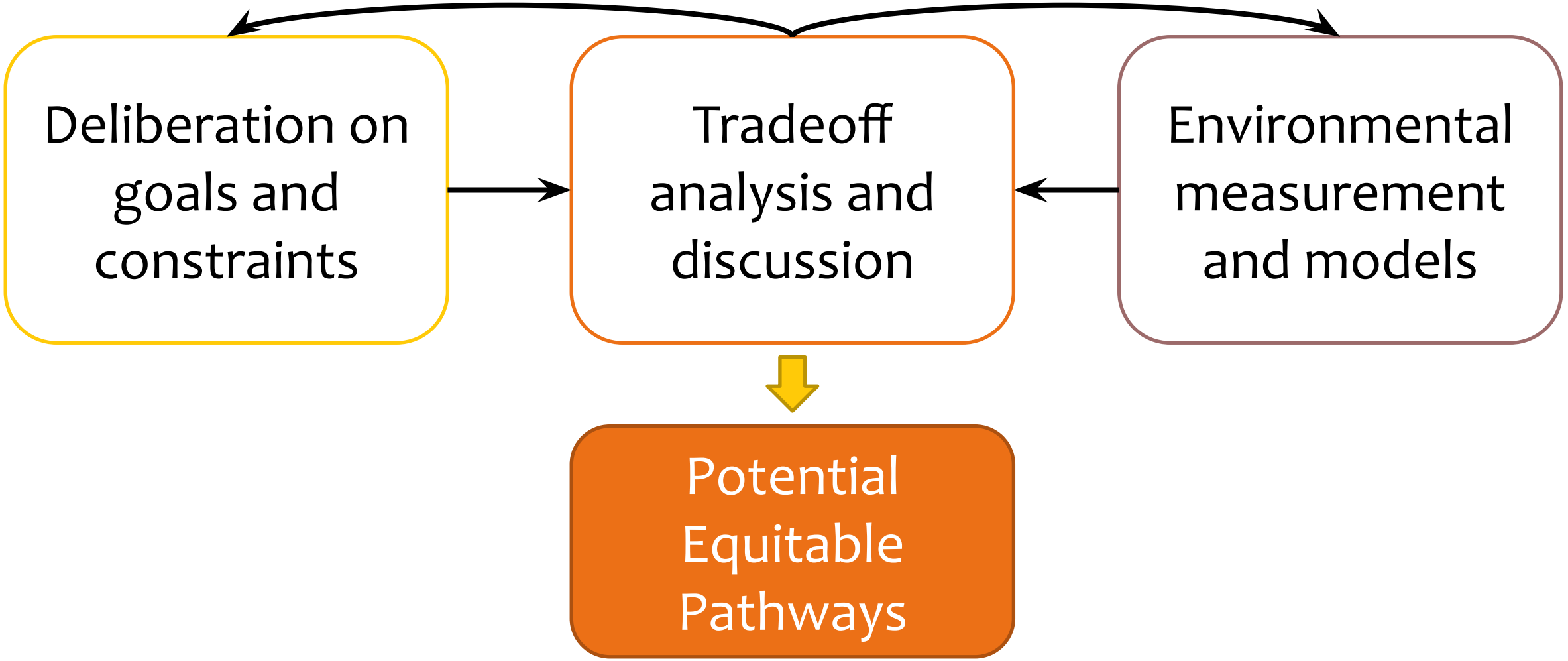
THE BALTIMORE SOCIAL-ENVIRONMENTAL COLLABORATIVE

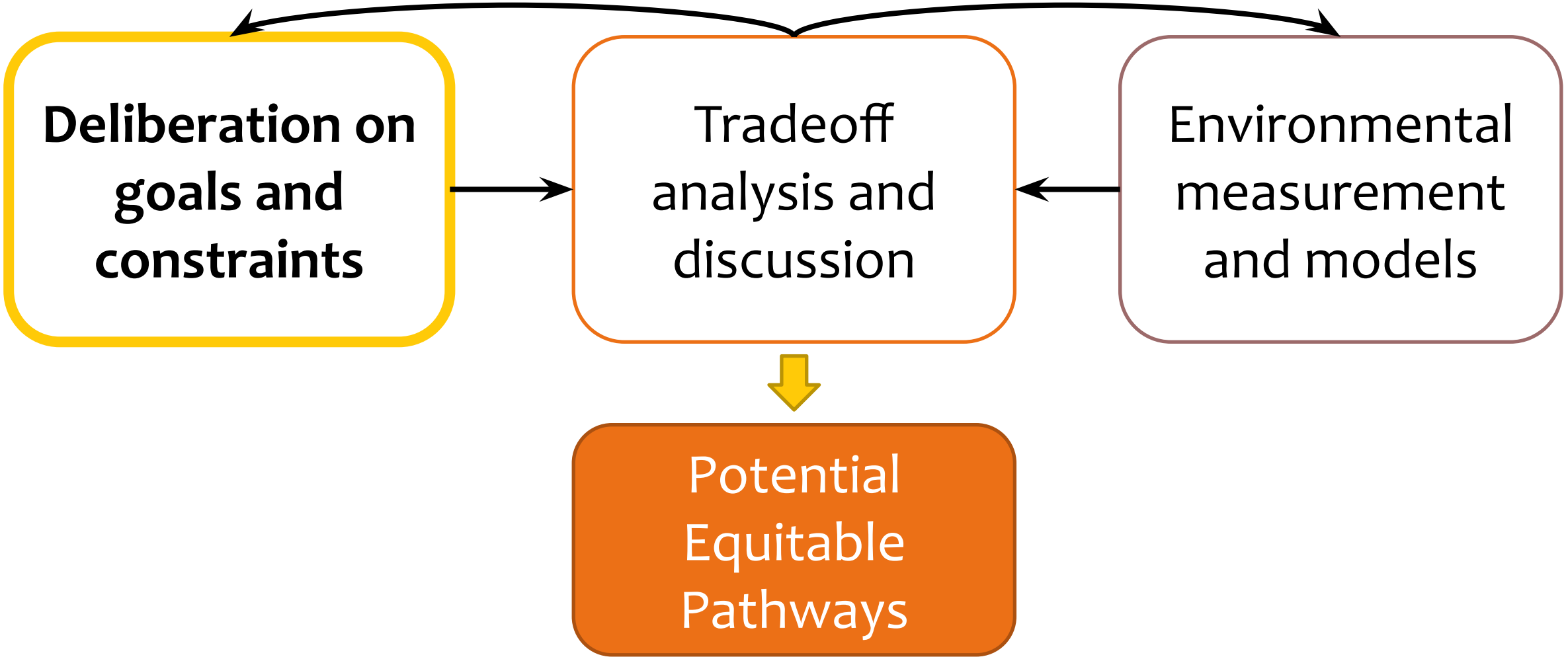
The BSEC Mission

The **Baltimore Social Environmental Collaborative** will produce the urban climate science needed to inform community-guided ***potential equitable pathways*** for climate action

