



ASPEN
FIRE







Regional Variability of Ozone in the Northeast United States Associated Circulation Anomalies & Climate Teleconnections

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NOAA CPA Workshop
Tucson, AZ
March 22, 2006



NEISA: Rationale, Progress, & Future Plans

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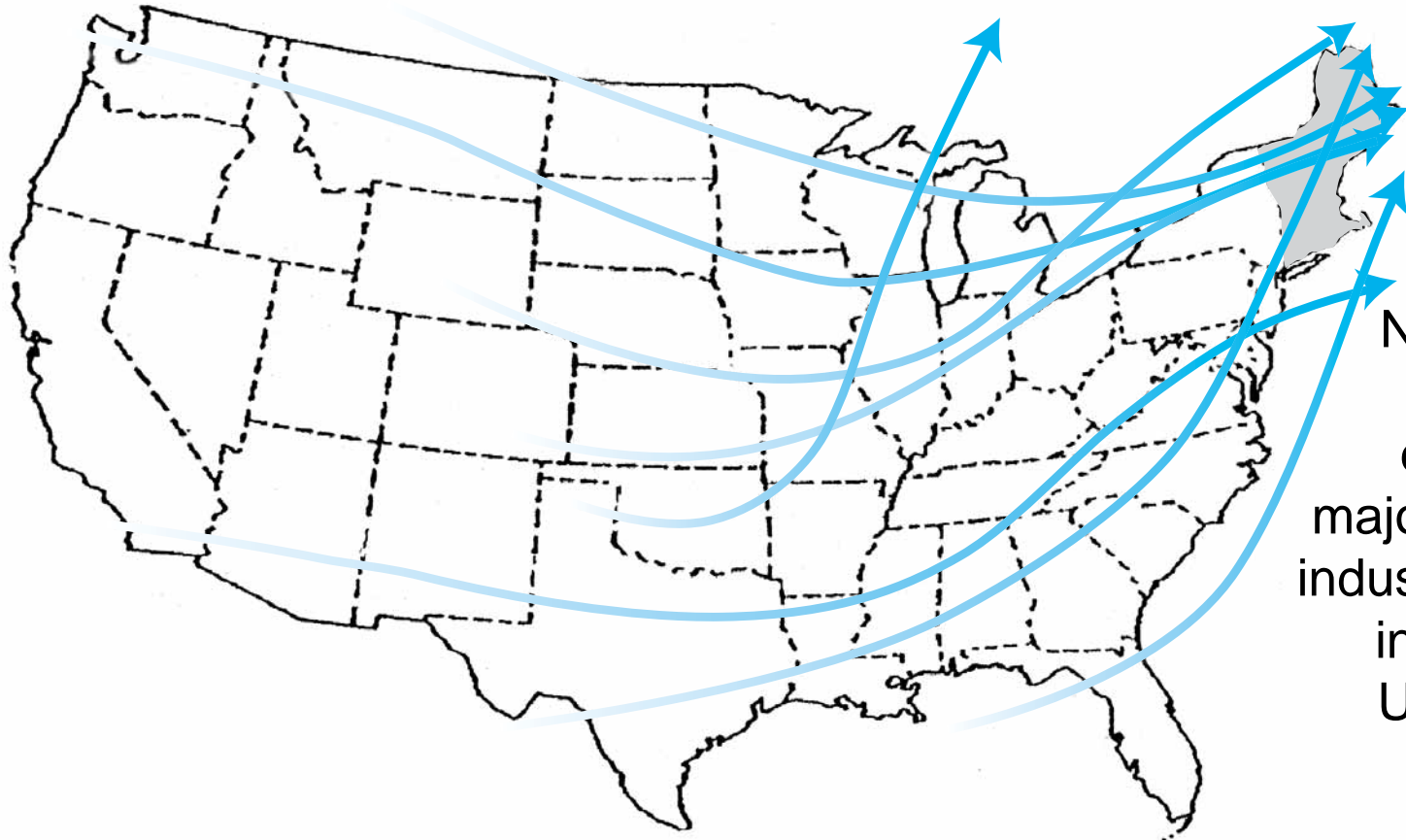
Why NEISA?



