Reducing Vulnerability to Extreme Heat: Science-Policy Interface

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and
SIMMER research team

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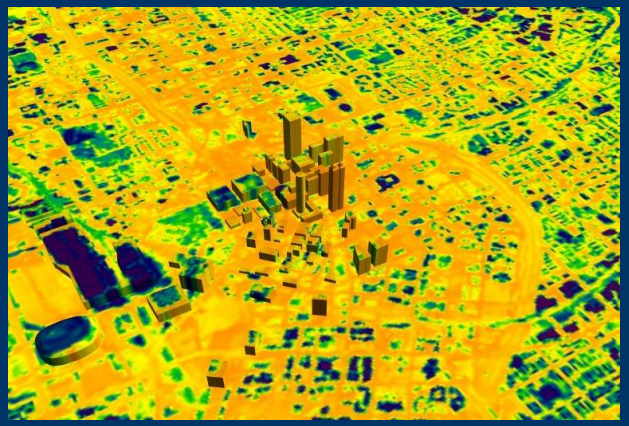
Science-Policy Interface

- **Scientific goal: *understand* and characterize current and future vulnerability of urban population to extreme heat**
  - Advance vulnerability methods
  - Improve datasets and models
  - Explore interactions among environmental, social and behavioral elements



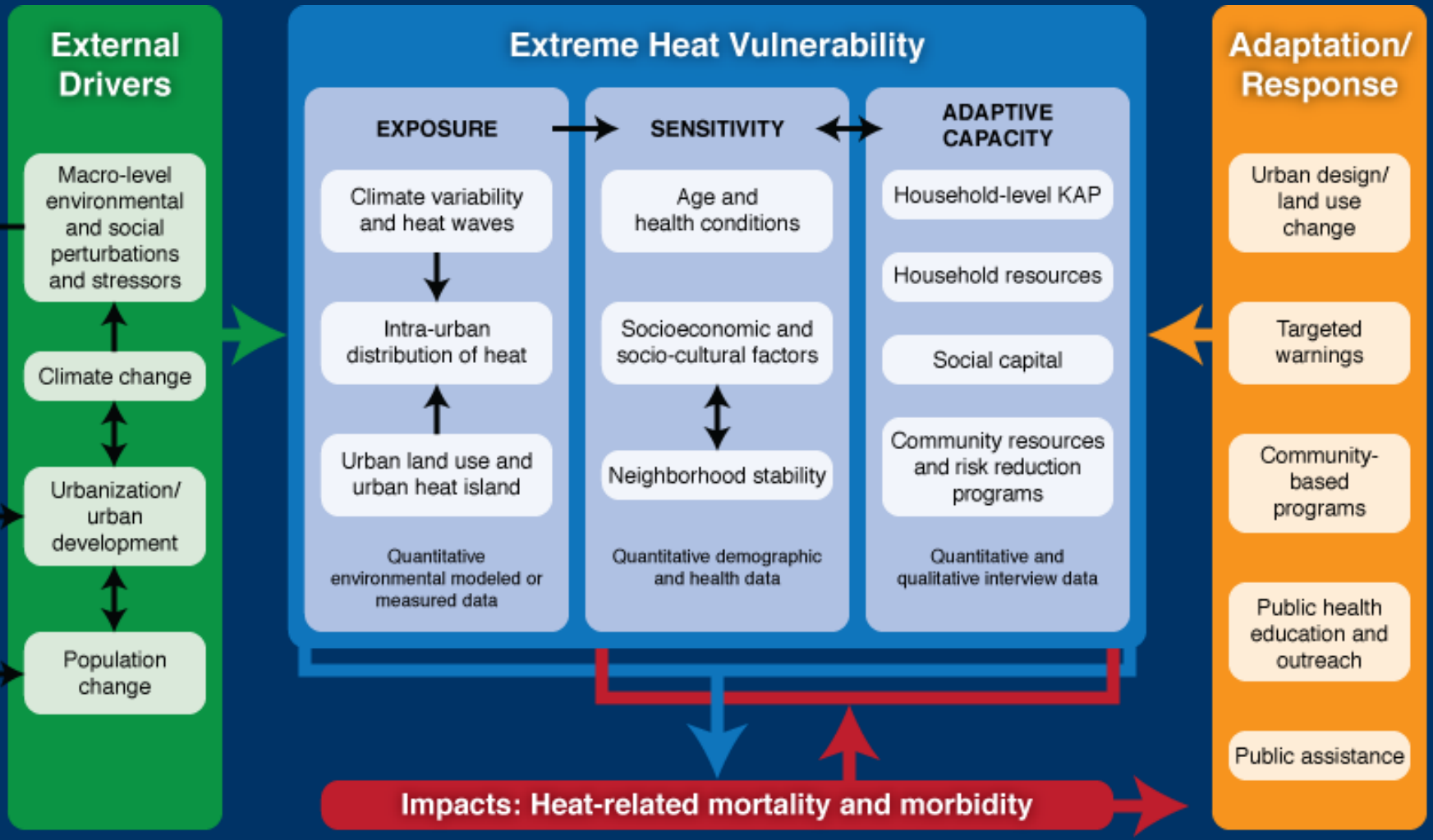
- **Decision making goal: *reduce* negative outcomes**
  - Land use, policy and regulations
  - Public health interventions
  - Education and communication

- **SIMMER strategy: solution-oriented research that informs policy**
  - **Usable science - "a science that meets the changing needs of decision makers" (Dilling et al. 2011)**

Integrating complex heat-health information for decision makers

- **Framework**
  - Create shared vision, outline possible courses of action or to present a preferred approach
- **Methods and data**
  - Does scale of analysis match scale of decision-making?
- **Tools**
  - Simple representation of complex problems
- **Actions**
  - Short-term and long-term

SIMMER conceptual framework



Wilhelmi and Hayden (2010, ERL)

Data and scales

Climate Change

Modeled (CCSM)

Temp. **Humidity** **Wind** **Radiation** **Heat indices**	1/8° City-scale	1990-2009 2046-2065 Daily

Exposure

Modeled and Observed (HRDAS, MODIS, NUDAPT, Parcels)

Temp. **Humidity** **Radiation** **Wind** **Heat indices** **Surface Temp**	1 km	1990-2009 Half-hour Daily, 8 day composite
Building properties	Parcels 250 m	2010

Sensitivity

Observed (Census)

Demographic and socio-economic	Census block group	2000 2005

Adaptive capacity

Observed (Survey, Parcels)

KAP **Household Resources** **Social capital** **Programs**	Points Parcels	2011 2010

Adaptation and response

Modeled and Observed

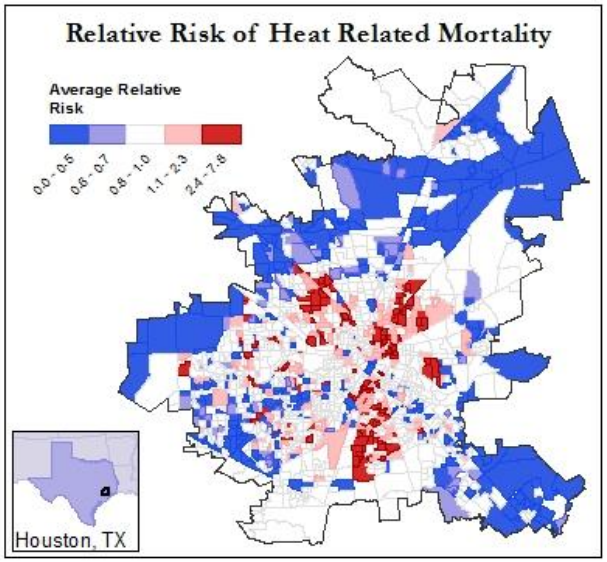
Urban planning **Heat warning** **Programs** **Outreach**	City and local	2013-2040 daily seasonal ong.

