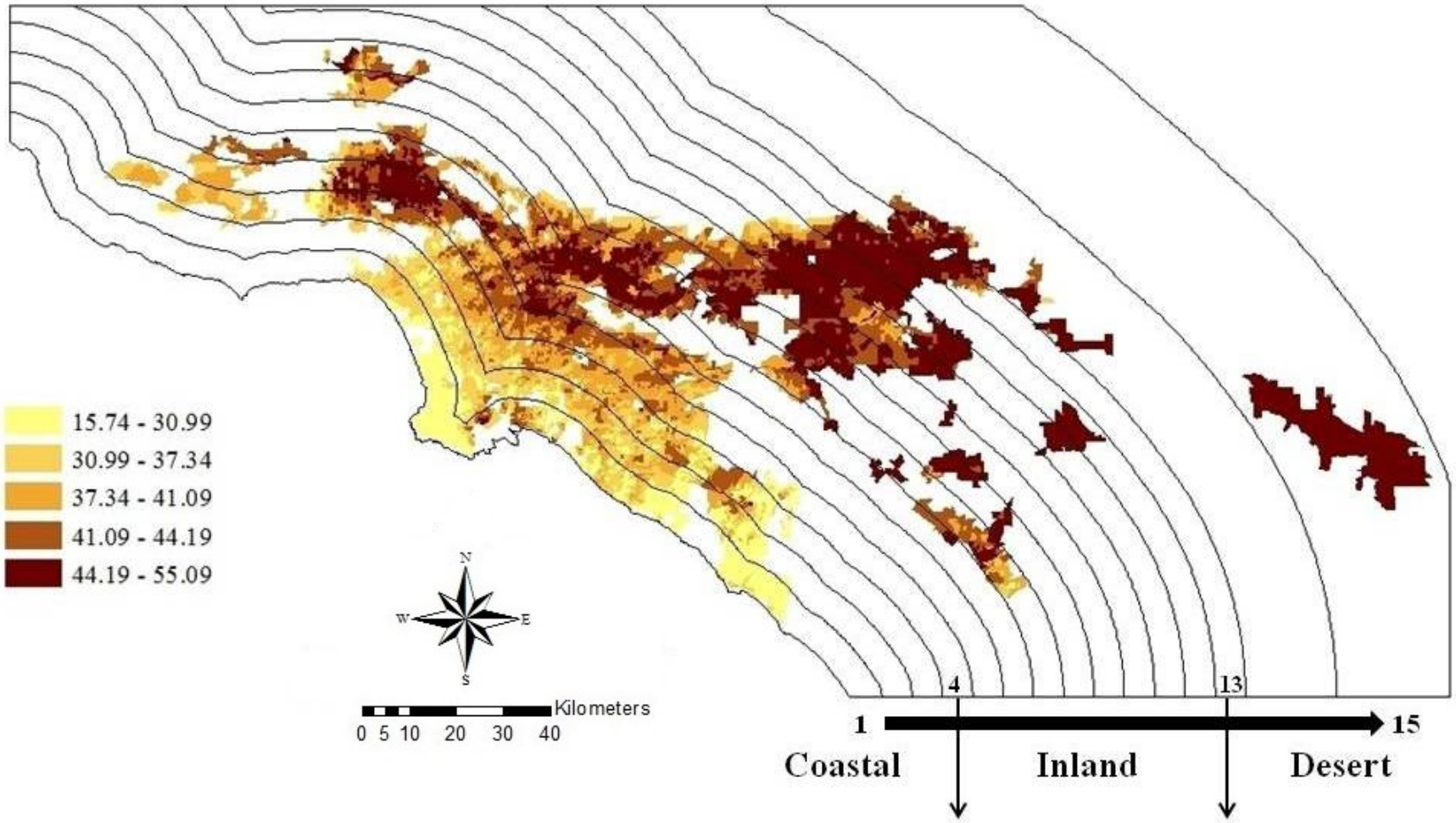


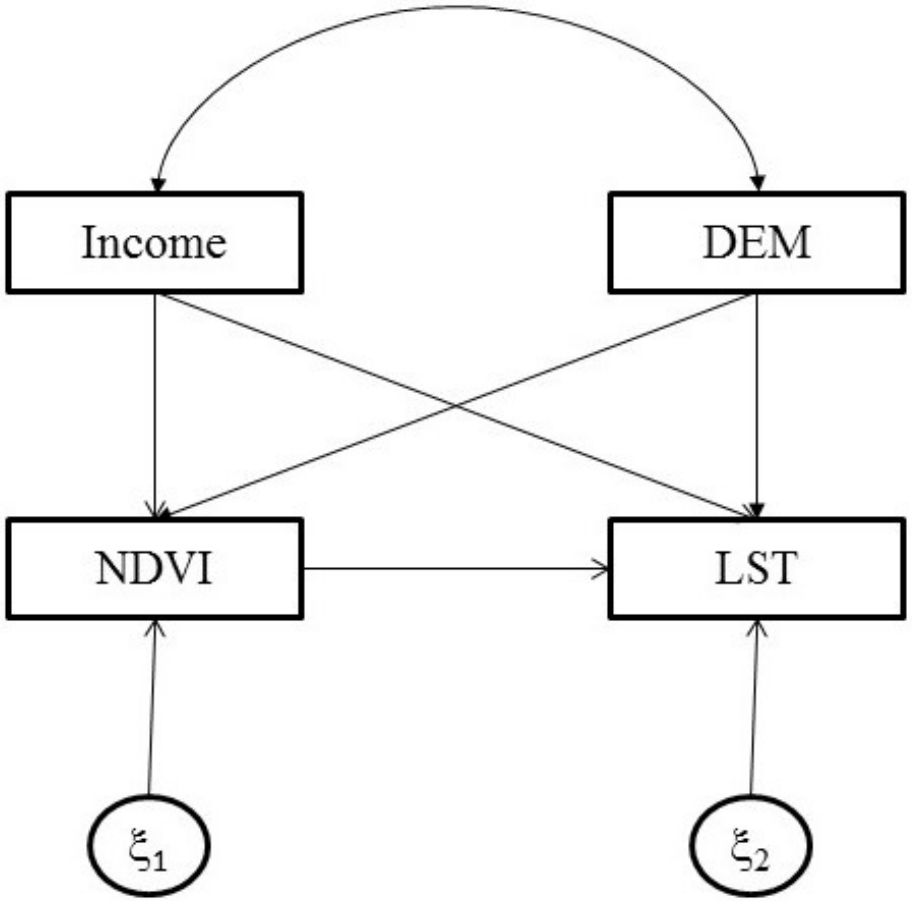


Line	Start	End	Location
Line 2	10:13am	10:47am	Desert
Line 6	12:08pm	12:41pm	Inland
Line 9	13:57pm	14:28pm	Coastal

