

# Overview of USDA Agricultural Air Quality Research



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# Agricultural Air Quality Issues

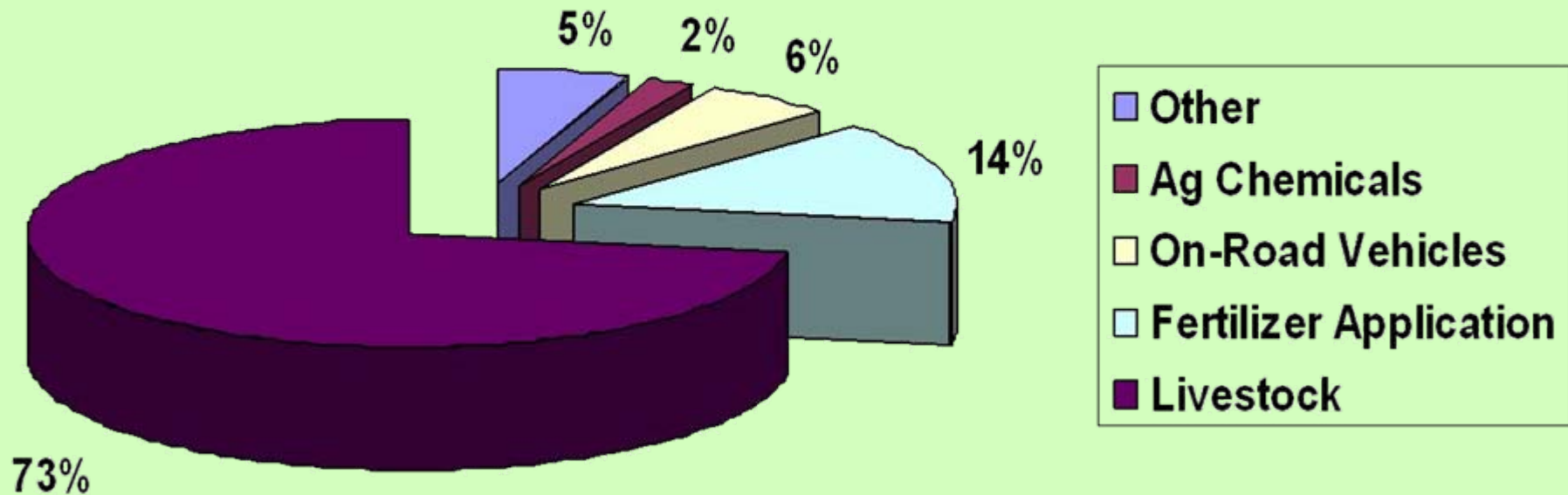
- Emissions
  - Particulate matter emission (criteria pollutant)
    - Fugitive dust
    - Agricultural burning
  - Gaseous emissions (animal & crop)
    - H<sub>2</sub>S
    - NH<sub>3</sub>
    - Burning
    - VOCs
    - N<sub>2</sub>O
  - Ozone
    - VOC emissions
    - Impacts on crop production

