

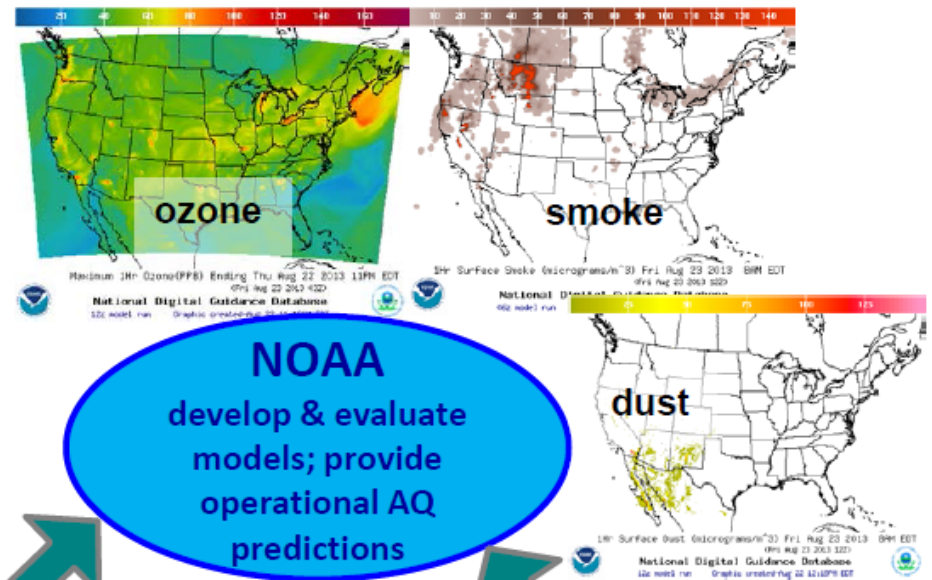
# Air Quality Forecasting in the US

Exposure to fine particulate matter and ozone pollution leads to premature deaths of more than 50,000 annually in the US (Science, 2005; recently updated to 100,000 deaths; Fann, 2011, Risk Analysis)

Air quality forecasting in the US relies on a partnership among NOAA, EPA, state and local agencies

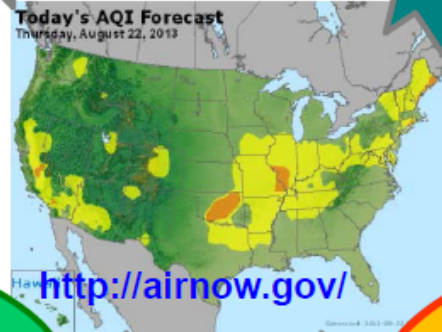
NOAA air quality forecasting team includes NWS, OAR and NESDIS

<http://airquality.weather.gov/>



**NOAA**  
develop & evaluate models; provide operational AQ predictions

Air Quality Index for Ozone		
AQI Value	AQI Category	Cautionary Statements for Citizens
0-50	Good	Air quality is satisfactory, and air pollution poses little or no risk.
51-100	Moderate	Acceptable for most people. However, sensitive groups may experience minor respiratory irritation.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience more serious respiratory symptoms.
151-200	Unhealthy	Everyone may begin to experience respiratory symptoms, and asthma attacks may increase.
201-300	Very Unhealthy	Respiratory symptoms of the general population will likely be aggravated, and conditions will worsen.
301-500	Hazardous	Health warnings of emergency conditions. The entire population is more likely to be affected.



