Workshop on Applications of Environmental Remote Sensing to Air Quality and Public Health

NOAA Perspective on Satellite Products

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Workshop Objectives

- Provide an overview of projects in the areas of air quality and public health that have cross-disciplinary relevance
- Identify data needs for air quality and public health research and management communities
- Develop partnerships and identify collaborative research opportunities
- Provide training to facilitate collaborative productive interactions between the atmospheric/Earth science and public health/medical communities

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NOAA Satellite Products

- **Atmosphere**
  - Temperature soundings
  - Moisture soundings
  - Winds
  - Clouds
  - Aerosols
  - Earth Radiation Budget
  - Precipitation
  - Trace gases (ozone, nitrogen dioxide etc.)

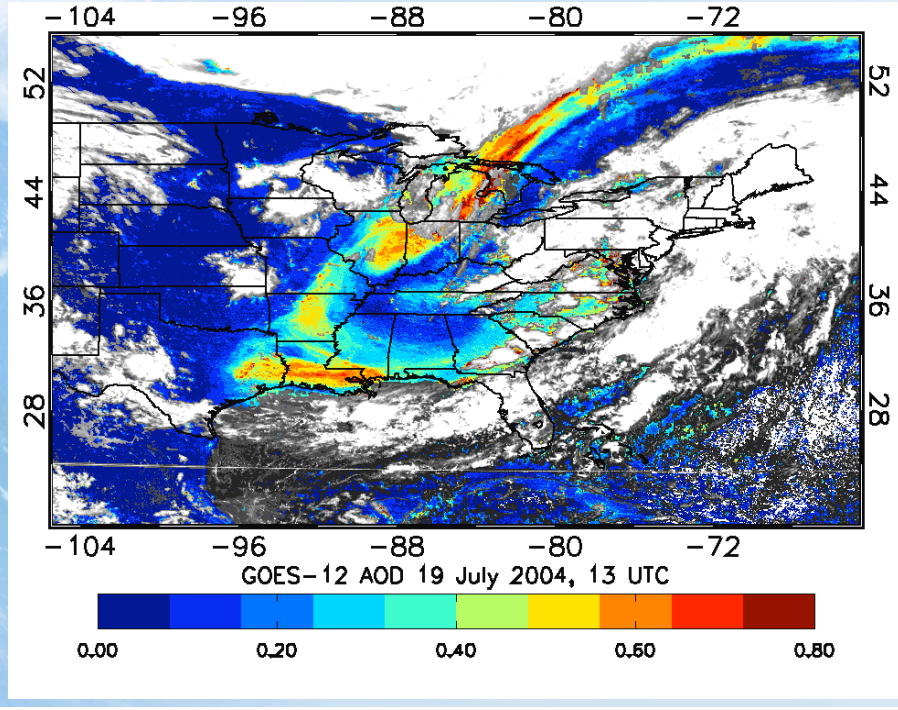
- **Ocean**
  - Surface temperature
  - Ice cover
  - Surface winds
  - Color
  - Sea level

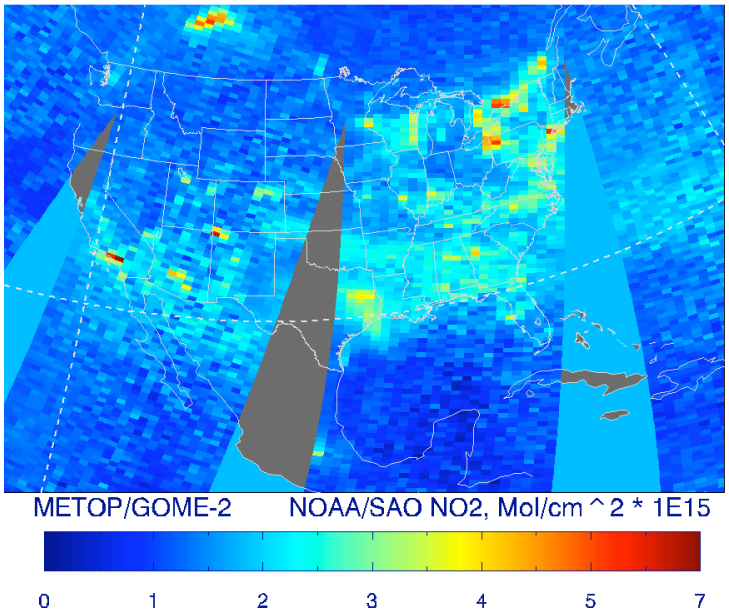
- **Land**
  - Vegetation condition
  - Snow pack characteristics
  - Other land characteristics (e,g., albedo, skin temperature, soil wetness, insolation)
  - Fire locations/Smoke Plumes