# Agricultural Air Quality Issues

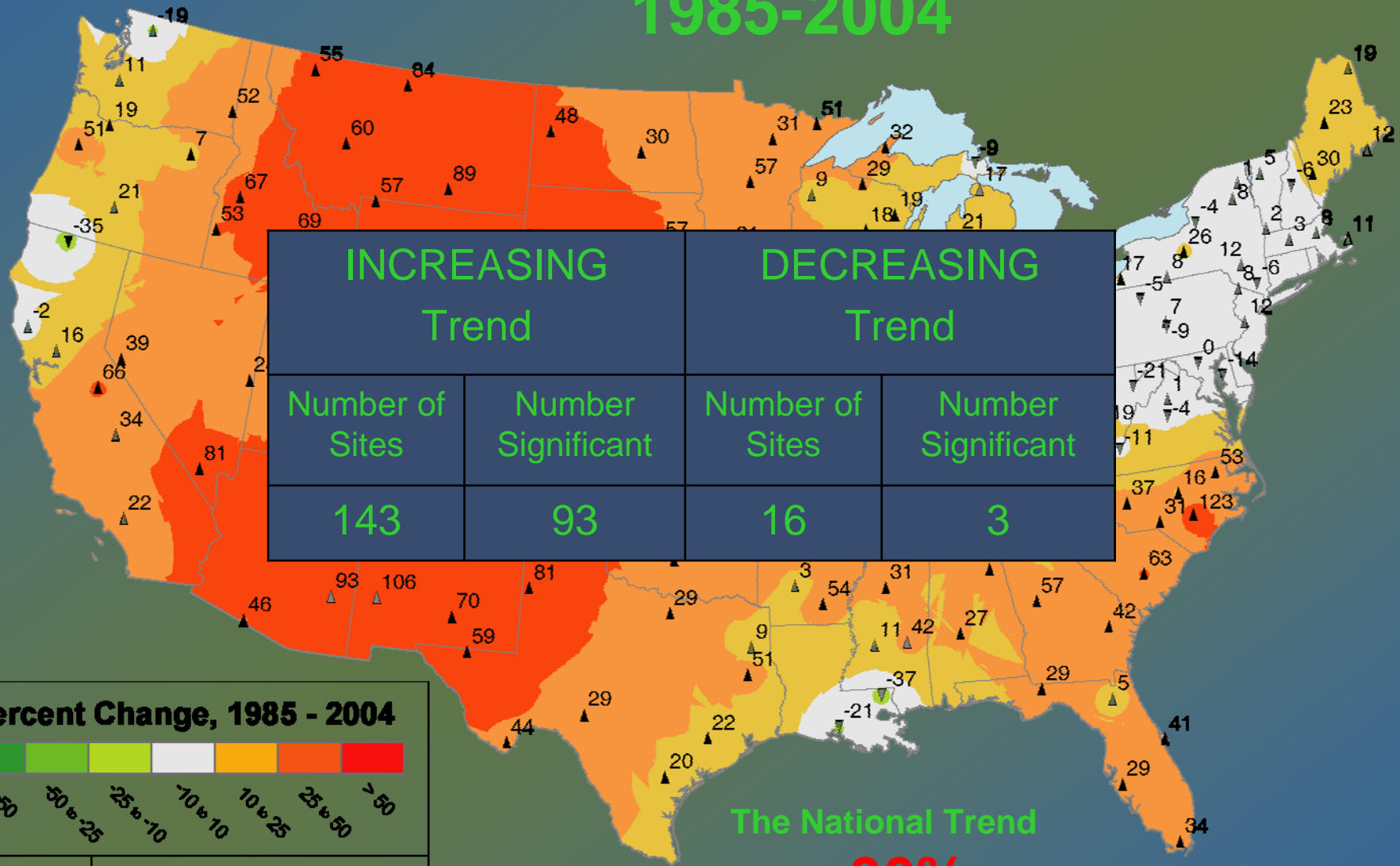
- Regulatory issues
  - Clean Air Act
    - Criteria pollutants (PM, gases)
  - CERCLA
  - EPCRA
- Litigation
  - Emissions from livestock
  - Crop burning

# 2001 Total U.S. Emissions of Ammonia

(4,998,000 short tons)



# NADP/NTN Ammonium Trend 1985-2004



## Percent Change, 1985 - 2004



### Trend

### Significance

- ▲ Increasing
- ▼ Decreasing

- Significant and Homogeneous
- Significant, not Homogeneous
- Not Significant

The National Trend

**+ 30%**

(median change)

# USDA Response

- Formation of USDA Agricultural Air Quality Task Force (1996)
  - Recommend research priorities for air quality
  - Recommend policy changes to Secretary
- Sponsored National Academy of Science study with EPA on air emissions from animal feeding operations
  - Recommends process based modeling rather than using animal emission factors

