

Break out group – Urban Warming, Air Pollution, and Infectious Disease

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What are the major areas of scientific consensus related to theme?

- Infectious Disease:
 - Climate and weather have definite impact on infectious diseases
 - Warmer air translating into bugger air is too simplistic; impacts of climate/ weather on infectious diseases is very complicated
 - Higher temperatures lead to
 - Faster replication rates for pathogens
 - More infection vectors survive winter

What are the major areas of scientific consensus related to theme? Con'd

- Air Pollution:
 - High temperatures promote the reactions that produce secondary pollutants
 - Climate change will make it harder to achieve future air quality goals on average (i.e., climate penalty); more definite for ozone than for other pollutants
 - Mitigation of climate change often results in reductions to health-relevant pollutants
 - Urban climate and air pollution mitigation actions can bring direct health benefits while reducing global climate impacts
 - Ozone is scavenged by local pollutants (e.g., nitrogen oxides); thus implementation of strategies to reduce local pollutants need to be paired with strategies for reducing ozone from surrounding areas to limit the ozone coming into cities
 - We know a lot about the health effects of air pollution; we also know much about the health effects of temperature; the direct impacts have been well-established, but not much on the combined effects or interactions between these and other air quality parameters

What are the major areas of scientific uncertainty related to theme?

- Infectious disease
 - Why West Nile Virus has not become as big a problem in south as the Midwest?
 - Not knowing *how* climate change will change infectious disease
 - Microclimates can vary at fine scales, complicating the study of zoonotic disease
 - In order to better predict and detect impacts of climate on infectious disease, need better surveillance systems; e.g.,
 - Mosquitoes (WNV)
 - Consumption of cold medicine; prescription fills (influenza)

What are the major areas of scientific uncertainty related to theme? Con't

- Air Pollution
 - We need a better understanding of the pros and cons of reducing air pollution balanced with impacts on local climate, and vice versa
 - Sulfates in air → cooling effect
 - Urban heat island effect increases vertical mixing (potentially reducing concentrations), but with adaptation measures we are trying to cool the surface which reduces vertical mixing (thus potentially increasing concentrations)
 - We lack climate, air quality, and health information at fine enough spatial scales for decision makers
 - We need ensembles of multiple air pollution models to better characterize uncertainties – this is the norm for climate modeling, not so much yet for AQ modeling
 - We lack understanding of how multiple atmospheric variables (e.g., humidity, heat, air pollution) may interact with one another to impact health
 - Understanding how our cities will change and develop in the next few decades
 - How can we use existing policies to address these challenges?
 - E.g., EPA using the clean air act to influence climate change, even though it was never intended to

What is the most essential information related to theme to be communicated to government officials?

- New emerging infectious diseases are likely to appear in the US in the near future because insect vectors for transmitting the disease are already present
- The distribution of the infectious disease vectors will change
- Climate change will make it harder to achieve air quality goals; thus, in planning for air quality improvement, climate change influences need to be taken into account
- Mitigating climate change can have co-benefits of reducing pollutants that impact human health; careful analyses are needed to quantify the benefits and disbenefits
- Actions taken to mitigate air pollutants can have co-benefits for reducing climate change