



EPA AIRNow Program

Changing Behaviors and
Protecting Public Health

2007 Environmental Information Symposium

November 16, 2007, St. Louis

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Health Effects of Air Pollution



Air pollution affects everybody

Aggravates

- lung disease including asthma
- heart disease including congestive heart failure

Resulting in:

- More premature deaths
- More admissions to hospitals
- More trips to emergency rooms
- More visits to doctors' offices
- More school and work absences
- More symptom days



Health Effects of Air Pollution



Air pollution affects human health, the environment, and has economic impacts¹

Each year in the United States:

- Human exposure to outdoor air pollution costs between \$40 to \$50 billion.
- 50,000 to 120,000 premature deaths are associated with exposure to air pollutants.
- People with asthma experience more than 100 million days of restricted activity, costs for asthma exceed \$4 billion, and about 4,000 people die of asthma.

¹ National Center for Health Statistics. Healthy People 2000 Final Review. Hyattsville, Maryland: Public Health Service. 2001. Library of Congress Catalog Card Number 76-641496

The AIRNow Program

- Cooperative effort began in 1997 between U.S. EPA, NOAA, Environment Canada, NPS, state and local air agencies to collect, quality assure, and transfer real-time and forecast air quality information to the public
- Utilizes the *Air Quality Index (AQI)*; a national reporting program that links air quality levels to cautionary health messages
- Fast and easy access for the public, media and stakeholders to understandable air quality information that they can use to make good health- based decisions about their daily activities

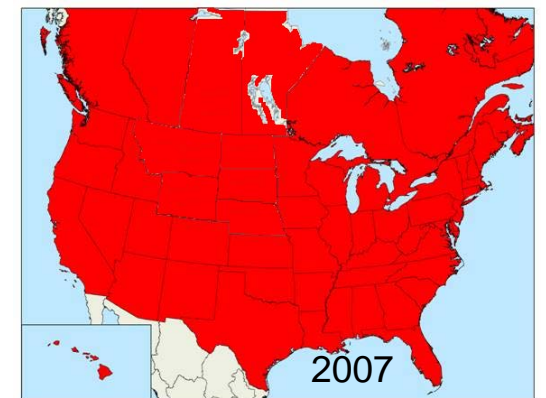
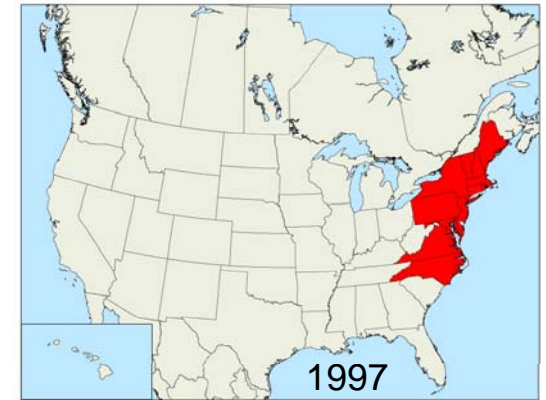
1. Relevant information