The BSEC Process



The BSEC Process



Deliberation

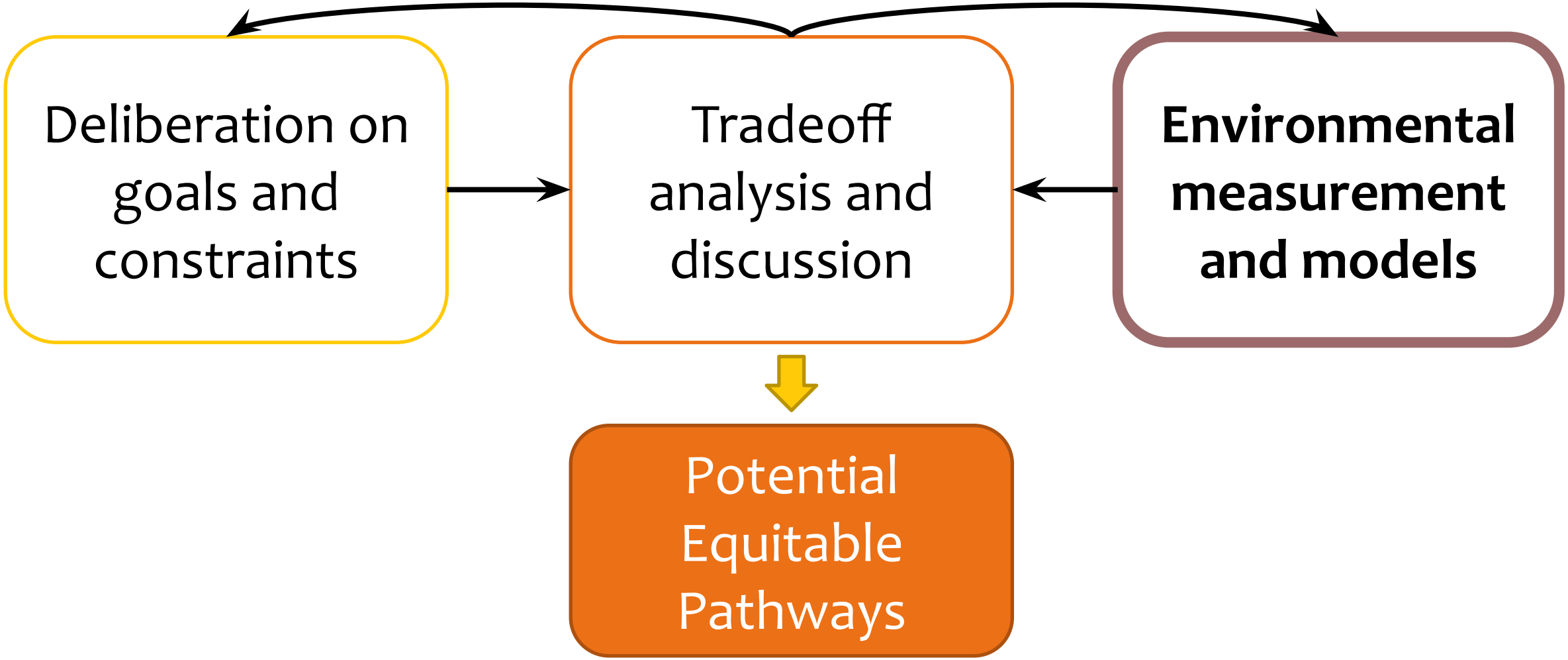
Extreme Heat

Indoor/Outdoor Air Pollution

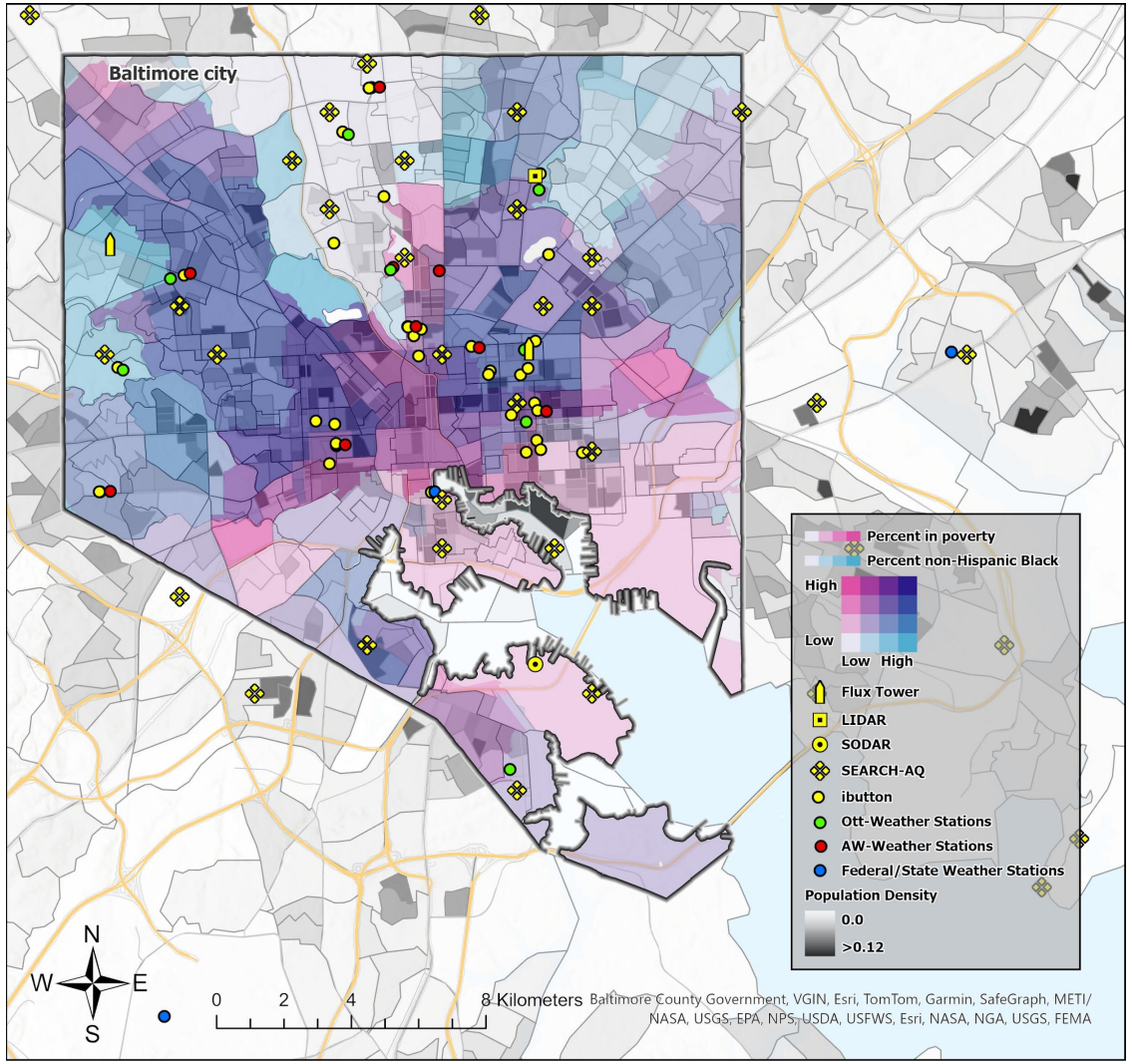
Urban Flooding

Decarbonization

The BSEC Process



Environmental Measurement and Models



Science area themes

Air Quality

Atmospheric Dynamics

Buildings & Energy

Decision Science

Greenhouse Gases

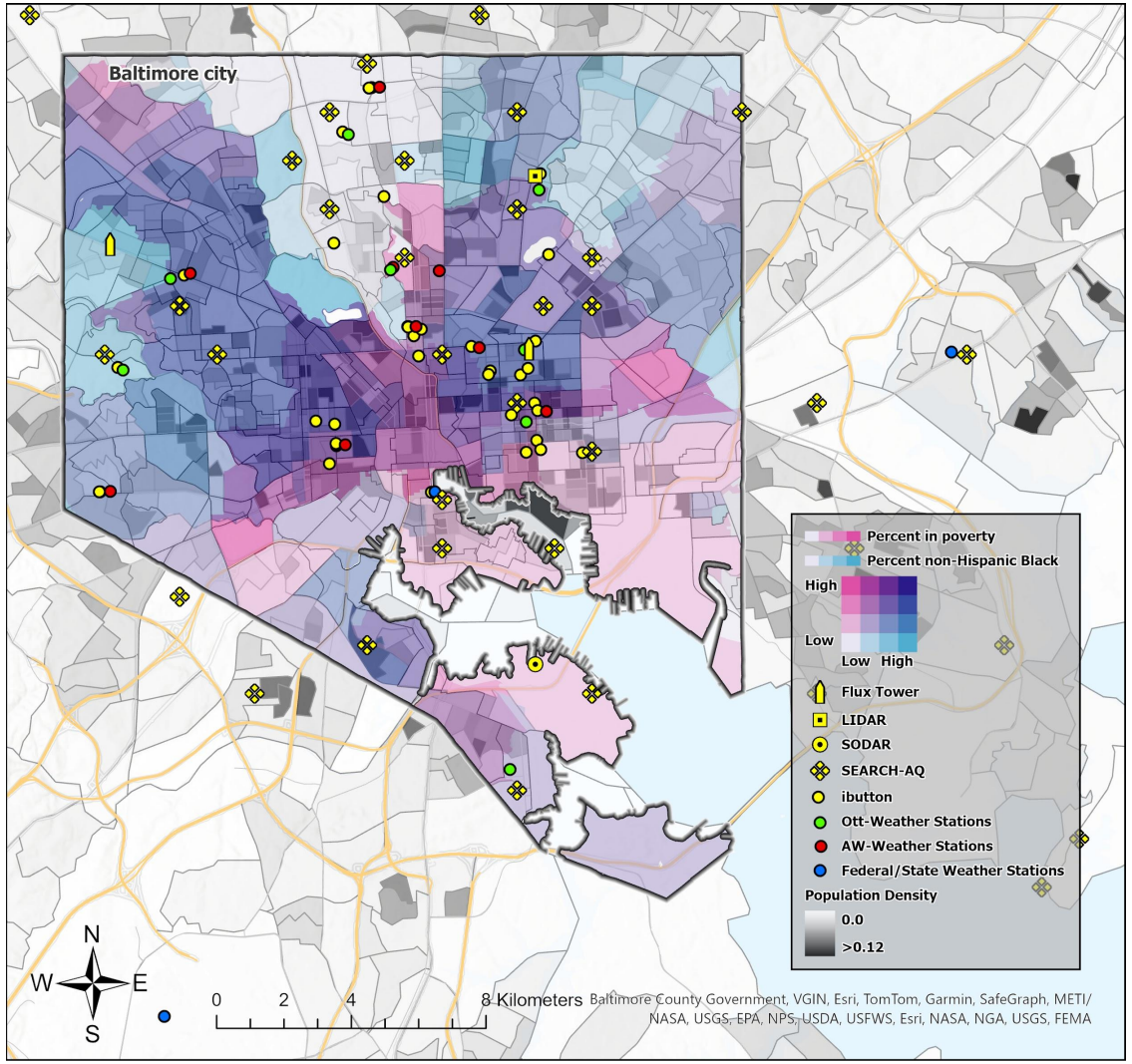
Health

Transportation

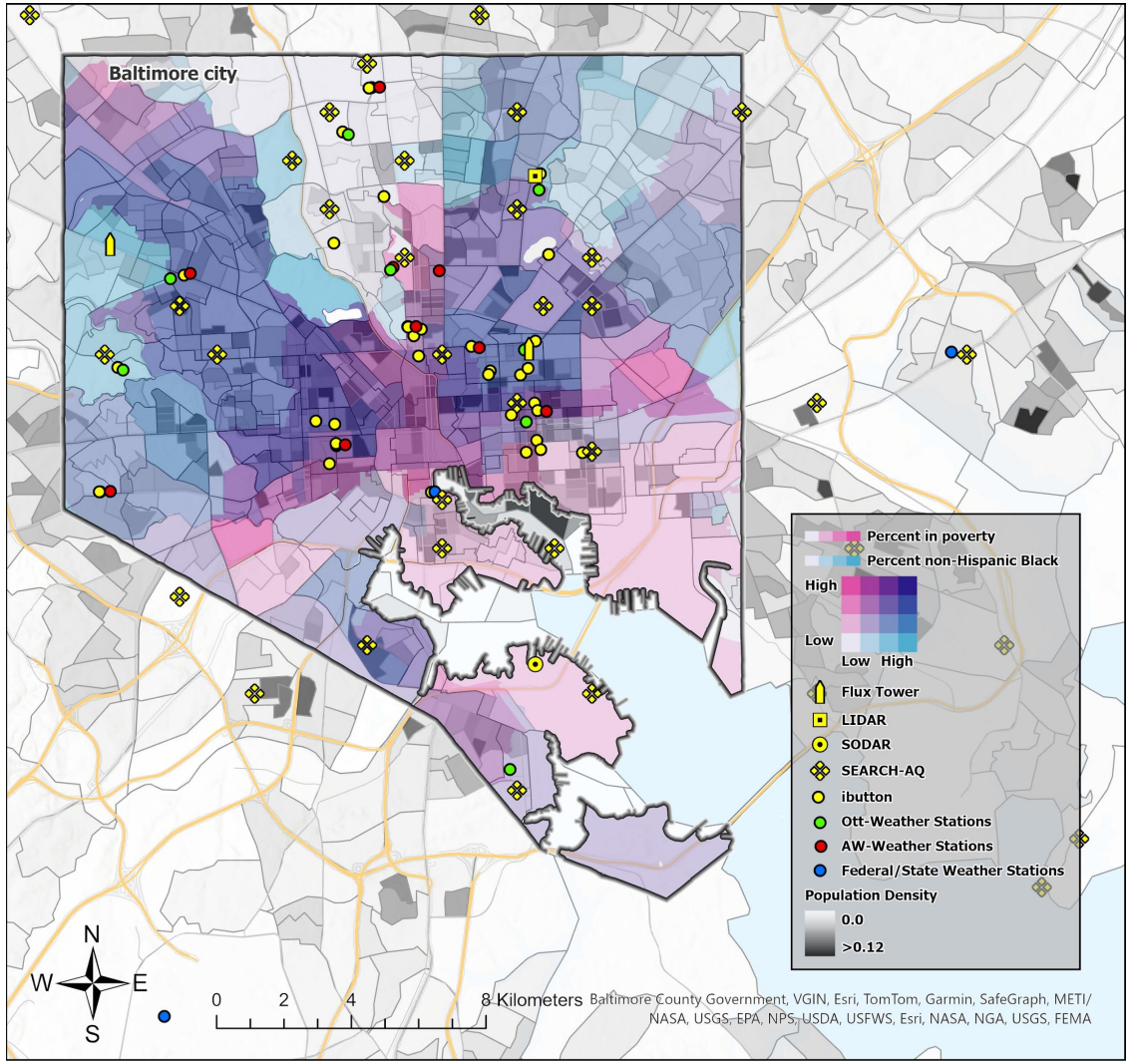
Vegetation & Soils

Water & Water Quality

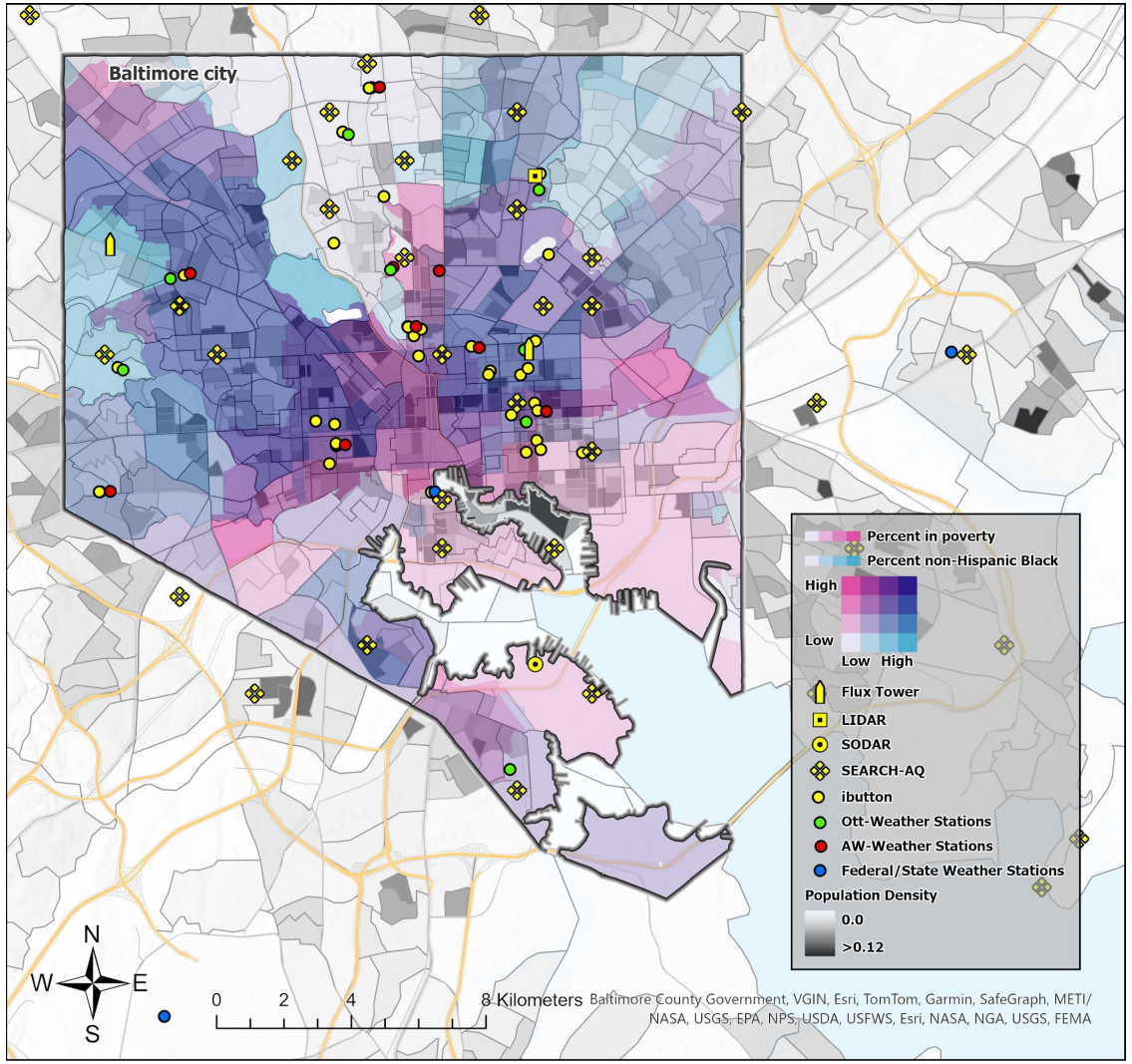
Environmental Measurement and Models



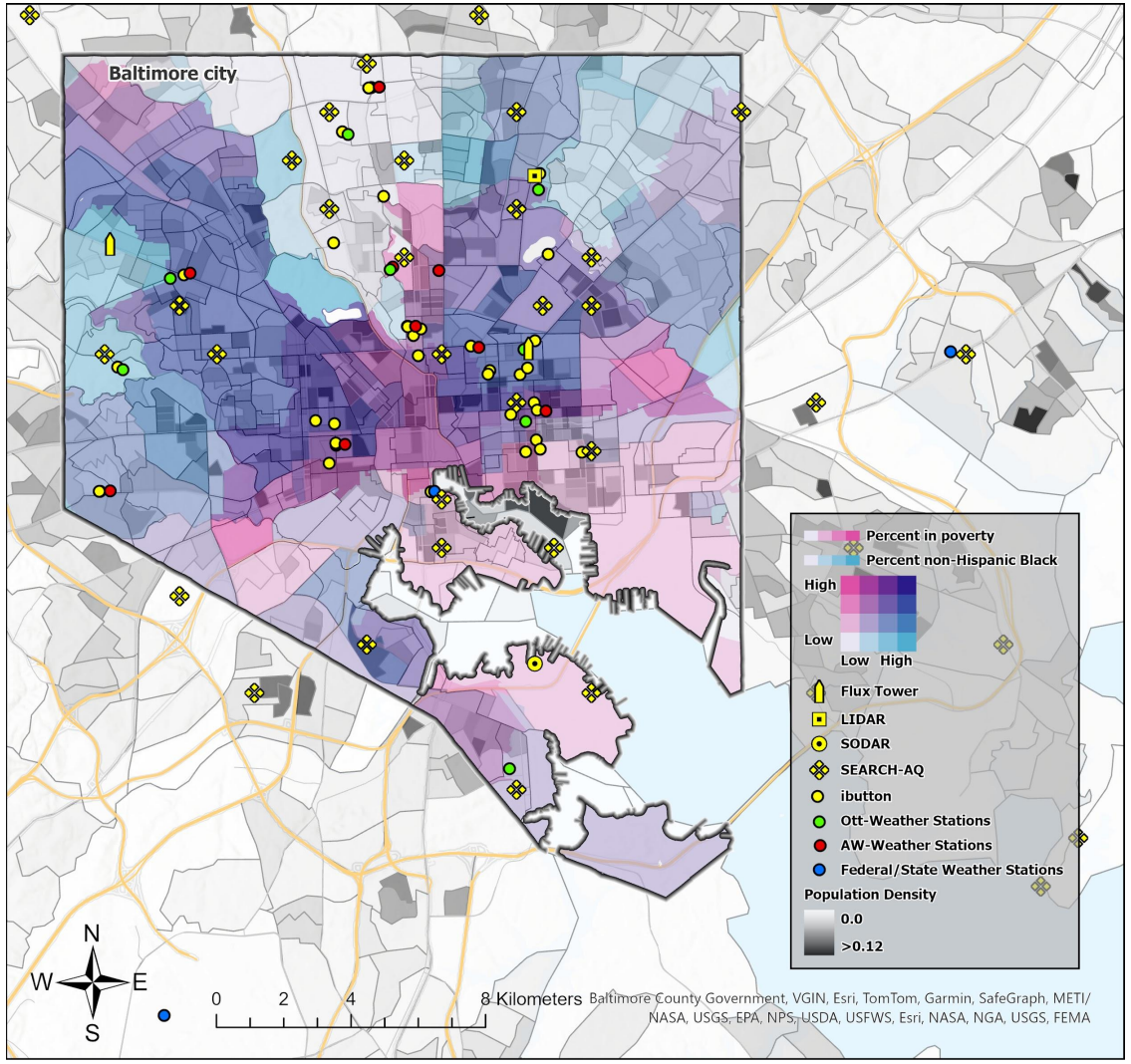
Environmental Measurement and Models



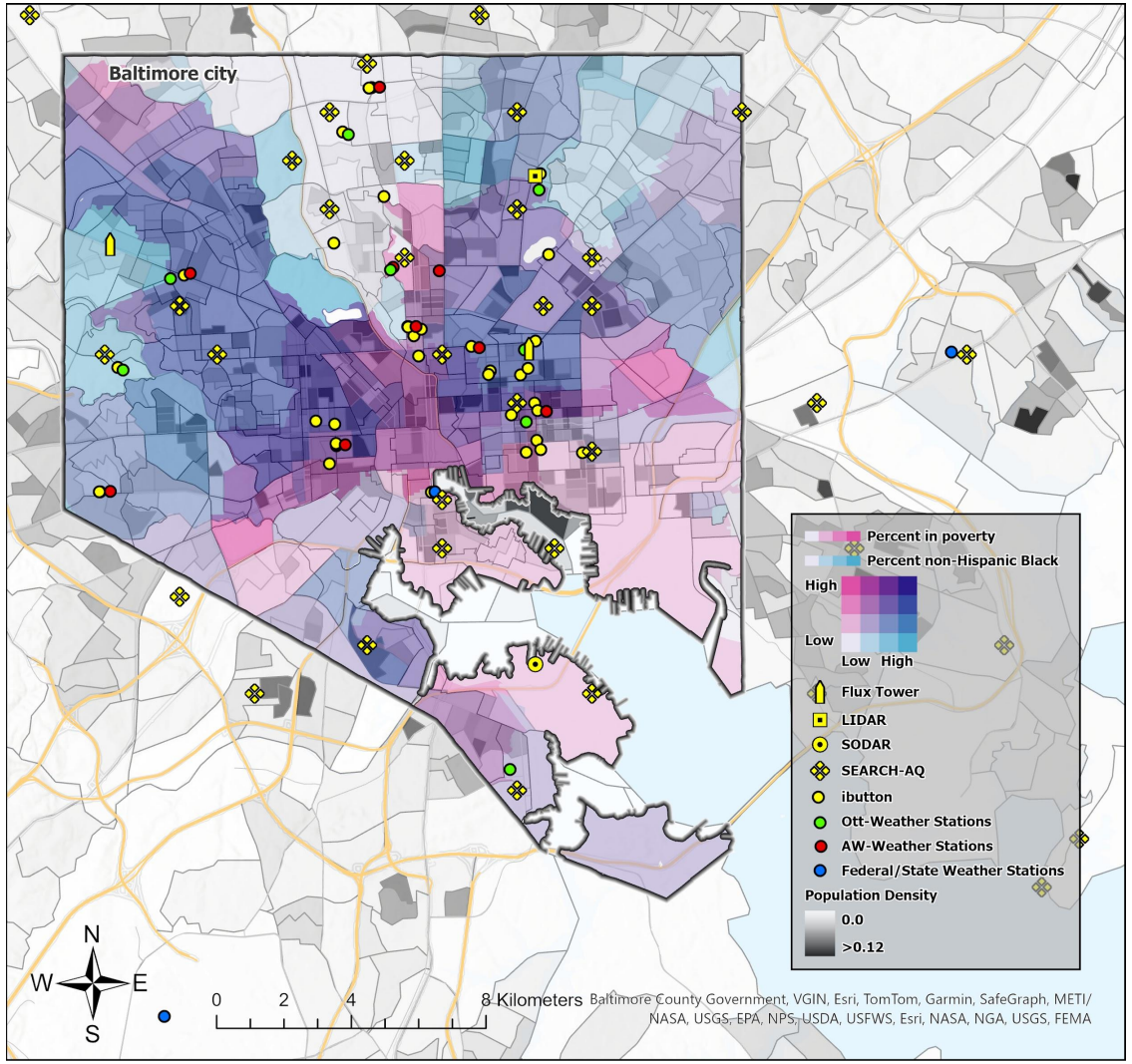