- New England has lots of problems



Why Air Quality in New England?



New England lies directly downwind of major urban and industrial centers in the eastern United States

Effects of Exposure to O₃/PM_{2.5}

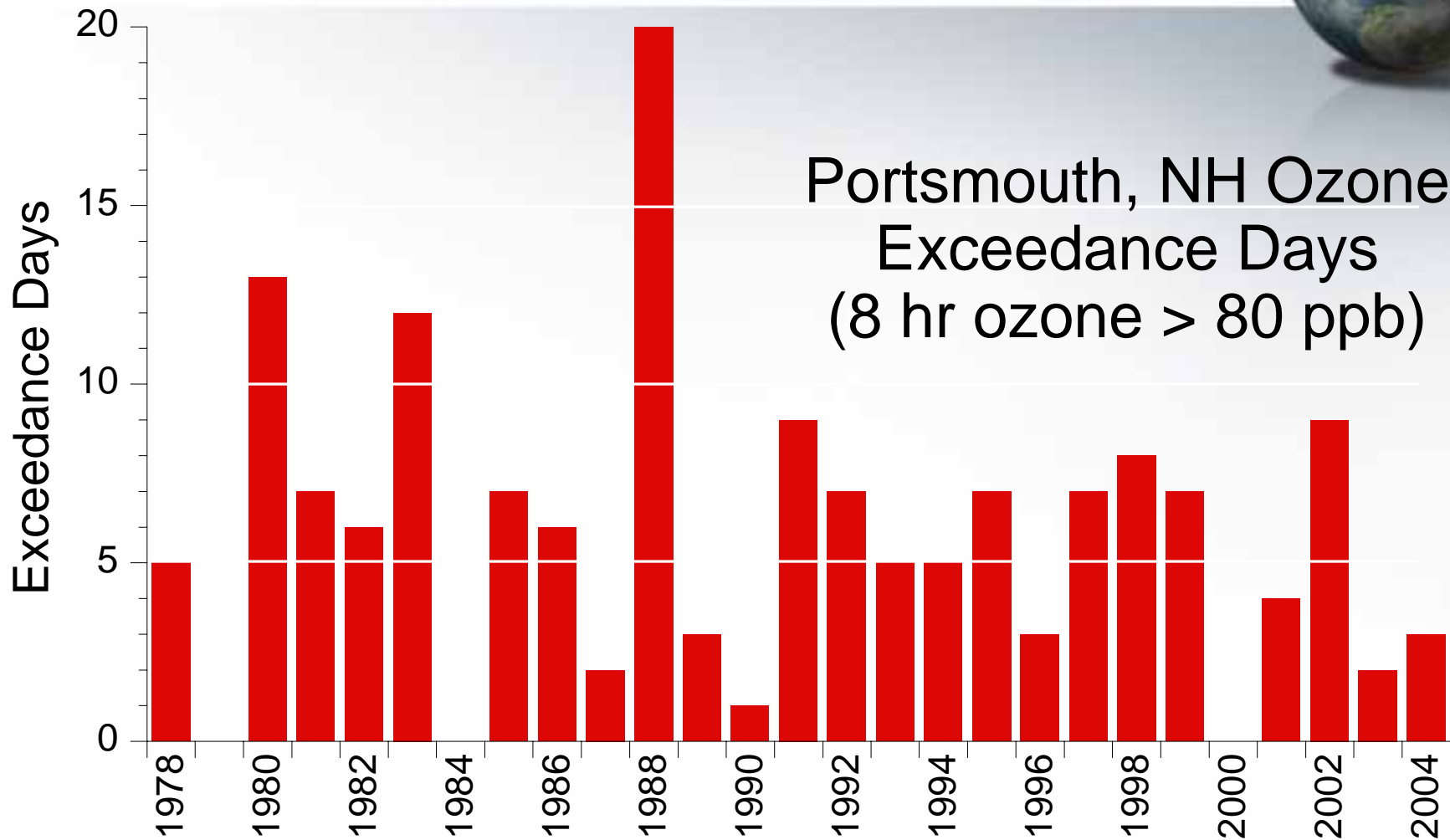


Ozone

- coughing
- nose and throat irritation
- chest pain
- reduced lung function
- increased susceptibility to respiratory illness
- aggravation of asthma
- children and people with chronic lung disease are particularly at risk