2. Effective Communication

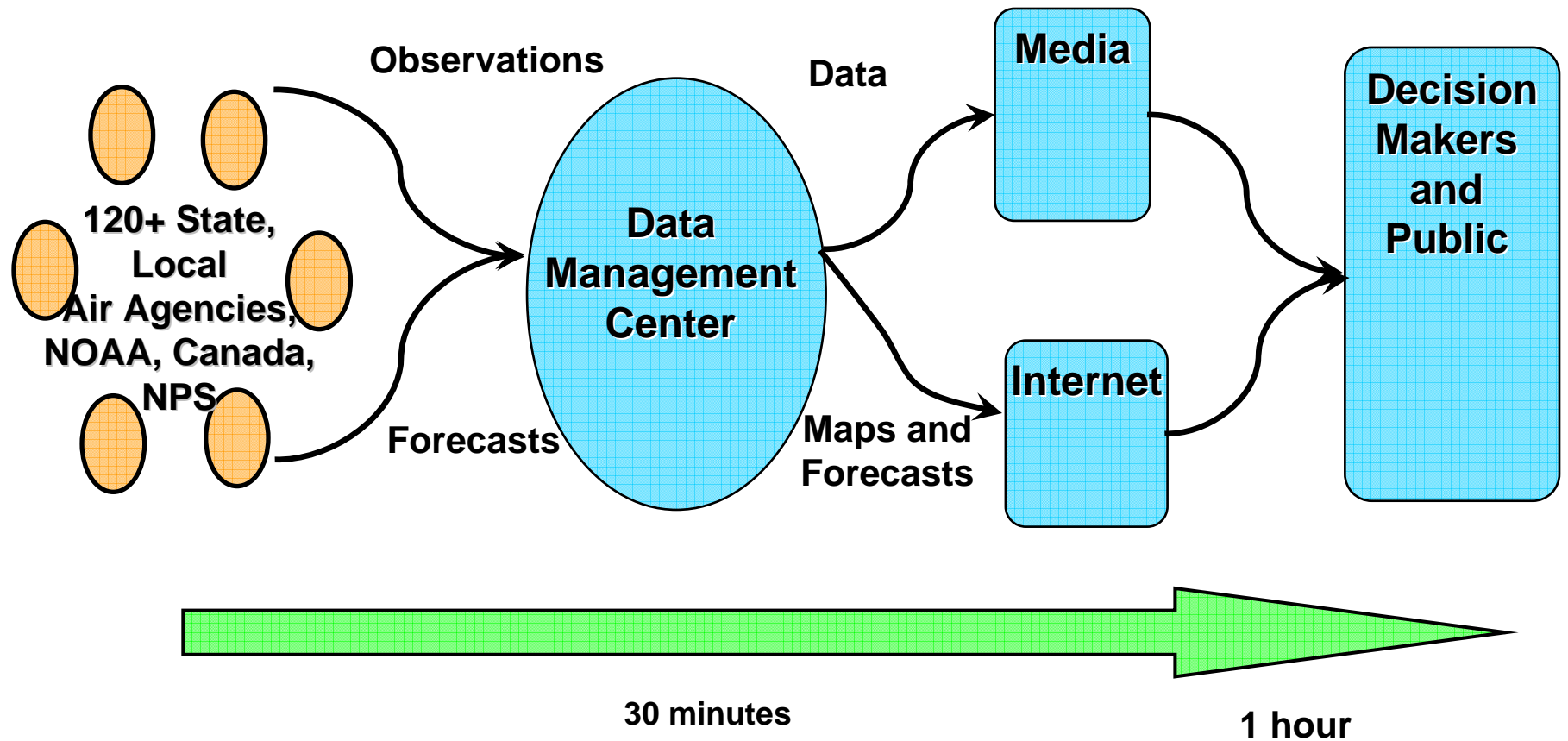
3. Evaluation

4. Improvement

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How AIRNow works



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Relevant Information:



Descriptors	8-hr Average Ozone (ppm)	24-hr Average PM _{2.5} (ug/m ³)
Good 0 – 50	0 – 0.064	0 – 15.4
Moderate 51 – 100	0.065 – 0.084	15.5 – 40.4
Unhealthy for Sensitive Groups 101 – 150	0.085 – 0.104	40.5 – 65.4
Unhealthy 151 – 200	0.105 – 0.124	65.5 – 150.4
Very Unhealthy 201 – 300	0.125 – 0.374	150.4 – 250.4
Hazardous 301 – 400	0.405 – 0.504*	250.5 – 350.4
401 - 500	0.505 – 0.604*	250.5 – 500.4

* Based on 1-hr standard
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Relevant Information

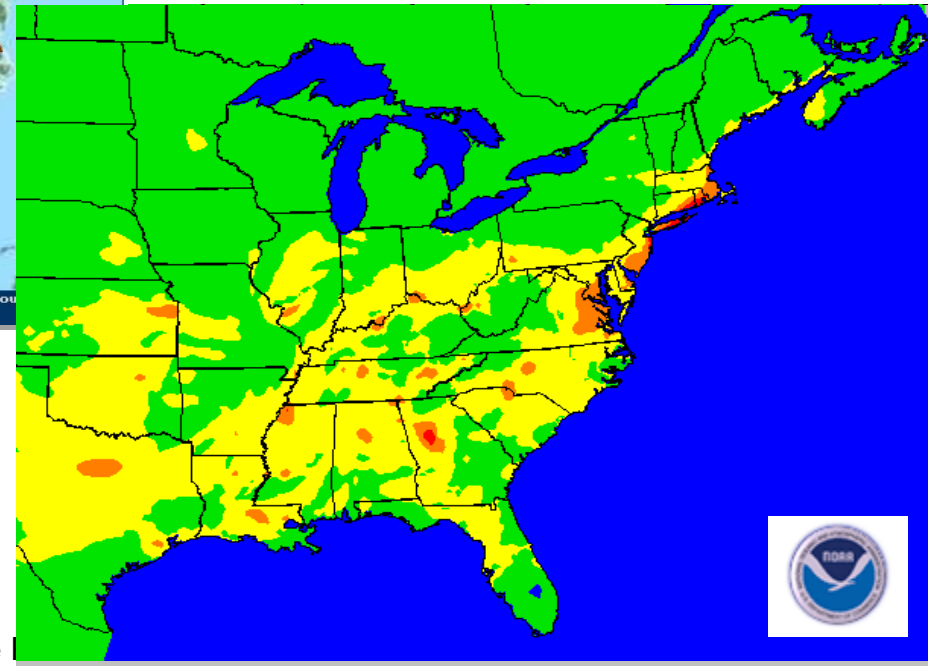
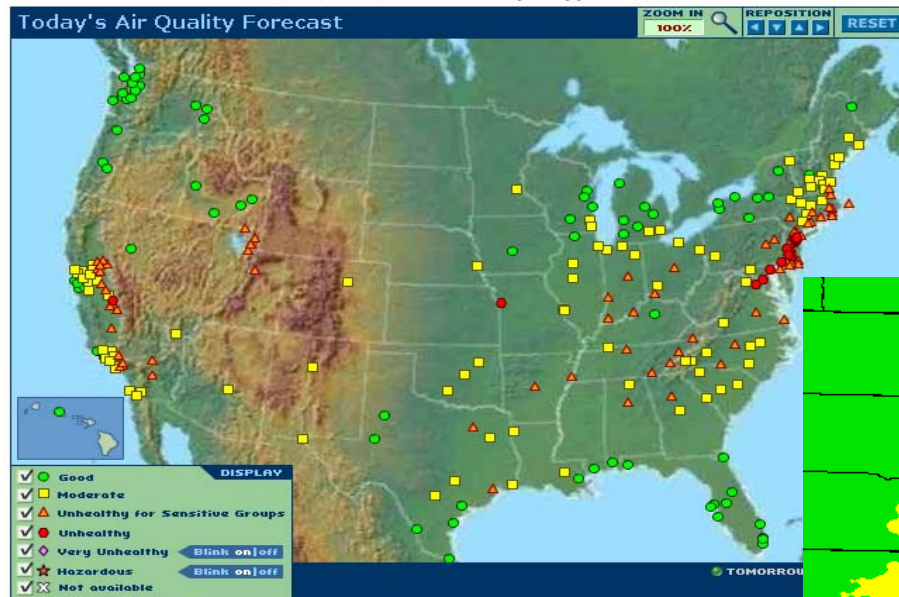
Animation and peak AQI maps (Ozone)