Environmental Measurement and Models

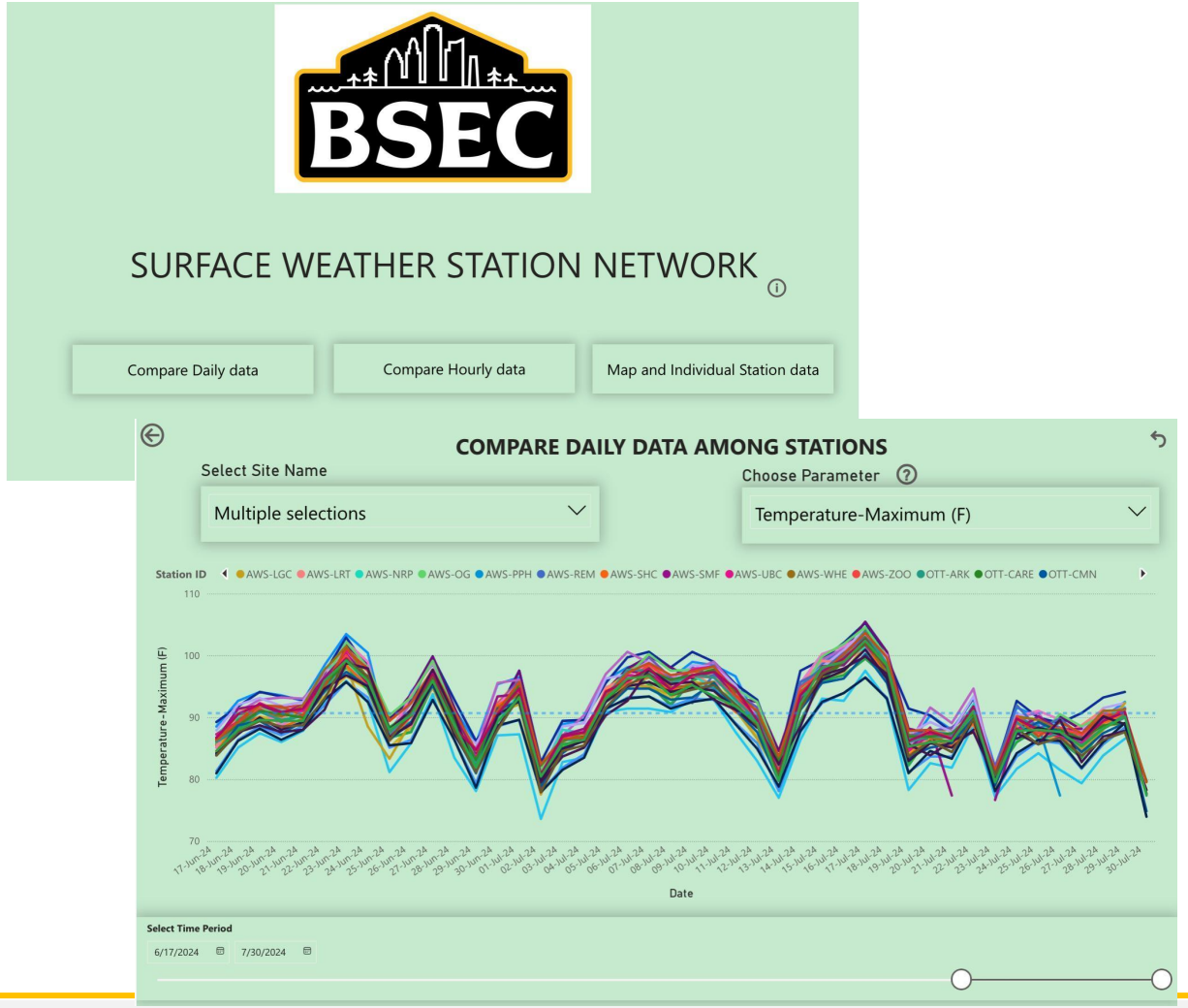


Environmental Measurement and Models



Environmental Measurement and Models





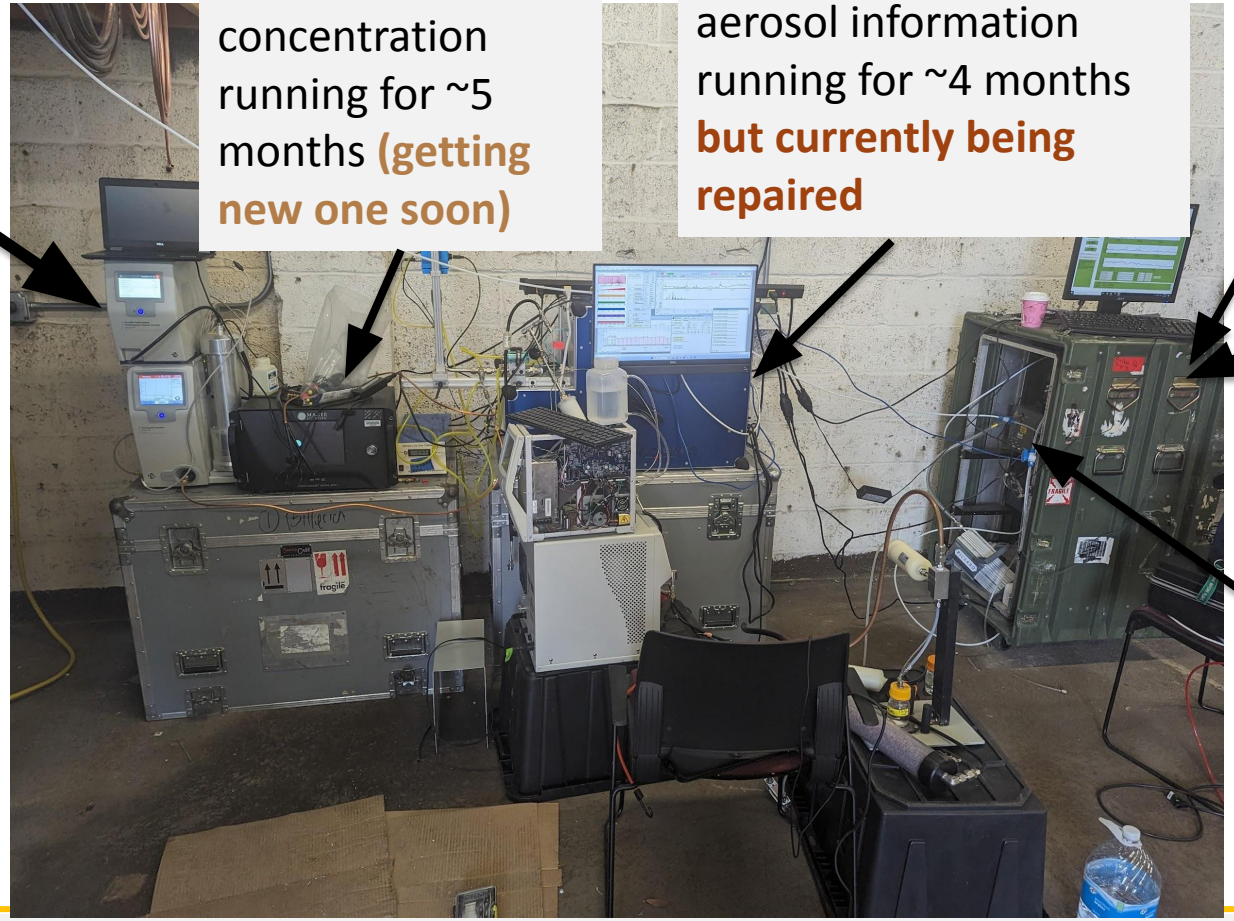
Darryn Waugh, JHU

BSEC AQ Supersite: current capabilities

Scanning mobility particle sizer (size / volume distributions) running for ~5 months

PM Black/brown carbon mass concentration running for ~5 months **(getting new one soon)**

Aerosol mass concentration, composition, organic aerosol information running for ~4 months **but currently being repaired**



Ozone been running off & on for ~3 months **(getting new one soon)**

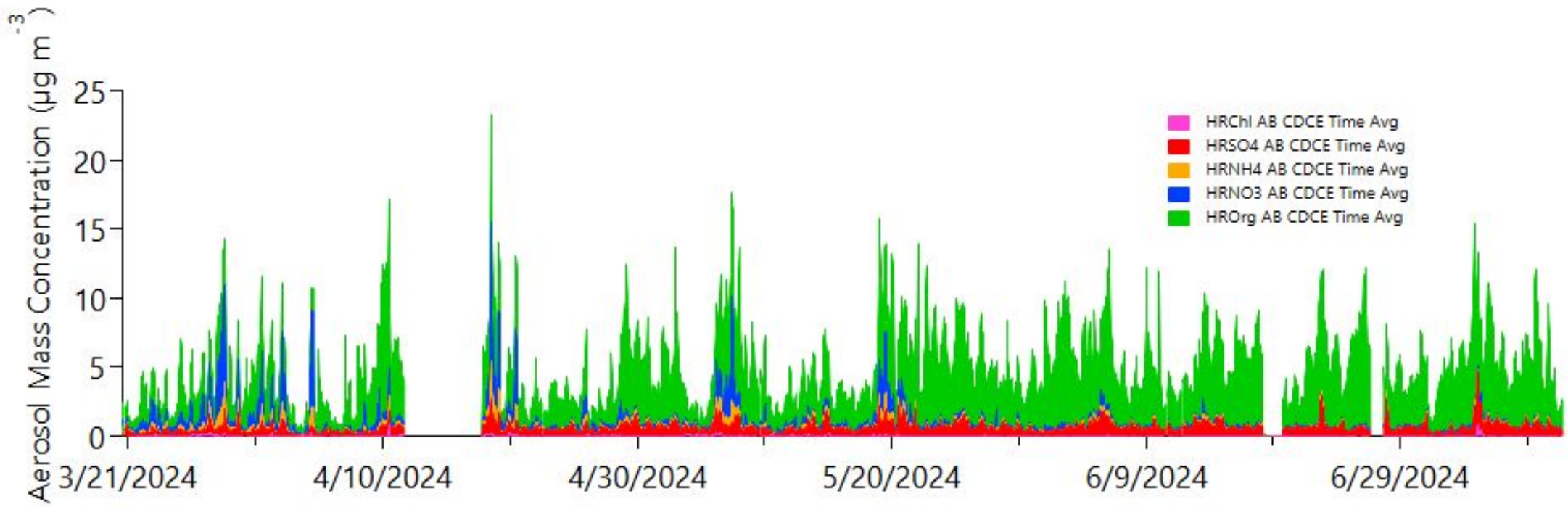
Getting a reliable nitric oxide & nitrogen dioxide instrument soon