**EPA**  
maintain national emissions, monitoring data; disseminate/interpret AQ forecasts

**State and local agencies**  
provide emissions, monitoring data AQI forecasts



# Ozone predictions

Operational predictions at <http://airquality.weather.gov>  
over expanding domains since 2004



## Model: Linked numerical prediction system

Operationally integrated on NCEP's supercomputer

- NOAA/EPA Community Multiscale Air Quality (CMAQ) model
- NOAA/NCEP North American Mesoscale (NAM) numerical weather prediction

Observational Input:

- NWS compilation weather observations
- EPA emissions inventory

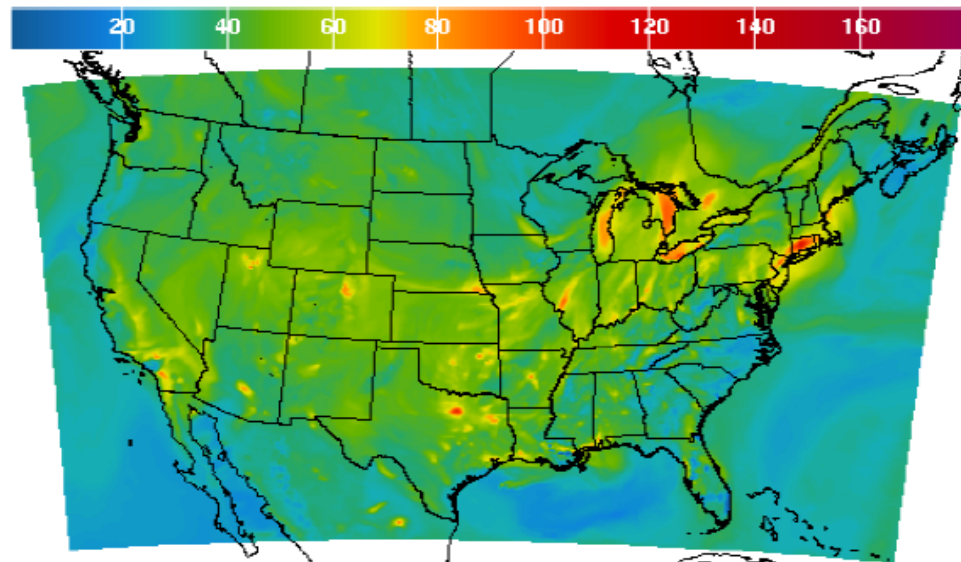
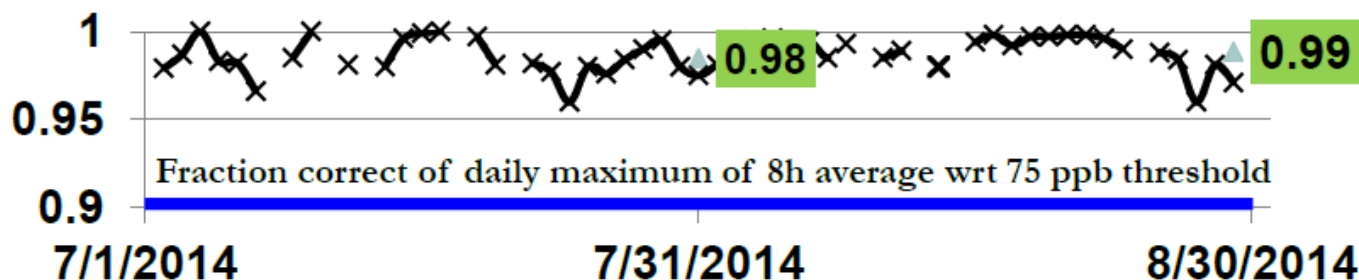
## Gridded forecast guidance products

- On NWS servers: [airquality.weather.gov](http://airquality.weather.gov) and ftp-servers (12km resolution, hourly for 48 hours)
- On EPA servers
- Updated 2x daily

Verification basis, near-real time: Ground-level AIRNow observations of surface ozone

## Customer outreach/feedback

- State & Local AQ forecasters coordinated with EPA
- Public and Private Sector AQ constituents




1Hr Avg Ozone Concentration(PPB) Ending Tue Jul 22 2014 7PM EDT  
(Tue Jul 22 2014 23Z)  
National Digital Guidance Database  
12z model run Graphic created-Jul 22 11:19AM EDT

