Emory-Georgia Tech AQAST Workshop: Translating Earth Science Products to Operations

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Atlanta, Georgia
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ROLLINS SCHOOL OF PUBLIC HEALTH
EMORY

Georgia Institute of Technology

AQAST
NASA Air Quality Applied Sciences Team

Agenda

1:30: Welcome & Introductions

1:40: Forecasting the air quality impacts of specific sources (Russell, GT)

2:00: Forecasting prescribed burns and their impacts: 2015 burn season in GA (Odman, GT)

2:20: Evaluating satellite based fire detection in GA (Liu, Emory)

2:40: Chemical reanalysis transition to operations (Hu, GT)

3:00: Break

3:15: Fire emissions inventories (Gillam, EPA Region 4)

3:30: Georgia wildland fire emissions (Tian, Georgia EPD)

3:45: Prescribed burning trends under changing climate (Liu, US Forest Service)

4:00: Discussion (Russell)

5:00: Reception

Welcome

- NASA Air Quality Applied Science Team (AQAST)
  - AQAST is a NASA Applied Sciences Team
    - Atmospheric scientists working in partnership with US air quality managers to exploit the power of Earth Science tools to address air quality issues.
  - Conduct a wide range of projects using satellite data, suborbital data, and models, and work with air quality agencies at the local, state, regional, and national level.
  - Eager to hear from air quality managers about new issues where we may help.
- GIT: Improving Operational Regional Air Quality Forecasting (Talat & Ted)
- Emory: Evaluation of satellite-based wild and prescribed fires products
- Tiger Teams: collaboration of several AQAST members pooling their expertise to address urgent needs from one or more air quality management partners
  - Chemical reanalysis transition to operations: Detailed species and source impacts (Yongtao)

Broader Research Portfolio

- Southeastern Center for Air Pollution and Epidemiology (SCAPE)
  - Emory – GT EPA Clean Air Research Center
- SESARM (SEMAP: Southeastern Modeling, Analysis, and Planning)
  - Emissions and air quality modeling
  - interstate transport
- NSF-PIRE: Low Carbon Cities
  - Studies in China, India, US
    - Taj Mahal (neat project… if time permits we can discuss)
- NSF-SRN: Healthy, Livable Cities
  - MSP, Atlanta, New York, Detroit
- HEI-Accountability
  - Impacts of regulations in Atlanta & the SE
- HEI-Dorm Room Inhalation and Vehicle Emissions (DRIVE) Hotspot
  - Impacts of living near/away from freeway
- ASACA
  - PM Characterization around Atlanta
- EPA – Reactive nitrogen in the environment
- EPA – Dynamic air quality management
- GA EPD – Air quality forecasting
- Phillips 66 – SOA mechanism improvement in CMAQ