Instruments waiting on or being installed soon:
-Methane + ethane
-Unit mass PTR-MS (BVOCs, OVOCs, aromatics)
-Discussions w/ potential guest groups

Methane, carbon monoxide, carbon dioxide running for ~4 months **but currently being repaired**

Ben Nault
Peter DeCarlo

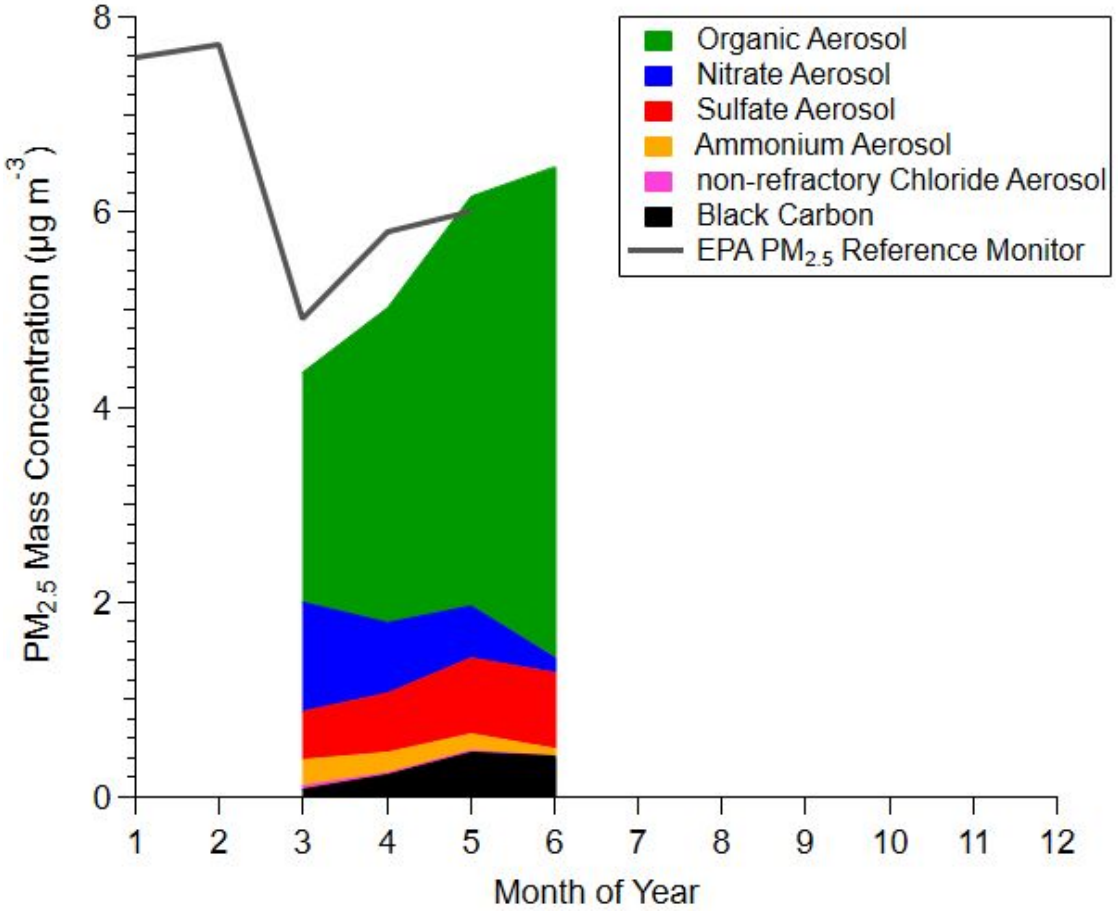
Time series of mass concentration and composition measured at BSEC for nearly 4 months



- Inorganic aerosol more important late winter/early spring & some specific cool/wet periods
- Organic becoming more important during summer because photochemistry and emission changes

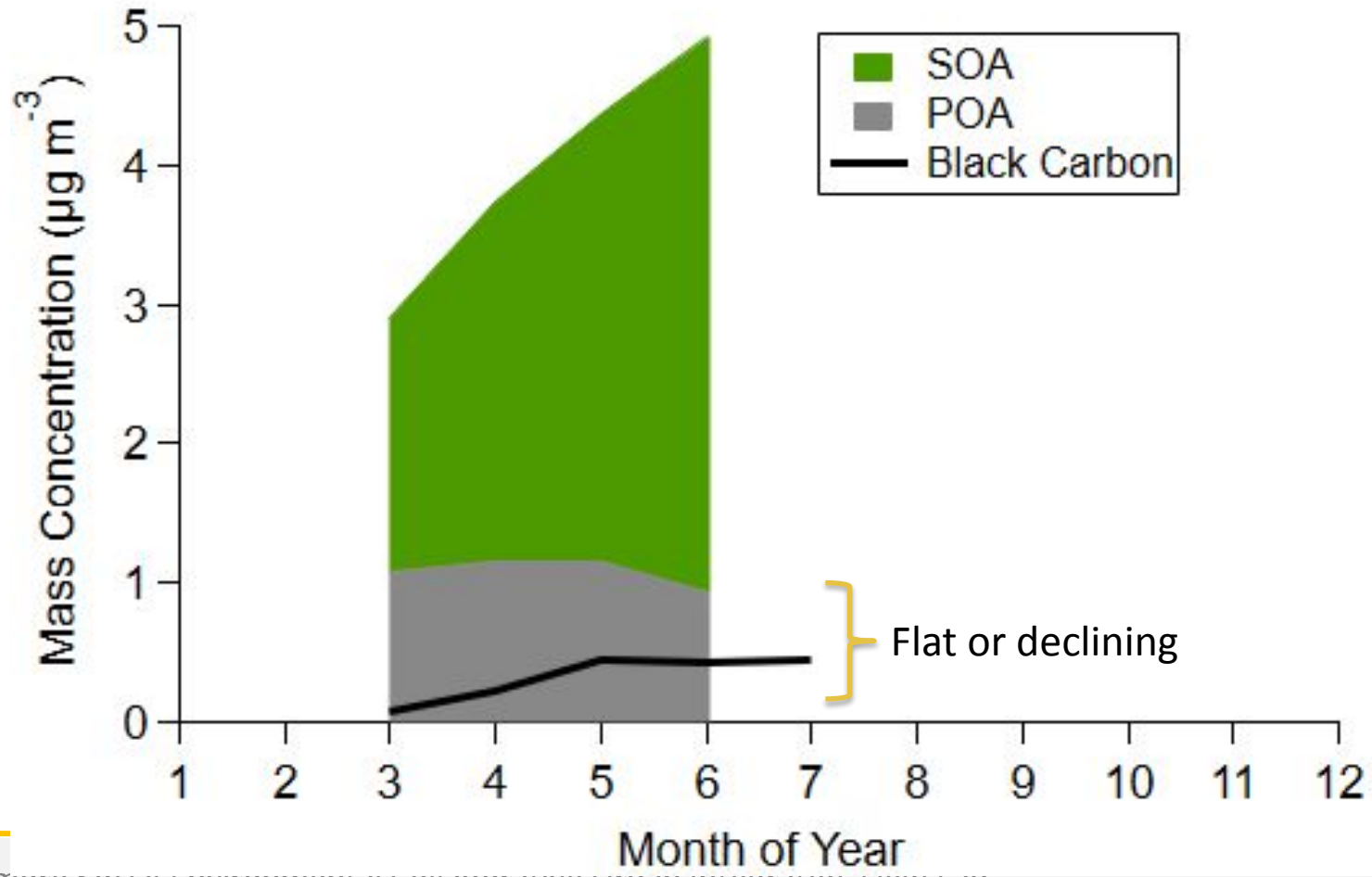
Ben Nault
Peter DeCarlo

Monthly average mass concentration and composition shows changes with $PM_{2.5}$



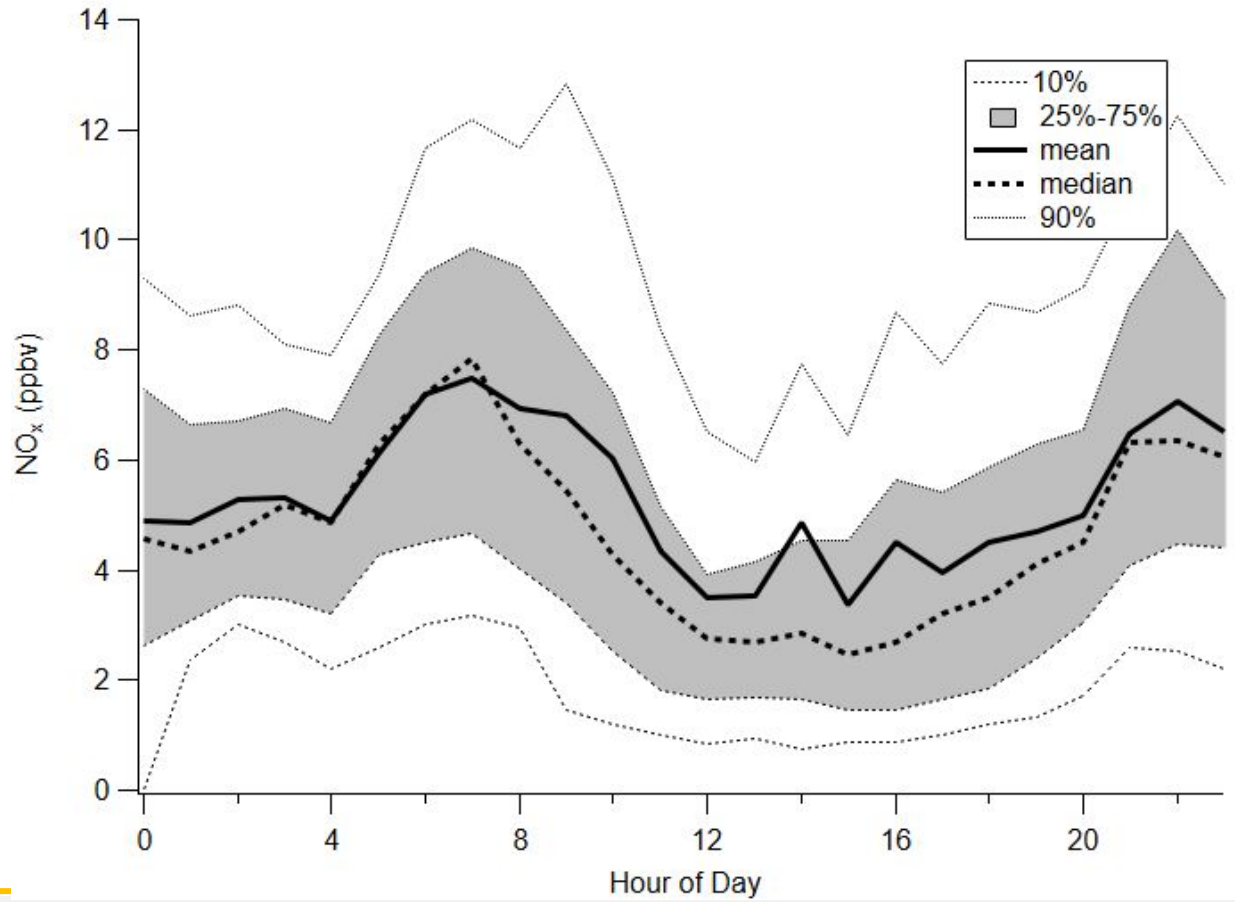
Ben Nault
Peter DeCarlo

Changes in organic aerosol related to increasing secondary organic aerosol



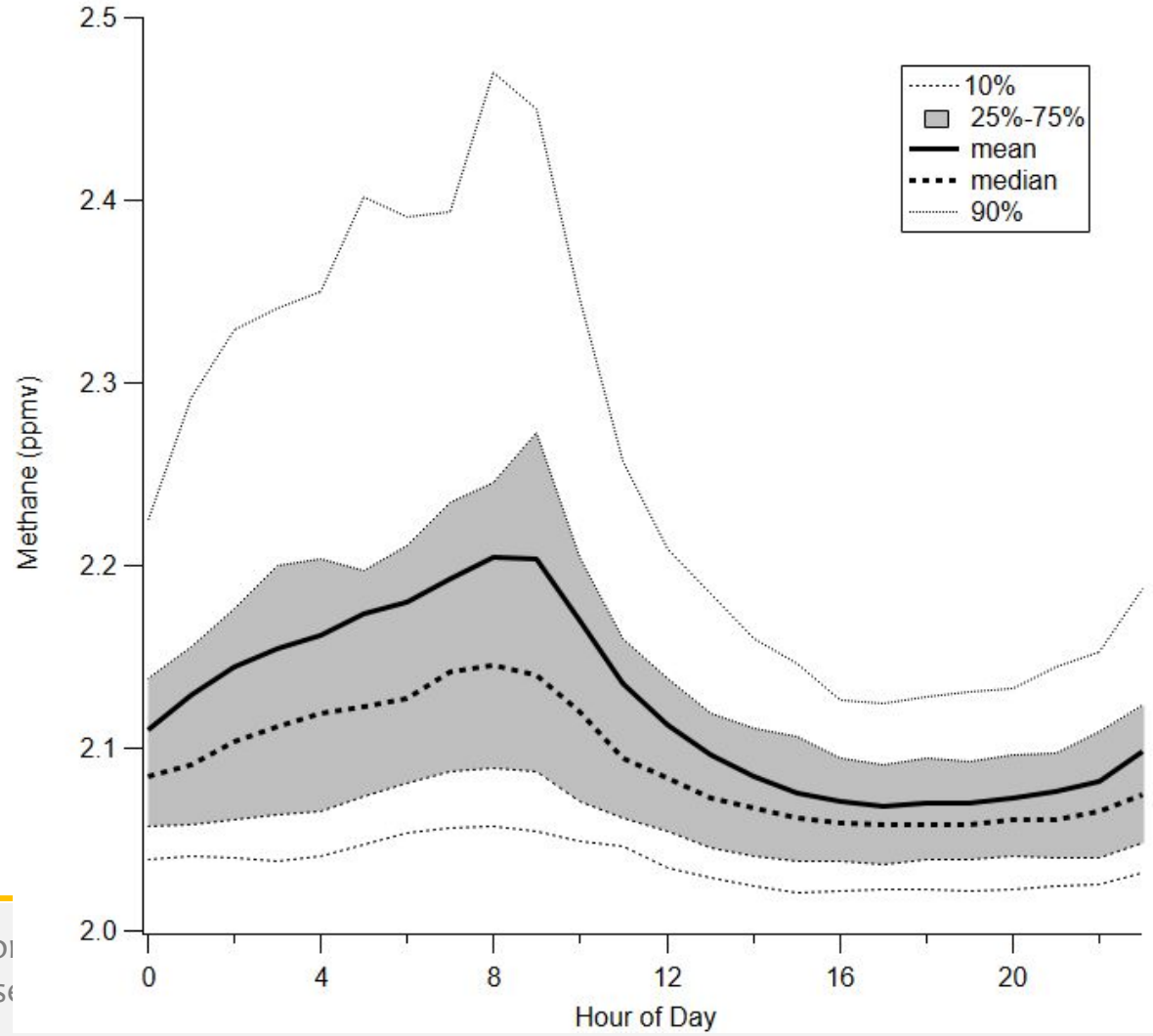
Ben Nault
Peter DeCarlo

Diurnal pattern of NOx shows high during rush hours and low at night and day (during summer)



