

The HAQAST Indicators Tiger Team: Using satellite remote sensing to track air quality and climate change effects

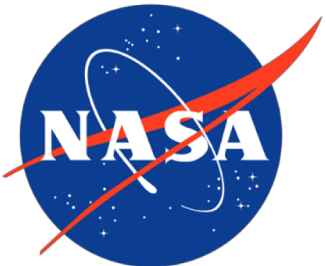
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George Washington University Milken Institute School of Public Health

NASA Health and Air Quality Applied Science Team 5

Phoenix, AZ

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Motivation and objectives

- Several high profile efforts to track pollution, climate change, and health indicators globally, with annual or biennial updates.
 - “The incorporation of new technologies, such as satellite imaging and data mining, into pollution monitoring can increase efficiency, expand geographic range, and lower costs.”
 - Lancet Commission on Pollution and Health, 2017
- Tiger Team initiates new collaborations between HAQAST members and these stakeholders with the aim of developing satellite-derived air pollution and climate indicators at the global scale.
- Specifically, using satellite remote sensing to:
 - 1) Transfer knowledge and global-scale datasets tracking indicators for ozone and NO₂ concentration, PM_{2.5} and ozone disease burden in cities, and wildfire occurrence;
 - 2) Scope the potential for using satellite remote sensing to track global airborne dust storms and pollen season start date and duration.
- Key goal: satellite-derived indicator datasets are incorporated into the materials developed by each of the stakeholders.

Stakeholders



Nick Watts



Phil Landrigan, Richard Fuller



Katy Walker



Iyad Kheirbek



Ananya Roy



Juan Castillo



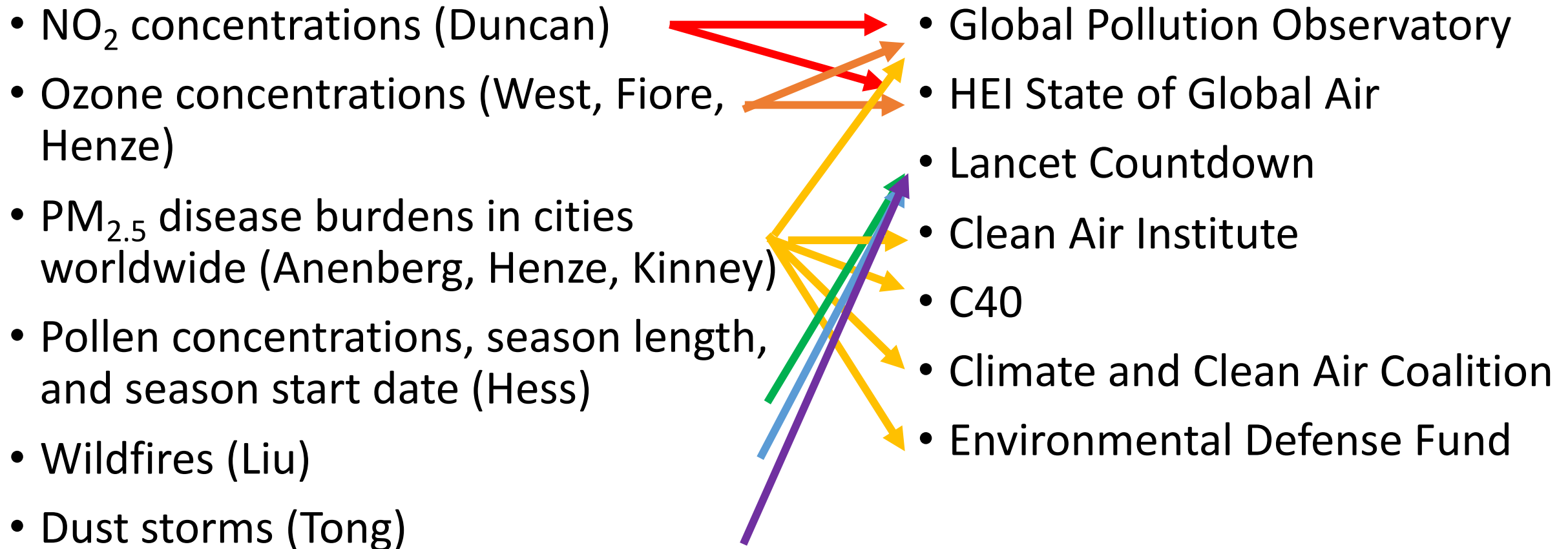
Sandra Cavalieri

Indicators

Stages: 1=scoping phase
2=some development required
3=ready with minimal reformatting

Indicator	Stage	HAQAST Investigators	Data/methods
Ozone concentration	2	Daven Henze, Jason West, Arlene Fiore	Model + monitor ozone concentrations developed by West under HAQAST core project, plus exploratory effort to incorporate data assimilation of satellite observations (OMI NO ₂ and SO ₂)
NO₂ concentration	3	Bryan Duncan	OMI NO ₂ column concentrations + GEOS5 and GEOS-Chem; vertical profiles; DOMINO NO ₂ for comparison; finer resolution TROPOMI data
PM_{2.5} burden of disease in cities	2	Susan Anenberg, Pat Kinney, Daven Henze	Estimate gridded Global Burden of Disease 2016 PM _{2.5} and ozone mortality burdens (using satellite-derived concentrations for PM _{2.5}), then sum gridcell totals within boundaries of cities worldwide
Wildfire occurrence	3	Yang Liu	NASA GEOS5+data assimilation; Processing and spatial matching of MODIS and VIIRS active fire products on a grid or by political boundaries defined by stakeholders
Pollen season start date and/or duration	1	Jeremy Hess	MODIS-derived greenup dates and Normalized Difference Vegetation Index (NDVI) metrics associated with season duration
Dust storms	2	Daniel Tong	Ground data (1990-present); MODIS dust optical depth estimated from AOD and particle size (2002-present)

Organizing ourselves: Which indicators for which stakeholders?



Progress to date

- August 2018: Tiger team launched
 - October 1, 2018: Launched webpage (www.haqastindicators.org)
 - October 16, 2018: First full team telecon
 - November 20, 2018: Investigator telecon
 - December 12, 2018: Investigator meeting at AGU
 - January 3-4, 2019: HAQAST5
 - January 15, 2019: Investigator telecon
 - February 2019: Second full team telecon
 - April 2019: Potential in-person meeting in DC
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- Added stakeholders: Clean Air Institute, C40, Climate and Clean Air Coalition, EDF
 - Spin off with GPO and NASA on global air pollution visualizations
 - Spin off with Anenberg, Duncan on NO₂ and global asthma impacts
 - Spin off with Anenberg, Kinney, Henze, and C40 on city burden of disease
 - Spin off with Duncan, Anenberg, and NASA on public communications
 - Spin off with Hess, Liu, Tong, and Lancet Countdown on wildfires and dust
 - Spin offs with West, Duncan, and HEI, EDF on ozone and NO₂

www.haqastindicators.org



Tiger Team: Using Satellite Remote Sensing to Derive Global Climate and Air Pollution Indicators

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Tiger Team launched!

The HAQAST Indicators Tiger Team kicked off on October 16, 2018, with a full team telecon. We heard presentations from the three original stakeholder participants ...