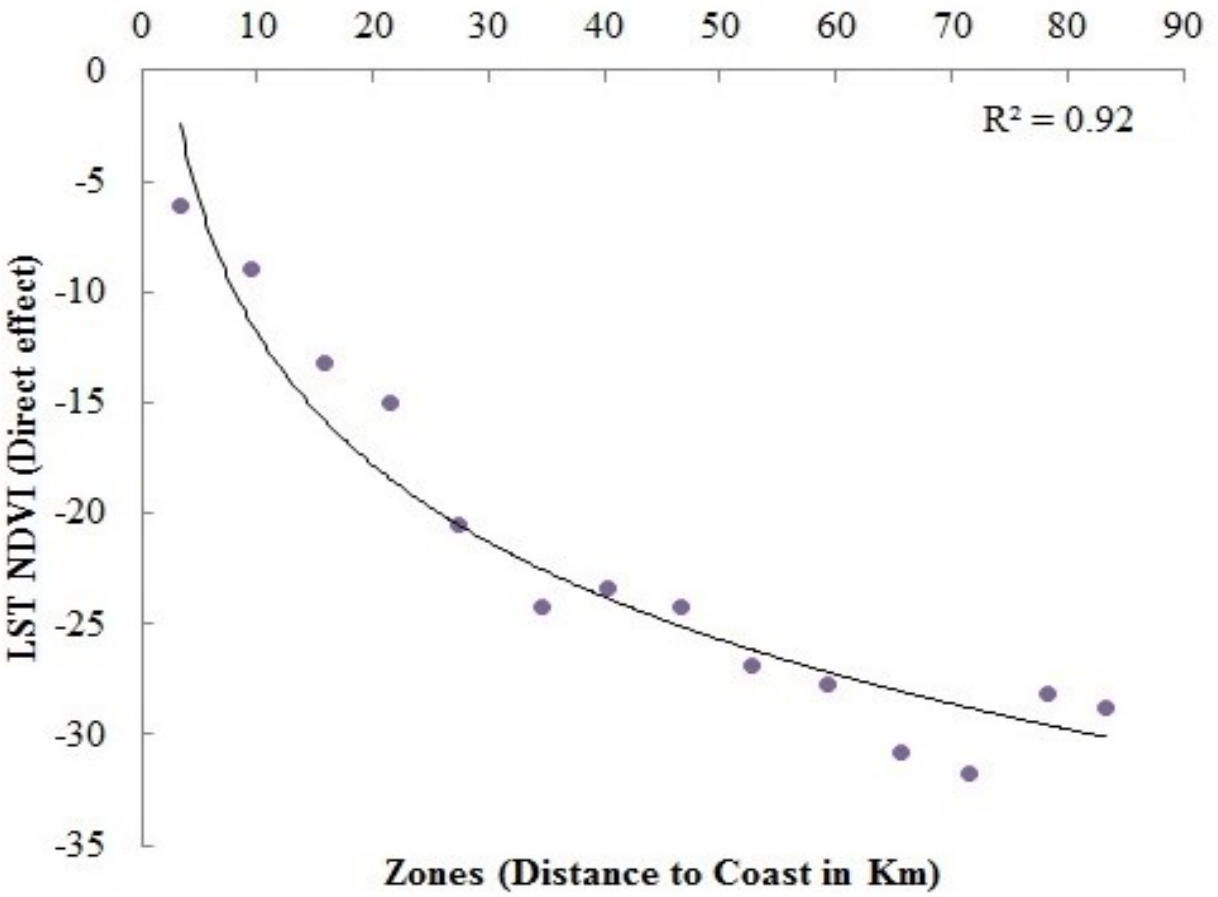
Standardized LST