Ben Nault
Peter DeCarlo

Diurnal pattern of methane shows build up during night



Ben Nault
Peter DeCarlo

The Johns Hopkins Mobile Laboratory

Particle-phase measurements

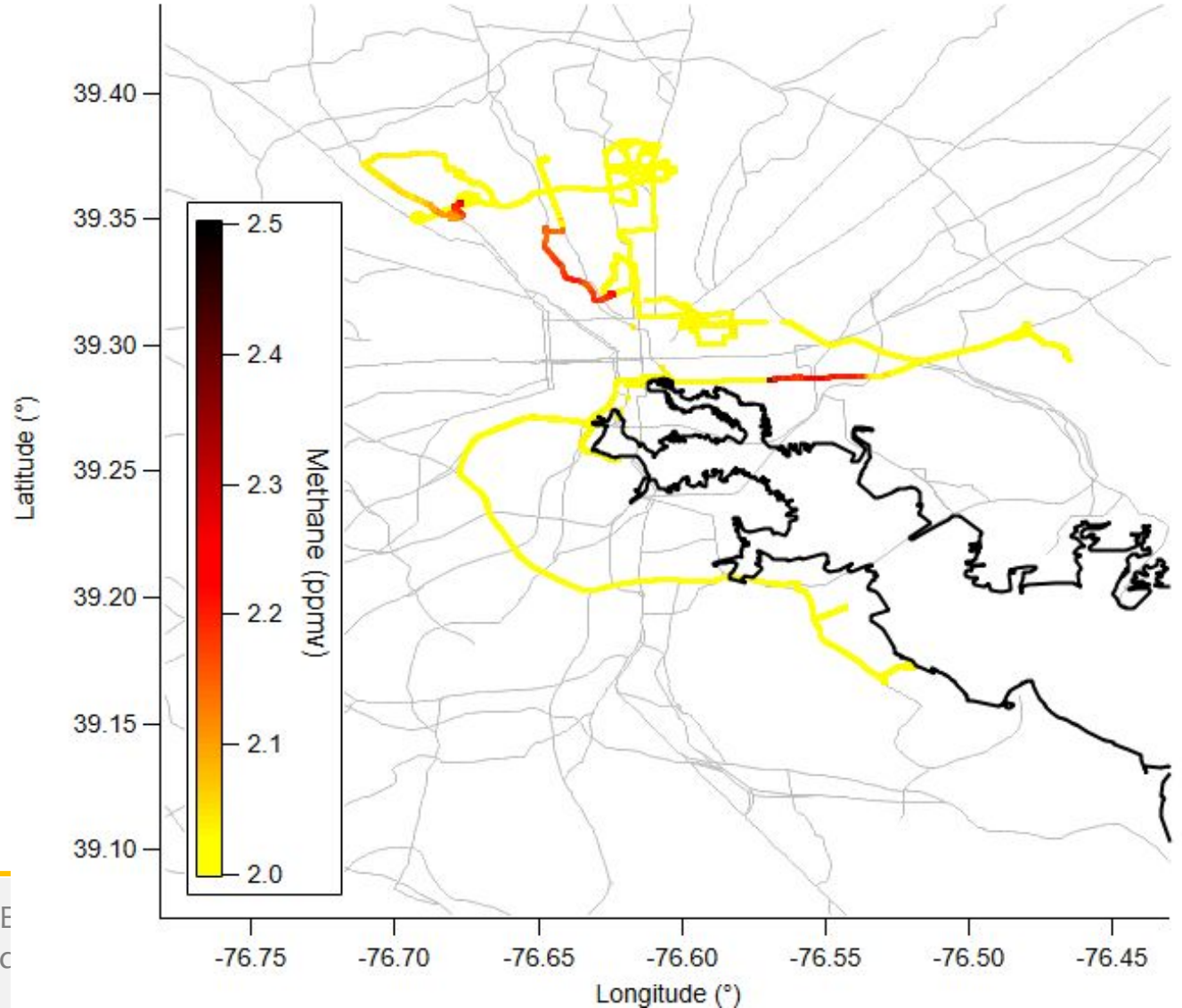
- Mini-AMS (OA, NO3, SO4, NH4, nr-Chl)
- Mini-Aethalometer (BC)
- mSEMS (size distributions)
- Magic CPC (particle #)
- Dustrak (PM1, PM2.5, PM10 mass)

Gas-phase measurements

- EC-TOF (PTR + GC, range of species)
- CAPS NOx
- Picarro EtO, HCHO, NH3, CO/CO2/CH4
- 2BTech O3

Associated lat, long, RH, & T

Some areas show higher methane leaks



Urban vegetation is predominantly turf grass

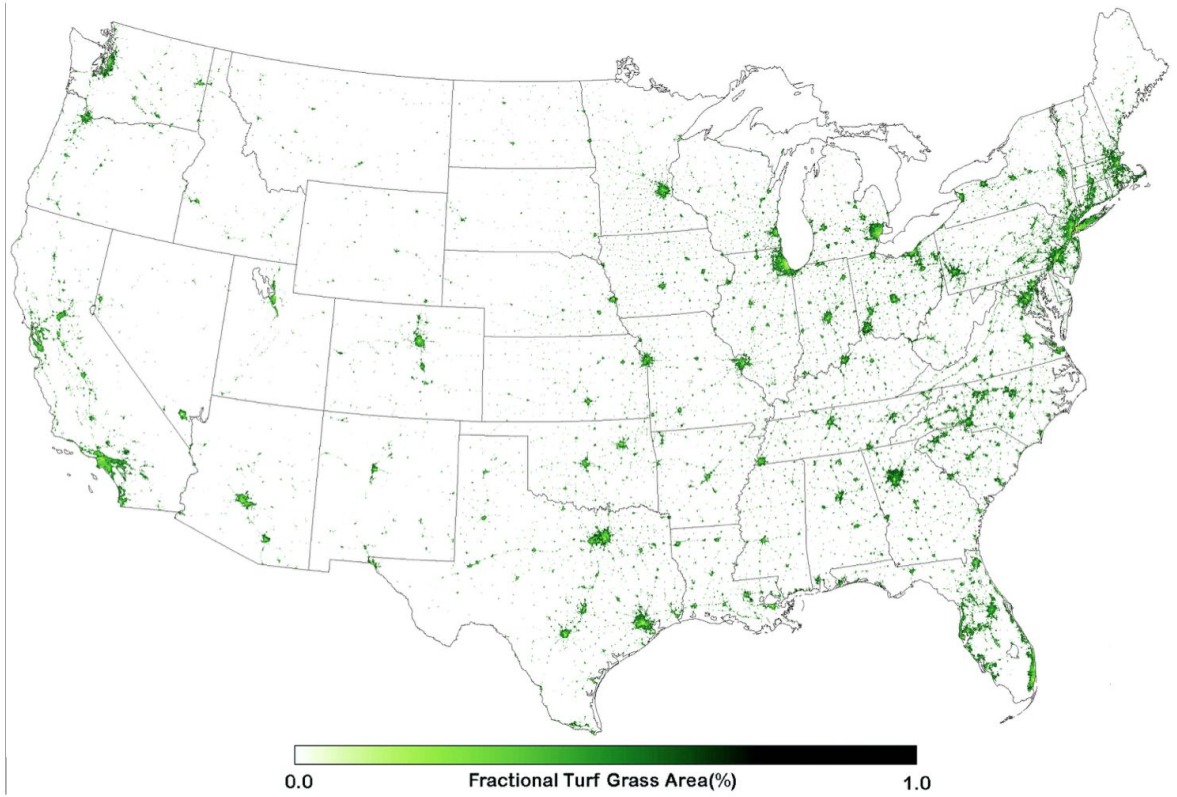
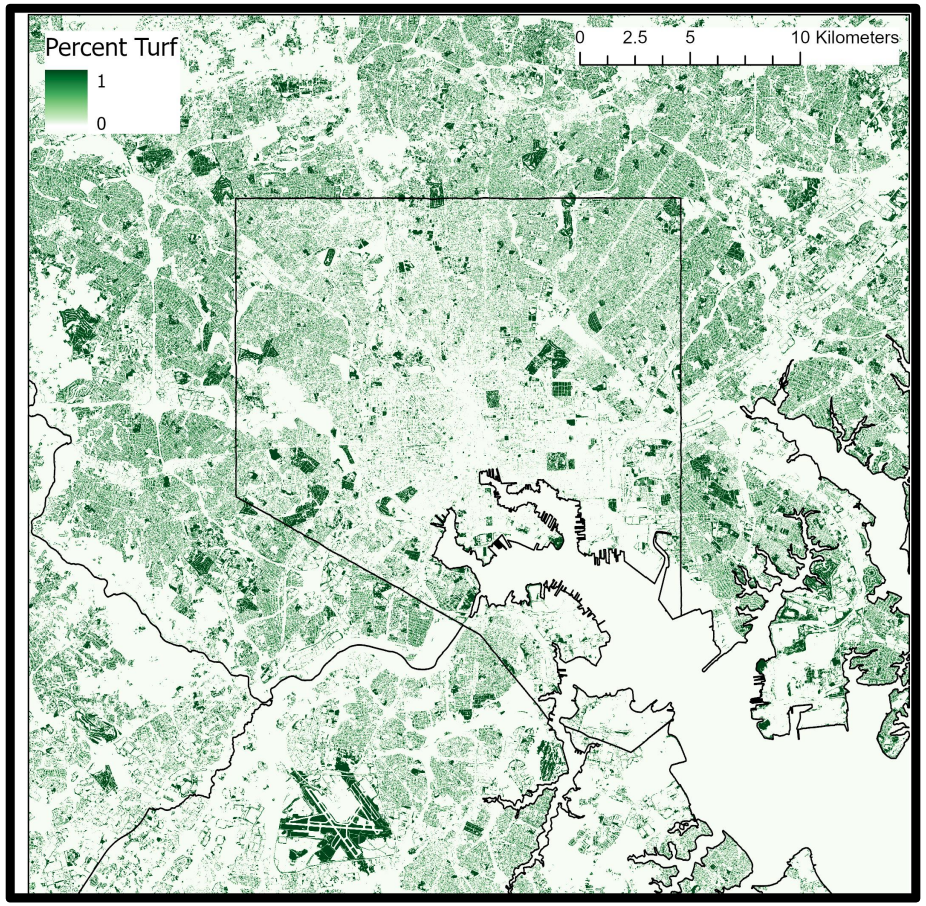
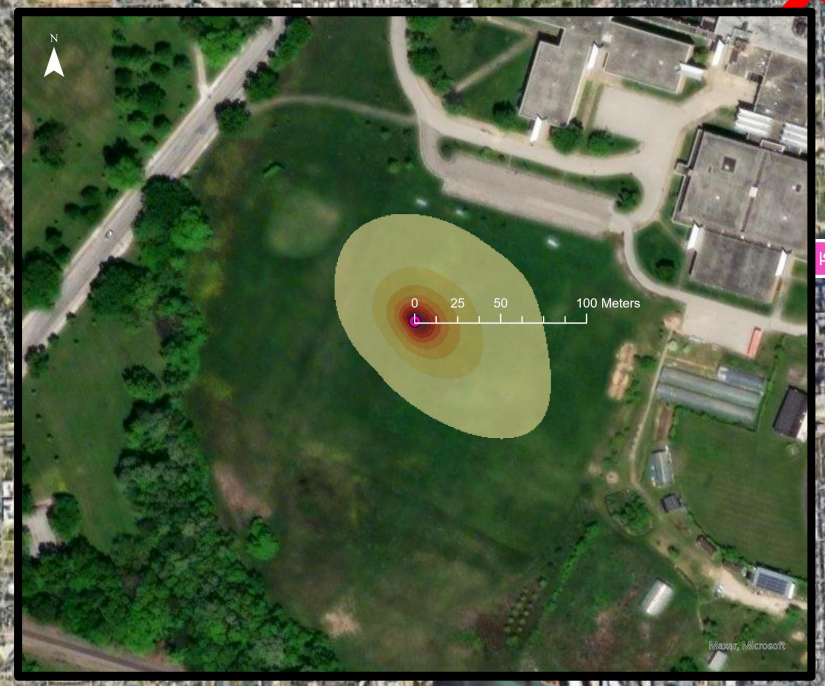


Figure 1. Distribution of the fractional turf grass area (%) in the conterminous U.S.