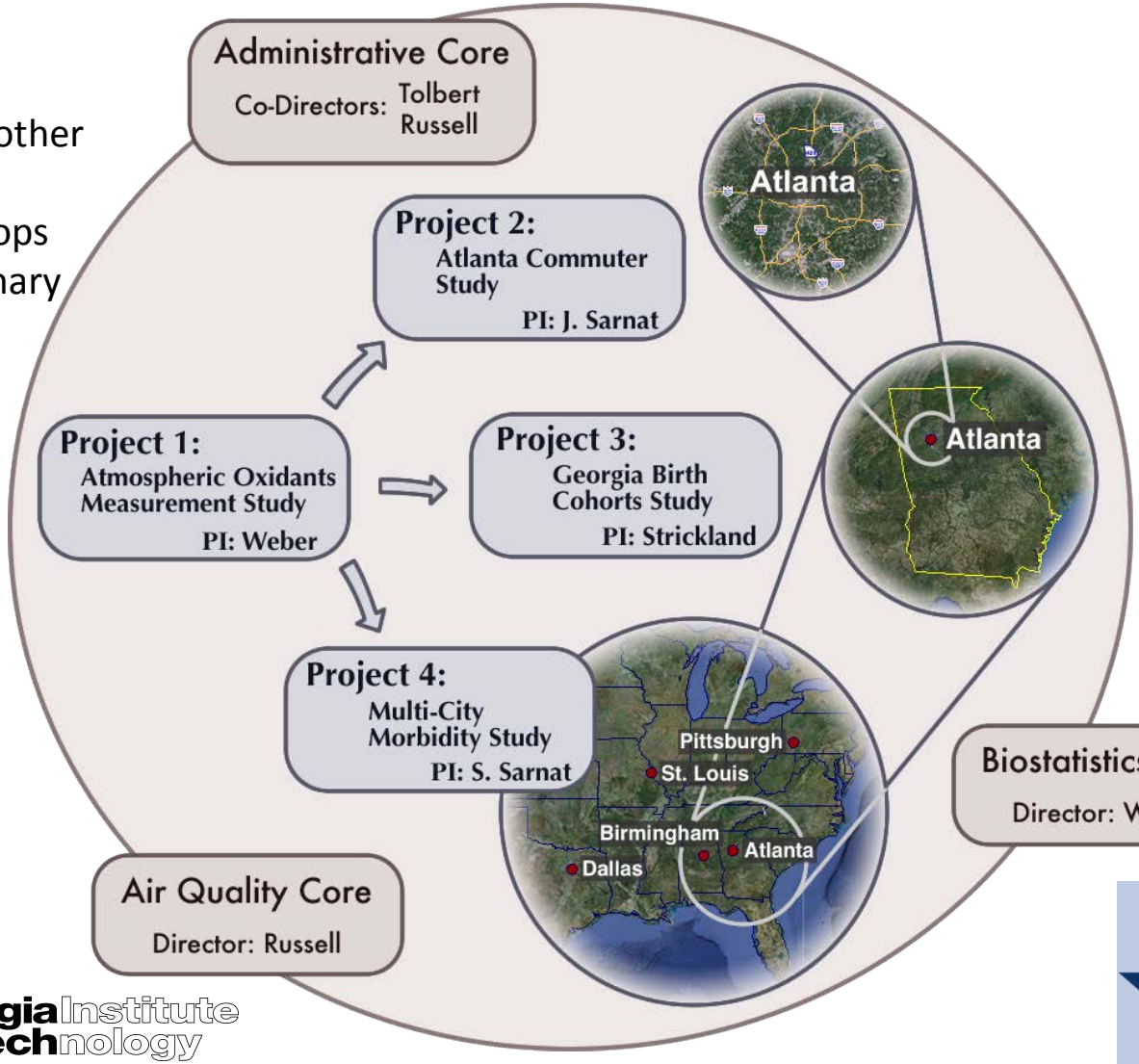
Southeastern Center for Air Pollution and Epidemiology (SCAPE)

Characterizing ambient air pollution mixtures and understanding their role in human health risks

Co-Directors: Paige Tolbert, Emory, and Armistead (Ted) Russell, Georgia Tech

Key Features:

- Children and other vulnerable/ susceptible pops
- Trans-disciplinary
- Multi-scale



Four Perspectives:

- Mechanistic
- Evidence-based
- Environmental management
- Empirical

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Objective

- Inform regional stakeholders of AQAST projects at GT and Emory
- Seek ways in which we can use our increasing capabilities to further improve and inform air quality management activities
  - Teaming
- Act as a convener for identifying needed research and discussing how research can be used to help regional air quality improvement activities

Ford ES&T Building

- Part of the GT Interdisciplinary Quad
  - Planned around broad research themes
  - Parts of multiple departments in each building
- Air quality labs on 2nd, 3rd and 4th floors
    - Great view of Atlanta from the platform

Soiling of the Taj Mahal

- Air pollution suspected of leading to premature soiling of the Taj Mahal
  - Soil, brown carbon
- Clean up requires special, expensive, techniques
- Sources not well understood
  - Needed to identify controls
- Approach
  - Sample air quality
  - Assess pollutant optical properties
    - Scanning Electron microscopy
  - Evaluate results

Results- Modeled color

Color from dust (59%)

AOD=0.22

Color from BrC (38%)

AOD=0.14

Color from BC (3%)

AOD=0.016

Color from dust, BrC, BC (100%)

AOD=0.37

Response: Within one month prohibited burning dung

Is this the correct response?

Municipal Solid Waste (MSW) Burning in India

- Waste burning is prevalent in India
  - Potentially elevated health impacts
    - In populated areas
    - Ground level, relatively less buoyant
    - Potentially more toxic emissions
      - Chlorinated organics
  - Welfare effects as well
    - Visibility
    - Soiling

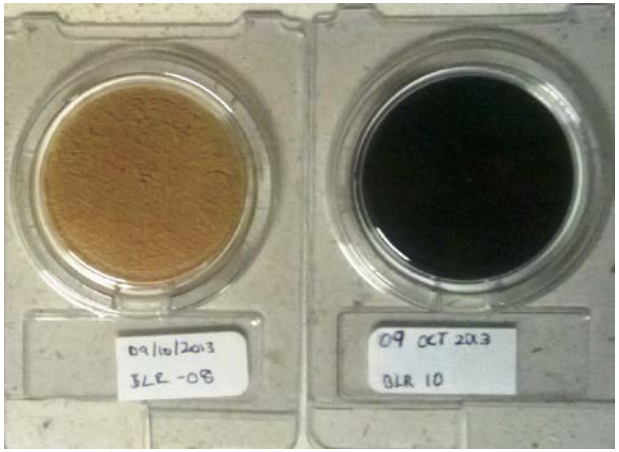
- Some waste has economic value
- Some areas have services to remove waste
- Can we motivate an intervention (waste collection and efficient disposal) that will lead to improved health and reduced environmental damage?
  - Agra, India, but applicable elsewhere