**Operational**  
CONUS, wrt 75 ppb Threshold

Maintaining prediction accuracy as the warning threshold was lowered and emissions of pollutants are changing

http://airquality.weather.gov

 National Oceanic and Atmospheric Administration's  
**National Weather Service**

Site Map News

Local forecast by "City, St"  
City, St  Go

Sign-up for Email Alerts  
[XML](#) RSS Feeds

Warnings  
Current  
By State/County...  
UV Alerts  
Observations  
Radar  
Satellite  
Snow Cover  
Surface Weather...  
Observed Precip

Forecasts  
Local  
Graphical  
Aviation  
Marine  
Hurricanes  
Severe Weather  
Fire Weather

Text Bulletins  
By State  
By Message Type  
National

Forecast Models  
Numerical Models  
Statistical Models...  
MOS Prod  
GFS-LAMP Prod



Climate  
Past Weather  
Predictions

Weather Safety  
Weather Radio  
Hazard Assmt...  
StormReady /  
TsunamiReady  
Skywarn™

Education/Outreach  
Information Center  
Tsunamis  
Publications...

Contact Us  
FAQ  
Comments...

Submit comments on the draft NWS Strategic Plan

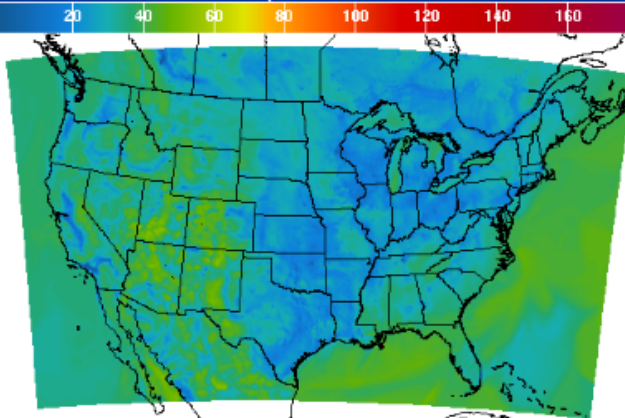
  
 Find us on Facebook  
NWS on Facebook

Home > Air Quality Forecast Guidance



This map shows NOAA's National Weather Service Air Quality Forecast Guidance. Public comments and suggestions are encouraged. A FAQ page is available.

Warnings & Forecasts Graphical Forecasts National Maps Radar Water Air Quality Satellite Climate

Go to State Click on Map To View Additional Guidance



1Hr Avg Ozone Concentration(PPB) Ending Fri Mar 04 2016 9AM EST  
(Fri Mar 04 2016 14Z)

 **National Digital Guidance Database**   
06z model run Graphic created-Mar 04 5:24AM EST

Mouse over or click on the times below to change the above graphic.  
1 Hour Average Ozone Concentration:  
| 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm | 7pm | 8pm |

Additional Air Quality Forecast Guidance

1-Hr Average Ozone	1-Hr Average Ozone	1-Hr Average Ozone
8-Hr Average Ozone	8-Hr Average Ozone	8-Hr Average Ozone
Surface Smoke	Surface Smoke	Surface Smoke
Vertical Smoke Integration	Vertical Smoke Integration	Vertical Smoke Integration