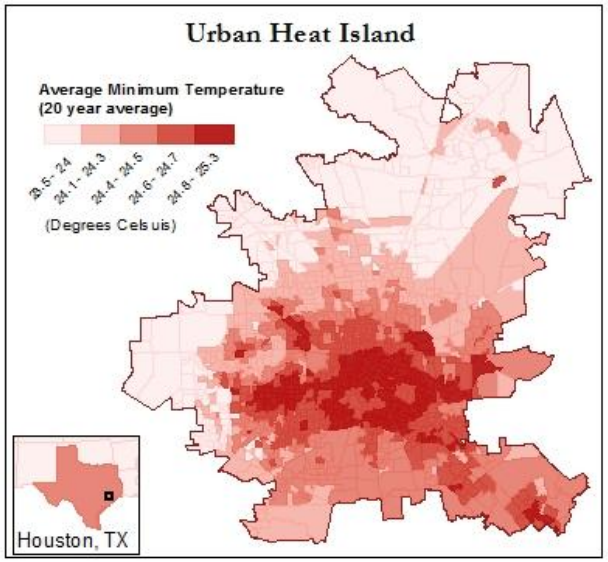
Health outcomes

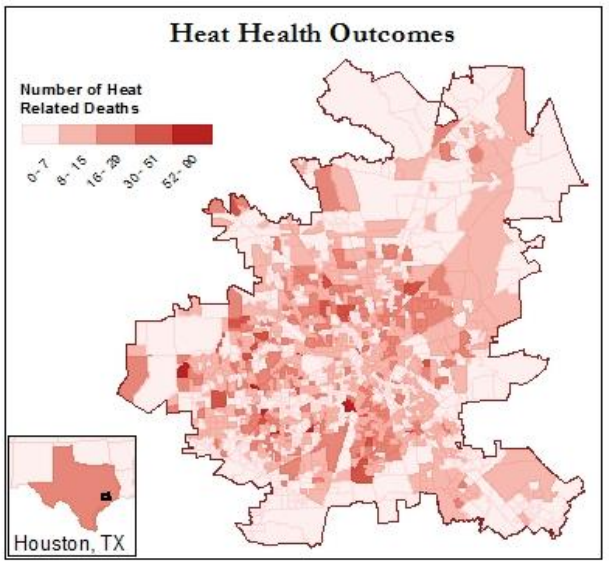
Observed (Health and Fire dept)

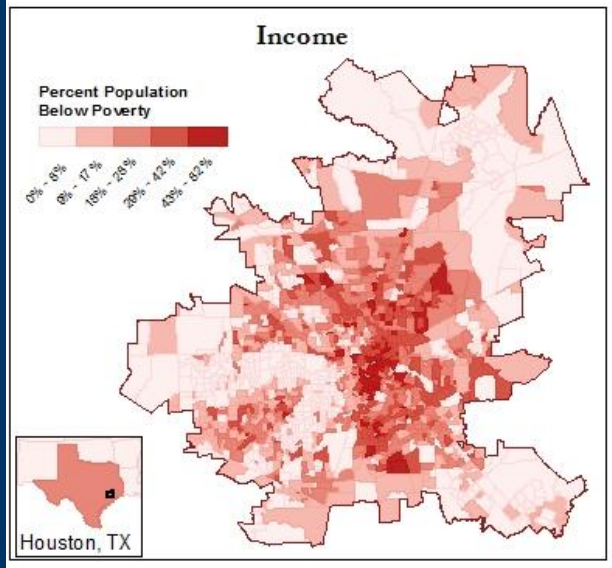
Mortality ICD-9; ICD-10) **Heat distress 911 calls**	Points	1999-2006 Daily 2007-2010 Time stamp

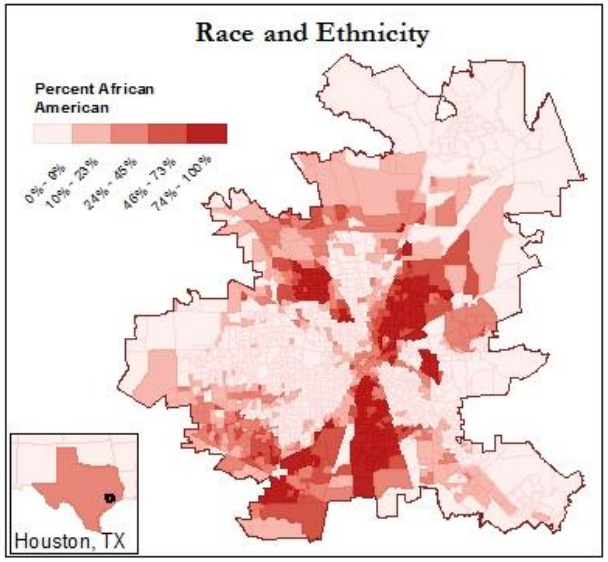
Data and Knowledge Integration

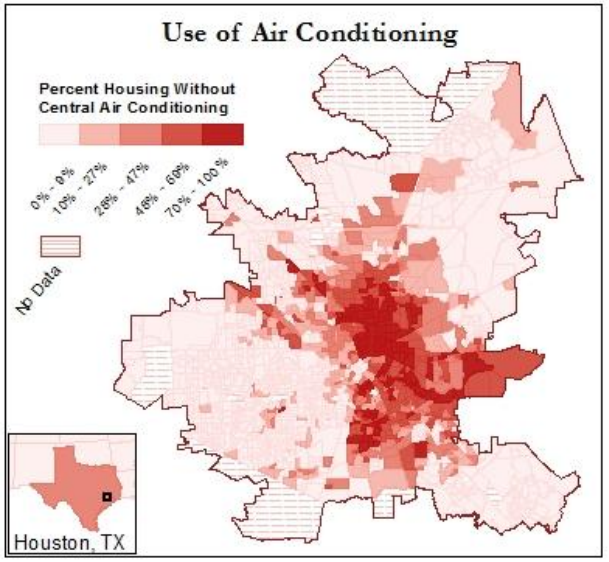






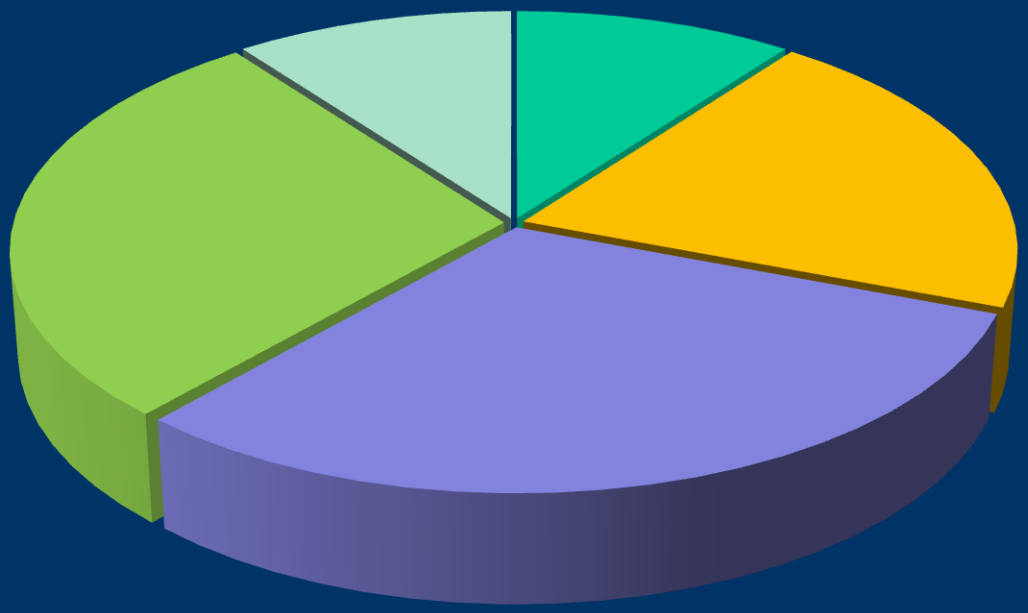






What are the next steps?