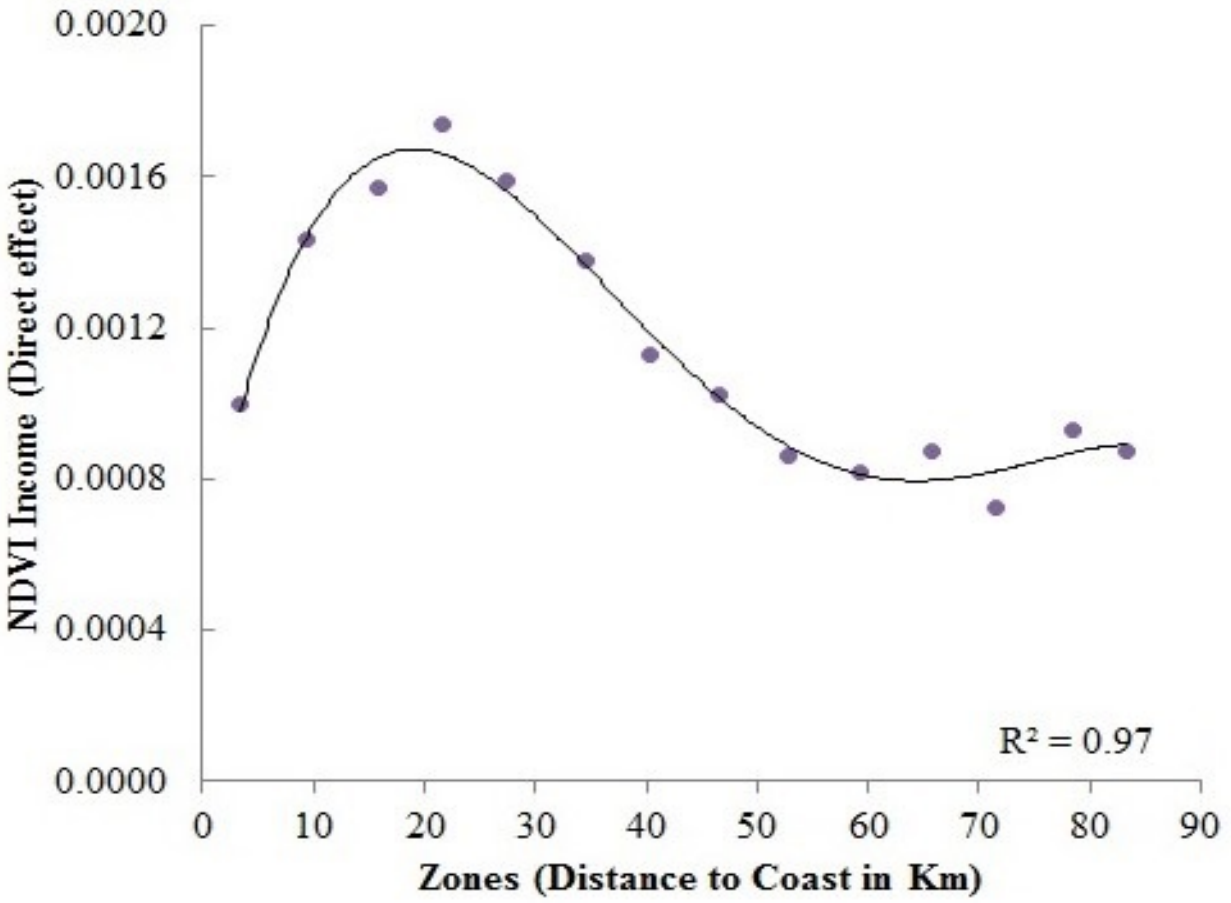
Structural Equation Modeling: For Large Scale Analyses