# Air Quality Forecast Guidance - Northeast Metro Area

Print Key Help



Daily View

Loops

Point Data

Page Help

Go to Region

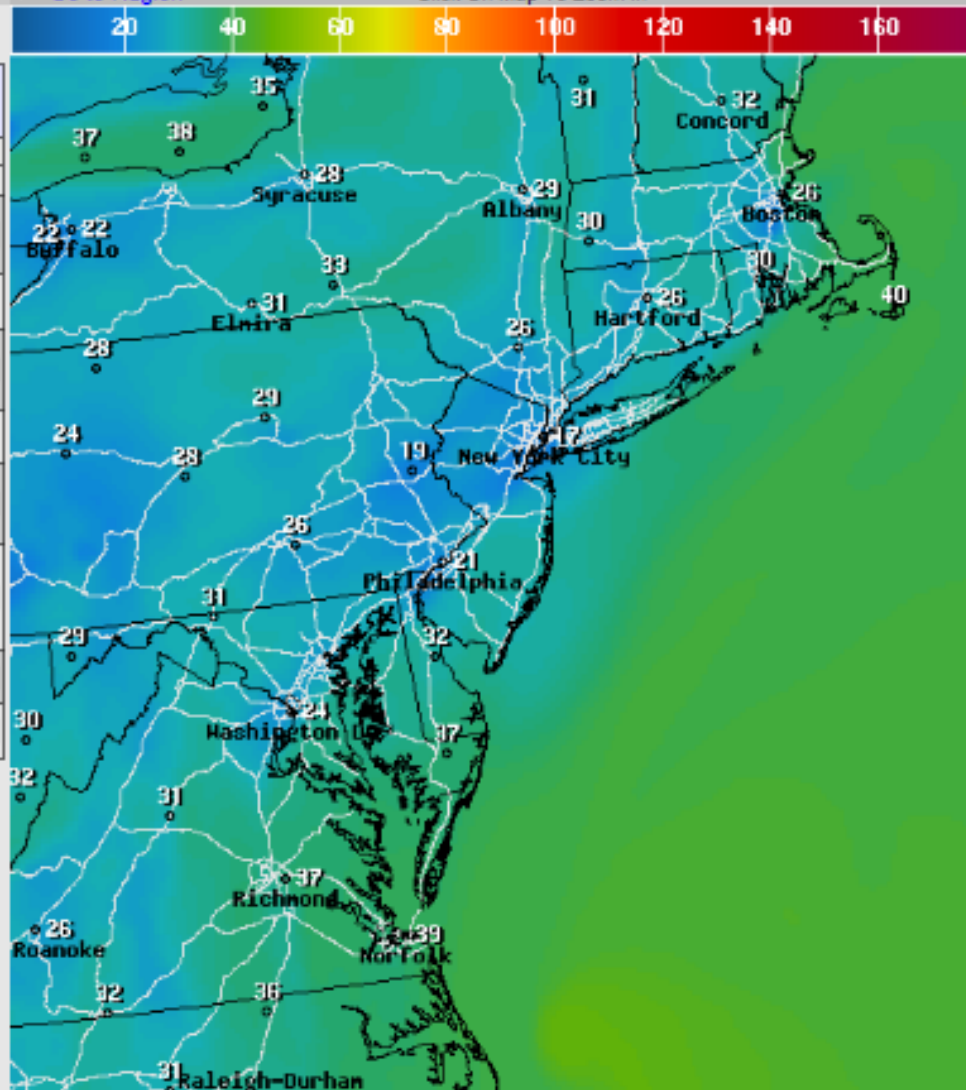
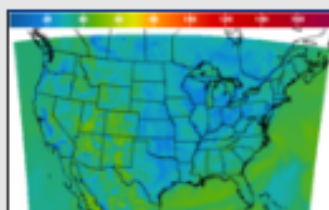
Click On Map To Zoom In

Mouse over or click on the table below to change the guidance image.

Today												±12Hrs >
Valid Hour (EST):	-- AM --					-- PM --						
	7	8	9	10	11	12	1	2	3	4	5	6
1Hr Average Ozone Concentration	-	-	-	-	-	-	-	-	-	-	-	-
Daily 1Hr Ozone Max	[Progress Bar]											
8Hr Average Ozone Concentration	-	-	-	-	-	-	-	-	-	-	-	-
Daily 8Hr Ozone Max	[Progress Bar]											
1Hr Average Surface Smoke	-	-	-	-	-	-	-	-	-	-	-	-
1Hr Average Vertical Smoke Integration	-	-	-	-	-	-	-	-	-	-	-	-
Surface Dust Concentration	-	-	-	-	-	-	-	-	-	-	-	-
Column Dust Concentration	-	-	-	-	-	-	-	-	-	-	-	-

Table MouseOver Effect On

Overview



1Hr Avg Ozone Concentration(PPB) Ending Fri Mar 04 2016 10AM EST  
(Fri Mar 04 2016 15Z)



