National Aeroallergen Monitoring and Tracking Network: Potential Collaboration: CDC, NASA, NAB, and NOAA

Pius Lee¹ and Daniel Tong¹,²,³ with contribution from Jeremy Hess⁴, Fiona Lo⁴, and Amir Sapkota⁵

¹Air Resources Lab., NOAA Center for Weather and Climate Prediction, College Park, MD
²Cooperative Institute for Climate and Satellite, U. of Maryland, College Park, MD
³Center for Spatial Information Science and Systems, George Mason University, Fairfax, VA
⁴Dep. Environmental and Occupational Health Sciences, U. of Washington, Seattle, WA
⁵Maryland Institute for Applied Environmental Health, U. of Maryland, College Park, MD
a) Maize
b) Juniper
c) Birch
d) Grass

a) Cedar
b) Oak
c) birch
d) poplar

a) Poplar
b) Dandelion
c) Oak
d) Cedar

a) Aster
b) Juniper
c) Mulberry
d) cedar
2012-2017 Tree Pollen Volume vs Average Daily Average for Weekly Periods

Grains per Cubic Meter

Jan | Feb | Mar | Apr | May | Jun

0  200  400  600  800  1000  1200  1400

AVG 2012 2013 2014 2015 2016 2017

NOAA/ARL recognizes the need for an aeroallergen monitoring network (AMN):
- Focusing first on pollen;
- Health community’s long term support is needed for establishment & sustainability;
- Measurements are prerequisite for a credible forecasting system;
- Measurements should be resolved by pollen species, size, location and time;
- Automation of the National Allergy Bureau’s microscopic sampling is needed;
- NADP could potentially house the AMN data for easy accessibility;
- The NAPD ‘s few hundred sites below could be candidate AMN stations:
Leverage satellite observations to aid pollen forecast

Urban to Regional scale weather/climate prediction
- Temperature, wind,
- Precipitation, etc.

Soil/moisture
- Landsat 30m data
- SMOPS soil moisture
- STATSGO 1km soil
- Burn scar

Pollen prediction
- Phenology
- Emission
- Transport
- Deposition

Vegetation canopy
- Enhance Veg index
- NDVI
- Leaf area index
- IGBP
- Green veg fraction

Epidemiology and exposure response projection
- Asthma morbidity, etc.

Air Resources Lab, NOAA for HAQAST 2, Feb 27 2017
A handful of meteorological fields such as Precip, soil moisture, Wind and rh ... governs onset and severity of pollen emission.

NOAA Climate Prediction Center (CPC) forecasts seasonal meteorology for 2017 and 2018

CPC forecasts sfc seasonal temperature anomaly in °F w.r.t 1980-2010 average
HAQAST Ozone-pollen Surface Concentration

Healthy Air Forecasting and Reanalysis

Forecasting

Reanalysis

Ozone (O<sub>3</sub>)
NO<sub>2</sub>, SO<sub>2</sub>, and CO
PM<sub>2.5</sub>
PM<sub>2.5</sub> Components
PM<sub>10</sub>
Deposition

Map of Surface Ozone:

- animated (unit: ppbV)

Map of max(O<sub>3</sub>) (unit: ppbV)

Can be hosted?

Disclaimer:
These data are research products generated with support from NASA Health and Air Quality Applied Science Team (HAQAST) Initiative.
SUMMARY

- CDC, NBA, NOAA and other institutions ... establish a National Pollen Monitoring Network
- Monitoring is a prerequisite to substantiating research and service
- Network Sustainability: Continue interest, automation and leveraging existing networks
- Data archiving and dissemination: Partnerships with operational centers
- Achievable goal (e.g., TT): Seasonal forecast for onset and severity of pollen emission
  - National Weather Service Climate Prediction Center provides a wealth of data
  - Retrospective studies to quantify the performance of the approach using NAB obs, ..., etc