Houston stakeholder survey: Describe how you think the vulnerability to health risks from extreme heat may decrease in the future



- **60 percent of survey respondents highlighted *non-structural* ways for reducing urban vulnerability to extreme heat**

Stakeholder workshop

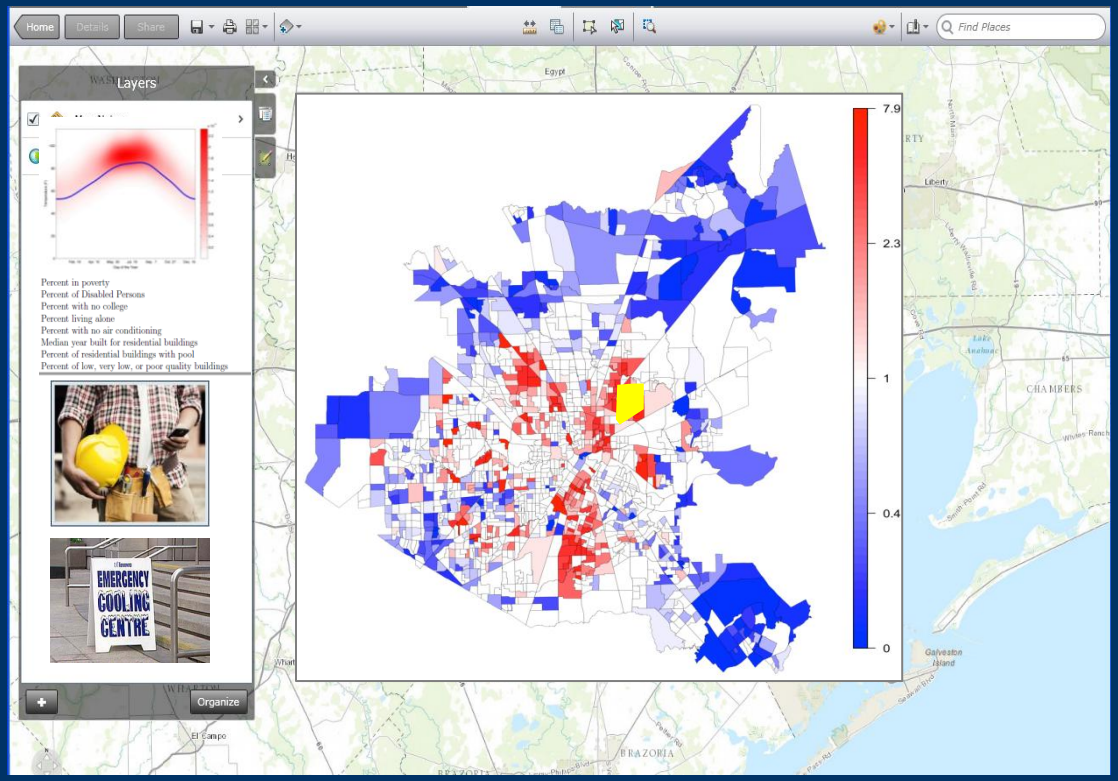
- **August 29th, 2013 Rice University, Houston, TX**
- **40 attendees represented diverse organizations in public and private sectors, NGOs, and academia**
  - HDHHS, Harris county (Dept. Health, Emergency Management, Agency on Ageing), H-GAC, NWS, broadcast meteorologists, transportation, housing and energy management
- **Workshop goals**
  - Present SIMMER results
  - Identify next steps in reducing future impacts from extreme heat
  - Promote coordination and collaborations

Specific gaps and activities

- **Cooling Centers**
  - Advertise. Expand services. Provide transportation.
- **Heat Advisories, Products and Services**
  - Thresholds. Sub-urban scale. Include public health messaging
- **Public Education / Effective Communication and Messaging**
  - Early in the season. Multi-media. Heat awareness day. Incorporate heat into multi-hazard preparedness communication
- **Research**
  - Integration of SIMMER with forecasting. Air pollution & heat. Climate change scenarios. Acclimatization
- **Policy**
  - Weatherization. Utility subsidies. Reduce UHI. Roofs. Community cohesion.
- **Collaboration and coordination of activities**
  - NWS and HDHHS, EMS, media, community service organizations. Heat champion is needed.