■ Next Day AQI Forecasts

Tuesday, July 18, 2006

[Tomorrow's National Air Quality Forecast](#) | [Northeast Air Quality Forecast](#)

Placement of cities on this map is approximate



For Conference I

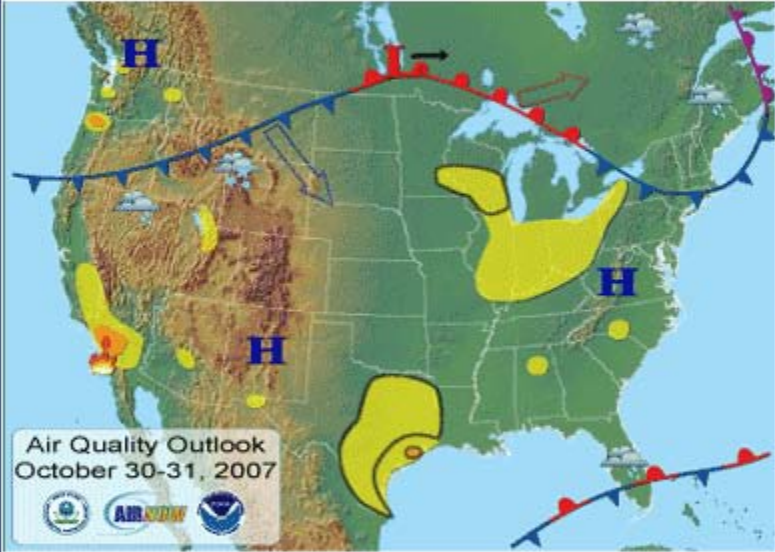
Communication: Web

A cross-agency U.S. Government Web site. [List of AIRNow partner agencies](#) [About AIRNow](#) | [Contact Us](#) | [FAQs](#) | Search: **GO**

AIRNOW Quality of Air Means Quality of Life

National Overview October 30th, 2007

National Outlook for October 30-31 Unhealthy Particle Pollution Levels in Southern California [— More —](#)



Air Quality Outlook
October 30-31, 2007

[National Forecast](#) | [Ozone Now](#) | [Particles Now](#) | [Map Center](#)

Air Quality News

October 29: Oregon DEQ Issues Air Pollution Health Advisory for Willamette Valley and Southwest Washington
Conditions are expected to persist through Friday [— More —](#)
[EXIT AIRNOW ▶](#)

[— More News —](#)

Partners

For Partners
List of Partners

Air Quality Basics

Air Quality Index
Ozone
Particles
UV

The AQI for:

Health Providers
Older Adults
Weathercasters


Key Topics

Your Health
Smoke From Fires
International Air Quality

The Learning Center

Kids (K-10)


E-mail Notification

 Sign-up for e-mail, cell phone or pager air quality notices

Historical Information

Air Compare
Compare Air Quality of U.S. Cities

Protect Your Health



Smoke from Fires

AQI

AIR QUALITY INDEX

Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
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Local Air Quality Conditions and Forecasts

Alabama [Select by map](#)

Communication: Timely

Wunder Blog : Weather Underground - Microsoft Internet Explorer

File Edit View Favorites Tools Help Search the Web Search Address <http://www.weatherunderground.com/blog/JeffMasters>

Condo Rentals

- [Save money with Timeshare rentals](#)

Ann Arbor Condos and Vacations

[CONDO SEARCH](#)
CondoCompany.com

- [Miami Condos](#)
- [Ann Arbor Condos](#)
- [Orlando Vacation](#)
- [Beach Chairs](#)

