

Workshop on a Pilot Design for Air Quality in Africa *(Focused on Addis Ababa, Ethiopia)*

Co-chairs

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Belay Demoz: University of Maryland Baltimore County



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UCAR



ASU
Arizona State
University

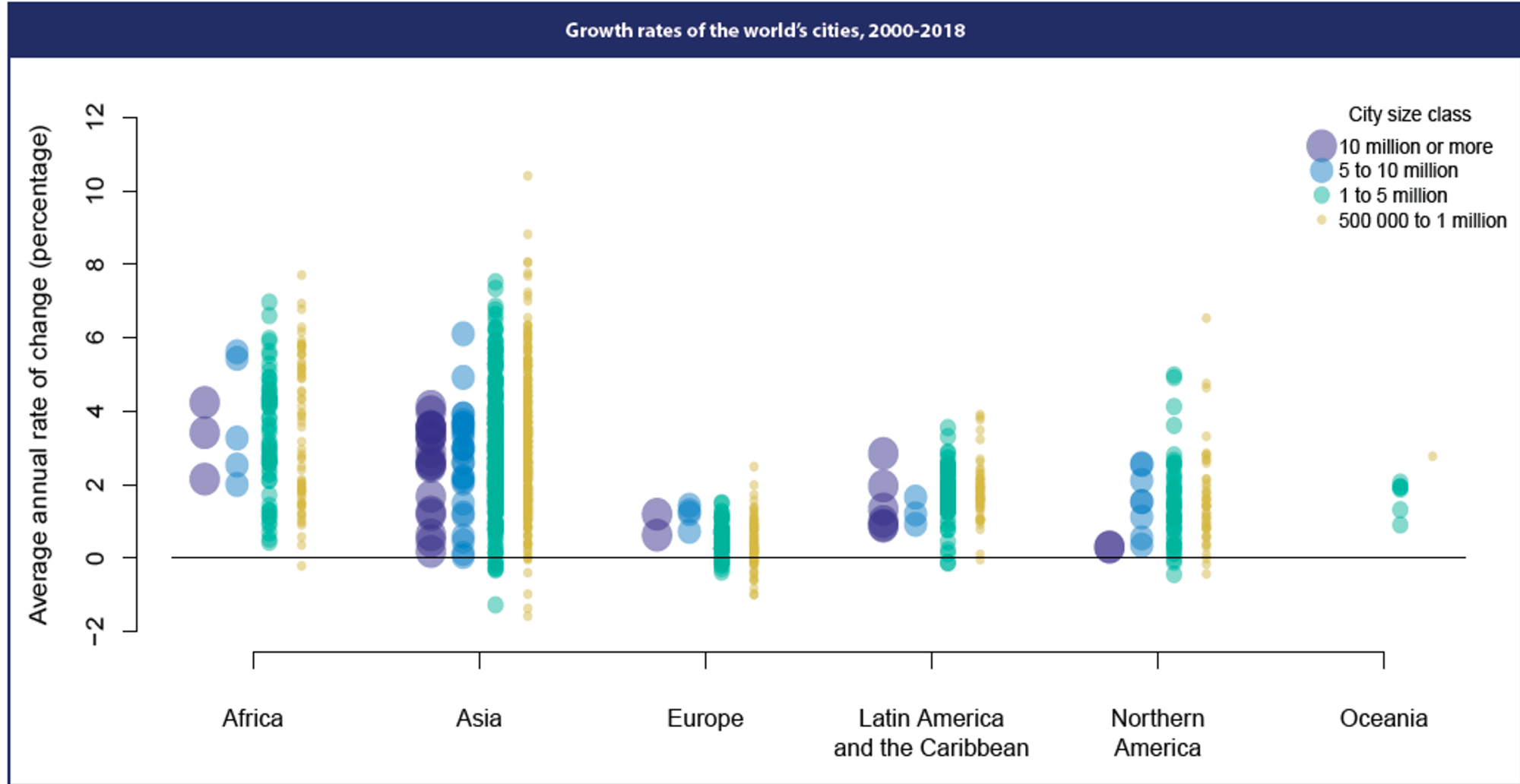