GIS tool: common data sharing platform

Work in progress

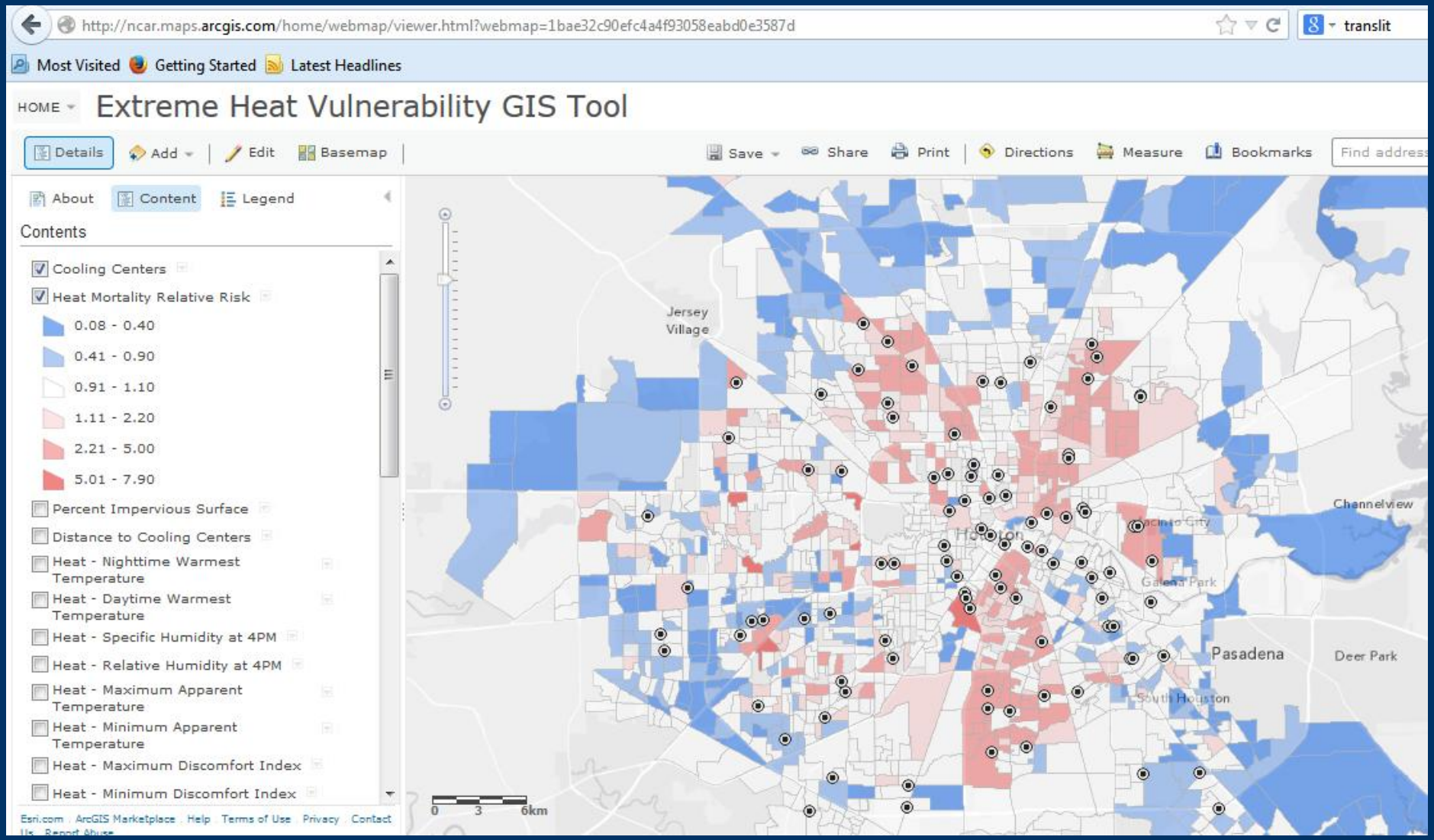


- **Interactive web-based GIS tool**
  - Risk of heat-related mortality is linked with vulnerability indicators and response / adaptation options

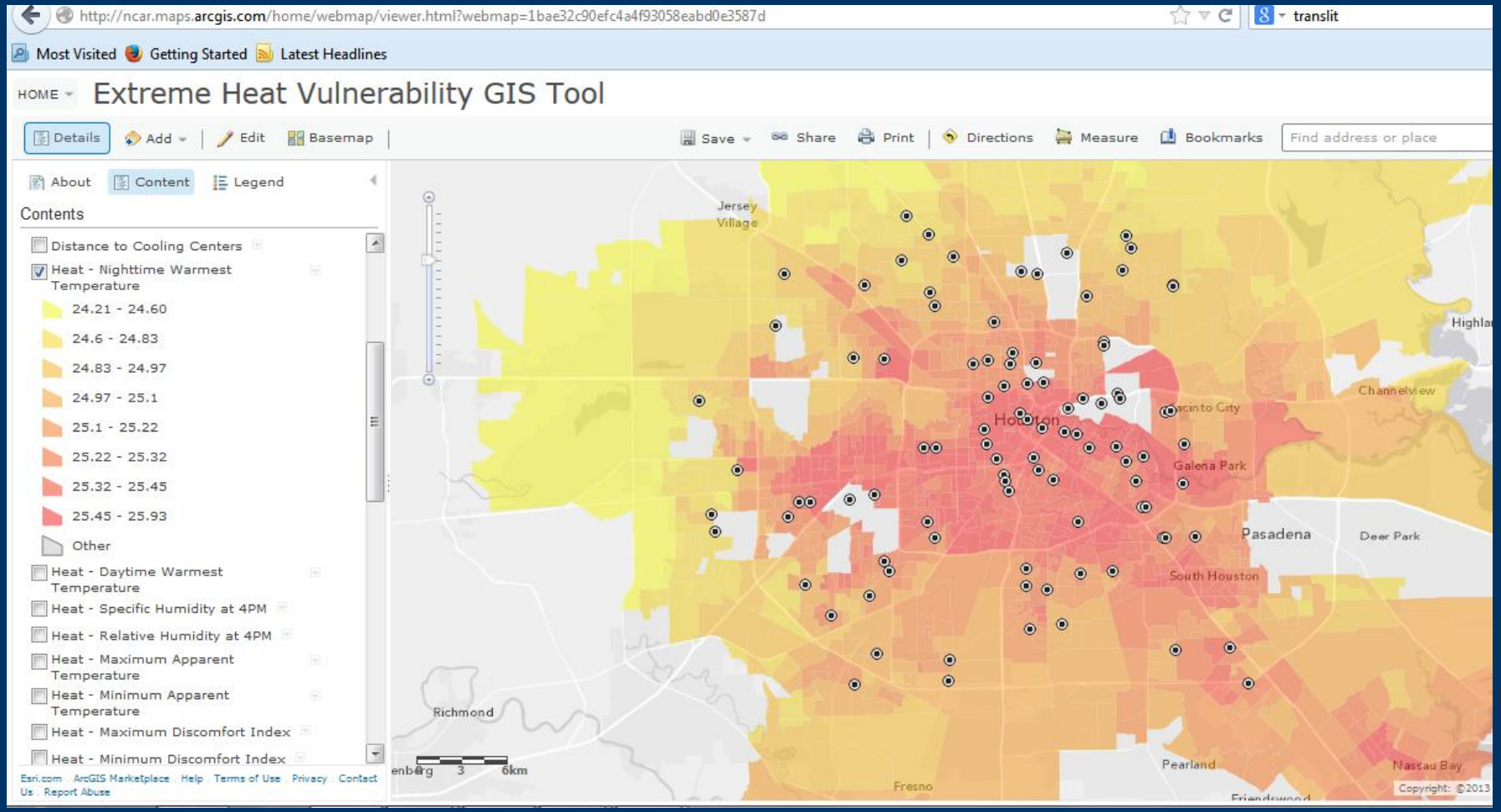
Adaptation/ Response

- Urban design/ land use change
- Targeted warnings
- Community-based programs
- Public health education and outreach
- Public assistance