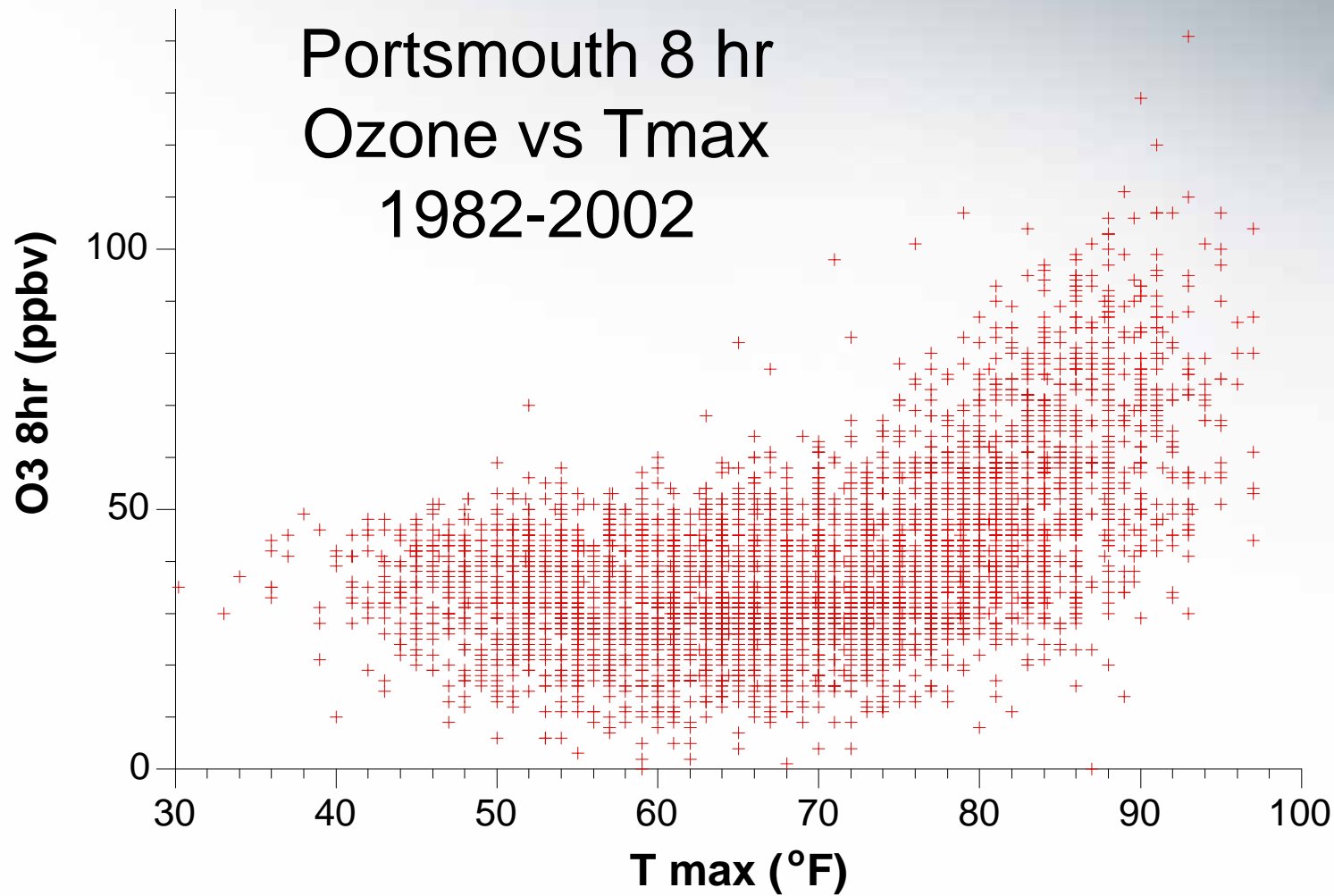
PM_{2.5}

- increased risk of cardiac arrest and premature death
- aggravation of asthma
- respiratory related hospital visits
- reduced lung function and chronic bronchitis
- work and school absences
- children, people with chronic lung disease are particularly at risk