National Digital Guidance Database

06z model run Graphic created-Mar 04 5:14AM EST



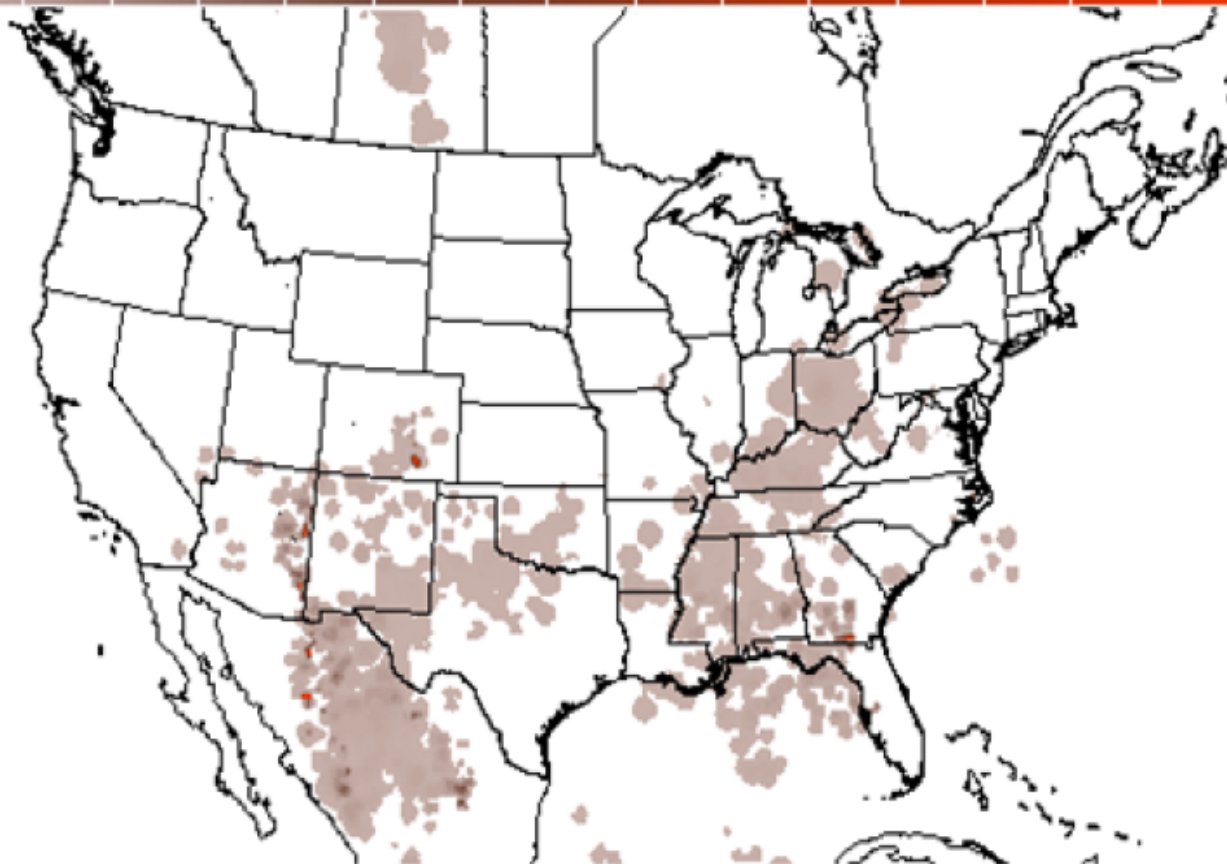


# Smoke Predictions



Operational Predictions at <http://airquality.weather.gov/>

10 20 30 40 50 60 70 80 90 100 110 120 130 140



1Hr Surface Smoke (micrograms/m<sup>3</sup>) Tue May 31 2011 7PM EDT  
(Tue May 31 2011 23Z)

National Digital Guidance Database

06z model run Graphic created-May 31 8:02AM EDT

- Smoke predictions for CONUS (continental US), Alaska and Hawaii
- NESDIS provides wildfire locations
- Emissions estimates from USFS Bluesky system (Testing updated version)
- HYSPLIT model for transport, dispersion and deposition (Rolph et. al., W&F, 2009)
- Recent updates include increased plume rise, decreased wet deposition, changes in daily emissions cycling
- Developed satellite product for verification (Kondragunta et.al. AMS 2008)