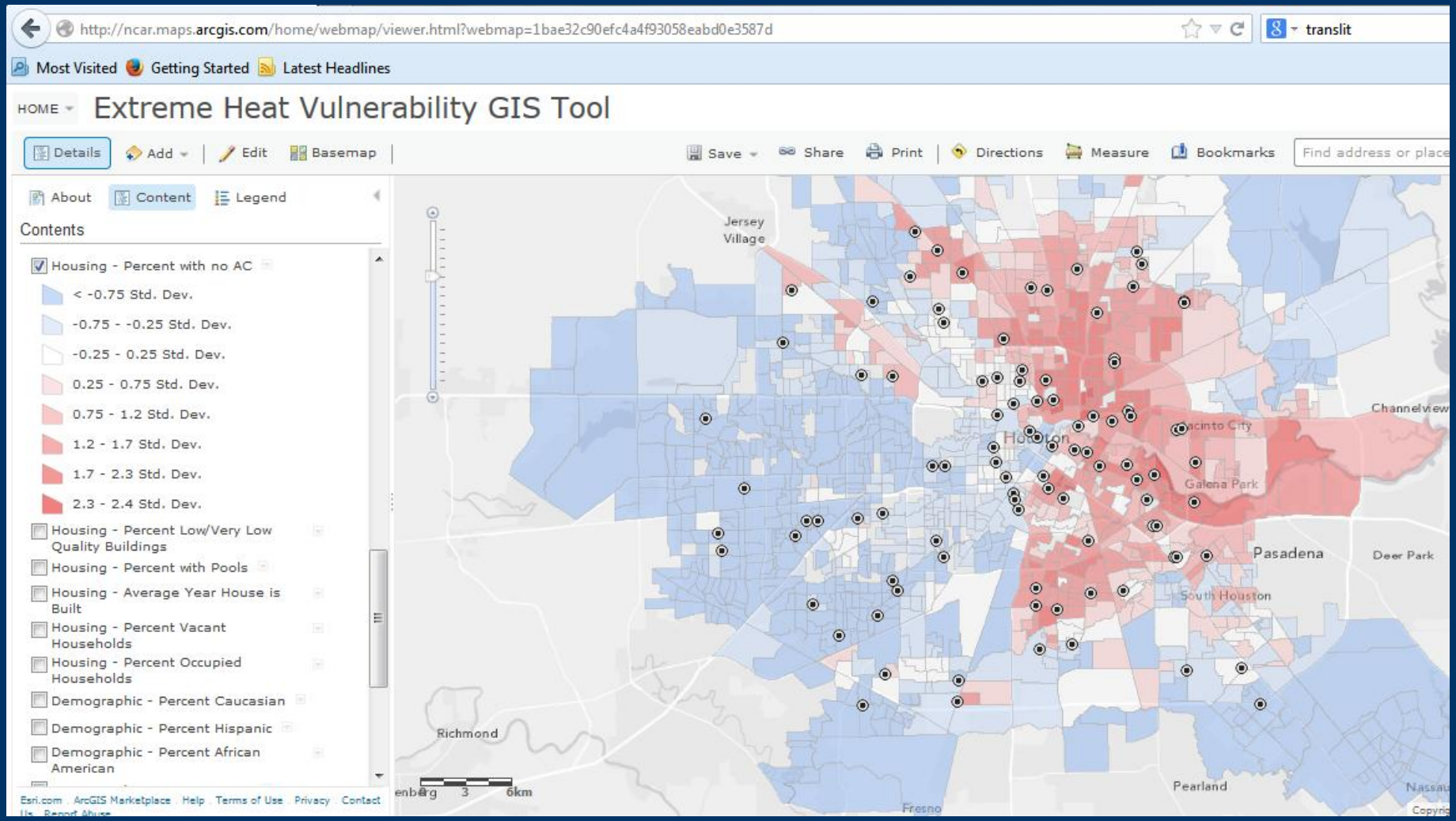
Data exploration and visualization (1)



Data exploration and visualization (2)



Data exploration and visualization (3)