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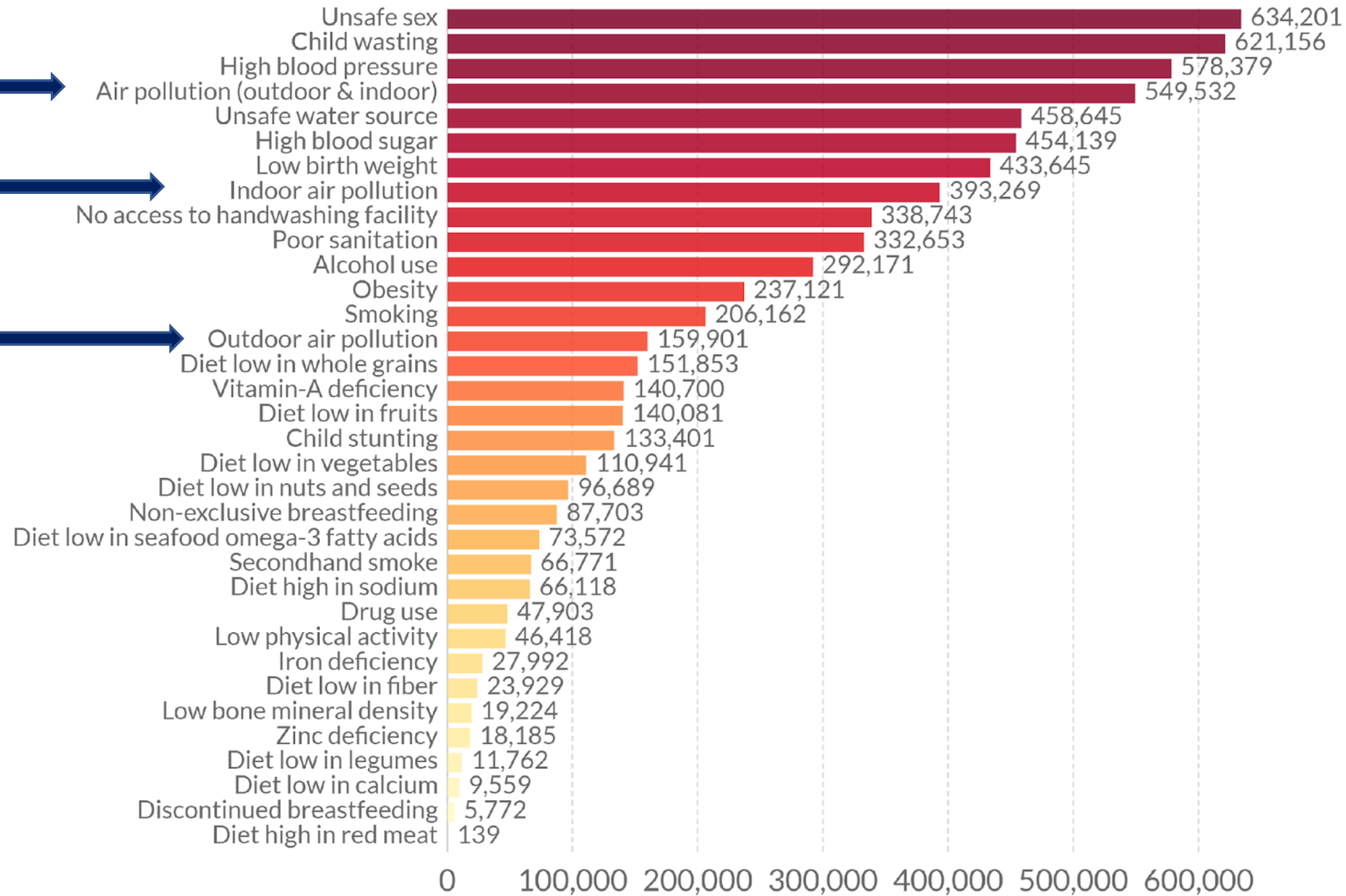
Most of the world's fastest growing cities are in Asia and Africa





Number of deaths by risk factor, Sub-Saharan Africa, 2017

Total annual number of deaths by risk factor, measured across all age groups and both sexes.