**NATIONAL WEATHER SERVICE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER **SAFETY** INFORMATION EDUCATION NEWS SEARCH ABOUT

Local forecast by "City, ST" or ZIP code  
Enter location ... Go  
Location Help

**News Headlines**

- [Latest Snowfall Forecast for Today and Tonight](#)
- [Climate Review of Meteorological Winter 2015 - 2016](#)
- [2016 Spotter Training Schedule](#)
- [CoCoRaHS March Madness - Sign Up Today!](#)

**NWS Weather Forecast Office - Boston / Taunton, MA**  
Weather.gov - Boston, MA

Current Hazards Current Conditions Radar **Forecasts** Rivers and Lakes Climate and Past Weather Local Programs

Click on the map below to zoom in.

Watches, Warnings & Advisories

- Storm Warning
- Gale Warning
- Winter Weather Advisory
- Small Craft Advisory
- Wind Advisory
- Special Weather Statement
- Hazardous Weather Outlook

City, ST  
Enter Your City, ST or ZIP Code  
Remember Me  
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Click on the map below to zoom in.

Last Map Update: Fri, Mar. 4, 2016 at 10:47:07 am EST

Radar  
Current Weather  
Rivers & Lakes  
Satellite  
Weather Information Display  
Forecast Maps

Hour by Hour Forecast  
Beach & Surf  
**Forecaster's Discussion**  
Submit Storm Report  
Text Bulletins  
Winter Weather

Weather Hazard Briefing

[weather.gov/boston](http://weather.gov/boston)

Pull-down menu for Air Quality

Pull-down menu for Forecaster's Discussion – can highlight confidence on heat waves, high humidity, etc. days in advance

Map will highlight any EPA Air Quality Alerts in a gray color (note: could be superseded by short-fused weather warnings)

Another way to access the Forecaster's Discussion





- Air Quality Safety
- Forecast and Alerts**
- Before an Air Quality Alert
- During an Air Quality Alert
- Air Quality Index



- ### Air Quality Resources
- Air Quality Safety
  - AirNow Air Quality Forecast
  - Air Quality Awareness Week
  - Hourly Air Quality Forecast
  - Wildfire Smoke Health Concerns
  - Wildfire Safety
  - Education and Outreach Materials
  - Links, Partners

## Why Air Quality Is Important

The National Oceanic and Atmospheric Administration (NOAA), in partnership with the Environmental Protection Agency (EPA), issues daily air quality forecast guidance as part of a national Air Quality Forecasting Capability. Air quality has improved significantly since the passage of the [Clean Air Act](#) in 1970; however, there are still many areas of the country where the public is exposed to unhealthy levels of air pollutants and sensitive ecosystems are damaged by air pollution. Poor air quality is responsible for an estimated 60,000 premature deaths in the United States each year. Costs from air pollution-related illness are estimated at \$150 billion per year. The goal of the U.S. air quality program is to provide ozone, particulate matter and other pollutant forecasts the public can use to limit the harmful effects of poor air quality. Our goal is to save and improve lives and reduce the number of air quality-related asthma attacks; eye, nose, and throat irritation; heart attacks and other respiratory and cardiovascular problems.

### Risks Related to Ground Level Ozone

Ground-level ozone (O<sub>3</sub>) is a product of nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) in the presence of heat and sunlight. Motor vehicle exhaust, industrial emissions, gasoline vapors, and chemical solvents are among the major sources of NO<sub>x</sub> and VOCs responsible for harmful buildup of ground-level ozone. Even at low concentrations, [ozone](#) can trigger a variety of health problems such as lung irritation and inflammation, asthma attacks, wheezing, coughing, and increased susceptibility to respiratory illnesses.