Ann Arbor Tickets and Technology

- [VOIP Phone Systems](#)
- [Disney Tickets](#)
- [Event and Concert Tickets](#)
- [Discount Disney Tickets](#)

Hot Travel Savings

- [Ann Arbor Vacation Packages](#)
- [Ann Arbor Car Rentals](#)
- [Ann Arbor Hotels](#)
- [Ann Arbor Airline Tickets](#)
- [Ann Arbor Condos](#)
- [Ann Arbor Internet Providers](#)

Great Vacation Ideas

- [Ann Arbor Cheap Vacations](#)
- [Ann Arbor Bed and Breakfast](#)
- [Ann Arbor Vacation Kentucky Lake](#)
- [Las Vegas Travel Deals](#)
- [Ann Arbor DSL](#)

Real Estate

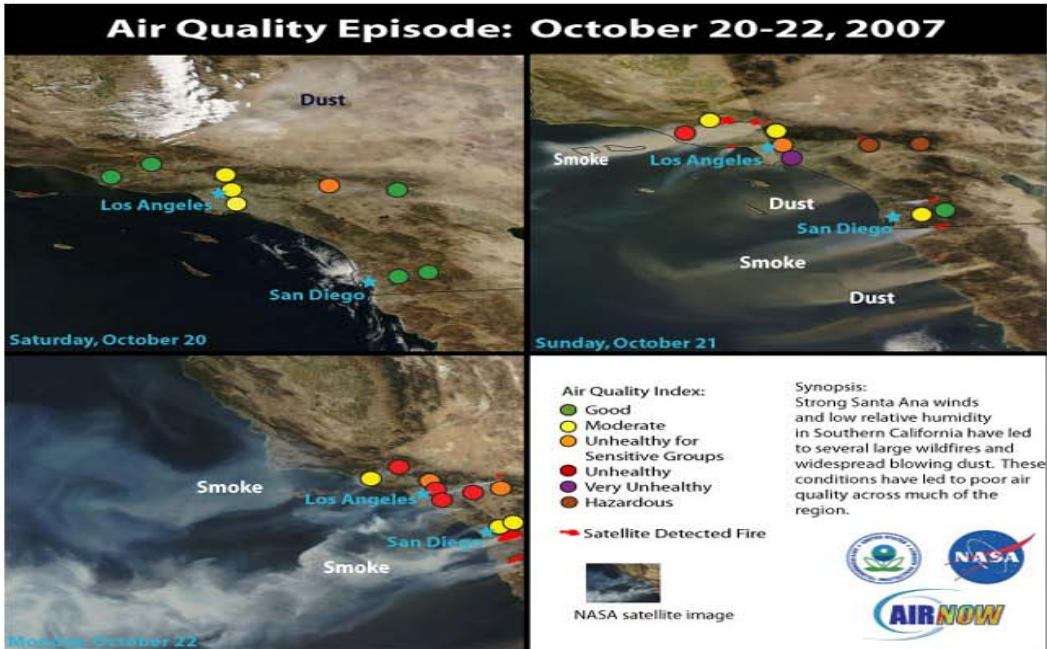
- [Ann Arbor Homes For Sale](#)
- [Ann Arbor Foreclosures](#)
- [Michigan Homeowners Insurance](#)
- [Ann Arbor Real Estate](#)
- [Ann Arbor DSL Service Providers](#)

Fantastic Rental Deals

- [Ann Arbor Vacation Rentals](#)
- [Ann Arbor Timeshares](#)
- [Ann Arbor Apartments](#)

Air quality

Not surprisingly, air quality due to particulate matter has been awful in Southern California (Figure 1). Exceedances of the Federal air quality standards by more than a factor of two have occurred the past three days in both Los Angeles and San Diego. Heightened particulate pollution is strongly correlated with increased death rates, particularly in vulnerable populations, such as those with heart conditions, asthma, or other lung diseases. Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly, and children should remain indoors. Keep your windows and doors closed unless it is extremely hot inside. In these cases, seek alternate shelter. Run your air conditioner if you have one. Keep the fresh air intake closed and the filter clean to prevent bringing additional smoke inside. [EPA's Airnow](#) website has more information.



Air Quality Episode: October 20-22, 2007

Saturday, October 20

Sunday, October 21

Monday, October 22

Air Quality Index:

- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy
- Hazardous

→ Satellite Detected Fire

Synopsis:
Strong Santa Ana winds and low relative humidity in Southern California have led to several large wildfires and widespread blowing dust. These conditions have led to poor air quality across much of the region.

NASA satellite image

Figure 1. Visible satellite images taken midday on Saturday, Sunday, and Monday. Overlaid on the images is the peak daily particle pollution Air Quality Index (AQI) levels due to smoke. Poor air quality became more widespread across the region as the number and size of the fires increased from day to day. Smoke is visible as white or bluish-white streaks. Blowing dust (brown streaks), reducing visibility under three miles, is also apparent on the images. Image credit: NASA and EPA.