Clifton Park turf grass tower



The Study at Hopkins

Wendy's

Residence Inn Baltimor at The Johns Hopkins M

Google

BSEC

Carbon and Turbulent Energy Fluxes

Carbon and Turbulent Energy Fluxes

Growing 1 Dormant 1 Growing 2

Carbon fluxes

CO_2 Flux µmol m^{-2} s^{-1}

CO_2 flux : -5.27
Air temp : 22.7 C

CO_2 flux : 1.9
Air temp : 30.8 C

CO_2 flux : -5.59
Air temp : 27.7 C

Ben Ahlswede,
PSU

Turbulent energy fluxes

H: 17.4
LE: 170

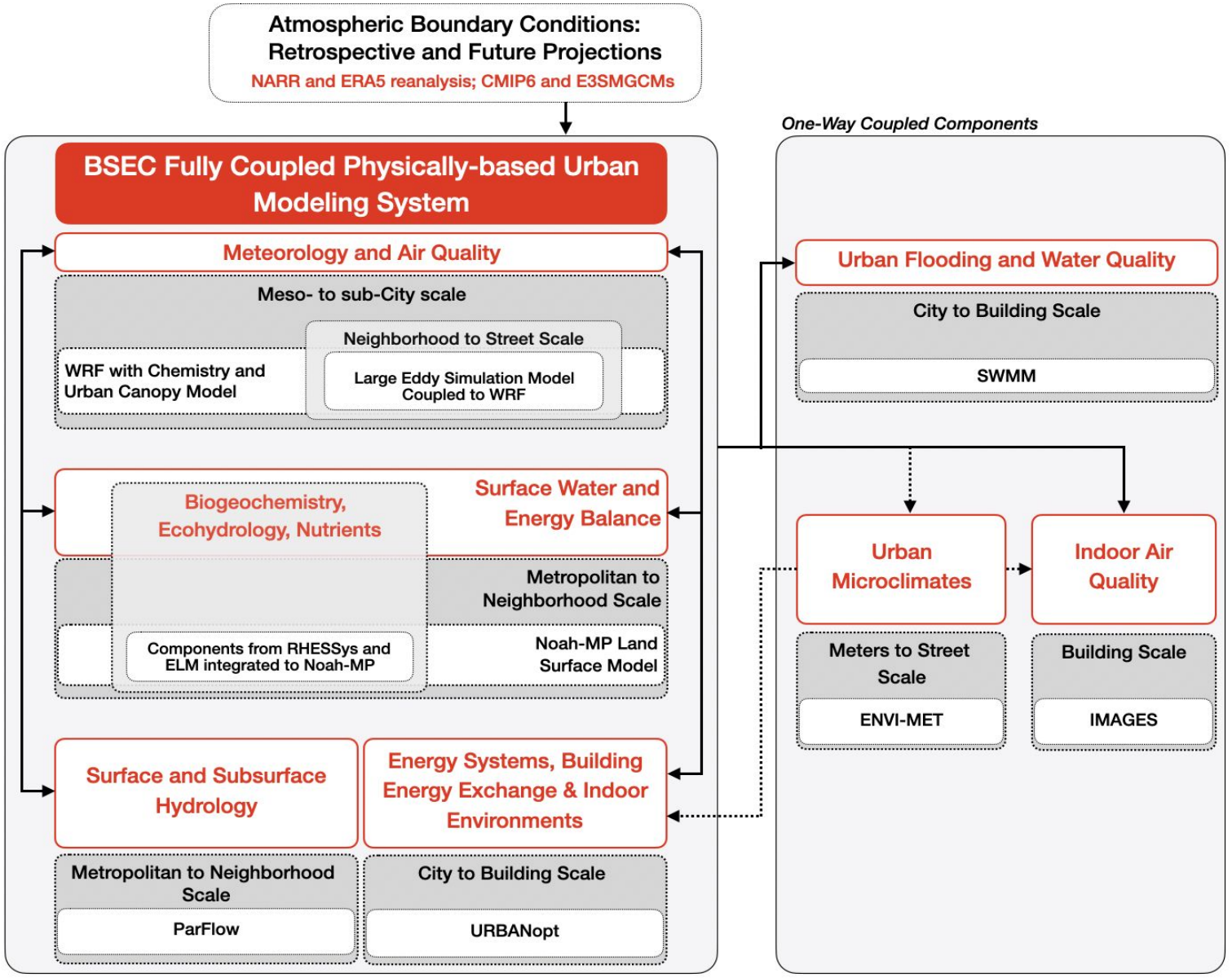
H: 58.2
LE: 102

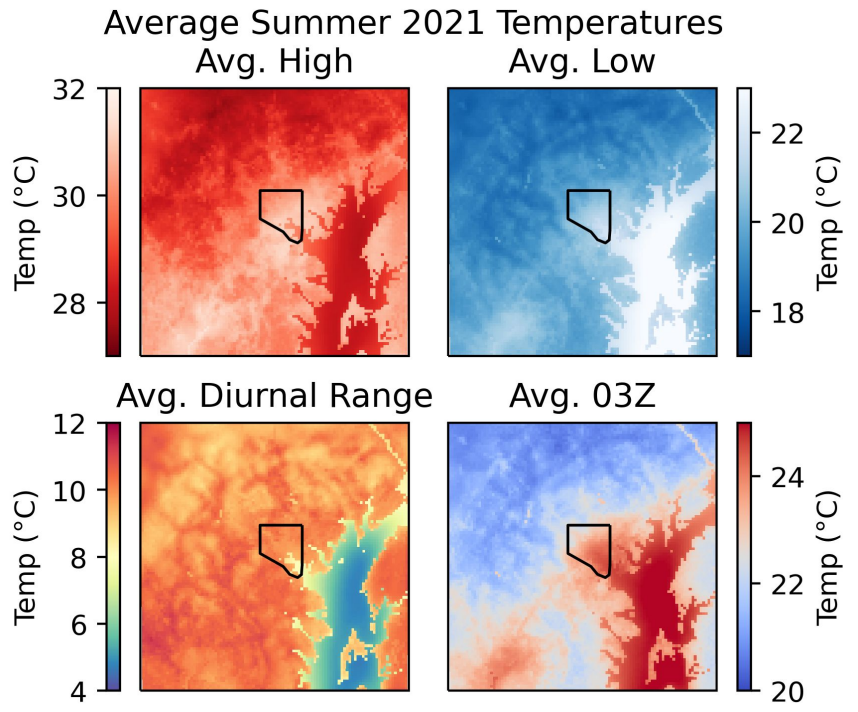
H: 12.8
LE: 163

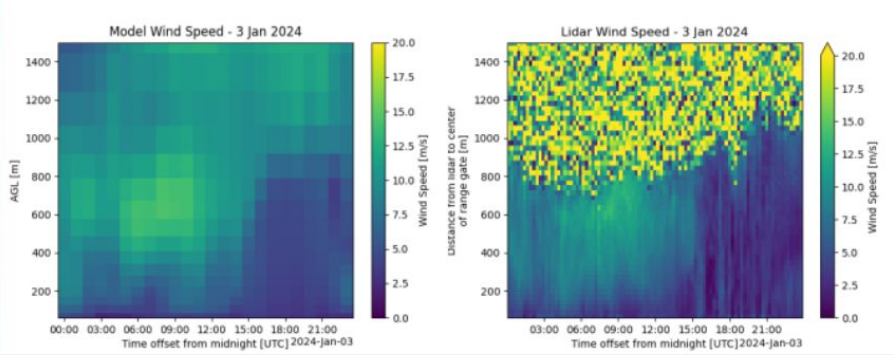
W m^{-2}

Ben Ahlswede,
PSU

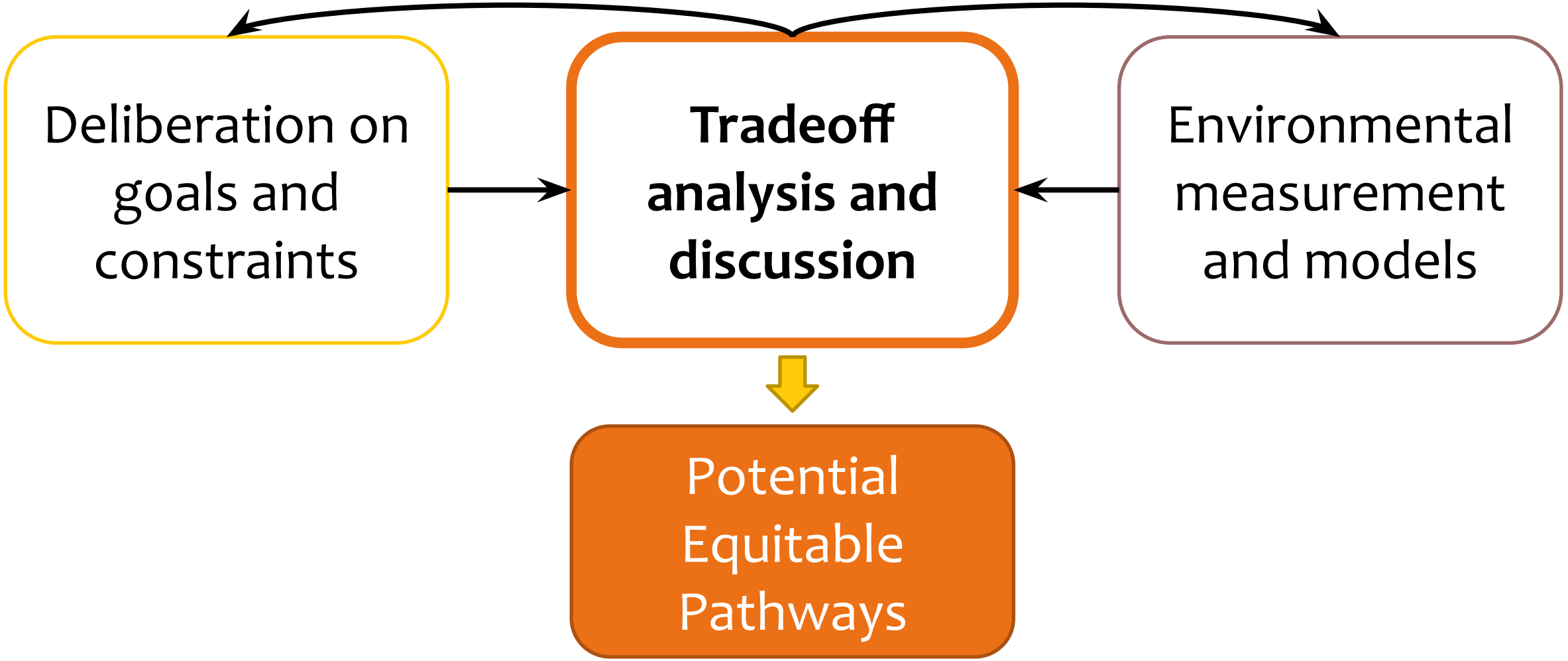
Modeling Framework



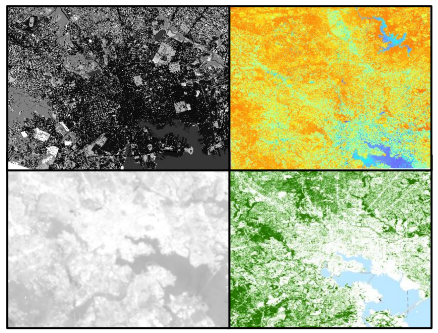


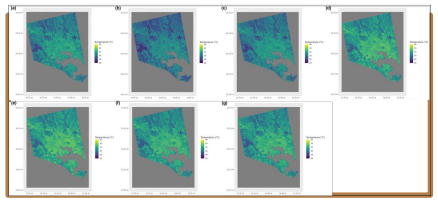


The BSEC Process



Integrating medical health records with environmental variables using a precision medicine platform