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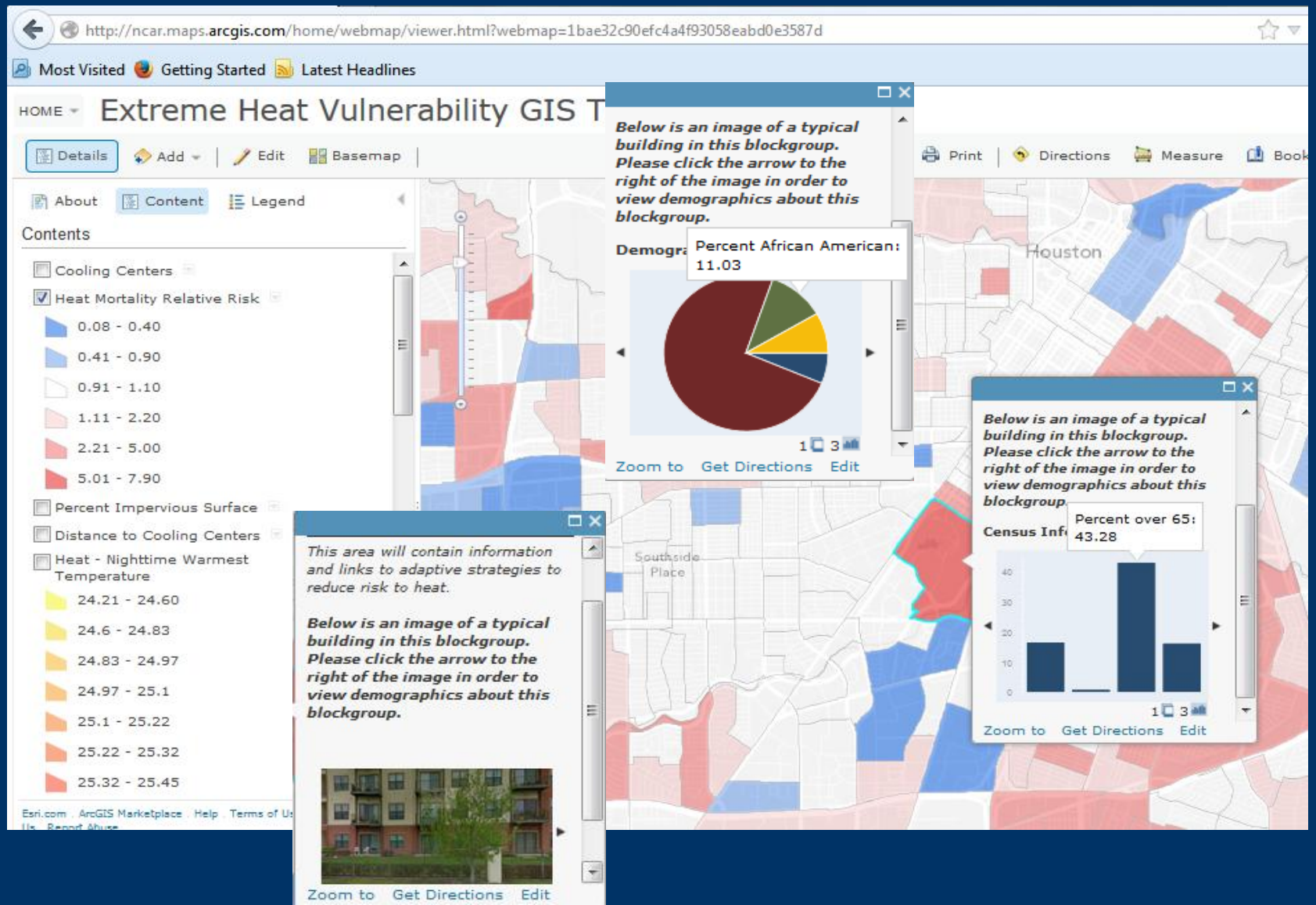
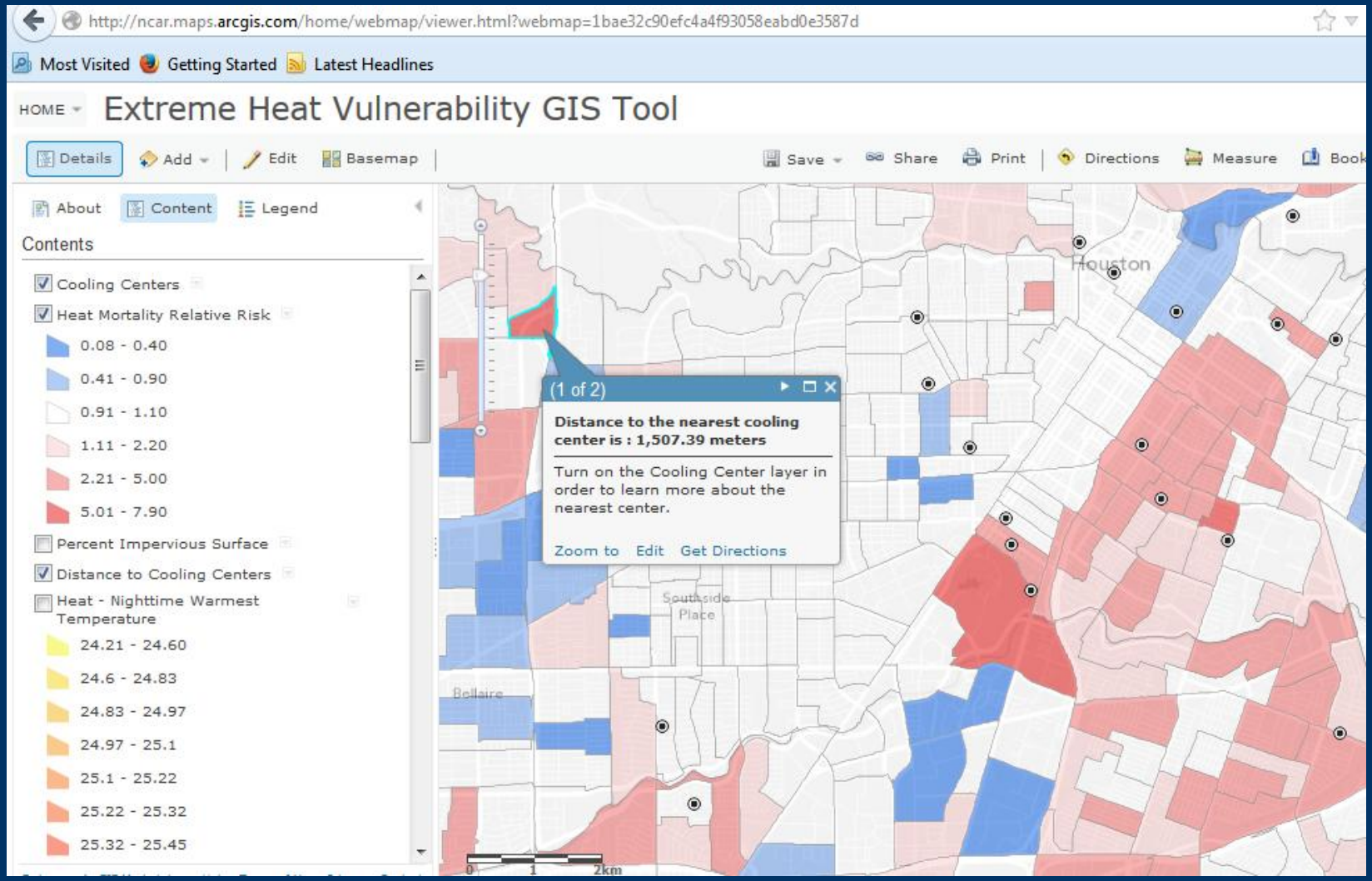
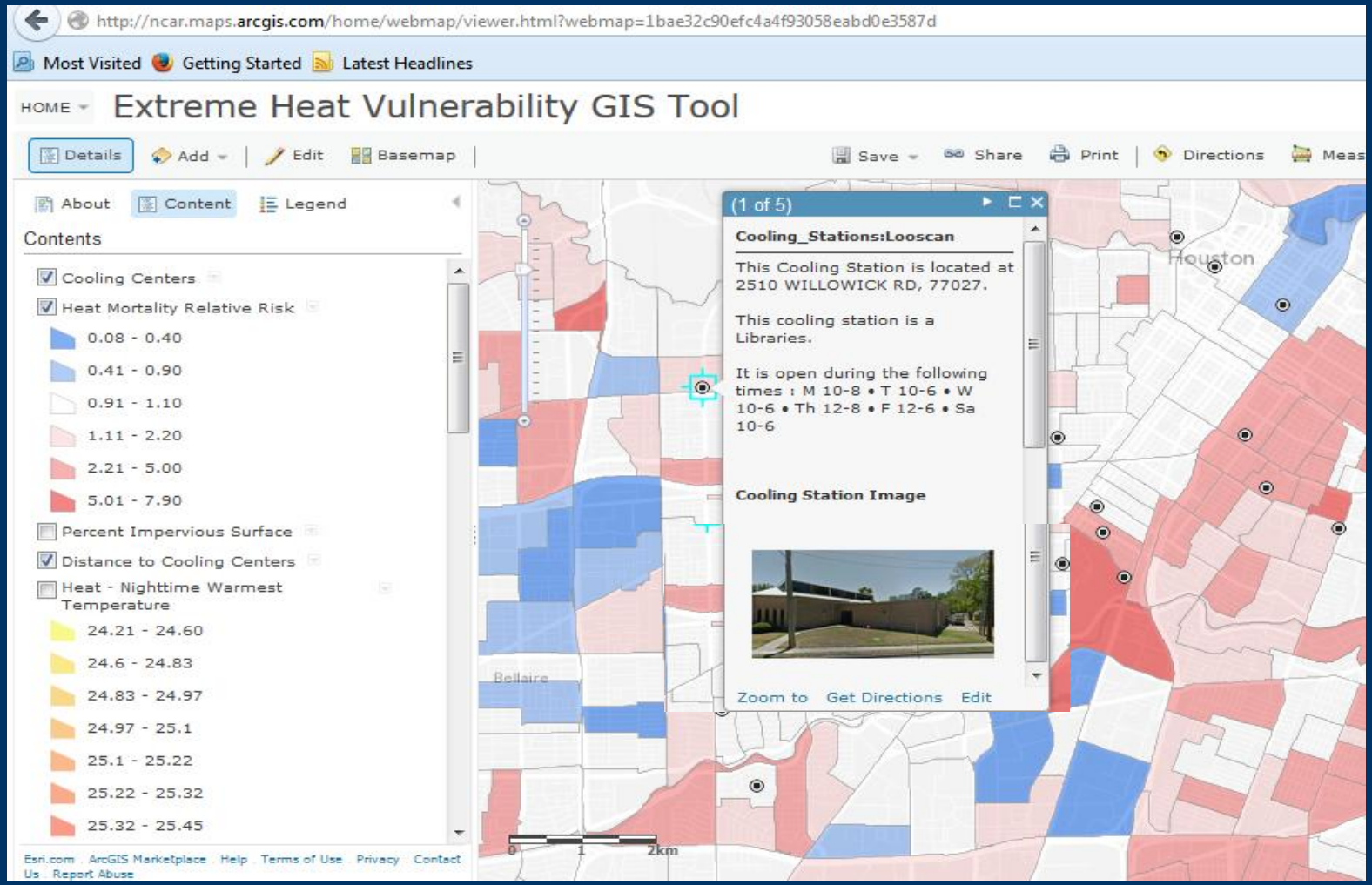