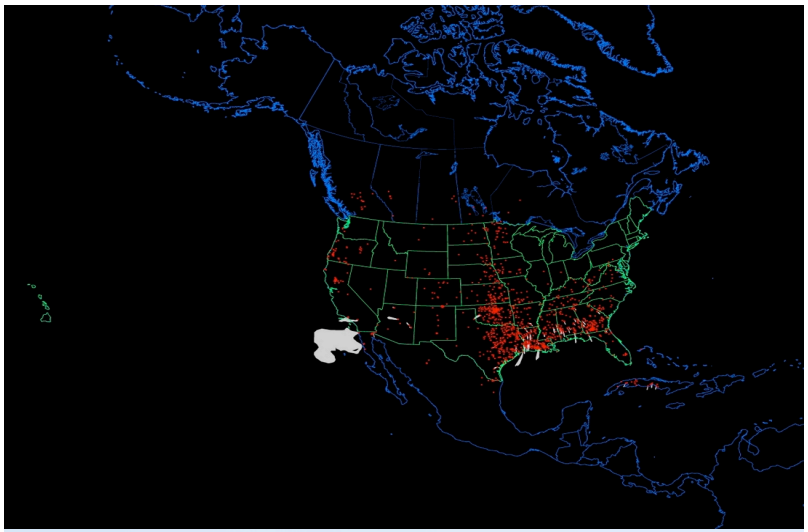
Air Quality Related Products

Specific Products

- Aerosol Optical Depth
- Trace gases (ozone, nitrogen dioxide, CO etc.)
- Fire and smoke detection
- Biomass burning emissions







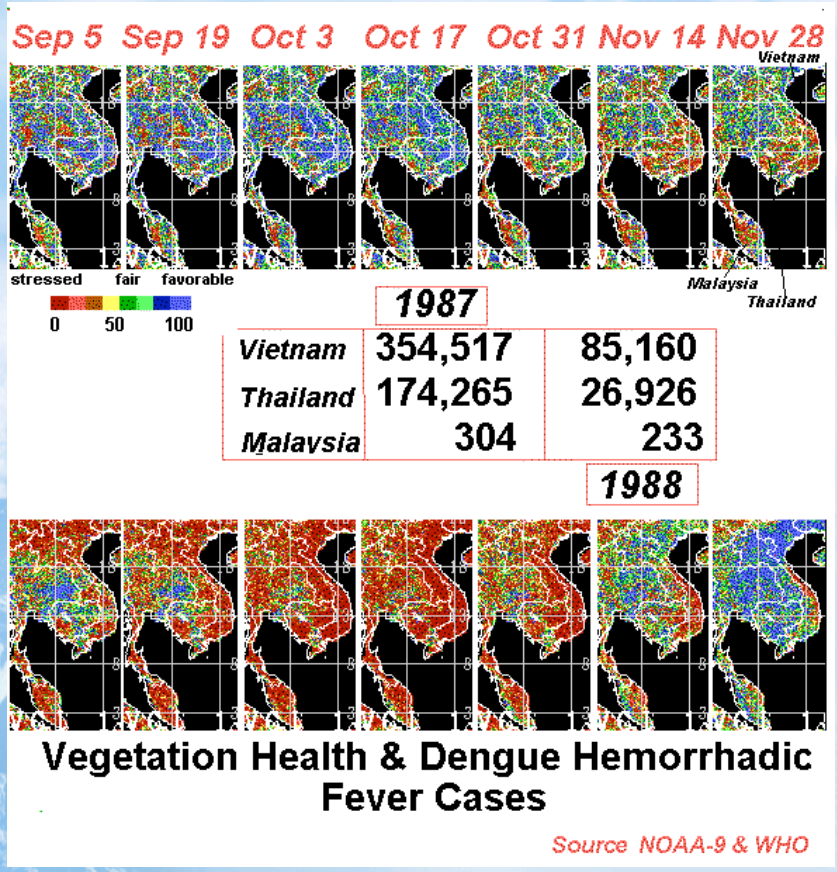
Satellite Data

- Pros
  - Continuous coverage in space and time
  - Long term record
  - Near real time availability (within 1 hour of data collection in most cases)
- Cons
  - Interference and gaps due to clouds
  - No vertical information in most cases, only column amounts
  - Satellite sensor sensitivity to changes in PBL amounts varies and depends on what is being sampled and what technique is being used

How Can Satellite Data be Useful?