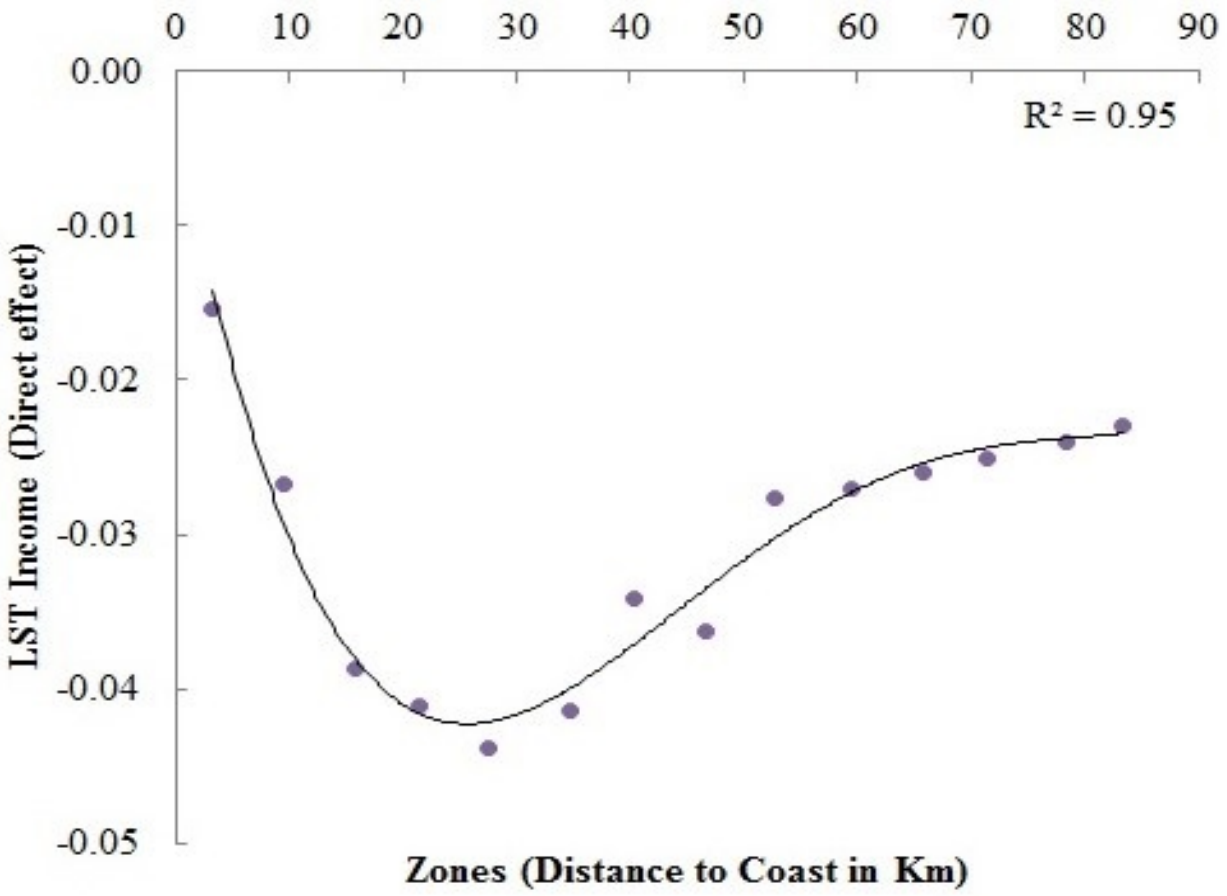
Regional Variation: Vegetation and LST



Regional Variation: Income and Vegetation



Regional Variation: Income-LST



Conclusion

- Vegetation cooling effectiveness varies by a factor of 6 in greater Los Angeles
  - ✓ Consistent with ecophysiological mechanisms of plant microclimate control that becomes stronger in warmer and drier environments