The forecast

The warm, dry, and windy weather will continue today, bringing a repeat of yesterday's extremely dangerous fire situation. A trough of low pressure is expected to move into northern California Wednesday morning, weakening the high pressure system driving the Santa Ana winds. By Thursday, the Santa Ana winds will be gone, and fire fighters will be able to gain the upper hand.

This may only be the first of several serious fire situations in Southern California in the coming months. Santa Ana winds conditions commonly develop during the October through March period, and the extreme drought conditions in Southern California are not going to improve until at least December, when the winter rainy season typically starts. The [3-month precipitation forecast](#) from NOAA's Climate Prediction Center calls for a 33% chance of below-average rainfall over Southern California for the coming winter.

Communication: Active



Email Alerts

Text Message

Subject: Air quality forecast for Detroit, MI

Air Quality Forecast:

Wednesday, February 2

Particle Pollution(2.5 microns) - Unhealthy for Sensitive Groups

Thursday, February 3

Particle Pollution(2.5 microns) - Unhealthy for Sensitive Groups

National and regional air quality maps are available at: <http://www.epa.gov/airnow>

For additional information concerning the air quality forecast, current air quality data and information is available at: <http://www.michigan.gov/deqair>

This information was issued by the Michigan Department of Environmental Quality on Wednesday, February 2.

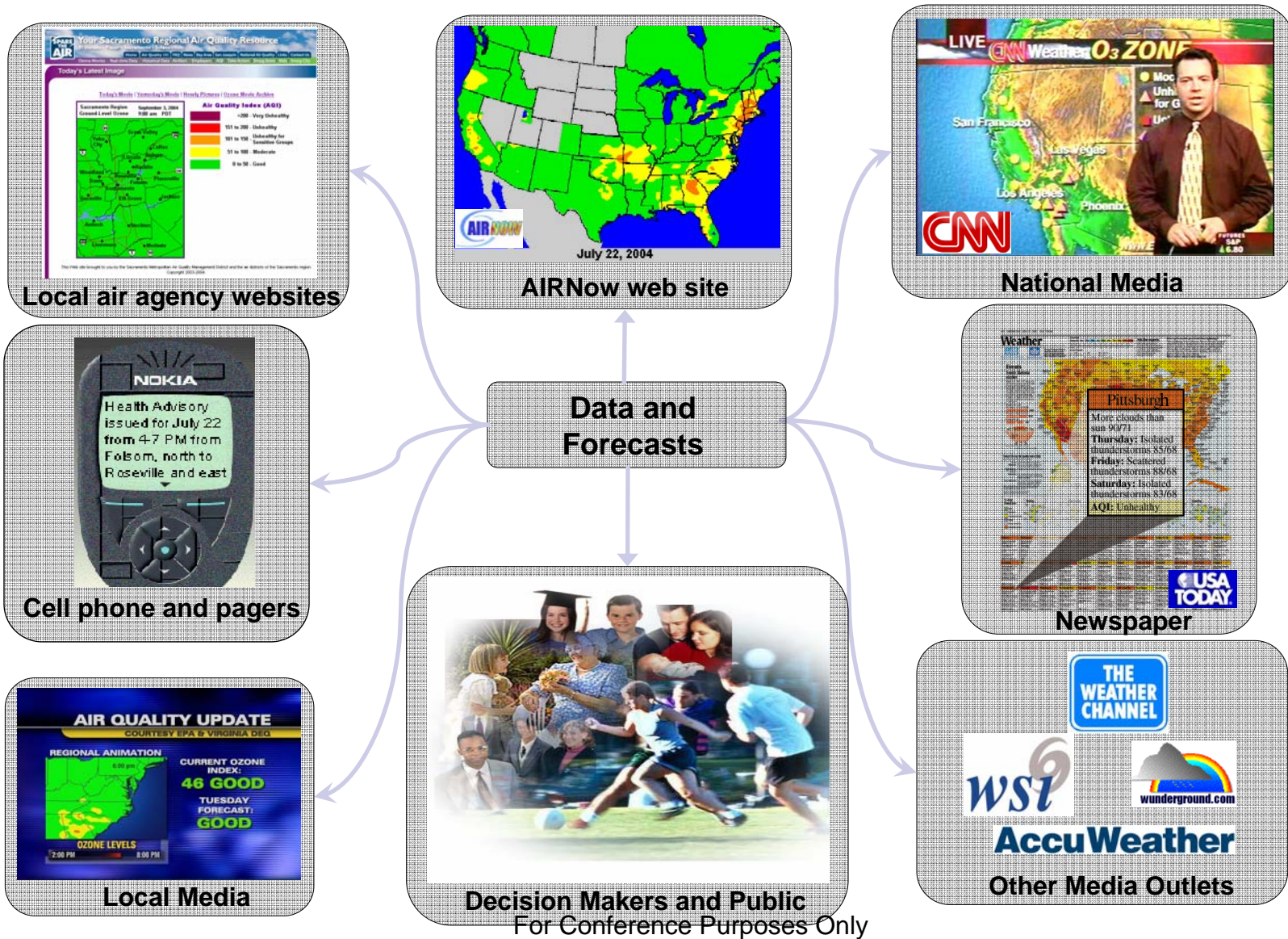
This information is provided via a partnership of the Michigan Department of Environmental Quality and the U.S. Environmental Protection Agency (EPA).