Address-level Patient Data

Census Block Group
Census Tract

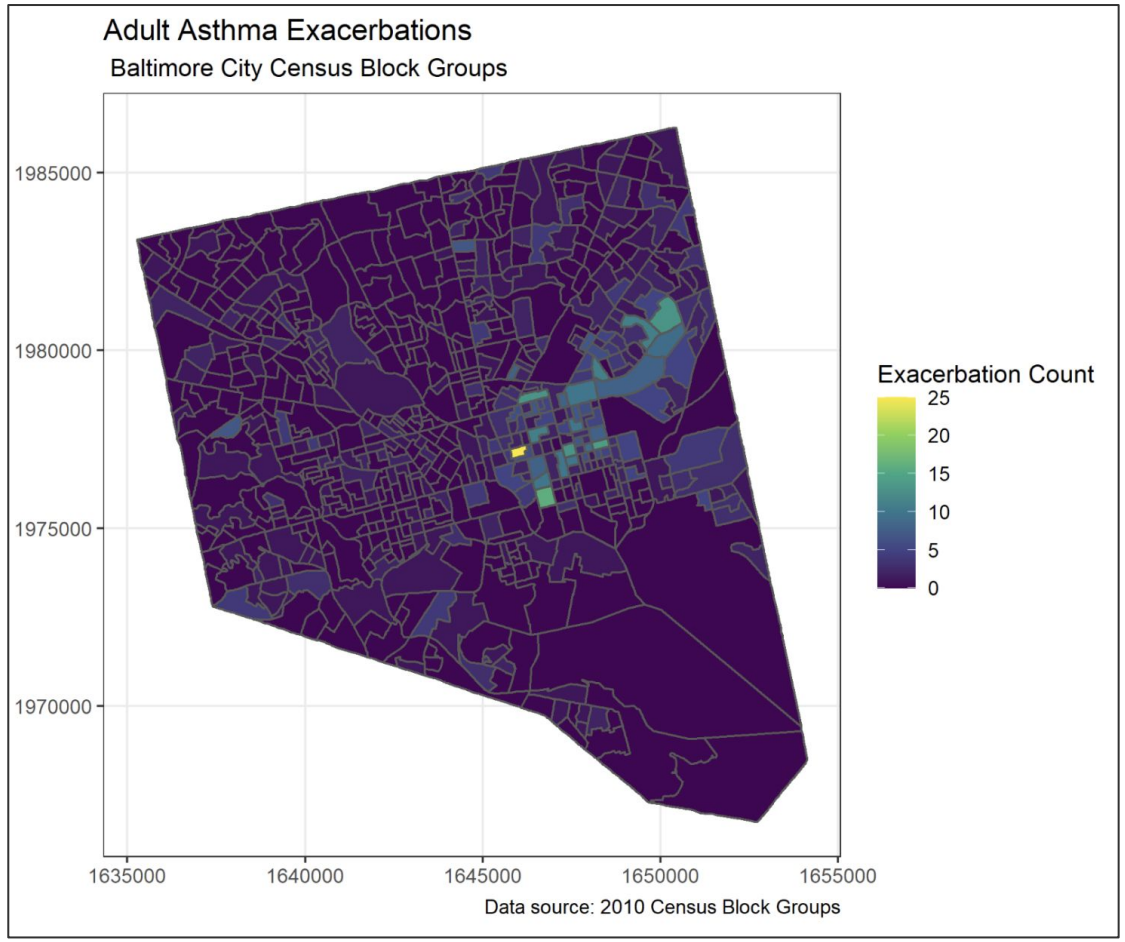
Census Block Group
Census Tract

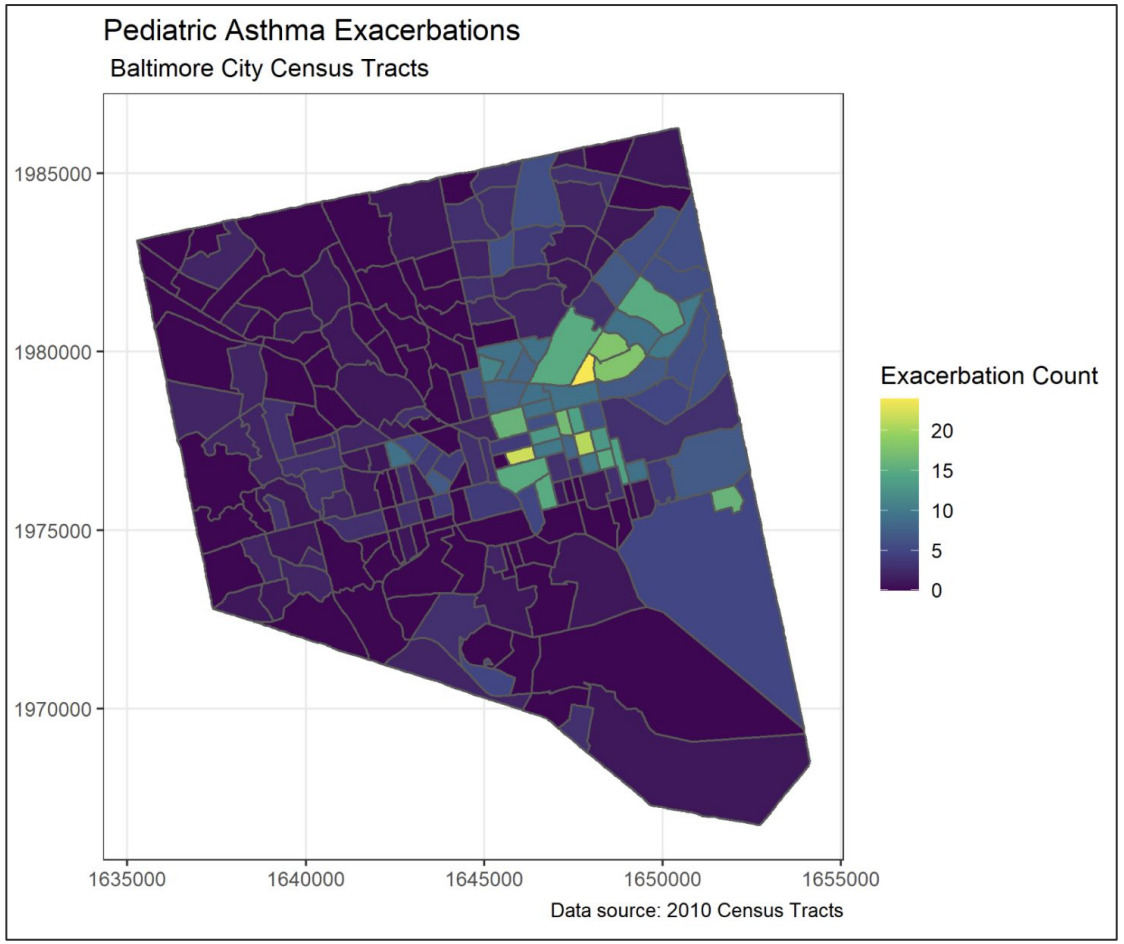
Census Block Group
Census Tract

NWS Temperature Data

Bianca Corpuz
(In Prep)

Integrating medical health records with environmental variables using a precision medicine platform

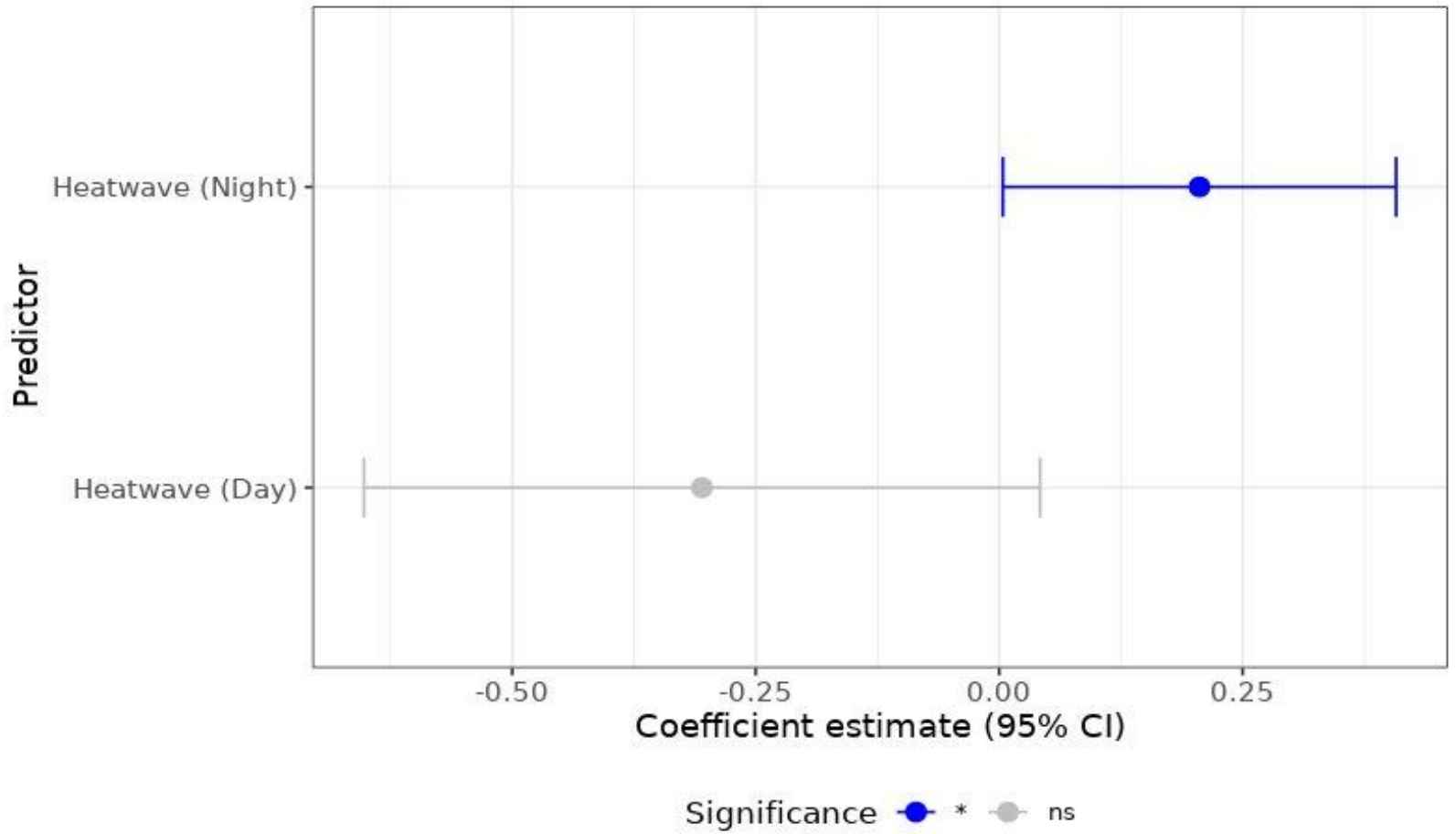




Integrating medical health records with environmental variables using a precision medicine platform

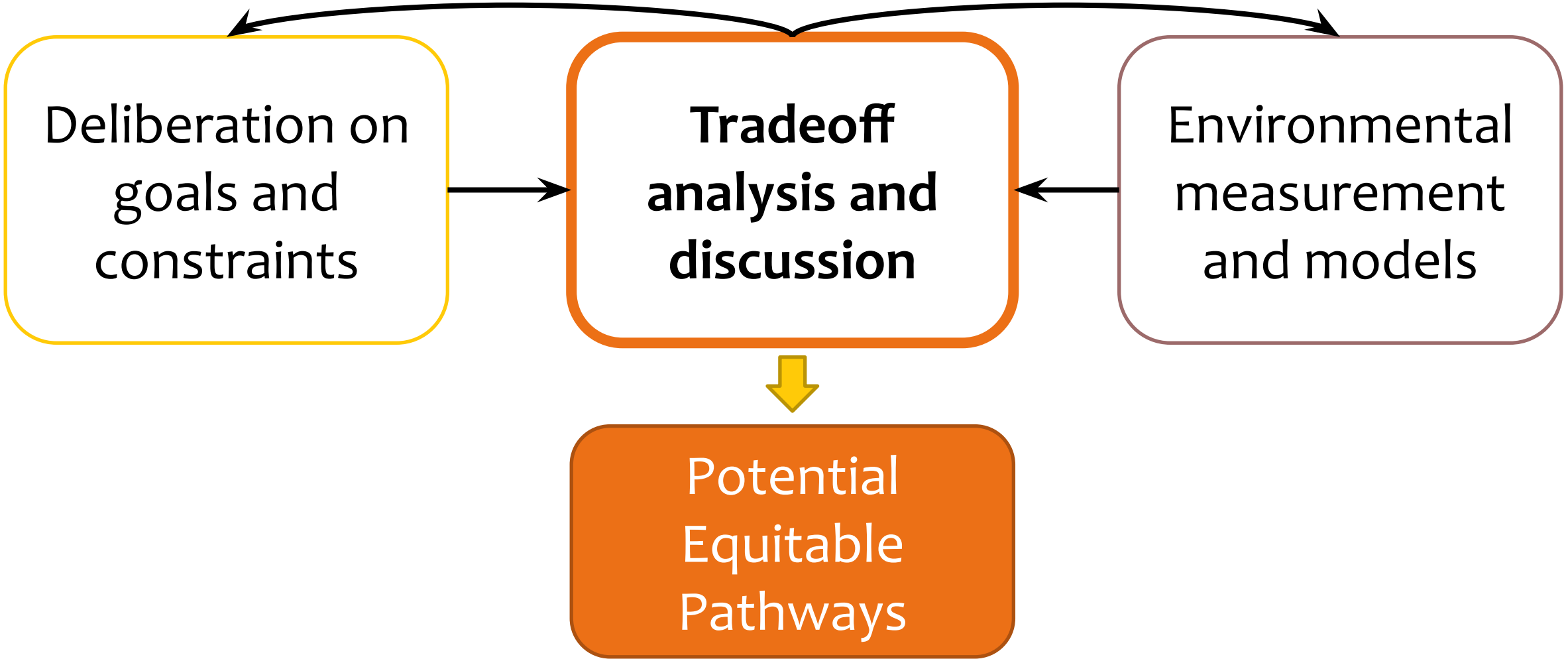
In pediatric patients, we find a higher risk of asthma exacerbations on warmer nights than on hot days

(when using 1m resolution air temperature estimates)



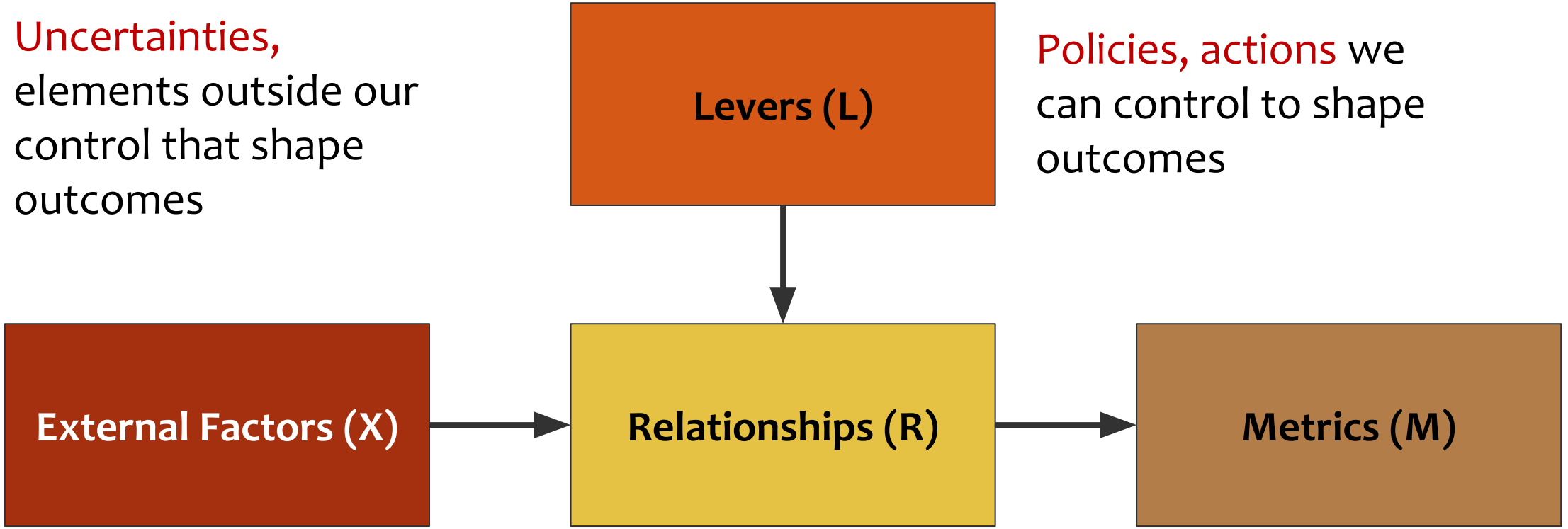
Bianca Corpuz
(In Prep)