- Studies related to cause and affect
  - Is there a correlation between a particular pollutant and a particular health impact
- Predictive capability
  - Use long-term datasets of satellite data and health indicators to derive a statistical model and use the statistical model in prediction mode
  - Assimilation of satellite data to improve air quality forecast
- Air quality monitoring

Dengue Fever and Vegetation Health

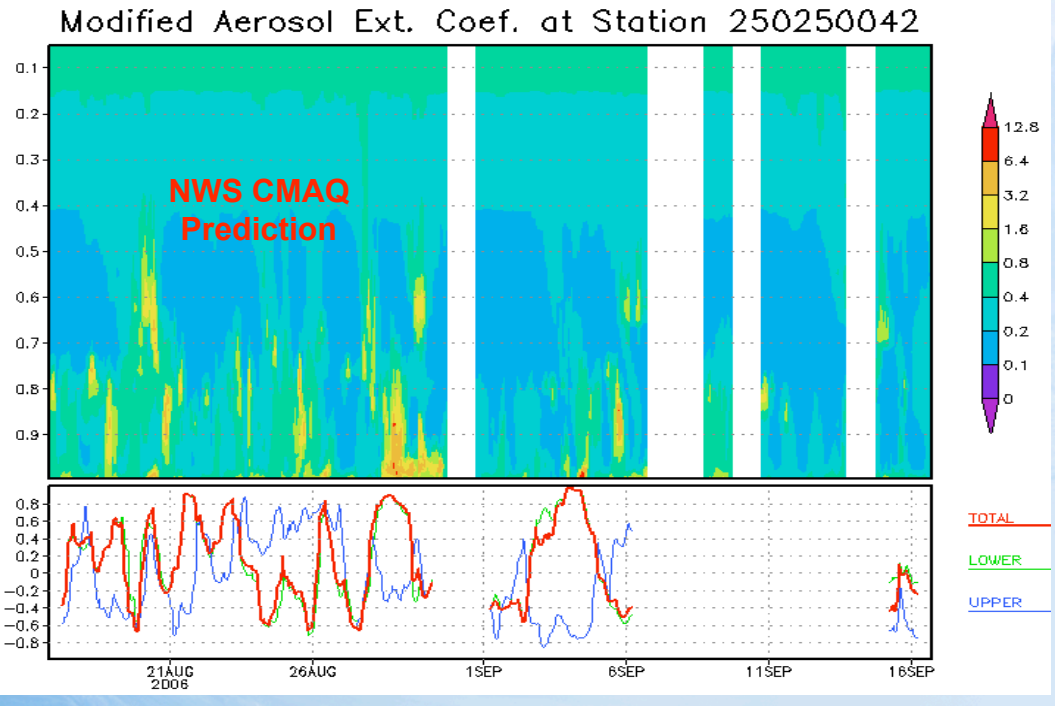


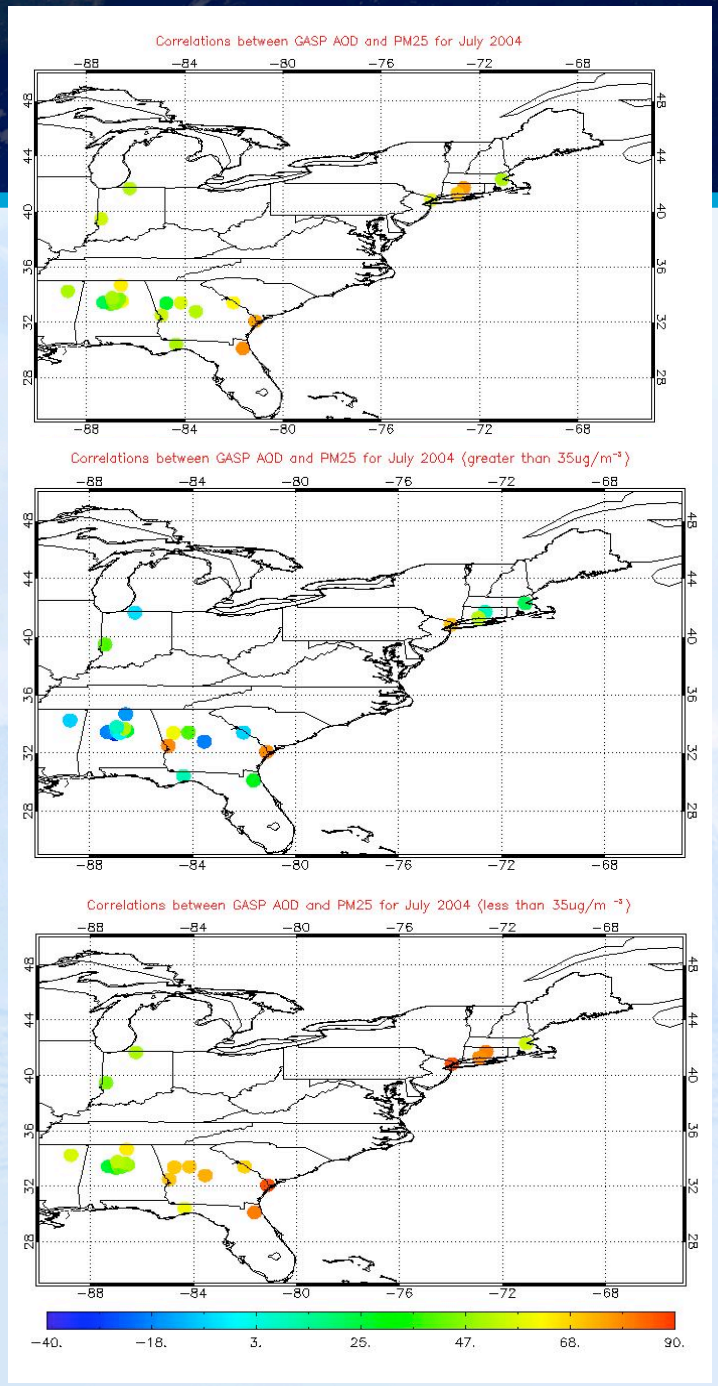
- No vegetation stress (population affected)
- Vegetation stress (population not affected)