Source: IHME, Global Burden of Disease (GBD)

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Do we know all the chemistry?

What are the unique reactive volatile organic compounds (VOCs) their sources and their influence on O_3 -NO_x-VOC-PM chemistry that is different from well-studied regions of the world?

For example, rich mixture of sources of pollutants: natural sources with Sahelian and Saharan dust emissions combine with anthropogenic sources including biomass, waste and animal dung burning, traffic, industry, residential cooking, etc. is unlike mid-latitude sources in Europe and US

Is there novel aerosol chemistry in African megacities?

- What are the meteorological controls on SOA formation in Addis Ababa?
- Aerosol aging of both suspended dust and biomass smoke can be significant. How does this affect the gas-phase chemistry?



Genesis- ACCORD 2015 WORKSHOP-

- REPORT FROM ATMOSPHERIC CHEMISTRY CENTER FOR OBSERVATIONAL RESEARCH AND DATA (ACCORD) WORKSHOP

- March 30, 31 and April 1, 2015

- Activity 9: Field campaign associated with an African megacity heavily polluted/tropical forest**

- “The leaders identified below would be responsible for keeping abreast of work going on in the community, and of developing partnerships and opportunities. The Megacity to be studied remains TBD.”

- Potential Leaders: Christine Wiedinmyer, Vernon Morris, Solomon Bililign**

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- Tasks: Maintain awareness of NASA and UK-based activities, and coordinate with these folks on potential future activities

- Potential Role for ACOM:** chemical measurements; modeling; forecasting; logistical support (EOL)

Subsequent Efforts 2015 - 2021

2018: Attempted to convene a meeting at AGU - No one showed up!!

October 2019: Dr. Everette Joseph helped organize a meeting of Drs. Vernon Morris, Belay Demoz and Solomon Bililign with NCAR-ACOM-members in Boulder

Dec. 2019- Meeting with several interested groups at AGU to discuss a proposal for a workshop

January 2020- Bililign –organized a meeting in Addis Ababa Ethiopia with potential stake holders, city government leaders and University faculty.

February 2020- Proposal submitted to NSF

March 2020- NSF funded the proposal to UCAR/CPAESS – Thanks to Claudia Rankins and Brandon Jones

Goals- Short term- (6 months to 1 year)

- Define methods to quantify the current state of air quality and future trends in emissions from Addis Ababa and understand their impacts on atmospheric composition and chemistry over multiple scales, from local to global
- Identify the observational and modeling requirements for a rigorous experimental design which enables addressing the research questions.
- **A Follow up meeting in Addis Ababa (Ethiopia) in January 2022** to coordinate activities with all groups working on Air Quality research in Addis Ababa and local universities to develop a platform for sharing experience and data, training of local expertise, and to design experiments.
- Creation of “African Megacities Research and Advocacy in Atmosphere Sciences (AMRAAS)” to **coordinate activities with all (close to 20) groups working in Addis Ababa**
- Write a short BAMS paper of the efforts that are ongoing
- Identify funding sources and organize a working group for developing proposals.

Goals –Midterm (1 year-3 years)

- Working with the local universities in particular Addis Ababa Science and Technology University and Addis Ababa University to deploy ground based stationary and mobile advanced instrumentation and train personnel to collect point source and other emission data.
- Collect Canister samples from Addis Ababa and conduct chemical analysis using the labs at NOAA and NCAR
- Explore for satellite-based data and training session with local stakeholders
- Identify a proxy city with similar emission sources in East Africa for a field campaign if situations in Addis Ababa do not permit.

Goals- long term- 3 to 5 years

**Conduct a comprehensive
Atmospheric Chemistry
campaign in Addis Ababa!**