The BSEC Process



Structuring a Multicriteria Problem

Uncertainties, elements outside our control that shape outcomes

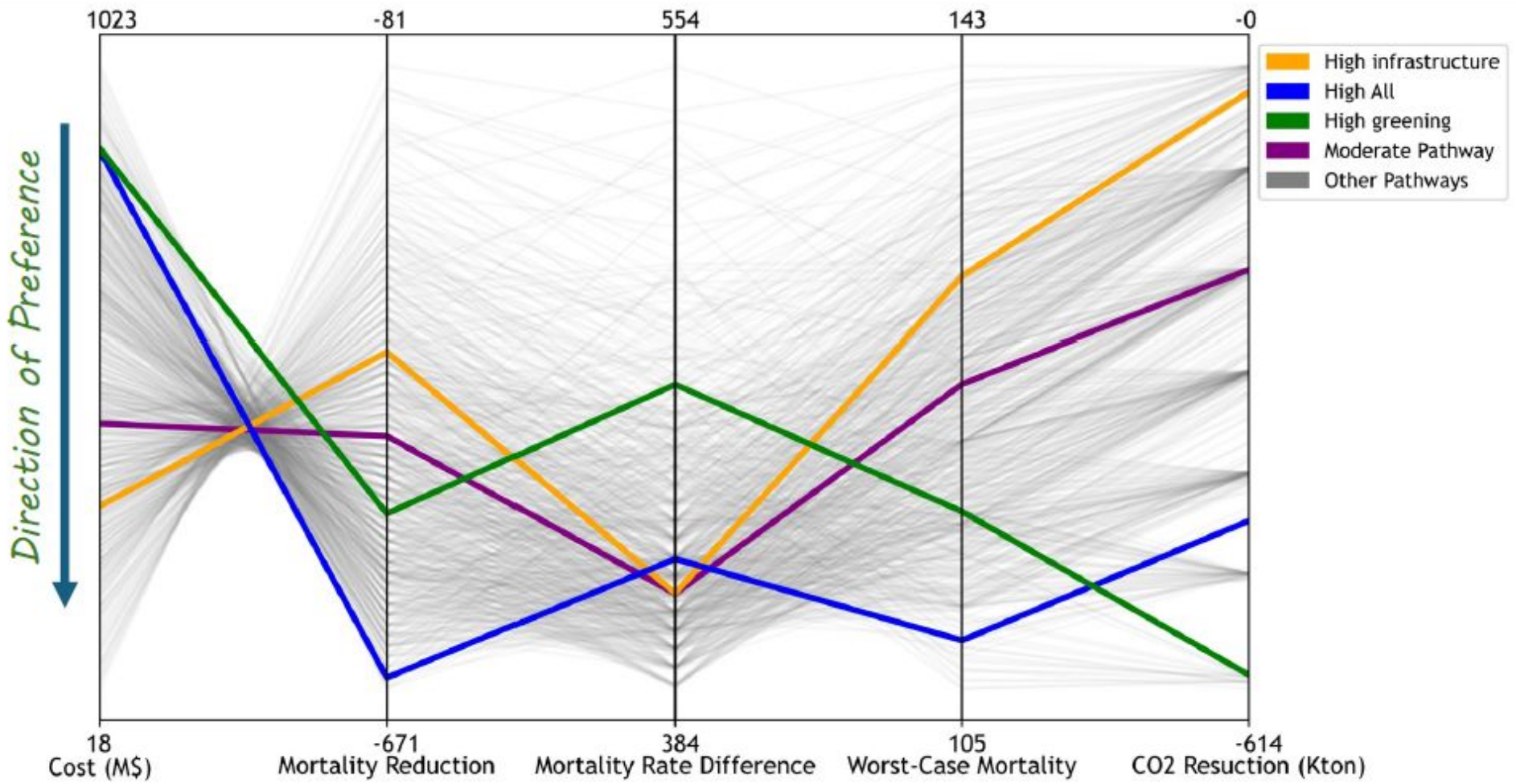


Policies, actions we can control to shape outcomes

Models that map X's, L's, and M's to each other

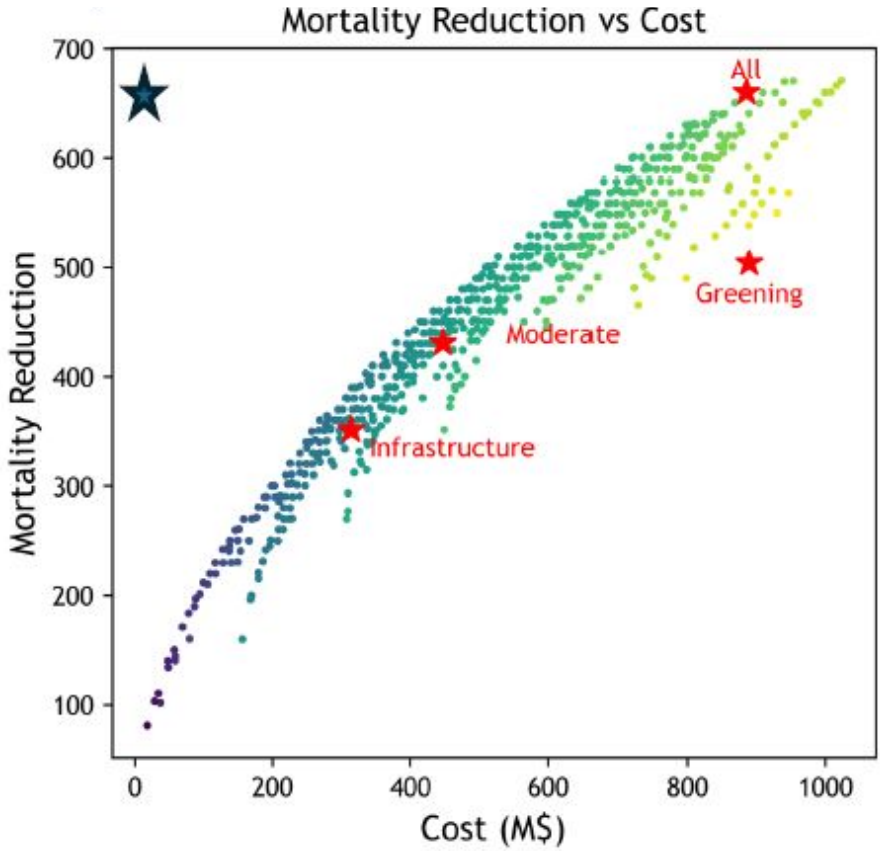
Goals and outcomes we care about

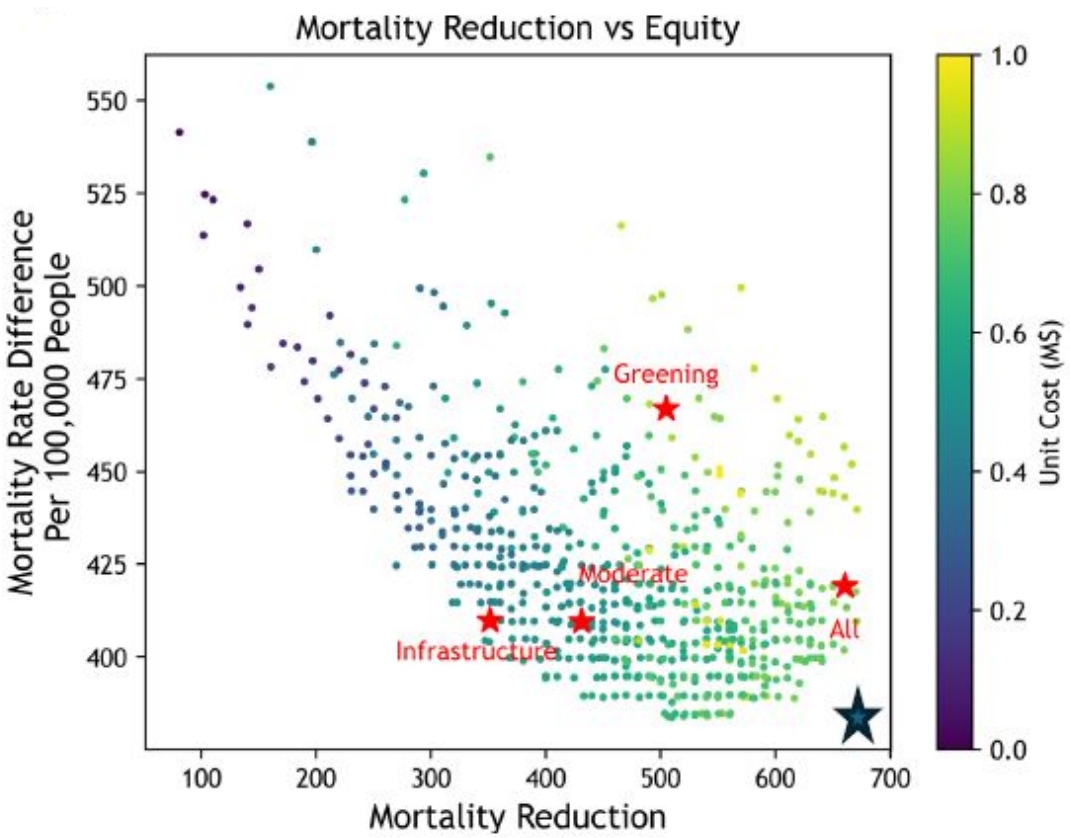
Extreme Heat Mitigation



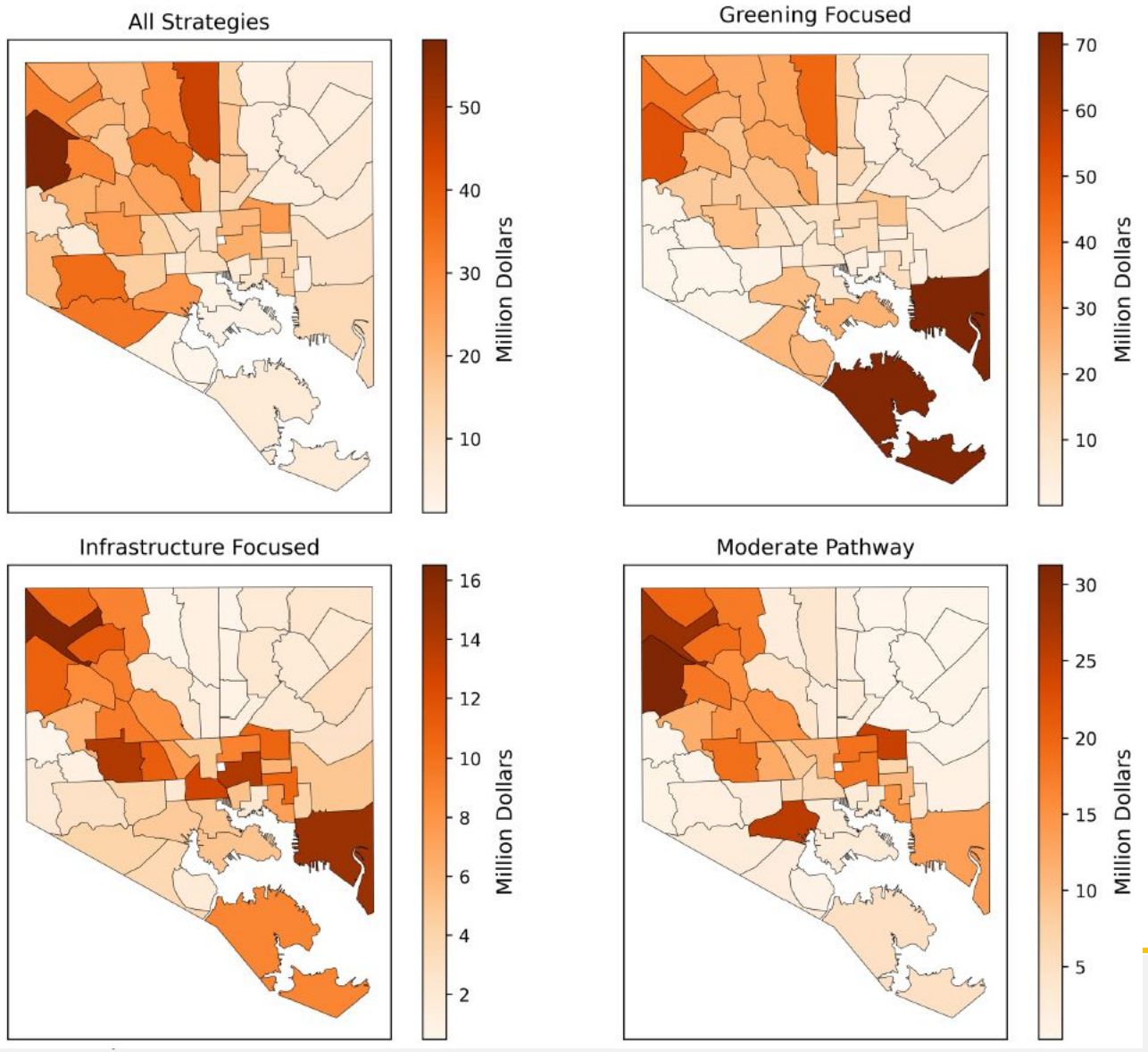
Eyni et al.
(In Review)

Extreme Heat Mitigation



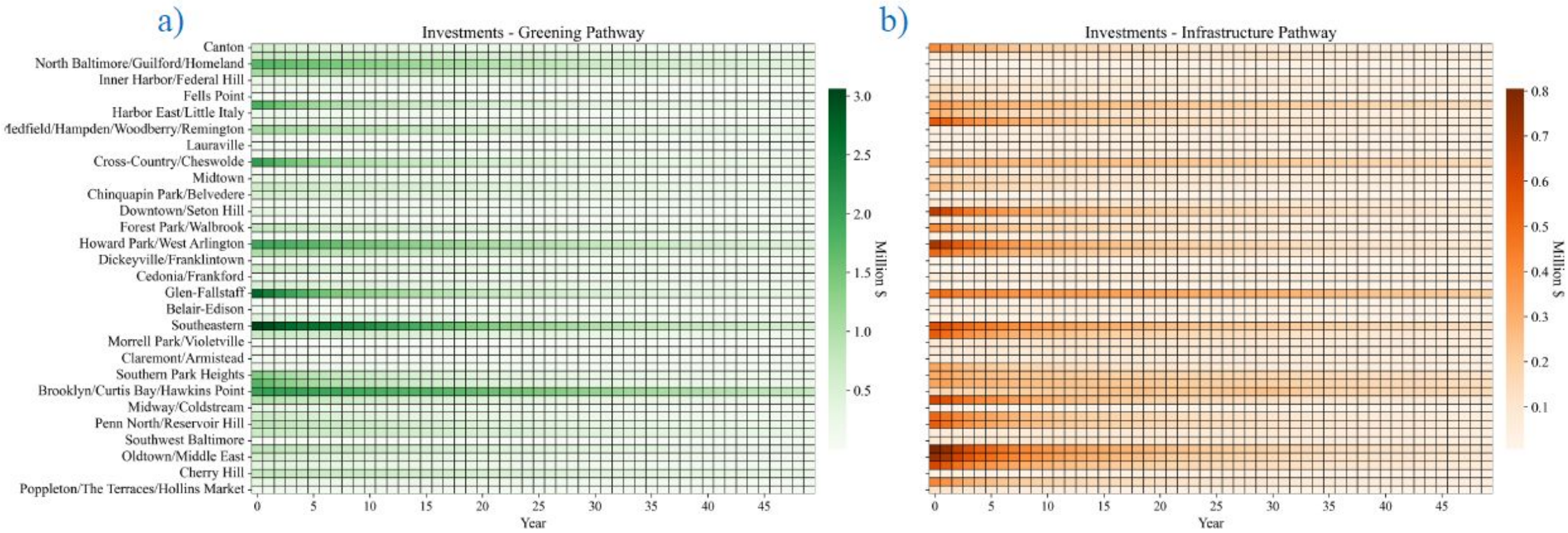


Extreme Heat Mitigation



Eyni et al.
(In Review)

Extreme Heat Mitigation



Coming Up!

BSEC

Annual Meeting

Community Engagement Focused Updates and Panel Discussions

https://21cc.jhu.edu/bsec/

- Understand how Baltimore experiences climate change, with a focus on partnering with Baltimore communities.
- Collaborate with communities to identify climate adaptation strategies that meet residents' needs, who may have insights that are novel to the researchers.

MEETING DETAILS

- Saturday, November 16, 2024
- 11am - 5pm
- Lovely Lane United Methodist Church
- 2200 Saint Paul St.

RSVP BY NOVEMBER 11TH

CONTACT US FOR MORE INFORMATION

Community Engagement Coordinator
khalia.young@morgan.edu

Thank you