# USDA Response

- New National Research Initiative Air Quality Program (~\$20M since 2003)
  - Determine emission factors for production agriculture
  - Develop new monitoring and measurement technologies
  - Understand the fate and transport of agricultural air pollutants
  - Develop and transfer practices that reduce emissions

# USDA Response

- National Workshop on Agricultural Air Quality in June, 2006
  - Produce a state-of-the-art air emissions inventory for agriculture
  - Produce a best practices document for reducing air emissions



<http://esa.org/AirWorkshop/>



# NRI Air Quality Program

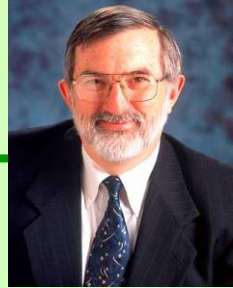
- Application Due Date - June 5, 2007
- Award Size – up to \$600,000 for 2-4 yrs (integrated)
- Award Size – up to \$400,000 for 2-4 yrs (research)
- Eligibility – All universities and federal research labs
- Integrated program – integrates research, education, and extension
- 60% integrated / 40% research (\$4,970,000)
- 17.5% success rate in 2006

# 2007 NRI Air Quality Program Emphasis Areas

- Emission data from production practices – particulates, gases/odors (more focus on crop production)
- Improved measurement protocols/instrumentation for within field and edge of field boundaries
- Practices for mitigating emissions
- Fate and transport of emitted particulates and gases