### Risks Related to Particulate Matter

Particulate matter (PM), or airborne particles, includes dust, dirt, soot, and smoke. Some particles are directly emitted into the air by cars, trucks, buses factories, construction sites and wood burning to name a few examples. Other particles are formed in the air when gases from burning fuels react with sunlight and water vapor. Such gases, from incomplete combustion in motor vehicles, at power plants and in other industrial processes, contribute indirectly to particulate pollution. This pollution can cause chronic bronchitis, asthma attacks, decreased lung function, coughing, painful breathing, cardiac problems and heart attacks, as well as a variety of serious environmental impacts such as acidification of lakes and streams and nutrient depletion in soils and water bodies.



**Local Air Quality Conditions**

Zip Code:  Go State:  Go National

## For Weathercasters

You will need Adobe Reader to view some of the files on this page. See the [AirNow PDF page](#) to learn more.

Ozone and particle pollution are often found at unhealthy levels in many parts of the U.S. Because of the link between weather and air pollution, weathercasters play an important role in raising air quality awareness. By providing Air Quality Index (AQI) current conditions and forecasts during your weathercast, you can help millions of people protect their health.

- Register in [AirNow Tech](#) to customize AirNow data for your own systems. A password-protected user account allows access to multiple GIS functions, forecast and observed AQI maps for ozone and particles (2.5), data queries, and more.
- [AirNow API](#) allows you to download air quality data in real time, including web services, data feeds, and other file products. AirNow Tech users can use their existing login information.

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### AQI Educational Toolkit for Weathercasters

The Air Quality Index Educational Toolkit was designed for weathercasters who make educational presentations to schools and civic groups. It includes:

- Presentations for grades 3-5, grades 6-8, and civic groups (long and short versions)
- Bullet points with key air quality messages
- Short, age-appropriate handouts
- Additional resources, including fact sheets, optional activities, and materials to leave with teachers

To request hard copies of the toolkit [contact us](#).

[Download Entire Toolkit](#) (PDF, 254 pp., 8.74MB)

- [AQI Toolkit-1: Grades 3-5 and Grades 6-8](#) (PDF, 84 pp., 3.2MB)
- [AQI Toolkit-2: Civic Groups and Additional Resources](#) (PDF, 35 pp., 3.7MB)
- [AQI Toolkit 3: Teacher Resources](#) (PDF, 47 pp., 357KB)

#### Handouts

- [Grades 3-5](#) (PDF, 1 p., 666KB)
- [Grades 6-8](#) (PDF, 1 p., 660KB)
- [Civic Groups](#) (PDF, 1 p., 98KB)

#### PowerPoint Presentations

- [Grades 3-5](#) (PPT, 2.1MB)
- [Grades 6-8](#) (PPT, 4.9MB)
- [Civic Groups \(short version\)](#) (PPT, 3.5MB)
- [Civic Groups \(long version\)](#) (PPT, 6.6MB)

[Forecast Earth: Air Aware Video \(About Air Pollution and Health\)](#)  
Format: Windows Media

### Basic AQI Information

- [Air Quality Forecasts and Observations Fact Sheet](#) (PDF, 4 pp., 313KB)
- [Air Quality Mapping](#) (PDF, 2 pp., 319KB)
- [AQI At-A-Glance Messages](#)
- [AQI - A Guide to Air Quality and Your Health](#)
- [Talking Points by AQI Color](#)
- [Sample Scripts for Forecasts](#)
- [Myths and Facts about Air Pollution](#)
- [Current and Real-time AQI by City](#)

### Ozone Media Kit

- [Ozone at a Glance](#) (PDF, 2 pp., 40KB)
- [Ozone Air Pollution and Health](#) (PDF, 4 pp., 78KB)
- [The Air Quality Index - AQI](#) (PDF, 1 p., 23KB)
- [Tip Sheet](#) (PDF, 1 p., 23KB)
- [Sample News Stories](#) (PDF, 5 pp., 98KB)
- [Air Pollution Facts and Figures](#) (PDF, 4 pp., 75KB)
- [Graphics, Photos, and Logos from the Ozone and AQI Media kits](#)