This email is being sent to this account at the request of the account user. If you want to change your notifications options, or stop receiving notifications, please click on the following link:

<https://enviroflash.epa.gov/airnow/subscriber/start.do>

Msg From:
epacdx@csc.com
(Air quality
forecast for Detroit)
Detroit: 2/03
forecast for Particle
Pollution (2.5
microns) is
Unhealthy for
Sensitive Groups.

Communication: Diversity



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Evaluation: Awareness/Response

2002 Green Gauge Reports by RoperASW	“Yes” Response
Have you ever heard of ozone action days or code orange / code red air quality days?	52%
Have ozone action days or code orange / code red air quality days ever caused you to change your daily activities by reducing amount of air pollution (e.g., car pooling, driving less)?	37%
Have ozone action days or code orange / code red air quality days ever caused you to change your daily activities by reducing exposure to air pollution (e.g., modifying outdoor exercise / work habits)?	46%

Evaluation: Awareness/Response

2005 Kansas Behavioral Risk Factor Surveillance System*	“Yes” Response
How many people had heard or read about the air quality index or air quality alerts where they live?	43%
How many people reduced or changed their outdoor activity level because they <i>thought</i> the air quality was bad or affecting how they felt?	9%
How many people reduced or changed their outdoor activity level based on the air quality index or air quality alerts?	15%

*2006., Potter, Catima and Perveen, Ghazala., Environmental Factors, Outdoor Air Quality and Activity Level 2005; Kansas Dept. of Health and Environment, August 2006.

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Evaluation: Awareness/Response

- Neidell (2006) Southern California Study
 - At-risk groups' zoo and observatory visits decrease*
 - Asthma-related hospital visits decrease
 - Children (5 - 19 years old)*
 - Elderly (≥ 65 years old)
- Cutter and Neidell (working paper) evaluate effectiveness of Spare the Air advisories in Bay Area of California
 - Traffic volume decreased*
 - BART ridership increased
 - Ozone levels – no clear effect

Papers at: <http://www.columbia.edu/~mn2191/>

* = statistically significant at $p < 0.05$
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Evaluation: Communicator/Response

- Ozone and Your Patients' Health Web-based training for physicians
 - Prior to the training, only 1 of the 9 health care providers had previously told patients about the AQI. After taking the training, ALL expressed an intent to tell patients about the AQI in the future.
- 2005 Kansas BRFSS
 - Respondents who heard/read the alerts on the air quality index/air quality from media are 6 times more likely to reduce/change outdoor activity level if advised by health professional (this statistic has been adjusted for age, gender, sex, race/ethnicity, education, employment, annual income, general health status, and activity limited by health problem).



Evaluation: Customer Feedback

“I want to let you know how wonderful this service is. My husband has stage IV lung/brain cancer. It never occurred to me that the air quality could be so dangerous in the winter (I only knew about the cold and dry). Because of your e-mails we were able to plan his appointments and time outside around those bad days.

Now, the other interesting part of this is that I have asthma and, truthfully, I haven't been taking very good care of myself. I haven't been taking my meds like I should. During that alert time, I should have increased my inhalers too but forgot. By this past Sunday, I was in a little trouble with my breathing--I actually thought I was coming down with a cold but then I realized your messages were meant for me also. I upped my meds (like I'm supposed to when I'm in trouble) and today I'm much better.

I know this is an experimental program--I've got to tell you it worked for me. From now on I'm going to respond to your warnings, not only for my husband but for me too.