Portsmouth 8 hr Ozone vs Tmax 1982-2002



NEISA Objectives



Support efforts to improve public health in New England by:

- improving our understanding of the link among climate, air quality, and human health
- estimating the health care and other economic costs associated with poor air quality
- developing and modeling strategies for predicting, communicating, and adapting to poor air quality events



NEISA Partners

Internal: UNH Departments and Institutes

AIRMAP - Institute for the Study of Earth, Oceans and Space

UNH Office of Sustainability

NH State Climate Office

Whittemore School of Business and Economics

School of Health and Human Services

New Hampshire Institute for Health Policy

New Hampshire Health Information Center

UNH Cooperative Extension

Academic: Other Universities

Northeast Regional Climate Center, Cornell University

Harvard School of Public Health

Columbia School of Public Health

Graduate School of Oceanography, University of Rhode Island



NEISA Stakeholders

Governmental Organizations

NH Dept. of Environmental Services (DEP) & Dept. Health and Human Services (HHS)

Vermont DEP and HHS

Maine DEP and Bureau of Health

EPA Region 1

NOAA

Non - Governmental Organizations

Lung Association (NH, Maine, New Brunswick)

Maine Thoracic Society

Asthma Regional Council (ARC) of New England

Exeter, Portsmouth and Wentworth Douglas Hospitals (NH)

NH Community Health Access Network

Dartmouth Hitchcock and Penobscot Bay Medical Center

John Snow Institute

New England Society of Allergists (NESAs)

Stakeholder Identification & Influence



Evolution of the Learning Community

- Stakeholders identified by networks of individuals already engaged in learning community
- Most influential stakeholders are those that share integrated assessment approach/philosophy, and manage boundaries with “networking” outlook
- NEISA working with “early adopters” from multiple sectors

NEISA Stories

Fall rise in demand for hospital services

Pulmonary function study (2004)

Illness cost of air pollution (ICAP)

Climate/Air Quality links





Project Summary:

UNH-led air quality and climate program unraveling fundamental chemistry-climate connections in the rural atmosphere of New England that is situated directly downwind of major urban/industrialized emissions.

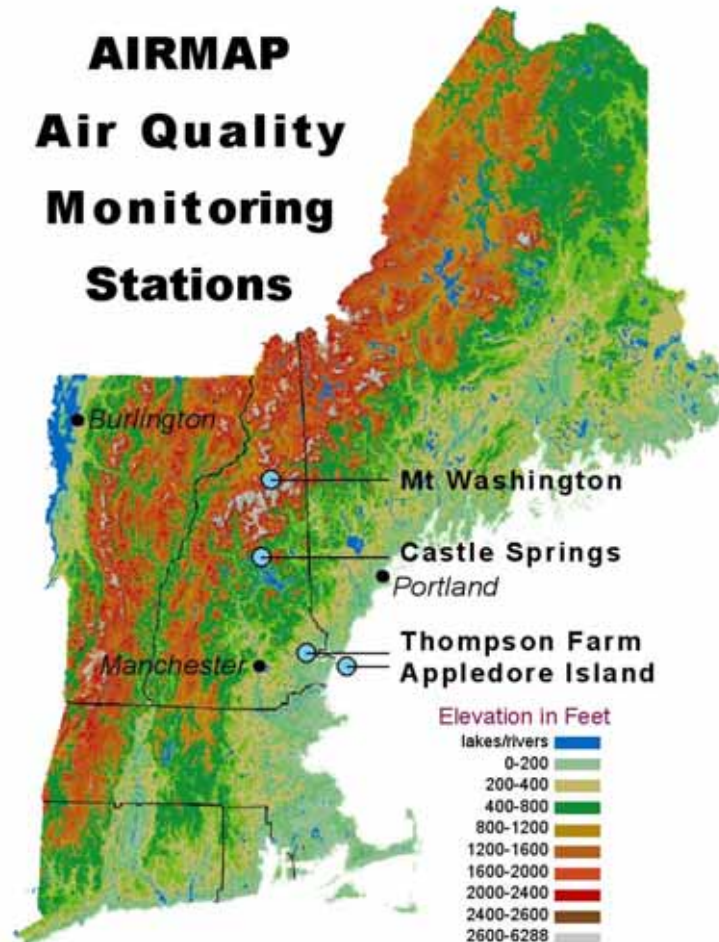
Research Goals:

- Document and analyze trends in the regional air quality of New England
- Delineate regional climate and air quality connections in the Northeast (especially those related to the biosphere)
- Quantify the relationship of regional air quality in New England to intercontinental transport of North American outflow over the Atlantic.

AIRMAP AQ Monitoring Sites



AIRMAP Air Quality Monitoring Stations



Ozone Climatology



- PCA-based regionalization of O₃ 8-hour maxima
- Apr 1 – Oct 31, 1980-2004
- Approx. 82% of variance explained by five coherent ozone regions





Ozone Climatology

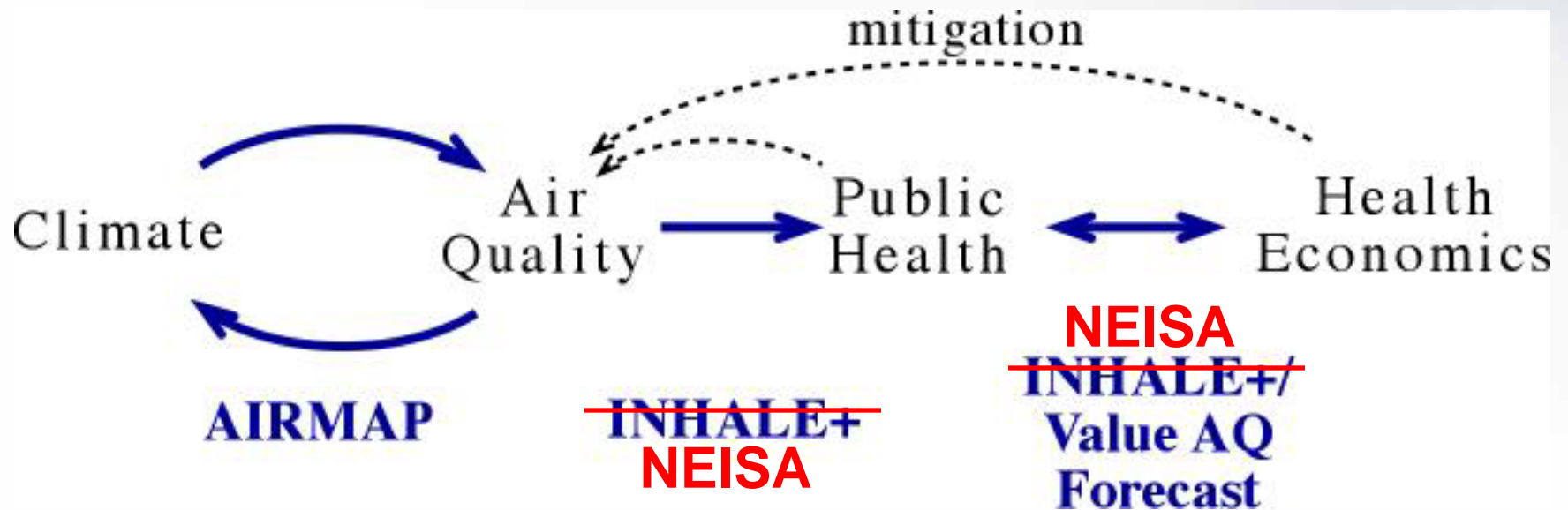
- Circulation-to-environment synoptic climatology
- Identify preferred regional circulation anomalies associated with high O₃ events in each region

* e.g., Bermuda High pattern linked to 25% of high O₃ days in northern New England, but only 3-5% of days in other regions