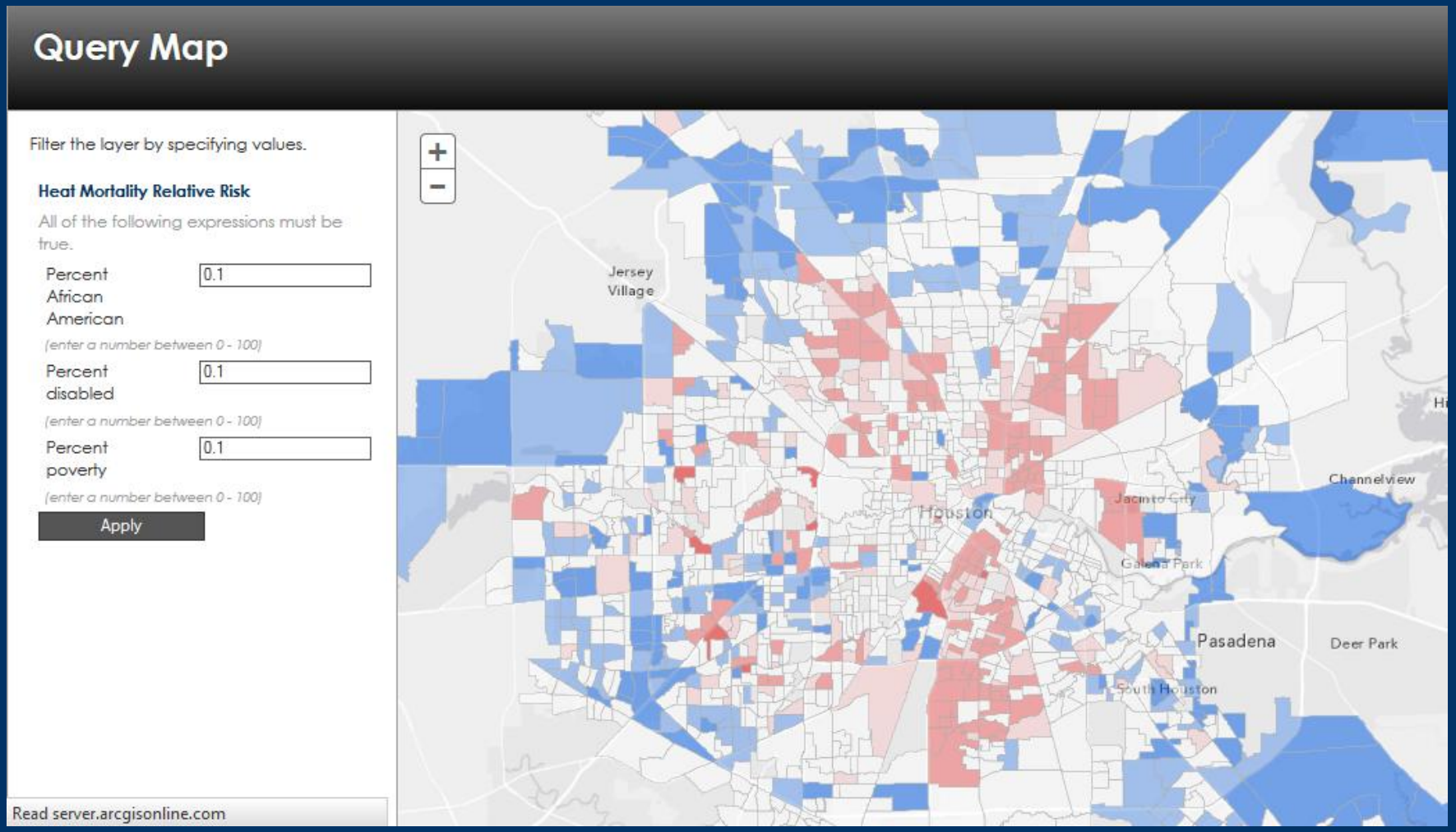
Data exploration and visualization (4)



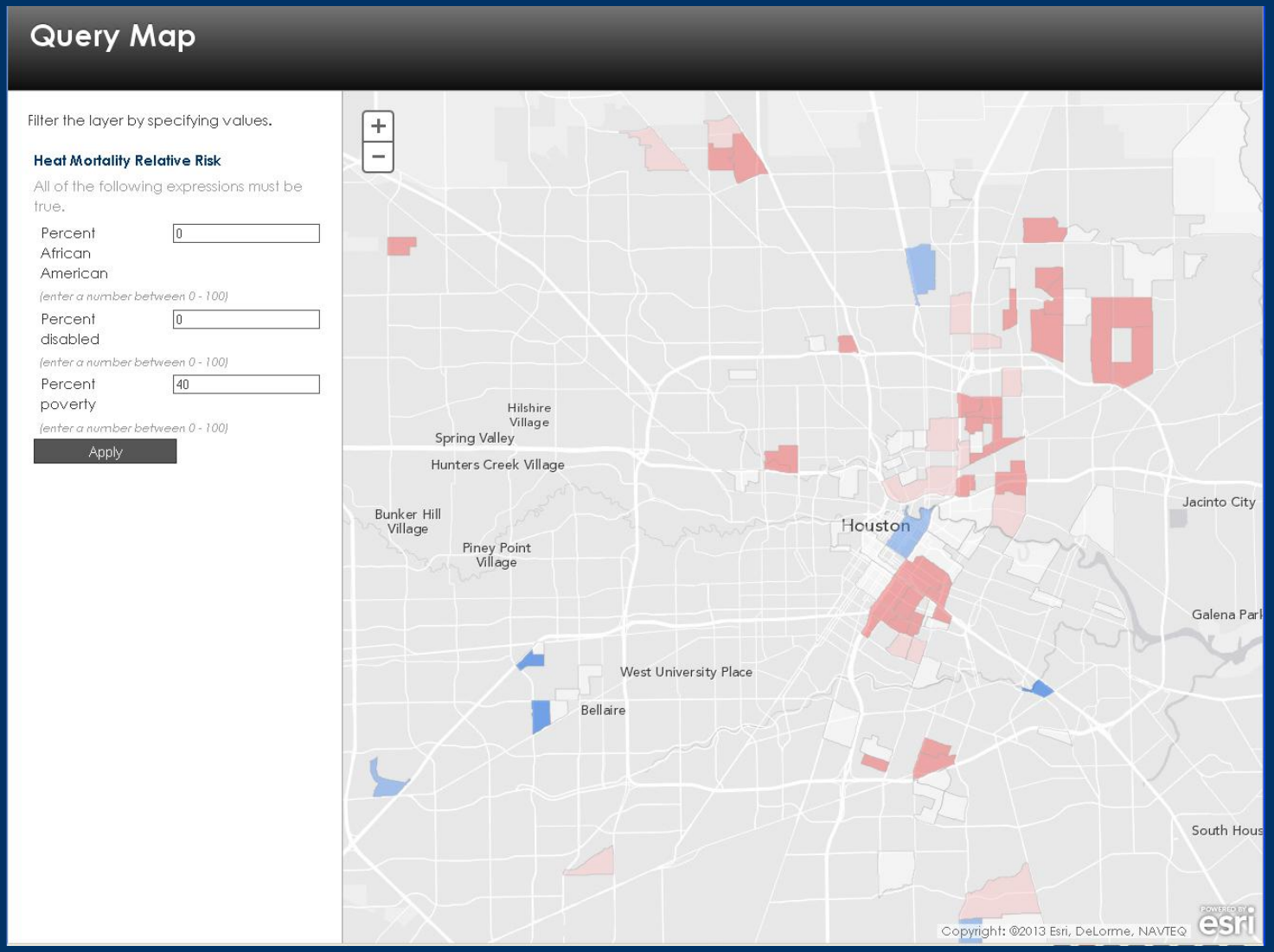
Data exploration and visualization (5)