Multidisciplinary Approach

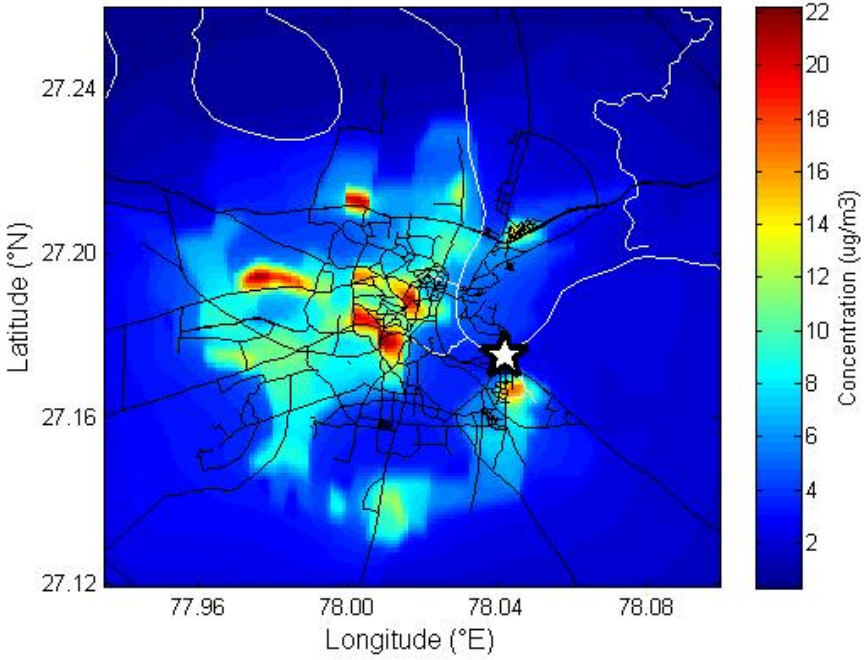
- Social actors study
  - Prevalence of waste burning
  - Survey of social institutions
- Air quality impacts
  - Measurements
  - Air quality modeling
- Health
- Welfare and Environment

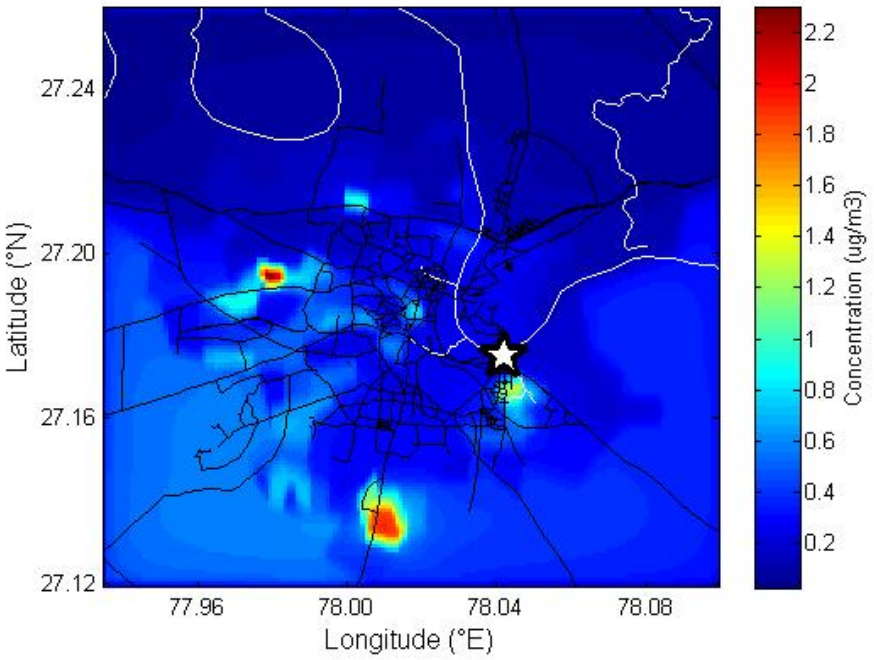
NAE Bridge Article

Waste Burning Emissions



Air Quality Modeling of MSW and Dung Cake Organic Matter in Agra, India





MSW burning has a larger impact than Dung Cake:
Organic Matter at the Taj Mahal: 3.6 μg m^{-3} vs. 0.27 μg m^{-3}