- Neighborhood income influence on vegetation and LST are peaked at intermediate distances from the coast

- Added complexities for urban studies of megacities

Ongoing Works

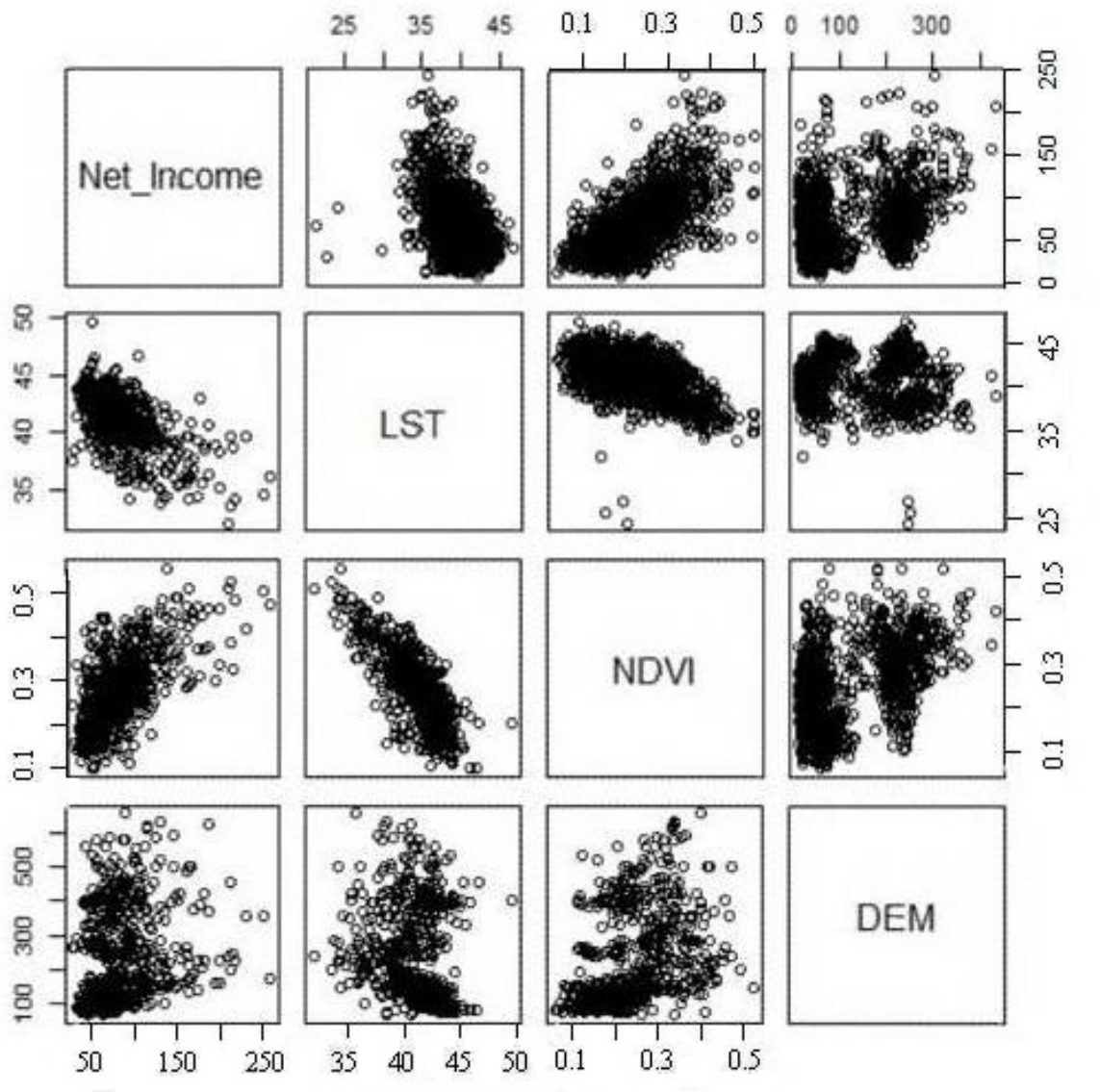
- Improving LST standardization
  - ✓Better time correction
  - ✓Use warming rate as heat indicator

- Seasonal and diurnal variation
  - ✓ Spring – Fall
  - ✓Day - Night

- Landscape composition
  - ✓ Using AVIRIS to develop land cover classifications

Thank you!

Scatter Plot



LST Challenges