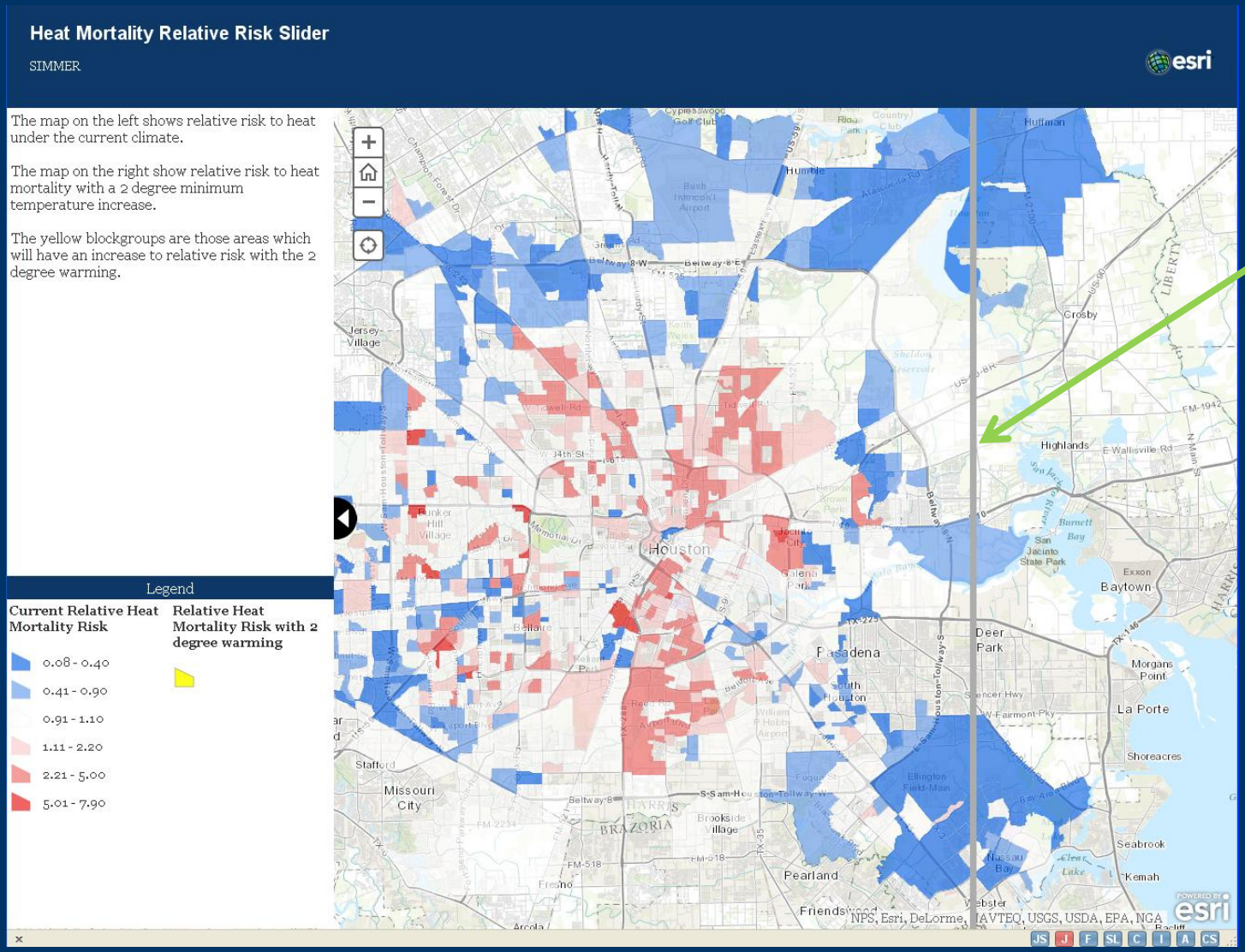
Data query application



Data query application (2)

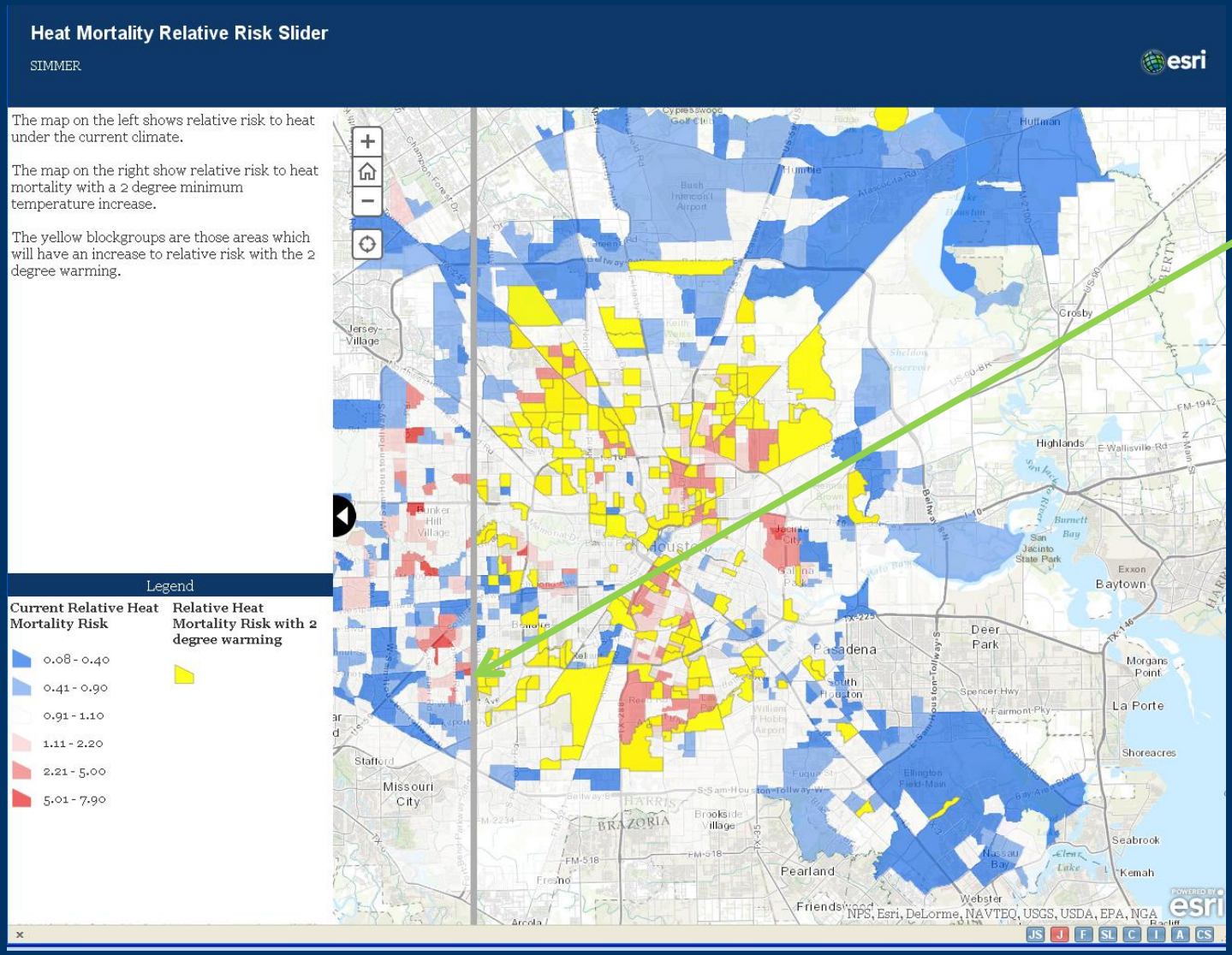


Current and future heat risk



Interactive "slider" allows to compare current and future heat risks

Current and future heat risk (2)



Interactive "slider" allows to compare current and future heat risks

Thank you!

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