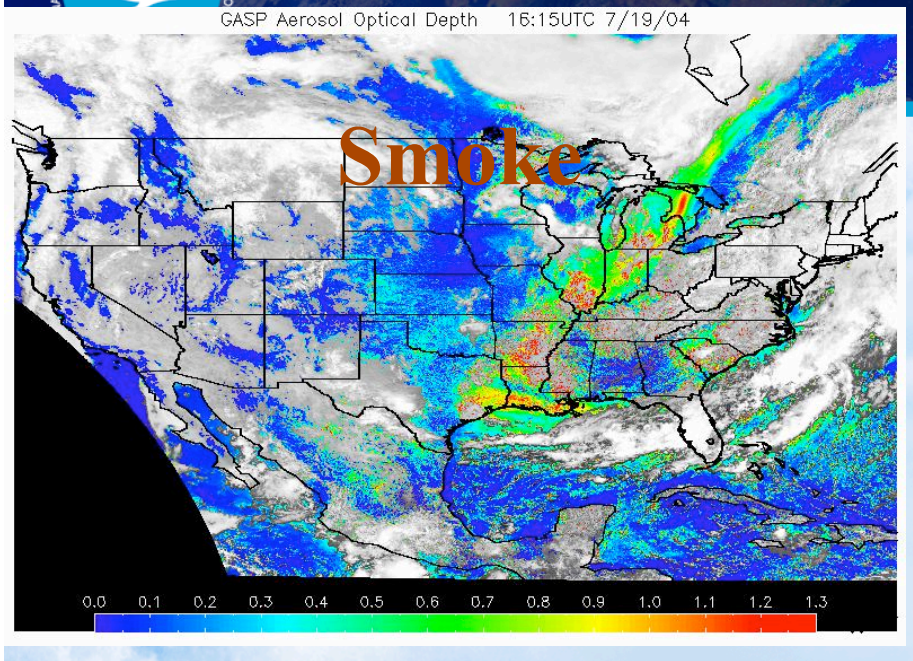
Felix Kogan, NOAA/NESDIS

Linking optical properties and mass concentration

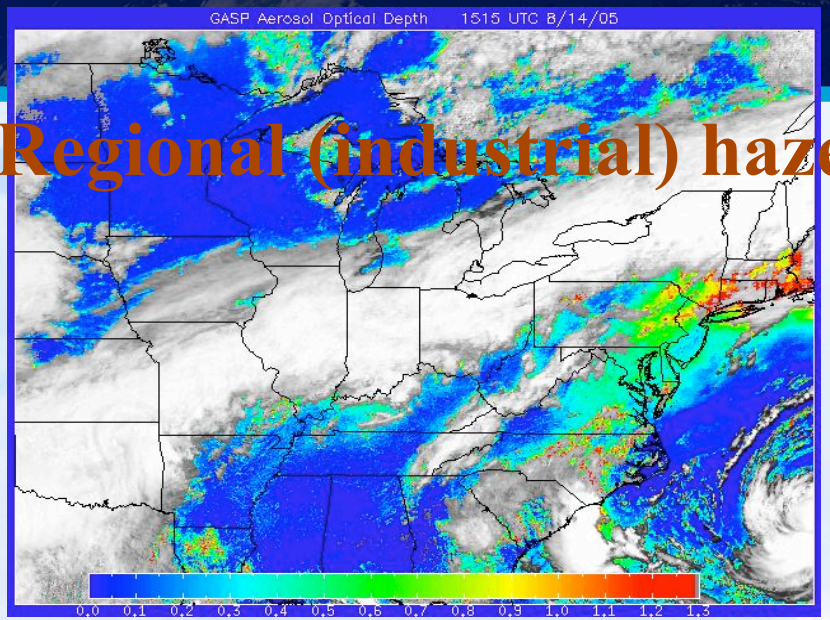
- Challenges
  - Correlation varies from station to station
    - Dynamic range critical
    - Aerosol vertical structure
    - Aerosol type



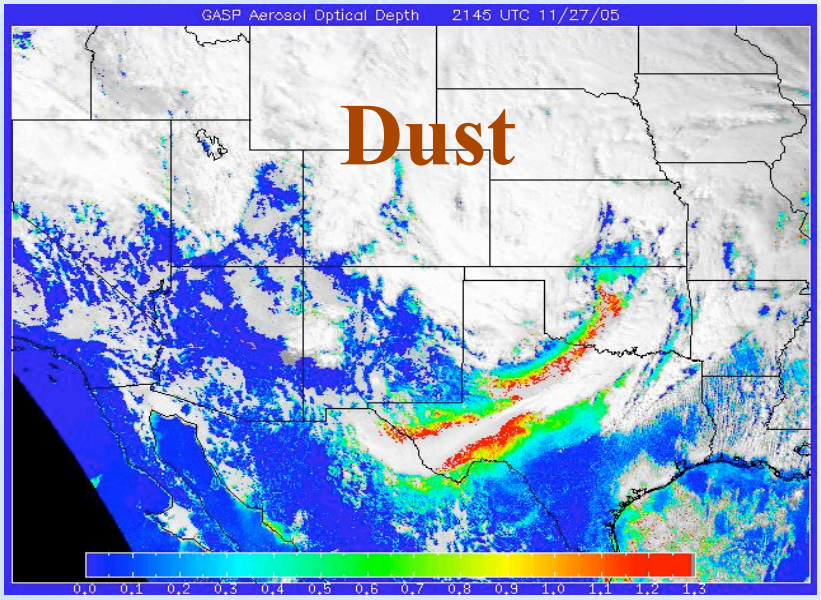




Smoke



Regional (industrial) haze



Dust

Observed aerosol type varies but most satellite retrieval algorithms use look-up tables created with assumed aerosol models *a priori*

Conclusions/Recommendations

- Conduct multiple collaborative studies to answer these questions:
  - Are the current satellite data useful?
  - Are there enough resources available to researchers to use satellite data and study the linkages between air quality and human health?
  - If current satellite data are inadequate (noise, accuracy), what are your requirements
  - Can NASA and NOAA work towards meeting those user requirements?