Thanks for providing this service.” -- Kathy Barney

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Evaluation: Future Plans

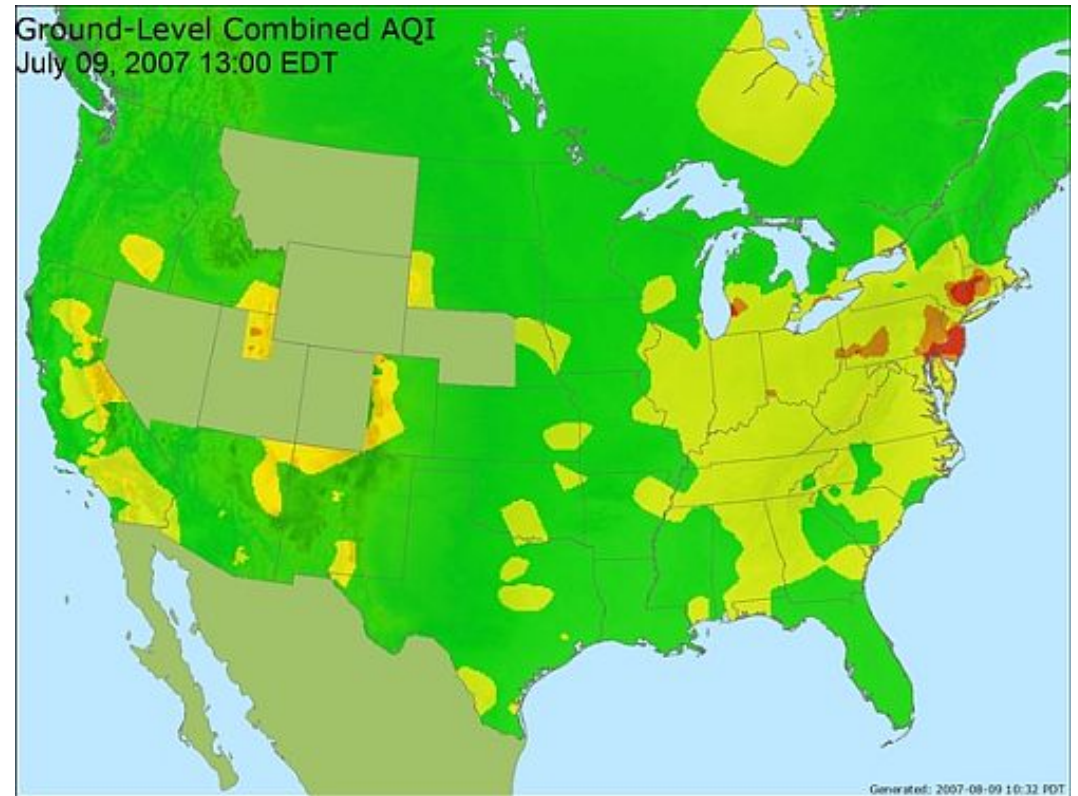
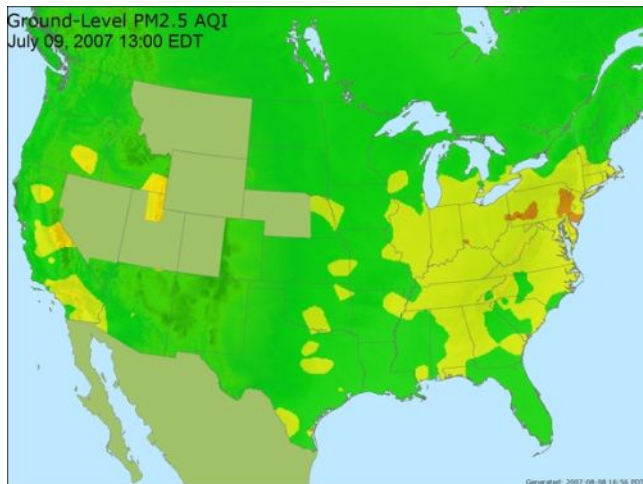
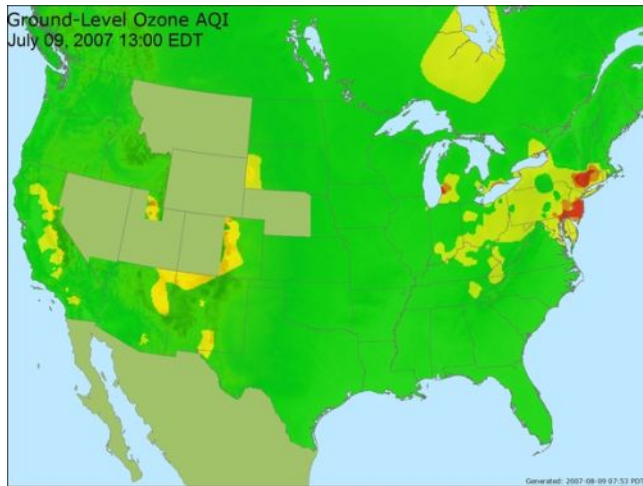
- National-Scale Activity Survey (N-SAS)
 - Joint OAQPS/ORD comprehensive national survey to examine air quality awareness and response
 - Cross-sectional - will evaluate what people know about air pollution and the AQI, and what they say they do in response to advisories
 - Longitudinal - will evaluate behavior directly through activity diaries over several days
 - Survey development complete
 - Plan to launch survey in 2008, dependent on funding



Improvement

- Feedback from evaluation of program reveals areas for improvement
 - Increase awareness of air quality link to health with physicians
 - Reduce confusion on multiple air quality messages for ozone and PM2.5
 - Improve accuracy, spatial coverage and multi-pollutant capability of air quality forecasts
 - Continue to investigate better ways to provide health protection through the air quality index