Circulation Types

Bermuda High *	Ohio Ridge
Coastal Ridge	Ohio Trough
Coastal Trough	Overhead High
Great Lakes Ridge	Southern High
Great Lakes Trough	Tilted Ridge
Mid-Atlantic Ridge	Zonal Flow

NEISA-AIRMAP Framework



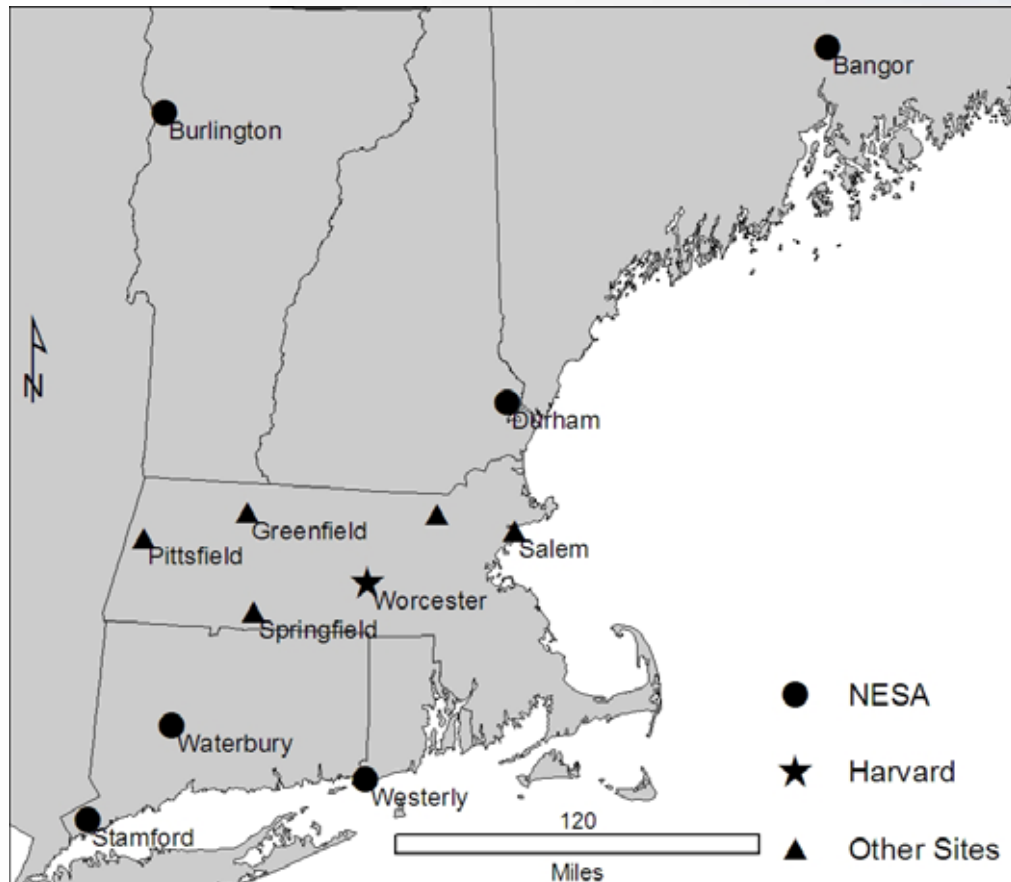
Future of NEISA



RISAs



Limitations of NEISA as RISA



- Some NEISA objectives aren't well-aligned with RISA program goals
- e.g., improved pollen monitoring network
- At the moment, the climate-AQ-health issue precludes other RISA initiatives

Current/Future Plans: non-RISA



- Leverage other funding sources
 - AHRQ (NIH)
 - New Hampshire HHS
 - AIRMAP
 - EPA
 - Others?
- More generally – find ways to conduct some original research, database development, etc. independent of RISA



Current/Future Plans: RISA

- Can we effectively forecast the fall peak in hospital admissions, due to pollen?
 - i.e., Is there a “forecast of opportunity”?
- Does an air quality forecast – one day, several days, or months in advance – improve public health?
 - Further development/dissemination of illness cost of air pollution
 - On multiple time scales & for all New England counties
- Improved messaging to stakeholders regarding EPA/NOAA air chemistry forecasts/information