# National Programs



## Animal Prod/Prot

### Food Animal Production

Animal Health

Arthropod Pests of  
Animals and Humans

Aquaculture

### Nutrition, Food Quality and Safety

New Uses, Quality &  
Marketability of Plant &  
Animal Products

Human Nutrition

Food Safety



## Natural Resources

Water Availability &  
Management

Soil and Air Resource  
Management

Pasture, Forages and  
Rangeland Systems

Ag. Waste & Byproduct  
Utilization

Agricultural System  
Competitiveness &  
Sustainability

Bioenergy



## Crop Prod/Prot

Plant, Microbial & Insect  
Germplasm Conservation &  
Development

Plant Biological & Molecular  
Processes

Plant Diseases

Crop Protection &  
Quarantine

Crop Production

Methyl Bromide Alternatives



# Air Quality Research Program

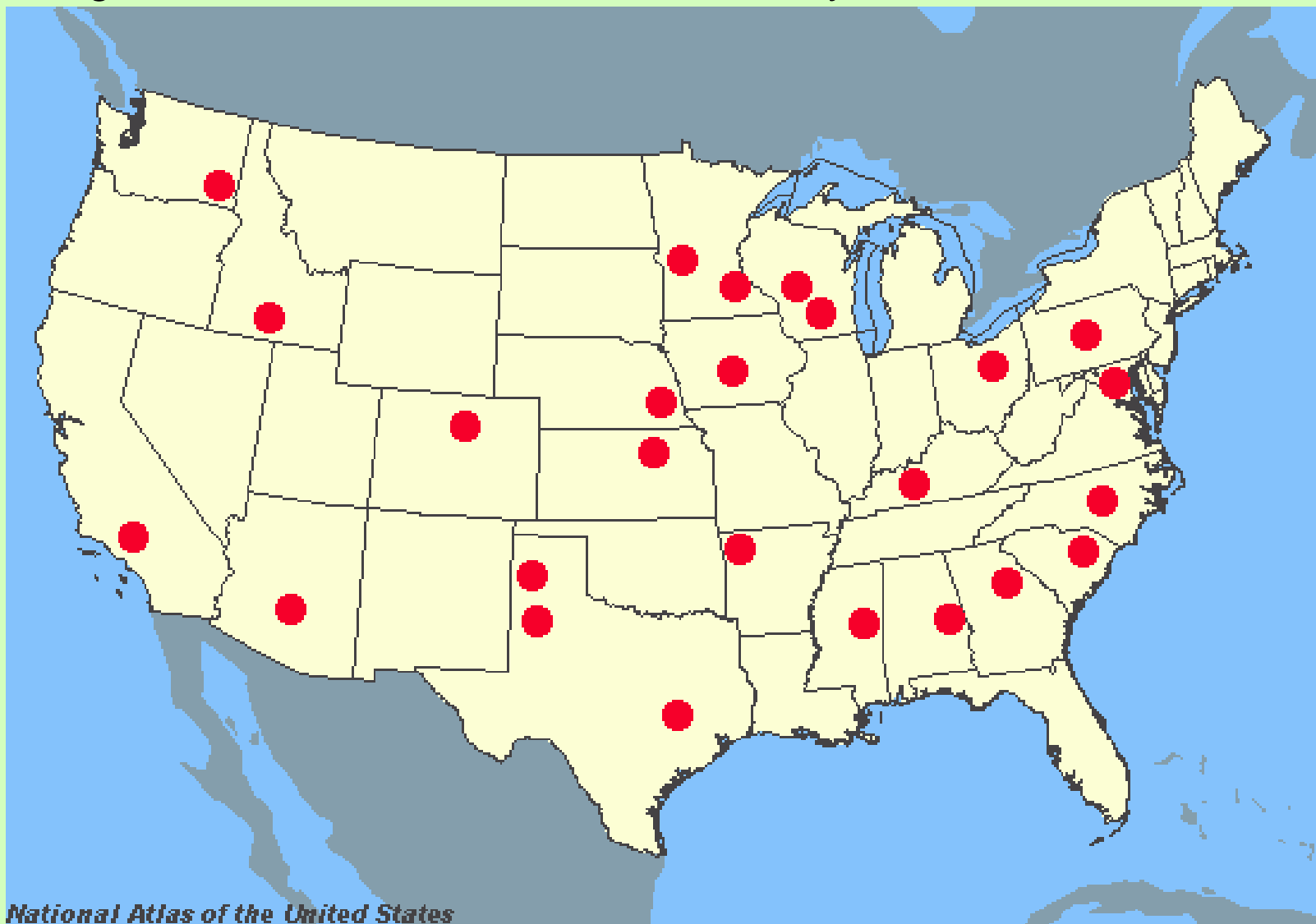
Through research,

- understand the processes of air pollution emissions from agricultural enterprises, and the effects of air quality upon agriculture,
- develop and test control measures, and
- provide decision aids useful for minimizing and reducing agricultural air pollution emissions, and predicting and mitigating the impacts of air quality upon agriculture

# Air Quality Research Components

- Particulate Emissions
- Ammonia and Ammonium Emissions
- Malodorous Compounds
- Ozone Impacts
- Pesticides and Other Synthetic Organic Compounds; Bioaerosols
- Aerial Spraying

# Agricultural Research Service Air Quality Research Locations



*National Atlas of the United States*

# Global Change

- Carbon Cycle and Carbon Storage
  - Greenhouse gas Reduction through Agricultural Carbon Enhancement network:  
*GRACEnet*
- Trace Gases
  - Methane, nitrogen oxides, ammonia

## Agricultural Waste and Byproduct Utilization

- Reduction of emissions, limiting transport of pathogens or chemicals from animal production operations
  - Ammonia, malodorous compounds, methane, carbon dioxide, nitrous oxides
  - Understand emissions, *emission rates, develop methods to predict emission, dispersion and transport across landscapes*

*Relevance*

Input

The ARS  
National  
Program  
Cycle

Assessment

Planning

*Performance*

*Quality*

Implementation





# Current Research Cycle

## Air Quality & Global Change

- Research Program 5 Year Cycle
  - Accomplishment Report 2008
    - Panel reviews\*
  - Workshop June 2008
    - Stakeholders
    - Scientists and Program Staff
  - Research Action Plan 2008
  - Research Project Plans 2009
    - Panel reviews\*
  - Research Project Implementations 2010

\*OSQR Oversight

# Questions

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