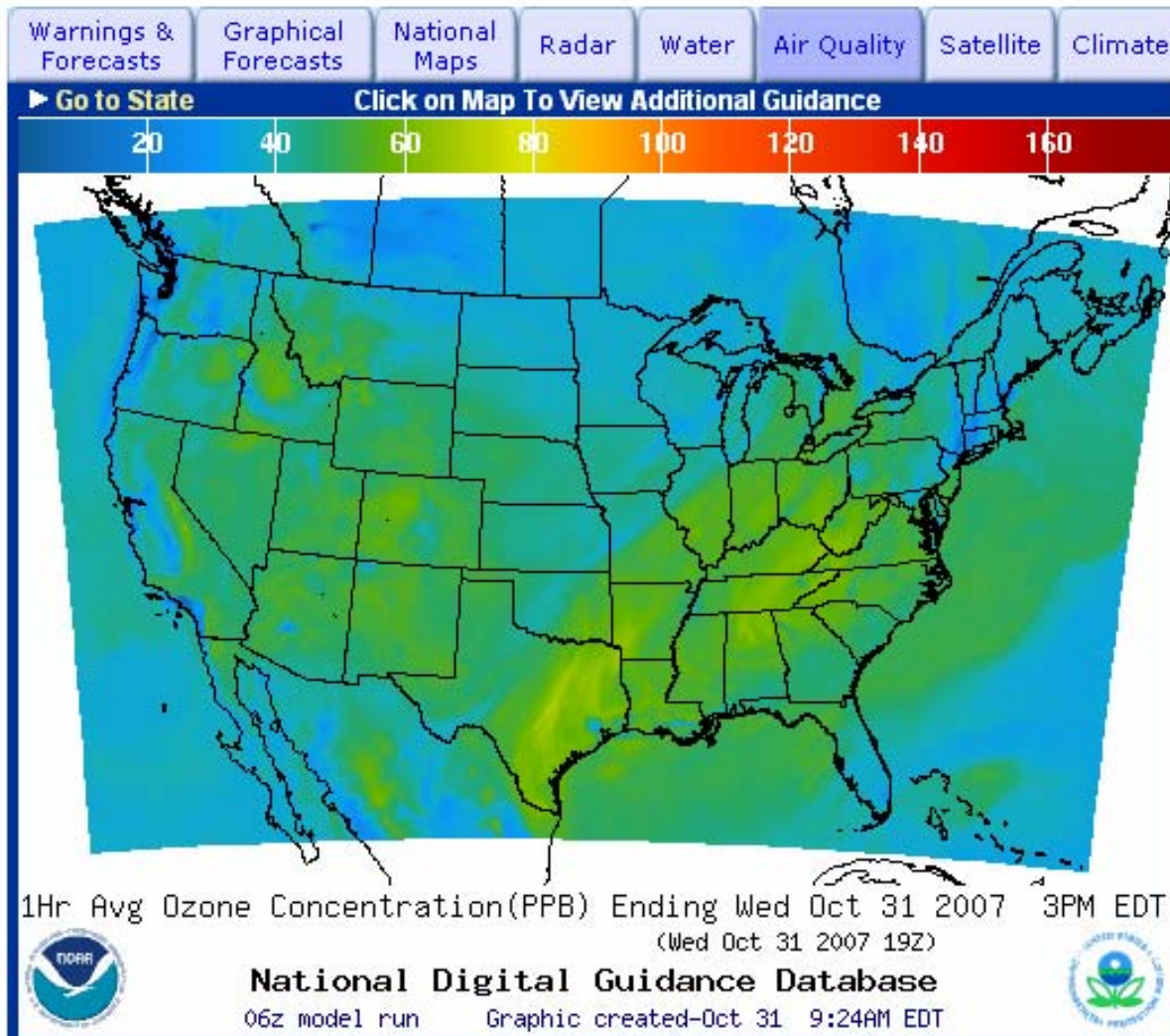
Improvement: Combined Ozone/PM2.5 AQI Map



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Improvement: Expanded Forecast Capabilities

- Snow Cover
- Surface Weather...
- Observed Precip
- Forecasts
 - Local
 - Graphical
 - Aviation
 - Marine
 - Hurricanes
 - Severe Weather
 - Fire Weather
- Text Messages
 - By State
 - By Message Type
 - National
- Forecast Models
 - Numerical Models
 - Statistical Models...
- Climate
 - Past Weather
 - Predictions
- Weather Safety
 - Weather Radio
 - Hazard Assmt...
 - StormReady /
 - TsunamiReady
- Education/Outreach
- Information Center
- Tsunamis
- Publications...



Improvement: Air Quality Health Index

0	1	2	3	4	5	6	7	8	9	10	+
LOW Health Risk				MODERATE Health Risk			HIGH Health Risk			VERY HIGH	

AQHI ▶ Check the **Index** to plan your **activities** today

air quality health index

AQHI BC

Home
Current AQHI
All Communities AQHI
Recent History AQHI
Air Pollution & Health
About the AQHI
More Information
What do you Think?
Tell A Friend

The Air Quality *Health* Index (AQHI) is a new way to help you protect your health.
Choose your community for today's Index.

Communities throughout BC
- select community -

Communities within Greater Vancouver & Lower Fraser Valley
- select community -

What do you think?
Tell us what you think of the AQHI
[Take the online survey](#)

Map locations: Prince George, Quesnel, Kamloops, Vernon, Kelowna, Nanaimo, GVRD & Lower Fraser Valley, Osoyoos, Victoria



***“They always say time changes things, but you
actually have to change them yourself.”***

Andy Warhol, *The Philosophy of Andy Warhol*
US artist (1928 - 1987)